DETERMINANTS OF DIARRHEAL CASES AMONG CHILDREN UNDERFIVE YEARS IN HOUSEHOLDS USING DOMESTIC WATER IN KANGEMI, NAIROBI COUNTY, KENYA

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DECLARATION

Declaration

This thesis is my original work and has not been presented for an award of a diplomaor conferment of degree in any other university or institution.

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Approval

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DEDICATION

This work is dedicated to my dearest husband Mr. Joseph Nderitu Warui who provided care, comfortable environment for preparation of this work, his contribution to my career is remarkable, and I appreciate him, for encouraging me to pursue intellectual fulfillment, for unlimited moral and financial support.

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ABSTRACT

Gastrointestinal illnesses known as diarrheal diseases cause loose, watery stools to flow more than three times each day. Inadequate sanitation and hygiene, tainted drinking water, and other factors contribute to the estimated 4 billion cases of diarrhea that occur annually around the world. The situation is even worse in Kenya, where youngsters in Nairobi's slums are exposed to unhygienic conditions. The main goal of this study was to identify the factors that contribute to diarrheal cases in children under the age of five in Kangemi, Nairobi County. The specific goals of this study were to investigate the economic, demographic, and awareness factors of diarrheal illnesses in children under the age of five in Kangemi homes using domestic water. What factors affected the management of domestic water in Kangemi, Nairobi County, for incidences of diarrhoea in children under five years old? This study employed a cross-sectional descriptive study design that included quantitative and qualitative research techniques. The study's target population included 381 parents of children aged 0 to 59 who resided in Kangemi. 195 respondents made up the sample size determined by Yamane (1967). In the quantitative research, 185 respondents were found using proportionate stratified random selection, whilst 10 respondents were chosen using purposive sampling strategies in the qualitative research. To evaluate the validity and reliability of the data gathering instruments, a pre-test was conducted in the Kawangware informal settlement. Descriptive and inferential statistics were used in the analysis of the data using the SPSS computer program, version 25. In terms of economic determinants, the results showed that 55.3% of respondents strongly agreed that low income was a contributing factor in poor access to medical services, while 70% of respondents strongly agreed that households lacked access to full medical coverage. The study also found that 31.1% of respondents had only a secondary education, while 51.6% of respondents were casual employees. In terms of demographic determinants, the study found that 31.9 percent of respondents strongly agreed that the high population of slums contributes to bad health, while 81.0 percent of respondents strongly agreed that congestion caused inadequate drainage and sanitation facilities. According to awareness determinants, 77.3 percent of respondents strongly believed that residents, particularly mothers, received training in child care, while 34.3 percent strongly agreed that parents received instruction in sanitation to improve their living conditions. In conclusion, the majority of Kangemi households did not have comprehensive medical coverage, and a small number of them had limited access to medical care because of their low income. Due to poor drainage and solid waste management, majority of Kangemi's residential areas were densely populated; creating a slum-like condition that contributed to poor sanitation, hygiene and overall health conditions. Many mothers in the community, according to information, received training in child care but only a small number received instruction in sanitation to enhance their living conditions. The county government of Nairobi City was advised by this study to improve Kangemi inhabitants' access to medical care by lowering medical costs. In order to enhance their living conditions, it was also suggested that the County Government of Nairobi open a drainage system and arrange training for both parents that focused on sanitation in the sub county of Kangemi.

LIST OF ABBREVIATIONS AND ACRONYMS

EU	European Union
GNP	Gross National Product
HWTS	Household Water Treatment and Safe Storage
JOOUST	Jaramogi Oginga Odinga University of Science and Technology
KDHS	Kenya Demographic Health Survey
KNBS	Kenya National Bureau of Statistics
MDG	Millennium Development Goal
MoH	Ministry of Health
NGOs	Non-Governmental Organizations
POU	Point-of-use (water treatment)
TTC	Total Coliform
UN	United Nations
UNICEF	United Nations Children's Fund
WASH	Water, Sanitation and Hygiene
WHO	World Health Organization

CHAPTER ONE
INTRODUCTION

1.1 Introduction

This section presents the background of the study, problem statement and justification of the study in addition to significance of the study. It also presents the objectives of the study. To this end, the broad objective, specific objectives, and specific research questions are presented. Lastly, the scope and limitations of the study are presented.

1.2 Background Information

The fact that diarrheal diseases are the major cause of death in children less than five cannot be disputed. According to the World Health Organization (2017), diarrheal diseases are gastrointestinal infections that result in the passage of loose, watery feces more than three times a day. Over 1.3 million children under the age of five die annually from diarrhoea, making it the second greatest cause of death among children worldwide(Soiza, et al., 2018).

In the first two years of life, the incidence of severe gastroenteritis is highest, making children the most susceptible (Oloruntoba, et al., 2014). More diarrhea-related mortality is concentrated in resource-constrained nations and disadvantaged communities (Dillingham, et al., 2014). Acute infectious diarrhoea is still a serious health hazard in high-income countries. It is also a prevalent reason for hospital hospitalizations and outpatient visits, especially among elderly and pediatric patients. Despite improvements in living standards, sanitation, water treatment, and awareness of food safety, diarrheal disease continues to cause significant economic and societal losses (Reddington, et al., 2014).

Each year, acute gastroenteritis causes 1.5 million hospitalizations, 200,000 hospitalizations, and 300 deaths in children in the United States (Hartman, et al., 2019). Multiple microorganisms are associated with acute infectious diarrhoea, with viruses accounting for more than half of cases. In Europe, rotaviruses and caliciviruses are the most prevalent (Weissl et al, 2012). In underdeveloped nations with poor hygiene and sanitation, intestinal bacteria and parasites are more widespread, with un usual summertime surge (Shingare et al, 2019).

In Shanghai, diarrhea is a leading cause of morbidity and mortality among children. In 58.4 percent of children with acute diarrhoea, enteropathogens were identified. This finding was significantly higher than the national average (44.6 percent) based on pooled data from 92 laboratories in the surveillance network (Yu, et al., 2015). Changet al. (2021) suggest that the variance in the prevalence of enteropathogens may be connected to the laboratory's detection capacity and procedures. Chang discovered that rotavirus and norovirus were the most prevalent causes of diarrhea among Shanghainese children (Chang, et al., 2021).

In Latin America, Herrera-Benavente et al. (2018) discovered that acute diarrheal disorders (ADD) are one of the leading causes of morbidity and mortality, especially among children younger than five. Although ADD control programs have been able todiminish the effect of these illnesses over the past three decades, this decline has not been uniform in Latin America. In Brazil, bacterial diarrheal etiologies continue to be the most prevalent pathogens among young children from low-income semiarid regions, followed by protozoa and viruses (Lima, 2019). However, Flanagan et al (2018) and Herrera-Benavente et al. (2018) do not highlight variables that hinder the ability of households to combat these diseases.

In Ethiopia, 13% of children under the age of five are at risk for diarrhoea (Central Statistical Agency, 2016). According to Melese et al. (2019), factors found to be associated with diarrheal diseases among children under the age of five years were the educational status of the mother/caretakers, the age of the indexed child, the nutritional status of the indexed child, methods of hand washing, methods of refuse disposal, and the floor material of the housing. These results have significant policy implications forchildhood diarrheal illness intervention programs (WHO, 2017; Mokomane et al., 2017) (2018). Even though Melese et al (2019).'s study explains some of the predictorsof diarrheal illnesses in children under five years, it was conducted in another Africancountry that may have distinct characteristics than Kenya.

In Kenya, diarrheal illnesses continue to be one of the most important public health problems, with the mortality rate of children under five years old due to diarrhoea surpassing that of HIV and Malaria combined (Mokomane, 2018). In addition, the Kenya National Bureau of Statistics (2014) reports that every child under the age of five in Kenya suffers an average of three episodes of diarrhea each year. Over fifty percent of hospital visits in Kenya are for

illnesses related to water, sanitation, and hygiene. This is mostly due to inadequate hygiene practices, sanitation infrastructure, and a lack of safe and clean drinking water (Manetu, et al., 2021). However, there are few research that investigate why parents are unable to address these issues.

Massive migration from rural to urban regions, coupled with political and economic instability, has increased the number of individuals living in informal communities like Kangemi. According to 2017 data, 25.6% of youngsters in Nairobi's informal slums had diarrhoea (Guillaume, et al., 2020). This is mostly attributable to poor sanitation in broad, heavily populated, low-income regions. Poor access to suitable excreta disposal and a lack of potable water are prevalent characteristics of slum communities.

Residents of Nairobi's informal settlements lack access to clean water, putting them at risk of contracting waterborne diseases (World Bank, 2020). Sanitation amenities are also lacking in informal settlements; some communities lack bathrooms and sewerage systems, permitting human waste to freely run through open sewers. Existing drainage systems cannot accommodate the rising population and its waste (Haregu, 2017).

1.3 Problems Statement

In Kenya, about 525,000 children under the age of five perish annually from diarrhoea(WHO, 2018). In 2018, there were 1,499,146 instances of diarrhea in children youngerthan five years old. Nairobi was accountable for 136,028 cases (DHIS, 2019). In spite of improvements in living conditions, water, and sanitation, awareness remains a key obstacle in the majority of slum regions. Among slum residents, water-borne diseases such as diarrhoea continue to cause significant economic and societal costs (Reddington, et al., 2014). Lack of proper sanitation and hygiene facilities in the low- income areas such as Kangemi remains a big threat to fight against diarrheal diseases. According to 2017 research, 25.6% of children in Nairobi's slum regions had had diarrhoea (Guillaume, Justus, & Ephantus, 2020). Even though the government and itspartners have made significant efforts to enhance sanitation and hygiene in low-incomesub county of Nairobi, it is obvious that hygiene-related disorders such as diarrhea arestill widespread in the area. This creates a gap that is difficult to fill without thorough investigation. This study aims to determine the determinants of diarrheal cases among children under the age of five residing in Kangemi, Nairobi County, Kenya, where domestic water is used.

1.4. Justification of the Study

Despite the fact that there are numerous health issues related with water, hygiene, and sanitation in informal settlements, diarrhoea remains one of the most debilitating disorders affecting children under the age of five worldwide. The number of slum- dwelling children admitted to hospitals due to diarrhea and related diseases remains very high. Compared to other diseases, the number of diarrheal -related deaths among both children and adults remains extremely high. According to the Global Burden of Disease Control and Prevention (GBDDC), 1.3 million deaths a year are attributed to diarrheal illnesses in 2017. To date, however, few research has been conducted to assess the determinants that contribute to childhood diarrhoea in Kenya, particularly in Kangemi, Nairobi County. Hence the need for this study, which aimed to investigate the predictors of diarrhea cases among children under the age of five residing in homeswith domestic water.

1.5 Significance of the Study

The findings of the study are anticipated to contribute to the corpus of knowledge on the determinants of diarrheal cases in the general community, not just children. The results are anticipated to be utilized by the government and public health policymakers.The data are also expected to assist households in understanding how to effectively manage their environment to reduce the prevalence of water-borne communicable diseases. The results may inspire other academics and thinkers to conduct related follow-up investigations.

1.6 Objectives of the Study

This study was provided with one broad objective and three specific objectives that thisstudy investigated and established the determinants of diarrheal cases among children under five years in households using domestic water in Kangemi, Nairobi County, Kenya.

1.6.1 Broad Objective

The broad objective of the study was; to establish determinants of diarrheal cases among children under five years in households using domestic water in Kangemi, Nairobi County, Kenya.

1.6.2 Specific Objectives

i. To identify economic determinants of diarrheal cases among children underfive years in households using domestic water in Kangemi, Nairobi County, Kenya
ii. To establish demographic determinants of diarrheal cases among children under five years in households using domestic water in Kangemi, Nairobi County, Kenya
iii. To establish awareness determinants of diarrheal cases among children under five years in households using domestic water in Kangemi, Nairobi County, Kenya

1.6.3 Broad Research Question

What are the determinants of diarrheal cases among children under five years in households using domestic water in Kangemi, Nairobi County, Kenya?

1.6.4 Specific Research Questions

i. What were the economic determinants of diarrheal cases among children underfive years in households using domestic water in Kangemi?
ii. What were the demographic determinants of diarrheal cases among childrenunder five years in households using domestic water in Kangemi?
iii. What were the awareness determinants of diarrheal cases among childrenunder five years in households using domestic water in Kangemi?

1.7 Scope and Limitations of the Study

Time was one of the limits of the investigation. The research was conducted over a period of six months since the researcher needed more time to recruit as many willing participants as possible. The focus of the study was Kangemi parents with children younger than 5 years' old who sought care at health facilities for diarrhoea. Most parents were cautious to submit information out of concern that it could be used to intimidate or portray them in a negative light. This was addressed by the researcher's introduction letter from the institution, which assured the participants that their information would be kept confidential and used only for academic purposes. In addition, the study's conclusions were limited by the Parents' willingness to provide accurate, objective, and reliable data. The researcher therefore evaluated the data for consistency and confirmed its accuracy.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This chapter contains literature gathered in relation to the study that established determinants of diarrheal cases among children under five years in households using domestic water. This was in three broad aspects: empirical literature summarized findings from other researchers on the study focus area, theoretical framework comprised of the theory on which the study is anchored, and conceptual framework provided the conceptual relationship between the independent variables and the dependent variable of the study. The main sources of literature review included books, journals and research reports from the internet which have served as means of underscoring the importance of the study. The reviewed literature also highlighted existing gaps on the various study focus areas.

