PREVALENCE & DETERMINANTS OF DIARRHEAL DISEASES AMONG CHILDREN UNDER FIVE YEARS ATTENDING KIRYANDONGO GENERAL HOSPITAL.

BY

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A RESEARCH DISSERTATION SUBMITTED TO THE FACULTY OF DENTISTRY AND CLINICAL MEDICINE IN PARTIAL FULFILMENT FOR THE AWARD OF BACHELOR OF MEDICINE AND SURGERY AT KAMPALA INTERNATIONAL UNIVERSITY

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DECLARATION

I do hereby declare that this research dissertation is the product of my own efforts and to the best of my knowledge and conviction, has never been presented to any institution for any award or qualification whatsoever. Wherever the works of other people have been included, due acknowledgement to this has been made in accordance with the appropriate referencing and citations. The findings and the analysis that will result from this research project will be my original information.

Researcher: **SEBUNYA ALEX, BMS/0009/141/DU**

Signature ……...

Date ……..….

APPROVAL

This is to certify that this research dissertation has been prepared under my supervision and has never been presented anywhere for any other purpose and is now ready for submission to the Faculty of Clinical Medicine and Dentistry of Kampala International University for further consideration.

Supervisor: Dr. ATUHÀIRWE MICHAEL, CONSULTANT PAEDIATRICIAN

Signed…….

Date……..……

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LIST OF ABBREVIATIONS AND ACRONYMS

ANC	**:**	Antenatal Care
ARI	**:**	Acute Respiratory Infection
CDC	**:**	Centre for Disease Control and Prevention
DM	**:**	Diabetes Mellitus
EAEC	**:**	Entero-Aggregative Escherichia coli
EHEC	**:**	Entero-Hemorrhagic Escherichia coli
ETEC	**:**	Entero-Toxigenic Escherichia coli
GOU	**:**	Government of Uganda
HICs	**:**	High Income Countries
HIV	**:**	Human Immune-deficiency virus
IREC	**:**	Institutional Research and Ethics Committee
LICs	**:**	Low Income Countries
LMICs	**:**	Low and Middle Income Countries
KDH	**:**	Kiryandongo General Hospital
KGH	**:**	Kiryandongo General Hospital
KIU	**:**	Kampala International University
MDGs	**:**	Millennium Development Goals
MICs	**:**	Middle Income Countries
MSD	**:**	Moderate – severe – diarrhea
PEM	**:**	Protein Energy Malnutrition
PUO	**:**	Pyrexia of Unknown Origin
SDGs	**:**	Sustainable Development Goals
UNICEF	**:**	United Nations Children's Fund
VIP	**:**	Ventilated Improved Pit latrine
WHO	**:**	World Health Organization

OPERATIONAL DEFINITIONS

All definitions as per (UNAIDS, 2015)

Acute diarrhea **:** Lasts several hours or days (less than 14 days)

Chronic diarrhea **:** Lasts for more than 21 days with evidence of underlying chronic illness such as inflammatory bowel disease (IBD), Human Immune deficiency virus (HIV), Diabetes Mellitus (DM) etc.

Diarrhea **:** Three to four times loses of stool per 24 hours reported by mother or caretaker in the preceding two weeks of the study.

Dysentery **:** Bloody diarrhea. May be parasitic or bacterial.

Persistent diarrhea **:** Lasts more than 14 days

Under-fives **:** Children between the ages of 0 – 59 months.

Watery diarrhea **:** Without blood in diarrheal stools. May be osmotic or secretory.

ABSTRACT

Introduction: Globally diarrhoea kills 2,195 children every day—more than AIDS, malaria, and measles combined. That is like losing nearly 32 school buses full of children each day! 1 in 9 child deaths are due to diarrhoea, making 801, 000 child deaths from diarrhoea every year. This makes diarrhoea the second leading cause of death among the under-fives. Despite this positive trend seen globally resulting from socioeconomic development and implementation of child survival interventions, in Africa the state of affairs is still worrisome. The average child in developing countries experiences three or more episodes of diarrheal disease each year, accounting for up to 4 billion cases annually.

Objective: To assess the prevalence and associated factors of diarrhea among children under the age of five years attending Kiryandongo General Hospital (KGH).

Method: A descriptive questionnaire-based cross-sectional study design was used that involved 135 under-fives with the diagnosis of diarrhea.