2.2 Economic Determinants of diarrheal Cases

The activities that members of a household engage in to earn a living affect their economic standing. At the individual, home, and societal levels, economic factors are essential survival predictors for children. The household income has a significant influence on the living standards of its members. It regulates numerous aspects of family life, including as housing, education, and healthcare. Additionally, household access to water and water-sourcing behavior are significantly influenced by income (Gebremichael et al., 2021).

2.2.1 Income Level of the Residents as a determinant of diarrheal cases

The World Health Organization (WHO) enlists income level as a key health determinant. As defined by Grimes et al (2017), income level is the amount of money residents have access to and rights to determines the condition of their housing as wellas their availability to sufficient clean water and hygienic feces disposal. Children living in low-income communities face a variety of interconnected problems, includinghunger, lack of access to clean water, sanitation, and hygiene, illnesses, and deficiencies in growth and development (Grimes et al., 2017).

The financial status of a home determines the availability of water and sanitation infrastructure and services. This is because low-income individuals cannot afford the

high costs of piped water hookups, resulting in limited access (Njuguna, 2019).Nevertheless, safe drinking water, sanitation, and hygiene (WASH) are essential to improving the living conditions of people (Mock et al., 2017).

2.2.2 Source of Income as a determinant of diarrheal cases

Source of income as defined by Kithinji (2015) is the day to day projects or activities that a household rely on to create financial resources, such as employment, business, or donations. The likelihood of having access to and using potable water and sanitation facilities is significantly influenced by a family's financial level (Kithinji, 2015). According to Gomez et al. (2019), the economic position of households is closely related to the affordability of services such as water. Thus, families with an uncertain source of income are more prone to utilize water from unimproved sources.

2.2.3 Access to Water Supply as a determinant of diarrheal cases

In slums, a rising number of desperate people are illegally connecting water pipes, a survival mechanism that may endanger the water supply through cross-contamination (WHO, 2016). When a family's wealth increases, they are substantially more likely to choose water with a higher quality (Ricciardi, 2019). The majority of disadvantaged households have access to water of worse quality compared to wealthier homes (Angoua, et al., 2018). While the majority of slum-dwelling urban poor are disproportionately unserved, fewer impoverished families have more reliable water network connections (World Bank, 2020).

Without direct access to public utilities, poor families must pay exorbitant water fees and rely on water merchants who provide low-cost, low-quality water. Moreover, subsidized water benefits are frequently reserved for affluent households connected to the public network. Since their water supplies are unreliable or undrinkable, poorer families are not eligible for these subsidies and must acquire water from unsubsidizedsources (Narzetti & Rui, 2020).

The type of water supply available to a family was significantly influenced by the occupation of the household's head. The family's dependence on unmodified water sources is mostly a result of family expenses; consequently, authorities must pay special attention to poor families while implementing access to safe and reliable water(Onyango et al., 2020).

2.2.4 Access to Health Facilities as a determinant of diarrheal cases

Access to inadequate health care has a huge impact on the health of individuals. Without health insurance, individuals are less likely to engage in preventive care and receive delayed medical treatment. Unmet health needs, failure to receive adequate care, inability to acquire preventive services, and avoidable hospitalizations are all potential effects of access to health services problems (Swain, 2017). It is essential to have access to safe water and high-quality health care services in order to develop, sustain, and control diseases such as diarrhea (UNICEF, 2018).

2.3 Demographic Determinants of diarrheal diarrheal Cases

Demographic factors play a critical role in determining occurrence of diarrheal cases. These are factors associated with family size and structure, population density, age, gender and other population dynamics over space and time and how they affect access to and quality of social services such as health of children (Nshimyiryo *et al.,* 2019).

2.3.1 Status of the Residence as a determinant of diarrheal cases

Majority of urban and rural areas have similar challenges, such as a greater risk of infant morbidity, mortality and insufficient health insurance (Baciu *et al.,* 2017). Changes in health status can reflect socio-economic and demographic variations across urbanization levels if there is diversity in these area characteristics. Dietary preferencesand geographical differences between rural places may also play a role. Therefore, a better understanding of cultural elements thus aids in the reduction of health disparities.

2.3.2 Age as a determinant of diarrheal cases

Age plays a critical role in health. As defined by Pantaleo and Temba (2019), age is thenumber of years, months or days that one has from the date of birth. Children tend to be vulnerable to diarrhea due to poor immune system and lack of awareness and personal consciousness to ensure their hygiene. Within the slum setting, poverty limits the ability to provide age-appropriate, nutritionally balanced diets or to alter diets when diarrhea occurs to reduce and repair nutrient losses.

The characteristics of the population to water management included low status in the socioeconomic, low education level, ethnic status of the minority and rural areas residence (Rheingans *et al.,* 2014).

2.3.3 Gender as a determinant of diarrheal cases

In a family, who is accountable for determining the source of water depends on whether they are male or female (Borja-Vega & Grabinsky, 2020). According to Geere and Cortobius (2017), three factors might influence the link with water: gender-based work divisions, resource ownership and access, and policy and local norm discourse, which may place economic water uses as well as distinct gender domains for domestic uses. For example, the burden of collecting water from traditional sources falls on women and girls in terms of livelihood options, but investment decisions for improving familywater sources fall mostly on the shoulders of men (Geere, & Cortobius, 2017).

In Africa, women and girls are hit harder by lack of access to water and lack of water than men and boys. The situation gets worse in rural areas because of institutional and cultural barriers, like differences in rights, decision-making power, tasks, and responsibilities related to water for productive and domestic activities (WWDR, 2020). Women are responsible for making sure their families have enough water to live on. Because of their roles as domestic water providers and household managers, they suffer when there is not enough water (Pouramin, 2020).

One thing that can be used to predict which water source a family will use is the genderof the person who runs the home. Households run by women are more likely than thoserun by men to get most of their water from a private or community tap (UNICEF, 2017). Since women get water the most often, they know more about its quality than other people in the house who get water much less often. In Uganda, a survey was done to find out how socioeconomic factors and water source characteristics affect how people get water and how that affects the environment. The answers to the question of who is the main water collector in the house were all the same (UNICEF & WHO, 2021).

Deal and Sabatini (2020) found that the number of women in a family had a big effect on where they got water to drink. Myers (2017) says that the more time women spendlooking for and collecting water, the less time they have for other things like cooking, taking care of children, and making money. How easy it is for rural households to get clean water depends on the gender of the person who runs the household. The

implication is that men have much less access to portable water for their homes. Theirpoint is that women are more likely to collect water at home (Myers, 2017).

Women and children are in charge of getting water, and as decision makers, they could be persuaded to put money into making it easier for women to get clean water. Also, because they are trying to get water for their families, women miss a lot of work time. Women have the power to decide how their families use water and who gets to use it (Geere & Cortobius, 2017).

2.4 Awareness of Determinants of diarrheal Cases

People all over the world have talked about how important education is and how it hasmany benefits that cannot be ignored. The level of education of family members, especially the head of the household, is a good indicator of how a home gets its water (Gebremichael, et al., 2021). Lack of or poor education is a big reason why communities do not have enough power over how water is managed.

2.4.1 Awareness of diarrheal cases

The level of awareness affects how people in a community think about clean water and the steps that need to be taken to make sure everyone has access to clean water. So, households with highly educated members get their water from safer sources than those with only a primary education or none at all, who do not care as much about how safethe water source is (Onundi, et al., 2014). This means that families with members who do not have a lot of education will have trouble getting water, whether it comes from improved or unchanged sources, because the people in the family will not be serious about how they get water. Because of the bad sanitation, there would be more health problems.

Lack of water also makes it hard for women and children, especially girls, to get a good education (Pouramin, et al., 2020). This is because they are responsible for collecting water, and the time they spend doing this often keeps them from going to school. Younggirls who do not have access to clean water and toilets miss out on the chance to get an education and become more independent. In many countries, girls are less likely to go to school than boys because it takes more time for girls to get and carry water. For example, on top of their other chores, many children in rural Tanzania spend a lot of time getting water and firewood (Levison, et al., 2018).

2.4.2 Knowledge on diarrhea as a determinant of diarrheal cases

In terms of health, the level of education of parents is important because it affects the health of their children and the health of their children's children. The level of education of a parent affects a child's health, chance of survival, and ability to do well in school (Raghupathi & Raghupathi, 2020). Walker (2017) says that a person's lack of power can make them less likely to demand good facilities from the government if they do not have much education. The level of education of the head of the family had a big impact on what kind of water source the family used. The level of education a mother has affects how well she understands her child's health, which is a key predictor of the child's health (Vikram & Vanneman, 2020). It helps the mother understand what causes illness and how to avoid it.

There are three ways in which a mother's education affects her child's health (Andriano & Monden, 2019). First and foremost, it has impact on a child's health since it improves the mother's understanding on health issues (Weitzman, 2017). (Weitzman, 2017). Second, it can make people more aware of how to prevent and control illness. Third, it could change a child's health and nutrition. Lastly, maternal education may help reduce poverty, social exclusion, and financial problems, so families can live better. Since this makes it easier for them to pay for social services and makes their social connections stronger (Myamba, 2020).

2.4.3 Preventive measures of diarrheal cases

The precautions include treating the water at home and washing your hands well after using the toilet and before eating. Moms are told to breastfeed their babies exclusively and continuously for the first six months. After that, they can add water, fruit juices, and other foods to their diets. This gives them the immunity they need, which helps keep them from getting diarrhea (WHO, 2017).

General practitioners' care for preventing diarrhea showed that a complete blood count test, a stool test, a measurement of electrolytes, and a test of kidney function can help show how bad diarrhoea is. Screening has been helpful, has been driven by patients, and has been helpful when it has happened. For the best treatment of acute infectious diarrheal disorders, it is important to use a screening method to tell the difference between invasive and non-invasive diarrhea (WHO, 2017).

2.4.4 Knowledge on Water Treatment and diarrheal cases

This is the knowledge of how to make water better so that it can be used for a certain purpose. To get rid of contaminants, people use physical processes like settling and filtration, chemical processes like disinfection and coagulation, and biological processes like slow sand filtration.

It is important to know how to treat water if you want to control the water in your home and lower the number of kids under five who get sick from diarrhea. This controls how water is used, since untreated water in these systems can cause a lot of problems, like more safety and health risks, less efficiency, and higher costs. Some of these are the growth of harmful bacteria and biofilms, the buildup of scale (hardness salts), metal corrosion, biofouling, and the buildup of particles in the air. If the problems listed above are to be solved, this water supply needs to be taken care of properly (World Bank, 2020).

2.5 Theoretical Framework

According to Kerlinger and Rinehart (1986), a theory is a set of interconnected constructs (concepts), definitions, and propositions that provide a systematic perspective of phenomena by constructing correlations between variables in order to explain and predict events. This research was based on social cognitive theory and ecological systems theory. Because these two hypotheses are more relevant to this topic, they are the focus of this investigation.

2.5.1 The Social Cognitive Theory

The research was based on Albert Bandura's Social Cognitive Theory, which says that external conditions rather than internal factors motivate people (Bandura, 1986). This paradigm explains human functioning as a three-way interplay between behavioral, personal, and environmental factors. This concept is widely known as reciprocal determinism. To increase self-efficacy, it is essential to equip people with the resourcesand support they need to increase their confidence. Others have stated that self-efficacy for behavior modification should be developed gradually over time. According to Bandura, even if individuals have a strong sense of efficacy, they may not engage in the behavior if they lack motivation (1986). Changing one's environment might result in behavioral modification. This includes facilitating behavioral change and offering social support. It is essential for determining how environmental obstacles impede behavioral change. Positive attitudes and good hygiene are

enhanced by acquiring knowledge. In order to effectively identify the determinants of diarrheal cases among children living in low-income areas, the Social Cognitive Theory will be essential in understanding the community's behavioral needs and how they play in management ofdiarrheal cases. The theory will also be helpful in precisely understanding the level of influence of the population's history and social structures towards positive behavior change towards reduction of diarrheal cases among children and the population at large.

2.5.2 Ecological Systems Theory

Urie Bronfenbrenner (1917-2005) proposed the Ecological Systems Theory to explain how a child's growth and development are affected by the environment (Bronfenbrenner, 2005). He stressed the microsystem, mesosystem, exosystem, and macrosystem as environmental qualities or layers that influence the development of children. The microsystem refers to the child's small and immediate environment, which includes any immediate associations or individuals with whom the child interacts, such as immediate family members or caretakers, as well as the child's school or day care. The contact between these groups or organizations and the child influences the child's growth. Additionally, a child's response to the adults in the microsystem influences their therapy. The manner in which a child is treated is influenced by his orher distinct genetic and personality traits, which are influenced biologically andreferred to as temperament (Rettew & McKee, 2005).

According to Bronfenbrenner, the mesosystem describes how the various components of a child's microsystem work together for the child's advantage. For instance, if a child's parents actively participate in their child's education by attending parent-teacher conferences and soccer games, this will contribute to the child's overall development. If, however, the child's two sets of caregivers, mom and stepdad, and dad and stepmom, disagree on how to best nurture the child and give him contradicting lessons when they see him, the child's development will be hindered in numerous ways (Freeman & Sugai, 2013). Other people and places that the child may not interact with frequently yet have a substantial impact on him or her, such as the child's parents' workplaces, extended family members, and the neighborhood. For instance, if a child's parent is laid off, the

youngster may suffer because the parents cannot pay rent or buy groceries; yet, if the parent gets promoted, the child may profit because he or she can provide for the physical necessities of the family (Fuller, et al., 2014).

According to Bronfenbrenner (2005), the macrosystem is the largest and most remote set of people and things for a child, yet it nevertheless exerts a considerable influence on the child. The microsystem encompasses the relative freedoms of the national government, cultural values, the economy, and conflicts (Nzioki, et al., 2009). These factors may have positive or negative effects on a child. This study focused on this model because it is concerned with the economic factors of diarrhea cases among children under the age of five residing in households that utilize domestic water in Kangemi, Nairobi County, Kenya.

In this study, the ecological systems theory was used to emphasize the context of environmental factors and how they played role in influencing the behavior, psychosocial and social facets of behavior change in response to diarrhea. The model was adopted in this study owing to its comprehensive ability to explain the multiple interacting health determinants while guiding development of relevant awarenesscreation interventions.

2.6 Conceptual Framework

A conceptual framework, according to Mugenda and Mugenda (2003), is a postulated model that identifies the concepts under research and their relationships. It depicts the researcher's conceptualization of the relationship between the independent and dependent variables in diagrammatic form. The independent variables are on the left side of the diagram, while the dependent variables are on the right. The following is a summary of the conceptual framework:

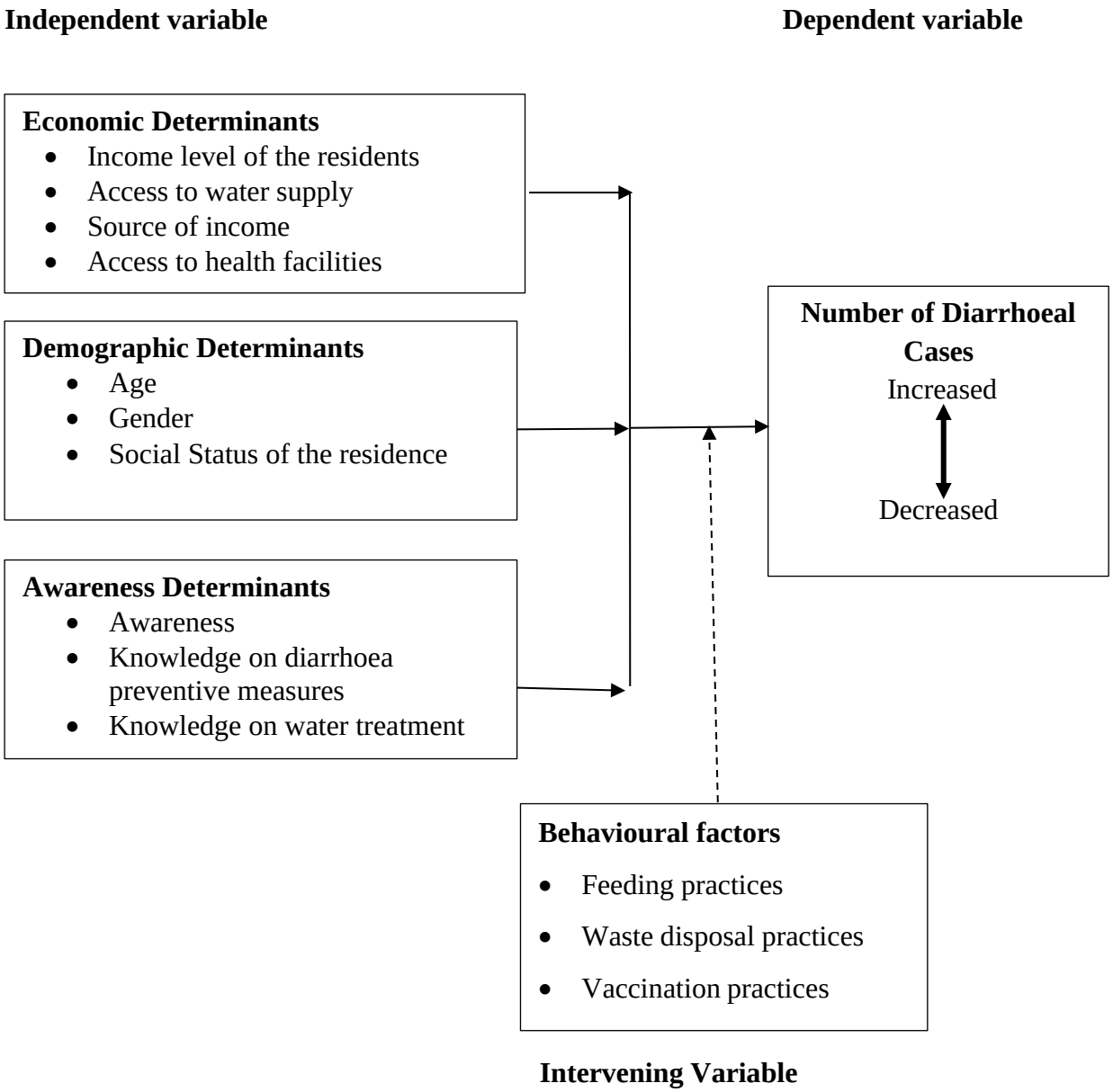


Figure 2.1 Conceptual Framework

Source: Author 2021

2.6.1 Descriptions of Conceptual Framework

The conceptual framework showed how the three research independent variables— economic determinants which were evaluated based on residents' income levels, accessto water supplies, sources of income, and access to healthcare facilities could be grouped together. Knowledge about diarrhea, awareness of preventive methods, knowledge of water treatment was used to measure awareness determinants and demographic determinants were evaluated based on age, gender and residency status. The number of diarrheal cases among children under the age

of five in Kangemi, whichrose or decreased based on the implementation efforts, served as the dependent variablefor this study.

The behavior of the inhabitants in terms of feeding practices and patterns among children under five, trash disposal practices, and resident immunization rates affected the link between the dependent and independent variables. According to the study, when independent variables are present, behavioral factors may have an impact on thefrequency of diarrheal cases. Due to the fact that residents do not adhere to the behavioral requirements in the management of the cases, diarrheal cases may still be increasing despite the presence of effective economic, demographic, and awareness variables.

CHAPTER THREE
METHODOLOGY

3.1 Introduction

Chapter three comprised of the following subsections; research design, target population, sample size and sampling procedures, research instruments, data collection procedures, data analysis techniques and ethical considerations.

3.2 Study Area

The study was conducted in Kangemi area, Nairobi County, Kenya. Kangemi is a low-class neighborhood in Kenya located, on the outskirts of the city. Kangemi is part of the West lands Sub-County which had a population of 308,854 during the 2019 National census. The number of households in the Sub-County are 4,980, with an average of 2.9 per household. With an area of 3,167 Square Kilometers, the sub-county is the second smallest in Nairobi County (KNBS, 2010). This means that there is high population density in the sub-county with the situation being worse in the Kangemi slums which is bordered on the north by the middle-class neighborhoods of Loresho and Kibagare and Westlands on its west. Its southern border connects with Kawangware, another large slum and its eastern border connects to Mountain View, a middle-class community. It is on the road connecting Nairobi with Naivasha (Nairobi County Government, 2021).

3.3 Research Design

The study used a cross-sectional descriptive study approach. This research design wasdeemed appropriate due to the manner in which data was gathered from Parents in Kangemi, Nairobi County, who had small children under the age of five. According toMugenda and Mugenda (2012), the study design is effective in characterizing factors and practices of the specified population at a particular time of the study; hence reducing biases. There were quantitative and qualitative approaches applied. Quantitative approaches were used to collect data from the parents while qualitative methods were used to collect data from the nurses as explained in the subsequent sections.

3.4. Population

According to Bicher et al (2015), total population is defined as the total number of specific species of organism (also referred to as subjects) at a specific area at a specific time. In this study, the target population was all the resident of the Kangemi informal setting. The total population of this study was 88,709 inhabitants of Kangemi informal settlement of Nairobi County (KNBS, 2020).

Table 3.1 Population Distribution

Wards/area	Population	Percent
Mountain View ward	29712	33.5
Ngong View	27708	31.2
Lower Kabete	31289	35.3
Total	**88709**	**100**

3.4.1. Study Population

The study population consisted of a total of 381 subjects; 361 parents who have children aged between 0 to 59 months old and who were visiting the three public health facilities in Kangemi area and; 20 nurses from all the public health facilities within Kangemi area as shown in table 3.2.

Table 3.2 Target Population

Parents/Nurses	Population	Percent
Parents from Mountain View	103	26.9
Parents from Ngong View	120	31.6
Parents from Lower Kabete	138	36.3
Nurses from All public health facilities	20	5.2
Total	**381**	**100.0**

3.4. 2. Sample Size Determination and Sampling Procedures

The sample size was calculated using the already established formula to determine sample size in similar studies. The sampling procedure used was based on the applicable sampling methods for accessing the parents for this study.

3.4.3 Sample Size Determination

The sample size was calculated using Yamane (1967) formulae. The Yamane formula was formulated by Tara Yamane in 1967 to determine the sample size from a given population. It is applicable when calculating a sample size when the population size is known. The formula is as shown below

$$\boldsymbol{n = \frac{N}{1 + N(e^2)}}$$

The formula was operationalized as follows;Where;

N = is the target population,

e = is the precision rate (error to make at 0.05) andn = is the sample size.

The sample size was obtained as follows:N=381,

e=0.05,

$$\boldsymbol{n = \frac{381}{1 + 381\ (0.05^2)} = 195.1344}$$

n = 195

This sample size was distributed proportionally as shown in table 3.3.

Table 3.3. Distribution of the sample size

Parents/Nurses	**Population**	**Percent**	**Sample**
Parents from Mountain View	103	27%	52
Parents from Ngong View	120	32%	62
Parents from Lower Kabete	138	36%	71
Nurses from All public healthfacilities	20	5%	10
Total	**381**	**100%**	**195**

The sample size constituted of 185 parents (mothers and fathers) out of the 361 with 0to 59 months old children and 10 nurses from the 20 nurses from the public health facilities that treated children with diarrheal diseases were also purposely sampled andinterviewed.

3.4.5 Inclusion Criteria

All the children under five years living in a household had equal chances and were included in the sample frame. This was also including households having twins and only parents who had children under five years of were the ones who were interviewed.

3.4.6 Exclusion Criteria

The mothers or guardian with children aged 0-59 months who were unwilling to participate in the study were excluded. In addition, parents of children above 59 monthswho were willing to participate in the study were also excluded.

3.5. Data Collection Instruments

The data collection method included conducting household survey, key informant interviews. The Primary quantitative data was gathered through structured and semi- structured questionnaires administered to parents. The questionnaires contained questions based on the study objectives. Parents were issued with the questionnaires and asked to fill them and hand them back before they left the health facilities as the enumerator waited. The aim for the self-administered questionnaires was mainly to limit biases. Where the parents were illiterate, the enumerator precisely sought translation services from the local community health assistants and where necessary, assisted in filing the questionnaire appropriately. Face to face interviews were conducted for nurses in Pre and Post-natal clinics. This was done by booking appointments with the interviewees and interviewing using the interview guide to interview them for a maximum of 15 minutes.

3.5.1 Pre-Testing

The purpose of pre-testing the data instrument was to ensure that the items in the instrument were designed and constructed clearly and have the same meaning to all respondents. This pre-test involved checking whether the questions were clear and evoking any positive or negative response. Pre-testing was conducted and 20 questionnaires were administered to the Parents in Kawangware Constituency who were chosen at random representing 10% of

the sample size. The Constituency which share the same environmental conditions and living characteristics and is also neighboring Kangemi Constituency which was the actual study area. The data that were collected were analyzed and hence informed the adjustment of data collection tools since some few gaps were identified at this process of pre-testing.

3.6. Reliability

The study deployed the Cronbach Alpha coefficient to test its reliability.The formula for Cronbach's alpha coefficient is;

$$\alpha = \frac{nn-1(\sigma X2 - \sum i = 1n\sigma i2)}{\sigma X2}$$

Where;

- **n** is the number of items,
- **σX2** is the total test score variance, and;
- **σi2** is the item variance.

From the above formula, it was noted that the overall Cronbach Alpha reliability coefficient was 0.852 which was considered appropriate as it exceeded the recommended value of 0.7 and above according to (Malhotra, & Birks, 2006). A Cronbach alpha reliability for each objective was also computed and the resultspresented in Table 3.4. This, therefore, depicts that the research instrument was reliableand therefore required no amendments.

Table 3.4 Reliability Analysis

Variable Descriptions	Cronbach's Alpha
Overall reliability	0.852
Economic determinants	0.708
Demographic determinants	0.843
Awareness determinants	0.773

3.7. Validity

Content validity was used to examine the level to which the questionnaires and interviews would measure the study variables. The expert opinion of university supervisors was sought to assess the research tools establish face validity. Furthermore, the research instruments were formulated based on the literature reviewed and the gapsidentified. This could thus enhance content and construct validity.

3.8. Data Collection Procedures

The study employed stratified multi-staged sampling method to sample and identify 185 parents who had children between 0 to 59 months old children registered in public health facilities for treatment with diarrhea. First, the study area (Kangemi) was conveniently sampled owing to its outstanding slum features and ease of access for the study. Thereafter, the facilities were purposely sampled on the basis of being public health facilities that were affordable to the parents. The parents were then stratified according to the facility they visit. Within the strata (strata 1, 2 &3), a representative sample was randomly drawn with replacement. Proportionate sampling technique was used to ensure that all the public health facilities in the three wards in Kangemi Constituency were effectively included in the study sample. The 10 nurses were selected using purposive sampling from the health units in the study area for Key Informant Interviews (KII).