Results: The prevalence of under-five diarrhea was 7.45%. The significant factors were age, sex and breastfeeding history of the under-five. Others were number of children, number of children below the age of five, education and occupation status of the mother, water and sanitation. The age of the mother was found to be insignificant.

Conclusion: The prevalence of diarrhea in under-fives was 7.45%, a value lower than previous statistics with evidence of a significant decline in diarrhea-related hospitalizations and death. Factors found significant in diarrhea among under-fives included age between 1 and 2 years, male sex, poor adherence to exclusive breastfeeding, 3 or more children in a family with more than 2 children being below five years, low education status and lack of employment of primary caretaker. Environmental factors included unsafe, unprotected drinking water sources and poor treatment measures for drinking water. The age of the mother was found to have no statistically significant association.

CHAPTER ONE: INTRODUCTION

1.1.BACKGROUND

Globally diarrhea kills 2,195 children every day—more than AIDS, malaria, and measles combined. That is like losing nearly 32 school buses full of children each day! 1 in 9 child deaths are due to diarrhea, making 801, 000 child deaths from diarrhea every year. This makes diarrhea the second leading cause of death among the under-fives. For children with HIV, diarrhea is even more deadly; the death rate for these children is 11 times higher than the rate for children without HIV (CDC, 2012).

Diarrhea causes death through depletion of body fluids resulting in profound dehydration and electrolyte imbalances. It can have a detrimental impact on childhood growth and cognitive development. More than 80% of diarrhea-associated deaths are attributable to unsafe water, inadequate sanitation, and insufficient hygiene.

According to the CDC, rotavirus is the leading cause of acute diarrhea and causes about 40% of hospitalizations for diarrhea in children under 5. Most diarrheal germs are spread from the stool of one person to the mouth of another. These germs are usually spread through contaminated water, food, or objects which become contaminated with stool in many ways including people and animals defecate in or near water sources that people drink, contaminated water is used to irrigate crops, food handlers do not wash their hands before cooking, people with contaminated hands touch objects, such as doorknobs, tools, or cooking utensils etc.

Strides made over the last 20 years have shown that, in addition to rotavirus vaccination and breastfeeding, diarrhea prevention focused on safe water and improved hygiene and sanitation is not only possible, but cost effective: every $1 invested yields an average return of $25.50 (CDC, 2012).

The incidence of diarrhea is higher among the under-fives particularly in low income-countries (LICs), then followed by middle-income countries (MICs) and then least in high-income countries (HICs). Even though the variation is not that substantial, the case fatality ratios are.

The top killers among the under-fives are infectious diseases, especially pneumonia, diarrhea, and malaria (Black et al., 2010)(Liu et al., 2012).

In the year 2010, there were about 1.73 billion cases of diarrheal disease and 2% of episodes progressed to severe disease(Fischer Walker et al., 2013). Of 7.6 million deaths in the under-fives in 2010, 64% (4.879 million) could be attributed to infections and 10.5% were due to by

diarrhea (Liu et al., 2012). The largest proportion of these childhood deaths are in Sub-Saharan Africa where half of the deaths are from diarrhea. Among all children under-fives, deaths as a result of diarrhea decreased by 4% per year as from 2000 – 2010 (Liu et al., 2012).

Despite this positive trend seen globally resulting from socioeconomic development and implementation of child survival interventions, in Africa the state of affairs is still worrisome. The average child in developing countries experiences three or more episodes of diarrheal disease each

year, accounting for up to 4 billion cases annually.

1.2.PROBLEM STATEMENT.

Diarrhea is the fifth cause of death among the under-fives causing more death than malaria, HIV and measles combined. This is an equivalent of losing 32 buses full of children daily (CDC, 2012).

50% of these childhood deaths occur in sub-Saharan Africa and despite the improvement in decline witnessed in childhood deaths elsewhere in the world, the trend in Africa is frightening. This is despite the several interventions put in place to improve childhood survival. As countries elsewhere are showing positive progress towards achieving the Millennium Development Goals(MDGs) and Sustainable Development Goals (SDGs), progress in Africa is under jeopardy since reduction of childhood mortality, particularly among the under-fives is the fourth goal (MDG_4) (United Nations, 2015). In Kiryandongo, many deaths among under the age of five years are caused by diarrhea and its complications (Bbaale, 2011). For this reason, the researcher proposed to conduct this study in Kiryandongo General Hospital.

1.3.STUDY OBJECTIVES

1.3.1. BROAD OBJECTIVE

To assess the prevalence and associated factors of diarrhea among children under the age of five years attending Kiryandongo General Hospital (KGH).