3.9. Data Analysis

After data collection, the questionnaires were checked, cleaned and organized. This was followed by coding and transcription of the questionnaires and quantitative data entry into the Statistical Package for Social Science (SPSS) statistical software, version
25. The transcribed quantitative data was then analyzed descriptively and inferentially. Whereas descriptive statistics included frequencies, percentages and weighted means (WM), inferential statistics included Pearson correlation and multivariate linear regression at a confidence level of 95%. The findings were presented in Tables and Figures. The following multivariate regression model was employed in the study.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \varepsilon$$

Y= Management of domestic water at household level and diarrheal morbidity

β_0=Constant

β_1, β_2 and β_3=Regression coefficients

$\mathbf{X_1}$=Economic determinants

$\mathbf{X_2}$=Demographic determinants

$\mathbf{X_3}$=Awareness determinants

$\boldsymbol{\varepsilon}$ = error term

On the other hand, qualitative data from interviews with nurses was subjected to content analysis with the findings obtained being presented in narrative form.

3.10. Ethical Issues

The study made an effort to maintain ethical standards. Voluntary participation was ensured. In this regard, the study participants were made aware of the purpose of the study before it started. There was a departmental board/school board presentation of proposal and pre-thesis defense followed by handing over of the proposal to the board of post graduate for ethical processing, JOOUST Ethics committee and Baraton for ethical approval and research license from National Commission for Science, Technology & Innovation. During data collection, a consent form was presented to the participants for consenting ahead of the data collection process. No identifying information was also required from the participants. The respondents were also assuredthat the findings would be used for academic purposes only. Furthermore, all materialsused in the study were adequately cited to attribute authorship.

CHAPTER FOUR
RESULTS

4.1 Introduction

This chapter four presents the findings of the analysis of the data presented according to the characteristics of the respondents and their opinions on the determinants of diarrheal cases among children under five years of age in Kangemi, Nairobi County.

4.2 Response Rate

The respondents of this study were; mothers and fathers who had children below five years of age who were living in Kangemi as established in Table 4.1.

Table 4.1 Response Rate

	Response	**Response Rate**
Response	151	77.43%
Non-response	44	22.56%
Total	**195**	**100**

Table 4.1 revealed that 77.43% (151/195) of the respondents returned questionnaires they when were dully filled. While 22.56 (44/195) did not respond to the research during data collection. While in qualitative data all the ten nurses responded reports were analyzed thematically to reinforce the quantitative findings. The response rate was accepted as being appropriate for analysis as it agreed with the recommendation of Mugenda and Mugenda (2012) that in a descriptive social study, a response of rate of 70% and above is considered appropriate for analysis.

4.3 Demographic Information

This section required the respondents to indicate their general information including age bracket and highest education level. This information was used to ascertain the eligibility of the respondents to participate in data collection of the study. The demographic information is as summarized in table 4.2 below.

Table 4.2 Summary of Demographics

Demographic Variable	Categories	Frequency (N)	Percentage (%)
Gender	Female	104	68.2
	Male	47	31.8
	Total	**151**	**100**
Age	21-30 years	38	25.2
	31-40 years	64	42.4
	41-50 years	28	18.5
	Above 50 years	21	13.9
	Total	**151**	**100**
Highest Level of Education	University	38	25.2
	College	43	28.5
	Secondary	47	31.1
	Primary	23	15.2
	Total	**151**	**100**
Source of Income	Employed	24	15.9
	Casual Worker	78	51.6
	Small Business	49	32.5
	Total	**151**	**100**
Duration of Work of Respondents	1-5 Years	37	24.5
	6-10 Years	69	45.7
	11-15 Years	17	11.3
	Above 16 Years	28	18.5
	Total	**151**	**100**

4.3.1 Gender of the Respondents

The respondents were asked to indicate their gender since the gender determines who holds the responsibility of managing and sourcing water in the household. The findingswere shown in table 4.2. The study established that 68.2% (104) of the respondents were females while 31.8% (47) of them were males. This implies that most of the respondents who participated in

the study were female. This represent a true position at the health centers where majority of the care givers to the children below five yearsare women.

4.3.2 Age Bracket of the Respondent

The respondents were further asked to indicate the age bracket to which they belong since the age of the respondents indicated the exposure, they had in regard to treatment of water at house hold level. The results in table 4.2 show that (21.9%) 33 of the respondents were female while 3.3% (5) of them were male below 30 years of age, 27.8% (42) of the respondents were the female while 14.6% (22) were male between 31 and 40 years of age. In addition, the findings showed that 7.9 % (12) were female while 10.6 % (16) were male aged between 41 and 50 years. Furthermore, the results revealed that 8.6 % (13) were female while 5.3% (8) were male above 50 years. This shows that majority of the parents were mature enough which made them to be cooperative in giving reliable information concerning the subject under study.

4.3.3 Highest level of Education

The parents were asked to indicate their highest level of education since education levels have influence in water treatment at house hold level. Majority of the parents had secondary school certificates as shown by 31.1% (47), followed by those who had college level education as shown by 28.5% (43) and those who had university level education as shown by 25.2% (38). The rest had primary level education at 15.2% (23). From these most of the females had secondary school certificates at 10.6% (16) followed by those who had college level education at 19.2% (29). The rest of the females had university level education and primary level education at 16.6% (25) and 10.6% (16) respectively. The same trend was also observed among the males.

4.3.4 Source of income

The study sought to assess the distribution of the source of income among the respondents. This was an important factor as it helped the researcher understand the economic state of the respondents that would help them to pay for water. Table 4.2 revealed that 51.6% (78) of the parents were casual workers, while 32.5% (49) ran small scale businesses and 15.9% (24). were employed. However, 13.2% (20) of fathers were casual workers while 11.3% (17) ran small scale businesses and 6.6% (10) were employed.

4.3.5 Percentage distribution of duration of Work of Respondents

The study sought to establish the duration that the respondents had been working in their own capacity. The study findings revealed that 45.7% (69) of the respondents hadworked for 6 to 10 years, followed by 24.7% (37) who had worked for 1 to 5 years, and18.5% (28) who had worked for more than 16 years. The rest 11.3% (17) had worked for 11 to 15 years. it was also revealed that 17.2% (26) of the male had worked for 6 to10 years while 8.6% (13) had worked for more than 16 years. The rest of the males, 3.3% (5) and 2% (3) had worked for 1 to 5 years and 11 to 15 years respectively. Thefindings show that the respondents had worked long enough and could understand thevarious determinants of diarrheal cases among children less than five years of age in Kangemi.

4.3.6 Response from the nurses

The nurses at the various health centers were subjected to an interview which sought to assess the prevalence of diarrhea among the residents in the area. They were asked to say if they conduct screening for diarrhea among children under five years of age among the parents visiting the clinic and also among the residents of Kangemi, throughfield visits. Findings are shown Figure 4.1.

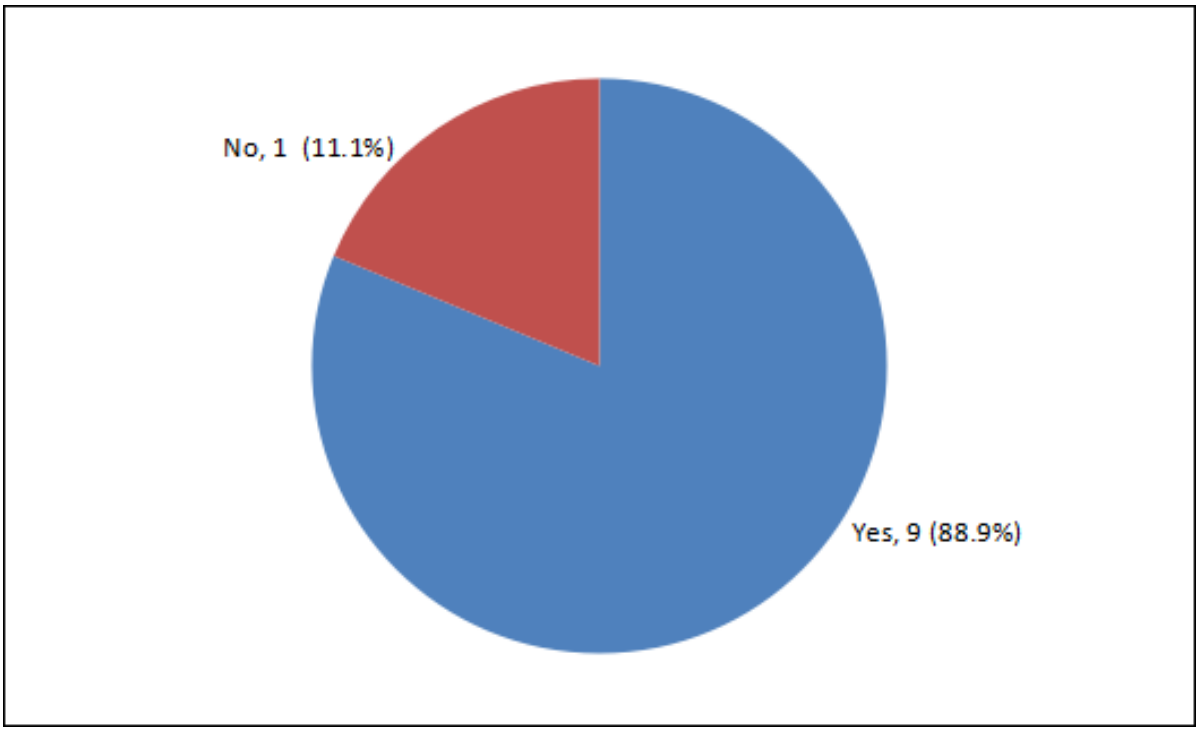


Figure 4.1 Whether Screening for Diarrhea is conducted in the area

Figure 4.1 revealed that, 88.9% (9) of the nurses during KII at Ante Natal and Post Natal Clinics indicated that they conduct screening for diarrhea among children under five years of age in Kangemi, while 11.1% (1) of the nurses in the same health facilities indicated that they do not conduct screening for diarrhea among children Under five years of age in Kangemi.

The findings were supported by data from KII. To this end, the nurses at the Health facilities affirmed that screening of the children for diarrhea assisted in reducing diarrhea cases among children under five years of age in Kangemi. This can be affirmed by the findings from one of nurses who said that:

> *Screening for diarrhoea played important roles in assisting the reduction of cases of diarrhoea among children under five years in Kangemi. This was however only possible if the children were brought to the hospital in time for screening. Indeed, I can say that understanding the importance of screening made some parents bring their children to the hospital in time. However, this was not the case with some parents who only brought their children in when the situation deteriorated.* (Nurse B, June 15, 2020, Kangemi,).

4.4 Effect of Economic Determinants on the number of Diarrheal cases

The respondents were asked to indicate their level of agreements with various statements on economic determinants of diarrheal cases among children under 5 years of age. This was on a scale of 1 to 5 where: 1= very low extent; 2 = low extent; 3=moderate; 4=great extent; 5= very great extent. The findings are as shown in Table 4.3.

Table 4.3 Agreement with Statements on Economic Determinants

Statements	Very low	Low extent	Moderate extent	Great extent	Very Great extent
1. Piped water is expensive	4.4%	10.3%	2.0%	53.0%	30.3%
2. Households cannot access piped water	4.4%	10.3%	4.1%	45.8%	35.4%
3. Low-income households live in poor environments	3.6%	2.5%	6.1%	51.7%	36.1%
4. Most households have no permanent employment	1.6%	11.7%	7.1%	32.5%	47.1%
5. Poor access to medical services due to low income	7.6%	5.1%	4.6%	55.3%	27.4%
6. Households have no access to comprehensive medical cover	0.0%	6.5%	6.9%	16.6%	70.0%
7. Members are unable to acquire knowledge due to low income	0.0%	5.7%	14.0%	15.2%	65.1%

N=151

Table 4.3 show that most of parent 53.0% agreed to a great extent, followed by 30.3% who agreed to a very great extent, 10.3% agreed to a low extent and 4.4% agreed to a very low extent with the statement that piped water is expensive to a great extent. The results were summarized by a mean value (M=4) which was an indication that most parents are un able to use piped water because it is expensive.

On whether households cannot access piped water the most of the respondents 45.8% agreed to a great extent 35.4% agreed to a very great extent, 10.3% agreed to a low extent and 4.4% agreed to a very low extent with the statement. The mean response of (M=4) indicated that most of the respondents agreed to a great extent that the residents were unable to access piped water because it was expensive for them for lack of income.

The results further sought to establish whether low-income households live in poor environments and this contributes to the number of cases in the areas. The results show that most of the respondents agreed to a great extent 51.7%, 36.1% agreed to a very great extent, 3.6% agreed to a very low extent and 2.5% agreed to a low extent with thestatement only 6.1% agreed moderately. The mean response (M=4) does indicate that most of the respondents agreed to a great extent that most of the families are low- income households and live in poor environments that does contribute to the number of cases in the area.

On whether most households had no permanent employment which might be a contributing factor to the increasing number of cases most of the respondents 47.1% agreed to a very great extent, 32.5% agreed to a great extent, 11.7% agreed to a low extent and 7.1% agreed moderately about the statement. The mean response of (M=4) further indicated that most respondents agreed to a very great extent that they did not have permanent employment and this posed a big challenge to them in terms of financeshence affected the number of cases of diarrheal in the study area.

Findings on whether there was poor access to medical services due to low income show that most of the respondents 55.3% and 27.4% agreed to a great extent and to a very great extent with the statement while 7.6% and 5.1% agreed to a very low extent and alow extent on the statement. The results further showed that the mean response of (M=4) agreed to a great extent that poor access to medical services has a role to play inthe increasing number of cases in the areas due to low-income levels.

Most of the respondents 70.0% further agreed to a very great extent, 16.6% agreed toa great extent, 6.5% agreed to a low extent and the rest 6.9% agreed to a moderate extent. The mean agreement indicated a very great extent (M=5) which implied that households have no access to comprehensive medical cover, and hence are likely not to get proper medical care.

Lastly, the results show that 65.1% of the respondents agreed to a very great extent, 15.2% agreed to a great extent and 5.7% agreed to a low extent that members were unable to acquire knowledge on the management of the disease due to low income. Theresults also indicated that the mean response of (M=4) show that most of the respondents agreed to a great extent with

the statement. This implies that majority of the respondents lacked economic power to manage the disease and hence the high casesof the disease in the study area. This finding is similar with a study in Kenya who foundthat economic factors of the slum dwellers play acritical factor in limiting their accessto clean water and medical services in the area.

The results were supported by the response from the interview conducted with the nurses. The nurses from the selected health facilities were asked to indicate their viewsregarding the effect of economic condition of the residents in the area and the number of diarrheal cases. The nurses were also asked to indicate whether the economic status of the respondents affected their efforts to conduct capacity building programs to educate residents on diarrheal preventive measures and how best they can ensure that they manage their domestic water effectively.

The results of the interview show that all the ten nurses who participated in the study pointed out that economic status of the residents had an effect on the effectiveness of the sensitization meetings and capacity building programs to educate residents on diarrheal preventive measures, even though most of these meetings were free.

The nurses however indicate that capacity building programs offered to educateresidents on diarrhea preventive measures have assisted in reducing cases of diarrhea in Kangemi by making sure that the residents have the right information on prevention and management. In this light, one of the nurses said that:

> *We ensure that the right information on preventing diarrhoea is promptly passed to the residents through health centres and chief's barazas (meetings) among others. However, the attendance is usually very low as most of the residents are much concerned about their daily chores of finding income.* (Nurse D, June 17, 2020, Kangemi,).

This clearly shows that the economic factors play a very critical role in the prevalence of the number of cases of diarrhoea among the residence in the slum areas. It was also noted that most nurses said that the public health department and the water departmenthad been effective in ensuring access to clean water in Kangemi. They also said that they think effective management of domestic water is effective in reducing cases of diarrhoea among children

under five years of age in Kangemi and that they conduct water treatment training programs in Kangemi.

4.4.1 Correlations Analysis

The researcher further conducted a correlation analysis to establish the nature of the whether the relationship between the variables was significant or not. This waspresented in table 4.4:

Table 4.4: Economic determinants vs number of cases of diarrhea (correlation).

	Economic determinants	Diarrheal Cases
Pearson Correlation	1	.869**
Sig. (2-tailed)		.000
N	151	151
Pearson Correlation	.869**	1
Sig. (2-tailed)	.000	
N	151	151

The findings showed that economic determinants had strong positive correlation that is very significant with the number of diarrheal cases among children under five-years of age in Kangemi since the results revealed ($r=0.869$, $p<0.05$). This implies that the prevalence of diarrheal cases in the selected slum area were attributed to the hard economic conditions among the residence.

4.5 Demographic Determinants

The second objective of the study sought to find out the effect of demographic determinants on the number of diarrheal cases among children under five years of age. The respondents were expected to rate the various statements defining demographic variables on a scale of 1 to 5 where: 1= very low extent; 2 = low extent; 3= moderate; 4=great extent; 5= very great extent. The findings are as shown in Table 4.5.

Table 4.5: Mean Percentages Agreement with Statements on DemographicDeterminants

Statements	Very low	Low extent	Moderate extent	Great extent	Very Great extent	Total
High Population in the slums contribute to poor health	0.0%	29.5%	11.2%	27.4%	31.9%	100%
Poverty level contributes to high cases of communicable diseases	0.0%	26.6%	18.5%	22.7%	32.1%	100%
Poor health facilities and knowledge in the sums affects their disease management level	1.6%	12.4%	0.5%	15.0%	70.5%	100%
Congestion leads to poor drainage and waste disposal	1.9%	3.9%	0.0%	13.2%	81.0%	100%
There are many young families who lack basic knowledge on hygiene	11.0%	1.5%	8.4%	45.6%	33.5%	100%
Poor housing affects the level of sanitation hence leading to diseases	10.2%	1.9%	0.0%	37.9%	50.0%	100%

N=151

Results on table 4.5 show that, most of the respondents 31.9% agreed to a very great extent, 27.4% agreed to a great extent, 29.5% agreed to a low extent while 11.2% agreed to moderate extent that high population in the slums contribute to poor health to a very great extent. The mean response of (M=4) clearly shows that the respondentsagreed to a very great extent with the statement. This implies that the high population in the slums contributes highly to the poor hygienic conditions that play a very high contribution to the number of diarrheal cases.

On whether the poverty levels contribute to high cases of communicable diseases. Mostof the respondents 32.1% agreed to a very great extent, 22.7% agreed to a great extent,26.6% agreed to a low extent and 18.5% agreed to a moderate extent on the statement.The results further

agreed with a mean of (M=4) to a very great extent that poverty levels contribute to a high case of communicable diseases such as diarrhea.

It was also noted that majority of the respondents 70.5% agreed to a very great extent, 15.0% agreed to a great extent, 12.4% agreed to a low extent and 1.6% agreed to a very low extent about the statement that poor health facilities and knowledge in the slums affected their disease management level. The results further show that majority of the respondents agreed to a very great extent since the mean response was (M=4). This implies that the poor health facilities and low knowledge on hygienic issues in the slums play a very critical role in the management of communicable diseases such as diarrhea.

On whether congestion leads to poor drainage majority of the respondents 81.0% agreed to a very great extent, 13.2% agreed to a great extent and 3.9% agreed to a low extent with the statement. The results also further indicated that the respondents agreed to a very great extent, since the mean response was (M=5). This implies that the high cases of diarrheal in the slums could be attributed to the congestion hence the poor drainage systems in the slums.

The most of the respondents 45.6% further agreed to a great extent, 33.5% agreed to a very great extent, 11.0% agreed to a very low extent that there are many young families who lack basic knowledge on hygiene. This was further noted with a mean value of (M=4) which indicates that the respondents agreed to a great extent with the statement. This implies that the lack of basic knowledge on hygiene among the slum dwellers has a great effect on the high number of diarrheal cases in the slums.

The last statement sought to assess whether poor housing affected the level of sanitation hence leading to diseases. The results showed that most of the respondents 50.0% and 37.9% agreed with the statement to a very great extent and a great extent respectively. While 10.2% and 1.9% agreed to a very low extent and a low extent about the statement. The study also computed the mean response and established a mean of (M=4). This implies that poor housing was seen to have a great effect on the level of sanitation hence leading to increase in number of diarrheal cases in the slums.

All ten of the study's nurses who participated in an interview to determine whether demographic factors like gender and age of respondents had any impact on the number of diarrheal illnesses among children under five years of age said that they might. Theyalso stated that, in comparison to the male, the female who spent a lot of time with thechildren are likely to know more about the problems associated with diarrheal episodesand the approaches used to treat them in children under the age of five.

To support these findings, one of the respondents said:

> *We regularly carried out capacity building initiatives on the dangers of diarrhoea. In grassroots areas, we often called residents together to train them on the relevance of understanding demographic variables in the management of communicable diseases such as diarrhea. This played an important role in checking the spread of the diarrhoea by taking effective measures to control the causes.* (Nurse F, June 21, 2020, Kangemi,).

This clearly implies that demographic variables play a significant role in the management of the number of cases of diarrhoea and their management in the slum areas.

4.5.1 Correlations analysis

The study also sought to assess the relationship between the variables by computing the correlation alpha coefficient of demographic variables and their effect on the number of diarrhoea cases occurring in the slum area in Nairobi. The study sought to establish whether there is a positive significant and strong correlation between the variables as this helps in effective prediction. The results are presented in table 4.6.

Table 4.6: Demographic variables and cases of diarrhea (Correlation).

	Demographic variables	**Diarrhoeal Cases**
Pearson Correlation	1	.944**
Sig. (2-tailed)		.000
N	151	151
Pearson Correlation	.944**	1
Sig. (2-tailed)	.000	
N	151	151

The findings in table 4.6 show that demographic determinants had a very strong positive correlation that is very significant with the number of diarrheal cases among children under five-years of age in Kangemi, since the results revealed ($r=0.944$, $p<0.05$). This can also imply that the prevalence of diarrheal cases in the selected slum area were to a high extent attributed to the low demographic factors that are characterized among the residence.

4.6 Awareness Determinants

The parents were asked to indicate their level of agreement with various statements on awareness determinants of diarrheal cases among children under five years of age. Thiswas an important determinant of diarrheal cases among children under five years of age. The respondents were asked to indicate the extent to which educational skills and knowledge influenced domestic water at the household level and hence the rate of diarrhoea in Kangemi slums. The findings are as shown in Table 4.7.

Table 4.7: Mean Percentages Agreement with Statements on Awareness Determinants

Statements	Very low	Low extent	Moderate extent	Great extent	Very Great extent	Total
Parents undergo sanitation training to improve their condition	31.7%	15.3%	1.6%	34.3%	17.3%	100%
Most parents had attended these training	1.6%	5.8%	0.0%	18.2%	74.4%	100%
Residents have knowledge of diarrhoea	1.6%	15.5%	0.0%	27.3%	55.6%	100%
Residents understand how to manage water	2.4%	7.4%	1.1%	14.3%	74.8%	100%
Residents especially mothers undergo child care training	0.0%	7.4%	0.0%	15.3%	77.3%	100%
Residents understand how to treat water for domestic use	0.0%	14.8%	1.0%	16.8%	67.4%	100%
Residents have knowledge on waste management	0.0%	4.2%	3.7%	23.8%	68.3%	100%

N=151

Findings in table 4.7, show that most of the respondents (34.3% and 17.3%) agreed to a great extent and to a very great extent respectively to the statement that parents undergo sanitation training to improve their condition. Only 31.7% of the respondents agreed to a very low extent and 15.3% agreed to a low extent. The mean responses of (M=4) indicated that most of the respondents agreed to a great extent to the fact that parent undergo training on sanitation. This implies that there is very limited training among the slum dwellers on sanitation and this contributes to the high number of diarrheal cases among the under five children.

On whether the parents had attended training on sanitation, majority of the respondents 74.4% agreed to very great extent, 18.2% agreed to a great extent, 5.8% agreed to a low extent and 1.6% agreed to a very low extent with the statement. The mean response of (M=5) clearly shows that the parents had not attended training on sanitation to create awareness of the pandemic. This implies that parents with under five children lack knowledge on the pandemic because they do not attend meeting on the same.

The results also show that most of the respondents 55.6% and 27.3% agreed to a very great extent and great extent while 15.5% and 1.6% agreed to low extent and a very low extent on the fact that resident had knowledge of diarrhoea. The mean response of (M=4) show that the respondents agreed to a very great extent with the statement. This implies that though the respondents did not attend the sanitation training but they had knowledge on the presence and prevalence of diarrhoea on the under five children.

On whether residents understood how to manage water, most the respondents 74.8% agreed to a very great extent, 14.3% agreed to a great extent and 7.4% agreed to a very low extent with the statement. The study also revealed that majority of the respondents with an average response of (M=5). The results indicate that majority of the respondents had knowledge on how to deal with water and this assisted them to minimize the level of diarrhoea on the under five children.

Most of the respondents 77.3% and 15.3% also agreed to a very great extent and a great extent with the statement that residents especially mothers underwent child care training. It was also noted that most of the respondents 7.4% agreed to a low extent with the statement. The mean

response (M=5) indicated that most of the respondents agreed to a very great extent with the statement implying that mothers of the under five children did receive training on child care and this has assisted them to improve on sanitation and hence reduce the cases of diarrhoea on the under five children.

In regard to water treatment and knowledge on waste management, most of the respondents 67.4% and 68.3% agreed to a very great extent, 16.8% and 23.8% agreed to a great extent, 14.8% and 4.2% agreed to a low extent that the residents understood how to treat water for domestic use and knowledge on waste management. The results further show that most of the respondents on average agreed to a very great extent (M=4) and (M=5) with the statement. This implies that most respondents had knowledge on water treatment and waste management. however, they lacked the resources to effectively carry out the exercise because of the cost involved.

The responses from the nurses who took part in the interview confirmed the findings. The nurses concurred that the residents had a good understanding of the correct procedures to follow in order to decrease the incidence of diarrhea in children under the age of five. Additionally, they supported the idea that mothers receive instructions on how to make home lodgings accommodating during clinic visits for children under five. This suggests that mothers are provided with sufficient training on how to care for the under-five children to reduce the cases of diarrhoea on the under-five children, even though the parents may not attend other awareness training in their area.

The study further conducted a correlation analysis to establish the nature of the relationship between awareness and number of cases of diarrhea among the under-five. This assisted the researcher to justify the effect of the determinants of awareness on the number of cases of diarrhea. This is presented in table 4.8.

Table 4.8: Correlation between awareness and number of cases of diarrhea

	Awareness Determinants	Diarrhoeal Cases
Pearson Correlation	1	.936**
Sig. (2-tailed)		.000
N	151	151
Pearson Correlation	.936**	1
Sig. (2-tailed)	.000	
N	151	151

The results clearly show that there is a very strong correlation between the awareness and number of cases of diarrhea among the under-five in the slum area. With a strong positive Pearson correlation coefficient of .936** which is very significant since the p value is < 0.05. This implies that the cases of diarrhea among the under-five in the slum area could be improved effectively if the residents were aware of the prevalence and the methods of managing the pandemic.

4.7 Diarrheal cases among Under Fives

The dependent variable in the study was diarrheal cases among children under five years in households using domestic water. The respondents were asked to indicate their level of agreement with selected statements on the extent of diarrheal cases among children in the study area. The findings are presented in table 4.9.

Table 4.9 Mean Percentages of Diarrheal cases among Under Fives

Statements	**Very low**	**Low extent**	**Moderate extent**	**Great extent**	**Very Great extent**
There are cases of diarrhoea among children under 5 years in Kangemi	3.4%	15.3%	29.7%	24.3%	27.3%
There are cases of mortality from diarrhea among children under 5 years	1.6%	5.8%	14.7%	12.2%	65.7%
Domestic water contributes to cases of diarrhoea among children under 5 years in Kangemi	1.6%	15.5%	12.2%	25.3%	45.4%
Domestic water treatment practices affect the level of diarrhoea among children under 5 in Kangemi	0.0%	7.4%	1.2%	16.6%	74.8%
Contaminated foods washed or cooked with domestic water contributes to diarrhoea among children under 5 in Kangemi	0.0%	0.0%	2.1%	18.6%	79.3%

N=151

The results show that most of the respondents 27.3% and 24.3% agreed to a very greatextent and a great extend while 29.7% agreed to a moderate extent, 15.3% and 3.4% agreed to low extend and a very low extent with the statement that there were cases of diarrhea among children under 5 years in Kangemi. The mean response (M=4) indicatesthat respondents agree to a great extent with the statement implying that there were cases of diarrhoea among children under 5 years in Kangemi. The results also showed that most of the respondents 65.7%, 14.7% and 12.2% agreed to a very great extent, moderate and great extent with the statement that there were cases of mortality from diarrhoea among children under 5 years. It is also noted that 5.8% and 1.6% agreed toa low extend and a very low extent respectively. The overall mean response of (M=4) show that the respondents were all aware of cases of mortality that resulted from the prevalence of case of diarrhea.

The results also indicated that most of the respondents 45.4% and 25.3% agreed to a very great extent and a great extent that domestic water contributed to cases of diarrhea among children under five years in Kangemi. It was also noted that 15.5% and 1.6% agreed with the statement to low extent and a very low extent. The overall mean of the response was (M=4) indicating that the respondents agreed to a very low extent with the statement. This implies that the respondents agreed that domestic water contributed to cases of diarrhea among children under five years in Kangemi.

The results also show that 74.8% and 16.6% agreed with the statement to a very great extent and a great extent respectively that domestic water treatment practices affected the level of diarrhea among children under five in Kangemi. The results also show that most of the respondents 7.4% agreed to a low extent about the statement. The results further show that on average the mean (M=5) indicates that the respondents agreed to a very great extent about the statement.

Finally, the respondents were asked to indicate the level of agreement with the fact that contaminated foods washed or cooked with domestic water contributed to diarrhea among children under five in Kangemi. The results show that majority of the respondents 79.3% and 18.6% agreed to a very great extent and a great extentrespectively with the statement.

4.8 Regression Analysis

The researcher conducted a multiple regression analysis to test the level to which diarrheal cases among children under five-years of age in Kangemi could be predicted by the independent variables. This section presents the coefficient of determination, Analysis of Variance and regression coefficients.

4.8.1 Model Summary

Table 4.10 show that independent variables (economic determinants; demographic determinants and; awareness determinants) could explain 95.4% of diarrheal cases among children under five-years of age in Kangemi. An adjusted R2 value of 0.953 was obtained. This shows that in this study the population from which the study sample was obtained could explain 93.3% variance of diarrheal cases among children under five-years of age in Kangemi. The results are presented in table 4.10.

Table 4.10 Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.976[a]	.954	.953	.29923

a. Predictors: (Constant), Awareness Determinants, Economic determinants,Demographic Determinants

4.8.2 Analysis of Variance

Table 4.11 shows that the combined influence of the independent variables could statistically and significantly predict the diarrheal cases among children under five- years of age in Kangemi (F= 1005.394, p<0.05).

Table 4.11 Analysis of Variance

ANOVA[a]				
Model	Sum of Squares	MeanSquare	F	Sig.
Regression	270.069	90.023	1005.394	.000[b]
Residual	13.162	.090		
Total	283.232			

a. Dependent Variable: Diarrheal Cases

b. Predictors: (Constant), Awareness Determinants, Economic determinants, Demographic Determinants

4.8.3 Regression Coefficients

Further analysis was done to assess the Regression Coefficient. This helped to assess the contribution of each of the three determinants on the model. The results were presented in Table 4.12.

Table 4.12: Regression Coefficients

Coefficients[a]					
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	-1.250	.094		-13.240	.000
Economic determinants	.251	.044	.197	5.648	.000
Demographic Determinants	.575	.042	.508	13.823	.000
Awareness Determinants	.445	.062	.324	7.189	.000

a. Dependent Variable: Diarrheal Cases

From the regression coefficient, it was established that the independent variables could statistically predict the diarrheal cases among children under five-years of age in Kangemi (P values <0.05). Standardized Beta Coefficient (P<0.05) indicate that an increase in the influences of economic determinants by 0.197; demographic determinants by 0.508 and; awareness determinants by 0.324 would lead to increase in diarrheal cases among children under five-years of age in Kangemi by 1 unit each.

When fitted using unstandardized coefficients, the regression model was as shown below.

Diarrheal cases among under five-years old children in Kangemi = -1.250 + 0.251* Economic determinants + 0.508 *

Demographic Determinants + 0.445 *Awareness Determinants + 0.094.

CHAPTER FIVE
DISCUSSIONS

5.1 Introduction

This section presents discussion for findings of economic, demographic and awareness determinants of diarrheal cases among children under five years of age in Kangemi.

5.2 Economic Determinants of Diarrheal Cases

The study found that low income levels, which were linked to poor sanitation, a lack of access to clean water, and low income levels, had a significant impact on people's health. According to Troeger et al. (2017), who found that diarrheal infections are probably more common in low-income communities with inadequate access to health care, clean water, and sanitation, the income level of the people led to the increase in diarrheal cases. These results concur with those of Gebremichael et al. (2021), who found that household access to water and water sourcing behavior are strongly influenced by household income. Families with unpredictable sources of income are therefore more likely to use water from sources that are not improved.

According to the study, low household income is linked to subpar housing, overcrowding, and a lack of access to sanitary fecal waste disposal or enough clean water. It was also shown that families with highly educated members obtain their water from safer sources. These findings were backed up by Swain (2017), who suggested that problems with access to healthcare might lead to unmet medical needs, improper care, inability to receive preventative care, and hospitalizations that could have been avoided. The study found that increasing personal income has a substantial impact on the quality of healthcare provided to the locals in Kangemi ward.

This study, further found that most of households did not depend on employed family members to access quality water and had not received training on diarrhea detection and treatment. These findings concur with Njuguna (2019) who noted that households' income levels are one of the determinants of which establish their water and sanitation facilities and services accessibility. This is as a result of the fact that groups of low- income have inability in affording high fees for piped water connection and thus connectivity being limited. In

addition, this finding is in agreement with Pouramin (2020) who argued that the household head occupation meaningfully affected the kind of source of water by family. This study revealed that there was a significant relationship between diarrheal cases among children under five-years of age and economic determinants which corroborates with the findings by Troeger, *et al.*, (2017)which indicates that economic determinant significantly influences the cases of diarrheal disease in the slum areas as given by the Pearson's correlation statistics ($r = 0.869$; p value< 0.05).

5.3 Demographic Determinants of Diarrheal Cases

According to the report, there are more incidences of diarrhea in the slum area becausethere are insufficient basic water and sanitation facilities. Households with more educated members obtain their water from safer sources than do families with people with very low levels of education. These results support the claims made by Baciu et al. (2017), who asserted that educational inequality significantly affects how people of rural and urban settings are impacted by incidences of diarrheal sickness. The study found that dwelling status is a significant determinant of access to adequate clean water and sanitary fecal waste disposal, which both contribute to increased diarrhoea.

Additionally, the study found that Kangemi has poor sanitation and hygiene and that not all households properly dispose their trash. These results are consistent with those of Onundi et al. (2013), who discovered that families with very low education levels faced difficulties getting access to water, whether from improved or unaltered sources,because the members did not take their water-sourcing habits seriously. The study's findings support those of Baciu et al. (2017), who found a connection betweendemographic variables and health outcomes, by demonstrating a significant relationship between diarrheal cases among children under five years of age and demographic determinants. This suggests that the demographic variable ($r = 0.944$; p value<0.05) has a very strong influence in determining the cases of diarrhea among children under the age of five in the Kangemi.

5.4 Awareness Determinants of Diarrheal Cases

The study found that parents who had received sanitation training to enhance their living conditions had a substantial understanding of diarrhoea. The results demonstrated that inhabitants possessed a comprehensive awareness of water management, water treatment

for home use, and waste management. These results are consistent with GBD (2017), which demonstrated that such a level related to the improved management of water-borne infections among parents.

The survey also found that households urged members to fully wash their hands after using the restroom and prior to eating in order to prevent diarrhoea cases. These findings are consistent with those of Ejemot-Nwadiaro et al. (2015), who claimed that rigorous hand washing after toilet use and before eating are effective prophylactic measures. In addition, the survey revealed that inhabitants lack awareness of diarrhea'ssymptoms, mode of transmission, and prevention. However, the study found that screening had helped reduce the incidence of diarrhoea among children younger than five in Kangemi. This was accomplished by ensuring that confirmed cases of diarrhoea were treated and by taking precautions to prevent further spread.

The study also indicated that good management of domestic water reduces the incidence of diarrhea in children under the age of five. This is because citizens of the region participated in training programs for water treatment. These results are congruent with those of Gebremichael et al. (2021), who stated that the level of education of the household head had a significant effect on the type of water source used by household members. Using Pearson correlation statistics, the study found a significant correlation between diarrhea cases among children under the age of five in Kangemi and awareness determinants ($r = 0.936$; $p<0.05$). These data confirm Ejemot- Nwadiaro et al (2015).'s assertion that diarrhoea prevention is linked to awareness of preventive techniques.

The overall regression analysis that sought to determine the combined effect of the three independent variables (economic, demographic, and awareness determinants) and the dependent variable revealed a very strong correlation between the variables, indicating that economic, demographic, and awareness factors all play a very significant role in determining cases of diarrhoea in Kangemi ($r = 0.976$; p value<0.05). Further study utilizing the regression coefficient revealed that a one-percent change in the combination of the three independent variables results in a 95.4% change in the number of diarrheal cases in Kangemi.

CHAPTER SIX
CONCLUSIONS AND RECOMMENDATIONS

6.1 Introduction

This section presents conclusions and recommendations of the study. These were deduced from the findings of the study and were based on the objectives of the study.

6.2 Conclusions

The study concluded that economic determinants had a considerable impact on the incidence of diarrhea in children under the age of five. This was due to low economic levels leading in inadequate access to clean water, poor sanitation, and limited access to health services, all of which have a significant impact on the health status of persons.Low-income homes cannot pay the expensive rates for piped water connection, the majority of households cannot rely on employed family members to acquire quality water, and they have not received training on the detection and treatment of diarrhea.

The study found that demographic determinants had a substantial impact on the incidence of diarrhea in children under the age of five in Kangemi. A high population in the slums adds to poor health, which is attributable to inadequate health facilities and low knowledge in the slums, and consequently impacts the degree of illness management. In addition, many young families lacked fundamental knowledge of cleanliness, and substandard housing impacted the degree of sanitation, resulting in therespondents' contracting infections.

The study found that awareness determinants had a substantial impact on the incidence of diarrhea in children under the age of five. In this instance, a mother's education improves her understanding of her child's health and treatment options, while her knowledge of diarrhea enables her to comprehend its causes and prevention strategies. In addition, all mothers in Kangemi are encouraged to exclusively breastfeed their infants for the first six months before supplementing their nutrition. Households also encourage members to maintain high standards by washing their hands thoroughly afterusing the toilet and prior to eating. It was determined that there was no routine illness screening in Kangemi and that inhabitants are unaware of the symptoms, method of transmission, and preventative measures for diarrhea.

6.3 Recommendations

i. The Nairobi County government should ensure every household can access piped water and work to reduce poverty in all its dimensions.
ii. This study recommended that the County Government should enhance access of medical services by reducing the medical charges to the residents.
iii. The study also recommended that the County Government should decongest drainage system and practice proper waste management.
iv. It further recommended that the County Government should organize trainings for both parents focusing on sanitation to improve their living conditions.

6.4 Recommendation for Further Research

Future studies should focus on establishing determinants of communicable (non-diarrheal) cases among children under five years of age in slum areas of Nairobi.

REFERENCES

Alain, S., & Denis, F. (2007). Epidemiology of infectious acute diarrhea in France andEurope. Archives de pédiatrie: organe officiel de la Sociéte française de pédiatrie. *Suppl, 14* (3), S132-44.

Andriano, L., & Monden, C. (2019). The Causal Effect of Maternal Education on Child Mortality: Evidence from a Quasi-Experiment in Malawi and Uganda. *Demography, 56* (1), 1765–1790.

Angoua, E., Dongo, K., Templeton, M.R., Zinsstag, J., & Bonfoh, B. (2018). Barriers to access improved water and sanitation in poor peri-urban settlements of Abidjan, Côte d'Ivoire. *PloS one, 13*(8), e0202928.

Baciu A, Negussie Y, Geller, A., & Weinstein, J. (2017). *Communities in Action: Pathways to Health Equity*. Washington (DC): National Academies Press (US).

Bandura, A. (1986). Fearful expectations and avoidant actions as coeffects of perceived self-inefficacy. *American Psychologist, 41*(12), 1389–139.

Bicher, M., Glock, B., Miksch, F., Popper, N., & Schneckenreither, G. (2015). Definition, validation and comparison of two population models for Austria. *International Journal of Business and Technology*, *4*(1), 7.

Borja-Vega, C., & Grabinsky, J. (2020). *Water fetching responsibilities reveal unequalgender dynamics: Elevates need for expansion of on-site WASH facilities*. World Bank.

Bronfenbrenner, U. (2005). Ecological systems theory (1992). In U. Bronfenbrenner (Ed.), *Making human beings human: Bioecological perspectives on human development* (pp. 106–173). Sage Publications Ltd.

Central Statistical Agency (CSA). (2016). *Ethiopia Demographic and Health Survey*. Addis Ababa, Ethiopia, and Rockville, Maryland, USA: CSA and ICF.

Chang, H., Guo, J., Wei, Z., Huang, Z., Wang, C., Qiu. Y. et al. (2021). Aetiology of acute diarrhoea in children in Shanghai, 2015–2018. *PLoS ONE, 16*(4), e0249888. https://doi.org/10.1371/journal.pone.0249888.

Deal, P., & Sabatini, D. (2020). Evaluating the Level of the Household Water Service Provided by a Private Water Enterprise in Ghana. *Water, 12*(3), 693.

DHIS. (2019). *The District Health Information Software. Diarrhoea among under five children.* Nairobi: DHIS.

Dillingham, R., Bulled, N., & Singer, M. (2014). The syndemics of childhood diarrhoea: a biosocial perspective on efforts to combat global inequities in diarrhoea-related morbidity and mortality. *Glob Public Health, 9*(7), 841-53.

Ejemot-Nwadiaro, R.I., Ehiri, J.E., Arikpo, D., Meremikwu, M. M., & Critchley, J. A.(2015). Hand washing promotion for preventing diarrhoea. *The Cochrane database of systematic reviews, 2015*(9), CD004265.

Flanagan, B. E., Hallisey, E. J., Adams, E., & Lavery, A. (2018). Measuring community vulnerability to natural and anthropogenic hazards: the Centers for Disease Control and Prevention's Social Vulnerability Index. *Journal of environmentalhealth*, *80*(10), 34.

Freeman J., & Sugai G. (2013). Recent changes in state policies and legislation regarding restraint or seclusion. *Exceptional Children, 79*(4), 427–438.

GBD. (2017). Global, regional and national age-sex-specific mortality for 282 causes of death in 195 countries and territories, 1980–2017: a systematic analysis for the Global Burden of Disease Study 2017. *Lancet*. *392* (1), 1736-1788.

Gebremichael, S.G., Yismaw, E., Tsegaw, B.D., & Shibeshi, A.D. (2021). Determinants of water source use, quality of water, sanitation and hygiene perceptions among urban households in North-West Ethiopia: A cross-sectional study. *PLoS ONE, 16*(4), e0239502.

Geere, J.A., & Cortobius, M. (2017). Who carries the weight of water? Fetching waterin rural and urban areas and the implications for water security. *Water Alternatives 10*(2), 513-540.

Gomez, M., Perdiguero, J., & Sanz, A. (2019). Socioeconomic Factors Affecting WaterAccess in Rural Areas of Low and Middle Income Countries. *Water, 11*(2), 202.

Grimes, J., Tadesse, G., Gardiner, I., Yard, E., Wuletaw. Y, Templeton, M., et al. (2017). Sanitation, hookworm, anemia, stunting, and wasting in primary school children in southern Ethiopia: baseline results from a study in 30 schools. *PLoSNegl Trop Dis., 11*(1), e0005948.

Guillaume, D.A., Justus, O., & Ephantus, K.W. (2020). Factors influencing Diarrheal prevalence among children under five years in Mathare Informal Settlement, Nairobi, Kenya. *Journal of public health in Africa, 11*(1), 1312.

Haregu, T., Ziraba, A., Aboderin, I., Amugsi,D., Muindi, K & Mberu, B. (2017). An assessment of the evolution of Kenya's solid waste management policies and their implementation in Nairobi and Mombasa: analysis of policies and practices. *Environment and Urbanization, 29* (2), 515-532.

Hartman, S., Brown, E., Loomis, E., & Russell, H. (2019). Gastroenteritis in Children. *Am Fam Physician,* 99(3), 159-165.

Herrera-Benavente, I.F., Comas-García, A., Mascareñas-de los Santos, A.H. (2018). Impact of acute Diarrheal diseases in Latin America. Justification for the establishment of a Committee on Diarrheal Diseases in SLIPE. *Rev Latin InfectPediatr., 31*(1), 8-16.

Kenya National Bureau of Statistics. (2010). *The 2009 Kenya population and housingcensus*. Nairobi: Kenya National Bureau of Statistics.

Kerlinger, F.N., & Rinehart, N. (1986). *Foundations of Behaviour Research*. Winston Inc. Research Definitions.

KNBS. (2014). *The 2014 Kenya Demographic and Health Survey (2014 KDHS)*. Nairobi: Kenya National Bureau of Statistics.

KNBS. (2020). *The 2019 Kenya population and housing census*. Nairobi: Kenya National Bureau of Statistics.

Kimani, H., Akunga, D., Anyango, S., & Ndwiga, T (2019). Diarrhoea Risk Factors Associated with Water, Sanitation and Hygiene Among the Under Five in Kasarani, Nairobi County. *Central African Journal of Public Health, 5* (6), 272-279.

Kithinji, F. (2015). *Factors Influencing Households' Access to Drinking Water*. Thesis. University of Nairobi. http://erepository.uonbi.ac.ke.

Kitonyi, H (2014). *Safeguarding sanitation in high population density urban settlements: a case study of Kibera Slums Nairobi County*. A Research Project,Kenyatta University.

Levison, D., DeGraff, D.S., & Dungumaro, E.W. (2018). Implications of Environmental Chores for Schooling: Children's Time Fetching Water and Firewood in Tanzania. *The European journal of development research, 30*(2), 217–234.

Lima, A.A., Oliveira, D.B., Quetz, J.S., Havt, A., Prata, M.M., Lima, I.F., et al. (2019) Etiology and severity of Diarrheal diseases in infants at the semiarid region of Brazil: A case-control study. *PLoS Negl Trop Dis, 13*(2), e0007154. https://doi.org/10.1371/journal.pntd.0007154.

Malhotra, N.K. and Birks, D. (2006). *Marketing Research: An Applied Approach* (3rd Ed.). Prentice Hall, Upper Saddle River.

Manetu, W.M., & Karanja, A.M. (2021) Waterborne Disease Risk Factors and Intervention Practices: A Review. *Open Access Library Journal, 8*(1), e7401.

Melese, B., Paulos, W., & Astawesegn, F.H. et al. (2019). Prevalence of Diarrheal diseases and associated factors among under-five children in Dale District, Sidama zone, Southern Ethiopia: a cross-sectional study. *BMC Public Health 19*, 1235.

Mock, C., Nugent, R., Kobusingye, O., & Smith, K. (2017). *Injury prevention and environmental health*. Washington (DC): The International Bank for Reconstruction

and Development / The World Bank.

Mokomane, M., Kasvosve, I., de Melo, E., Pernica, J. M., & Goldfarb, D. M. (2018). The global problem of childhood Diarrheal diseases: emerging strategies in prevention and management. *Therapeutic advances in infectious disease, 5*(1), 29–43. https://doi.org/10.1177/2049936117744429.

Mwangi, C. (2017). *An Assessment of Impact of Poverty on Female HeadedHouseholds in Kangemi, Kenya*. Master's Thesis. University of Nairobi.

Myamba, F. (2020). *Promoting women's economic empowerment through socialprotection: Lessons from the productive social safety net program in Tanzania*. UNICEF.https://www.unicef-irc.org/article/1950-empowering-women- through-social-protection.html.

Myers, K (2017). *Women, water & the cycle of poverty*. Concern World Wide.NairobiCounty Government. (2021). *Kangemi*. Nairobi County Government.

Narzetti, D., & Rui, C. (2020). Models of Subsidies for Water and Sanitation Services for Vulnerable People in South American Countries: Lessons for Brazil. *Water12* (7), 21.

Njuguna, J. (2019). Progress in sanitation among poor households in Kenya: evidence from demographic and health surveys. *BMC Public Health, 19*(1), 135.

Nshimyiryo, A., Hedt-Gauthier, B., Mutaganzwa, C. et al. (2019). Risk factors for stunting among children under five years: a cross-sectional population-based study in Rwanda using the 2015 Demographic and Health Survey. *BMC Public Health,* 19(1), 175. https://doi.org/10.1186/s12889-019-6504-z

Nzioki, A., Irimu, D. & Musoke, M. (2009). Audit of care for children aged 6 to 59 months admitted with severe malnutrition at Kenyatta national hospital. *KenyaInt Health. J., 1* (1), 91–96.

Oloruntoba, E.O., Folarin, T.B., & Ayede, A.I, (2014). Hygiene and sanitation risk factors of Diarrheal disease among under-five children in Ibadan, Nigeria. *Afr Health Sci. Dec., 14*(4), 1001-11.

Onundi, J., Ndiritu, S.W. & Stage, J. (2014). "Risk Perception, Choice of Drinking Water and Water Treatment: Evidence from Kenyan Towns." Environment for Development Discussion paper 13-10.

Onyango, I. S., Angira, C. & Nyambati, G. K. (2020). Economic determinants of domestic water management at household level on Diarrheal cases among children under five years of age in Kangemi, Nairobi County. *International Academic Journal of Health, Medicine and Nursing,* 2(1), 80-93.

Pantaleo, I., & Temba, G. (2019). Socio-Economic Determinants of Diarrheal Morbidity among Children in Tanzania. *African Journal of Economic Review, 7*(2), 147-164.

Pouramin, P., Nagabhatla, N & Miletto, M. (2020). A Systematic Review of Water andGender Interlinkages: Assessing the Intersection with Health. Systematic Review. *Water, 2* (1), 6. Doi: 10.3389/frwa.2020.00006

Raghupathi, V., & Raghupathi, W. (2020). The influence of education on health: an empirical assessment of OECD countries for the period 1995–2015. *ArchPublic Health, 78* (1), 20.

Reddington, K., Tuite, N., Minogue, E., & Barry, T. (2014). Review. A current overview of commercially available nucleic acid diagnostics approaches to detect and identify human gastroenteritis pathogens. *Biomol Detect Quantif.*, 1(1), 3-7.

Rettew, D.C., & McKee, L. (2005). Temperament and Its Role in Developmental Psychopathology. *Harv Rev Psychiatry, 13*(1), 14–27

Rheingans, R., & Anderson, J., Luyendijk, R., & Cumming, O. (2014). Measuring disparities in sanitation access: Does the measure matter? *Tropical Medicine & International Health, 19*(1). 10.1111/tmi.12220.

Ricciardi, V. (2019). *Water subsidies mostly benefit the wealthy*. World Bank

Shingare, R. P., Thawale, P. R., Raghunathan, K., Mishra, A., & Kumar, S. (2019). Constructed wetland for wastewater reuse: Role and efficiency in removing enteric pathogens. Journal of environmental management, 246, 444-461.

Soiza, R.L., Donaldson, A.I.C. and Myint, P.K. (2018) Vaccine against Arteriosclerosis: An Update. *Therapeutic Advances in Vaccines, 9* (1), 259-261. https://doi.org/10.1177/2042098618769568.

Swain, G 92017). How does economic and social disadvantage affect health? *Focus, 33*(1), 1-6.

Troeger, C., et al. (2017) Estimates of Global, Regional, and National Morbidity, Mortality, and Aetiologies of Diarrheal Diseases: A Systematic Analysis for theGlobal Burden of Disease Study 2015. *The Lancet Infectious Diseases, 17* (1),909-948.

UNICEF & WHO. (2021). *The measurement and monitoring of water supply, sanitation and hygiene (WASH) affordability: a missing element of monitoring of Sustainable Development Goal (SDG) Targets 6.1 and 6.2*. UNICEF: New York.)

UNICEF. (2018). *Promotion of household water treatment and safe storage in UNICEF WASH programs*. UNICEF.

Vikram, K., & Vanneman, R. (2020). Maternal education and the multi dimensionalityof child health outcomes in India. *Journal of biosocial science, 52*(1), 57–77. https://doi.org/10.1017/S0021932019000245.

Walker, J. (2017). “Spending Beyond Education: Supporting Education through Complementary SDG Spending. Education Commission Background Paper for the Learning Generation.” Accessed on October 22, 2021 from https://report.educationcommission.org/wpcontent/uploads/2016/11/Spending-Beyond-Education.pdf.

Wang, K. T. (2015). *Research design in counseling*. Nelson Education.

Weissl, K., Benetka, V., Schachner, E., Tichy, A., Latif, M., Mayrhofer, E., & Moestl, K. (2012). Osteoarthritis in cats and the possible involvement of feline Calicivirus and feline Retroviruses. *Wiener Tierärztliche Monatsschrift*, *99*(5/6), 123-133.

Weitzman, A. (2017). The effects of women's education on maternal health: Evidence from Peru. *Social science & medicine 180* (1), 1–9.

Westlands Sub-County Health Office. (2020). *Health Records.* Nairobi County Government.

WHO (2018). *Household water treatment and safe storage: manual for the participant.* Geneva, Switzerland.

WHO and UNICEF (2016). *25 Years Progress on Sanitation and Drinking Water: 2015 Update and Assessment*. Geneva: WHO and UNICEF.

WHO. (2017). *Children: reducing mortality fact sheet*. WHO. http://www.who.int/mediacentre/factsheets/fs178/en/. In.; Updated October 2017.

World Bank (2020). *Providing Sustainable Sanitation and Water services to Low-income Communities in Nairobi*. World Bank. Available from: https://www.worldbank.org/en/news/feature/2020/02/19/providing- sustainable-sanitation-and-water-services-to-low-income-communities-in- nairobi (Accessed on October 17, 2020).

WWDR. (2020). *UN World Water Development Report 2020: Water and Climate Change*. WWDR.

Yamane, T. (1967). *Statistics: An Introductory Analysis* (2nd Ed.). New York: Harper and Row.

Yu, J., Jing, H., Lai, S., Xu, W., Li, M., Wu, J., et al. (2015). Etiology of diarrhea among children under the age five in China: Results from a five-year surveillance. *The Journal of infection, 7*1(1)19–27.

APPENDICES

Appendix I: Introduction Letter

Onyango, Isabella Sophia

Jaramogi Oginga Odinga University of Science and TechnologyDear Respondent,

RE: REQUEST TO UNDERTAKE A STUDY

I am a student studying a Master's of Science in Epidemiology and Biostatistics of Jaramogi Oginga Odinga University of science and technology. I wish to conduct research entitled ***Determinants of Diarrheal cases among Children under Five Years in households using domestic water in Kangemi, Nairobi County.*** A questionnaire has been designed and will be used to gather relevant information to address the research objective of the study. The purpose of writing to you is to kindly request you to grant me permission to collect information on this important subject from your organization.

Please note that the study will be conducted as academic research and the information provided will be treated in strict confidence. Strict ethical principles will be observed to ensure confidentiality and the study outcomes and reports will not include reference to any individuals.

Your acceptance will be highly appreciated.

Yours faithfully,

Onyango, Isabella Sophia

Appendix II: Consent Note

I---------- (name of the patient), hereby agree to participate in the study of ***Determinants of Diarrheal cases among Children under Five Years in households using domestic water in Kangemi, Nairobi County*** that is ongoing. I fully understand after being informed that;

- There was no any financial gain or loss over me for participating in the study
- I asked questions basing on my knowledge on hygiene and sanitation
- The findings as agreed was not to be given to any unauthorized person

Name…….

Appendix III: Questionnaire for Male and Female

Kindly indicate your responses in the spaces of this questionnaire. The information you give will only be used for academic purpose. DO NOT write your name.

SECTION A: GENERAL INFORMATION

This section covers the respondent's general information. Please answer as accurate as possible.

1. What is your Highest Level of Education? Primary [1] Secondary [2] College [3] University [4]
2. What is your age in terms of completed years? 21-30 years [1] 31-40 years [2] 41-50 years [3] Above 50 years [4]
3. What is your gender? Male [1] Female [2]
4. What is your source of income? Employed [1] Casual worker [2] Have a business [3]
5. What is your duration of work? 1-5 years [1] 6-10 years [2] 11 to15 years [3] More than 16 years [4]

SECTION B: ECONOMIC DETERMINANTS

6. Please indicate your level of agreement with various statements on economic determinants of diarrheal cases among children under five years of age in Kangemi, Nairobi County? 1= very low extent; 2 = low extent; 3= moderate; 4=great extent; 5= very great extent

Statements	**5**	**4**	**3**	**2**	**1**
Piped water is expensive					
Households cannot access piped water					
Low-income households live in poor environments					
Most households have no permanent employment					
Poor access to medical services due to low income					
Households have no access to comprehensive medical cover					
Members are unable to acquire knowledge due to low income					

C: DEMOGRAPHIC DETERMINANTS

7. Please indicate your level of agreement with various statements on demographic determinants of diarrheal cases among children under five years of age in Kangemi, Nairobi County? 1= very low extent; 2 = low extent; 3= moderate; 4=great extent; 5= very great extent

Statements	**5**	**4**	**3**	**2**	**1**
High Population in the slums contribute to poor health					
Poverty level contributes to high cases of communicable diseases					
Poor health facilities and knowledge in the sums affects their disease management level					
Congestion leads to poor drainage and waste disposal					
There are many young families who lack basic knowledge on hygiene					
Poor housing affects the level of sanitation hence leading to diseases					

D: AWARENESS DETERMINANTS

8. Please indicate your level of agreement with various statements on awareness determinants of diarrheal cases among children under five years of age in Kangemi, Nairobi County? 1= very low extent; 2 = low extent; 3= moderate; 4=great extent; 5= very great extent

Statements	**5**	**4**	**3**	**2**	**1**
Most parents had attended training on diarrhoea					
Residents have knowledge of diarrhoea					
Residents understand how to manage water					
Residents especially mothers undergo child care training					
Residents understand how to treat water for domestic use					
Residents have knowledge on waste management					

E: DIARRHEAL CASES AMONG CHILDREN UNDER FIVE YEARS IN HOUSEHOLDS USING DOMESTIC WATER

9. Please indicate your agreement on the following statements on diarrheal cases among children less than five years in households using domestic water at Household Level? 1= very low extent; 2 = low extent; 3= moderate; 4=great extent; 5= very great extent

Statements	**5**	**4**	**3**	**2**	**1**
There are cases of diarrhoea among children under 5 years in Kangemi					
There are cases of mortality from diarrhoea among children under 5 years					
Domestic water contributes to cases of diarrhoea among children under 5 years in Kangemi					
Domestic water treatment practices affect the level of diarrhoea among children under 5 in Kangemi					
Contaminated foods washed or cooked with domestic water contributes to diarrhoea among children under 5 in Kangemi					

THANK YOU

Appendix IV: Interview Guide

i. How do economic determinants affect diarrheal cases among children under five years of age in Kangemi, Nairobi County?

ii. How do demographic determinants affect diarrheal cases among children under five years of age in Kangemi, Nairobi County?

iii. In which ways do awareness determinants affect diarrheal cases among children under five years of age in Kangemi, Nairobi County?

iv. Which other factors affect the level of diarrheal cases among children under five years of age in Kangemi, Nairobi County?

v. Does domestic water affect diarrheal cases among children under five years of age in Kangemi, Nairobi County? Please explain

Appendix V: Approval Letter

OFFICE OF THE DIRECTOR OF GRADUATE STUDIES AND RESEARCH
UNIVERSITY OF EASTERN AFRICA, BARATON
P.O. BOX 2500-30100, Eldoret, Kenya, East Africa

B0106022020 February 6, 2020

TO: Onyango Isabella Sophia
Department of Public Health
Jaramogi Oginga Odinga University of Science and Technology

Dear Sophia,

RE: Determinants of Domestic Water Management at Household Level on Diarrheal Cases Among Children Under Five Years of Age in Kangemi, Nairobi County

This is to inform you that the Research Ethics Committee (REC) of the University of Eastern Africa Baraton has reviewed and approved your above research proposal. Your application approval number is UEAB/REC/06/02/2020. The approval period is 6th February, 2020 – 5th Febuary, 2021.

This approval is subject to compliance with the following requirements;

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

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

Sincerely yours,

Jackie K. Obey

Prof. Jackie K. Obey, PhD
Chairperson, Research Ethics Committee

University of Eastern Africa, Baraton
06 FEB 2020
P. O. Box 2500-30100, ELDORET
Research Ethics Committee

Appendix VI: Research Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Ref No: **487217**

Date of Issue: **23/March/2020**

RESEARCH LICENSE

This is to Certify that Ms.. ISABELLA SOPHIA ONYANGO of Jaramogi Oginga Odinga University of Science and Technology, has been licensed to conduct research in Nairobi on the topic: DETERMINANTS OF DOMESTIC WATER MANAGEMENT AT HOUSEHOLD LEVEL ON DIARRHEAL CASES AMONG CHILDREN UNDER FIVE YEARS OF AGE IN KANGEMI, NAIROBI COUNTY for the period ending : 23/March/2021.

License No: **NACOSTI/P/20/3980**

487217

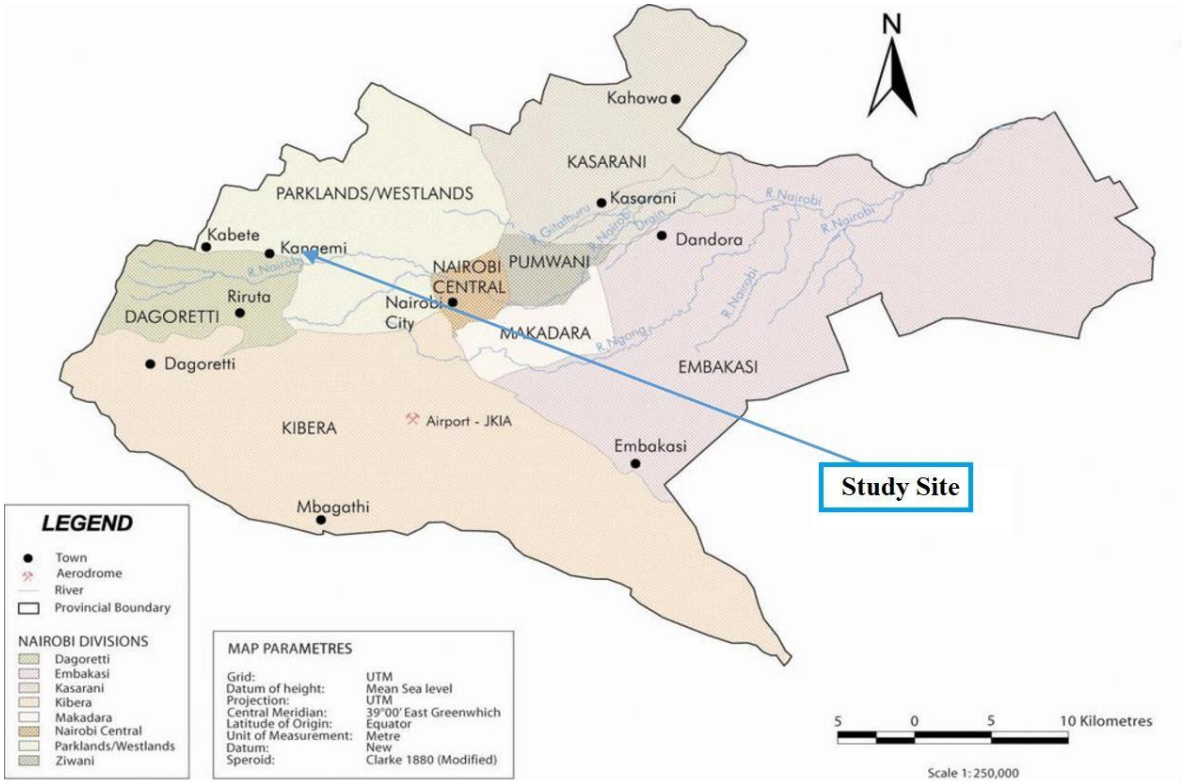
Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE,TECHNOLOGY & INNOVATION

Verification QR Code

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

Appendix VII: Map of Kangemi Areas in Nairobi County



Source: Mwangi, 2017.

Appendix VIII: Clearance for Data Collection

JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE & TECHNOLOGY

BOARD OF POSTGRADUATE STUDIES
Office of the Director

Tel. 057-2501804
Email: bps@jooust.ac.ke

P.O. BOX 210 - 40601
BONDO

Our Ref: H152/4383/2015

Date: 5th February 2020

TO WHOM IT MAY CONCERN

RE: ONYANGO ISABELLA SOPHIA – H152/4383/2015

The above person is a bona fide postgraduate student of Jaramogi Oginga Odinga University of Science and Technology in the School of Health Sciences pursuing Master of Public Health. She has been authorized by the University to undertake research on the topic: ***"Determinants of Domestic Water Management at Household Level on Diarrheal Cases among Children under five Years of Age in Kangemi, Nairobi County".***

Any assistance accorded to her shall be appreciated.

Thank you.

Prof. Dennis Ochuodho
DIRECTOR, BOARD OF POSTGRADUATE STUDIES