1.3.2. SPECIFIC OBJECTIVES

1. To determine prevalence of diarrhea among children under the age of five years attending Kiryandongo General Hospital.
2. To identify the various factors that predispose to diarrhea among the under-fives attending Kiryandongo General Hospital.

3. To assess diarrhea-related deaths among the under-fives attending Kiryandongo General Hospital.

1.4.RESEARCH QUESTIONS

1. What is the prevalence of diarrhea disease among children under the age of five years attending Kiryandongo General Hospital.?
2. With the advent of immunization against childhood diarrhea, has there been a shift in the diarrheal causes among the under-fives attending Kiryandongo General Hospital.
3. What are the various factors that predispose to diarrhea disease among the under-fives attending Kiryandongo General Hospital?
4. What is the case-fatality rate of diarrhea among the under-fives attending Kiryandongo General Hospital?

1.5.JUSTIFICATION OF THE STUDY

The fourth goal among the MDGs was to reduce child mortality by 2015. A few countries in Africa recorded minimal if any progress in achieving this goal. Whereas developed countries have achieved this goal, many countries in LMICs are still yet to or even have reported negative progress (United Nations, 2015).

Interventions such as vaccination against the rotavirus and breastfeeding have been cited as reasons towards reduction of diarrhea among the under-fives in the HICs, Interventions that were supposed to have been rolled out in countries worldwide. Sub-Saharan Africa, with its low socio-economic status and poor sanitation is the hardly hit by the diarrheal diseases among the under-fives. This is evidenced by the fact that Africa contributes 50% of all under-five deaths resulting from diarrhea(CDC, 2012).

The prevalence of diarrheal disease is more in developing countries due, partly, to lack of safe drinking water, sanitation and hygiene, as well as poorer overall health and nutritional status. According to the latest available figures, an estimated 2.5 billion people lack improved sanitation facilities, and nearly one billion people do not have access to safe drinking water. These unsanitary environments allow diarrhea-causing pathogens to spread more easily (Wardlaw, Salama, Brocklehurst, Chopra, & Mason, 2010).

The adoption of SDGs of 2030, came after the MDGs report of 2015, that highlighted the low attainment of some goals, particularly in sub-Saharan Africa, and the aim to sustain the achievements made in other countries. The sixth sustainable goal (SDG_6) was about provision of

clean water and sanitation that is geared towards prevention and eradication of diarrheal diseases (United Nations General Assembly, 2015).

This study, and others like it, is needed to provide the necessary evidence and information that can be used to measure the degree of progress made and furnish policy makers with important information they can use in decision making. Little data exists on the subject matter at Kiryandongo General Hospital and thus the researcher proposed to conduct the study with an effort to fill the existent information gap.

1.6.STUDY SCOPE

1.6.1. GEOGRAPHICAL SCOPE

The study was conducted at Kiryandongo General Hospital in the Western Region of Uganda. The hospital is on the Kampala–Gulu highway, in Kikube Parish, Kiryandongo sub-county, Kibanda County, in Kiryandongo District, about 50 kilometres (31 mi), north-east of Masindi General Hospital. This is approximately 211 kilometres (131 mi) north of the Mulago National Referral Hospital, the largest hospital in the country.The coordinates of the hospital are 01°52'46.0"N, 32°03'43.0"E (Latitude:1.879439; Longitude:32.061950). Kiryandongo General Hospital is a 109-bed, government-owned hospital. It serves Kiryandongo District and parts of the districts of Masindi, Nakasongola, Oyam, Apac, Amuru, and Nwoya.

1.6.2. CONTENT SCOPE

The study was about diarrhea among the under-fives. It looked at the prevalence and factors associated with diarrhea among this vulnerable but important age group as far as MDGs and SDGs are concerned. It also looked at the diarrhea-related deaths at KGH.

1.6.3. TIME SCOPE

The study was conducted in July to December 2018, a period of six months. This was the period for actual data collection.

1.7.CONCEPTUAL FRAMEWORK

Diarrhea among the under-fives is affected by independent variables that work at different levels; socio-economic & demographic factors e.g. income, parental education; behavioural factors related to water storage, water handling; environmental factors such as type of water source and its distance are all independent factors that can be modified or manipulated to influence diarrheal disease among the under-fives which is the dependent factor. These factors interplay in a way

that will determine the occurrence that they might prevent or promote the occurrence of diarrhea in the under-fives.

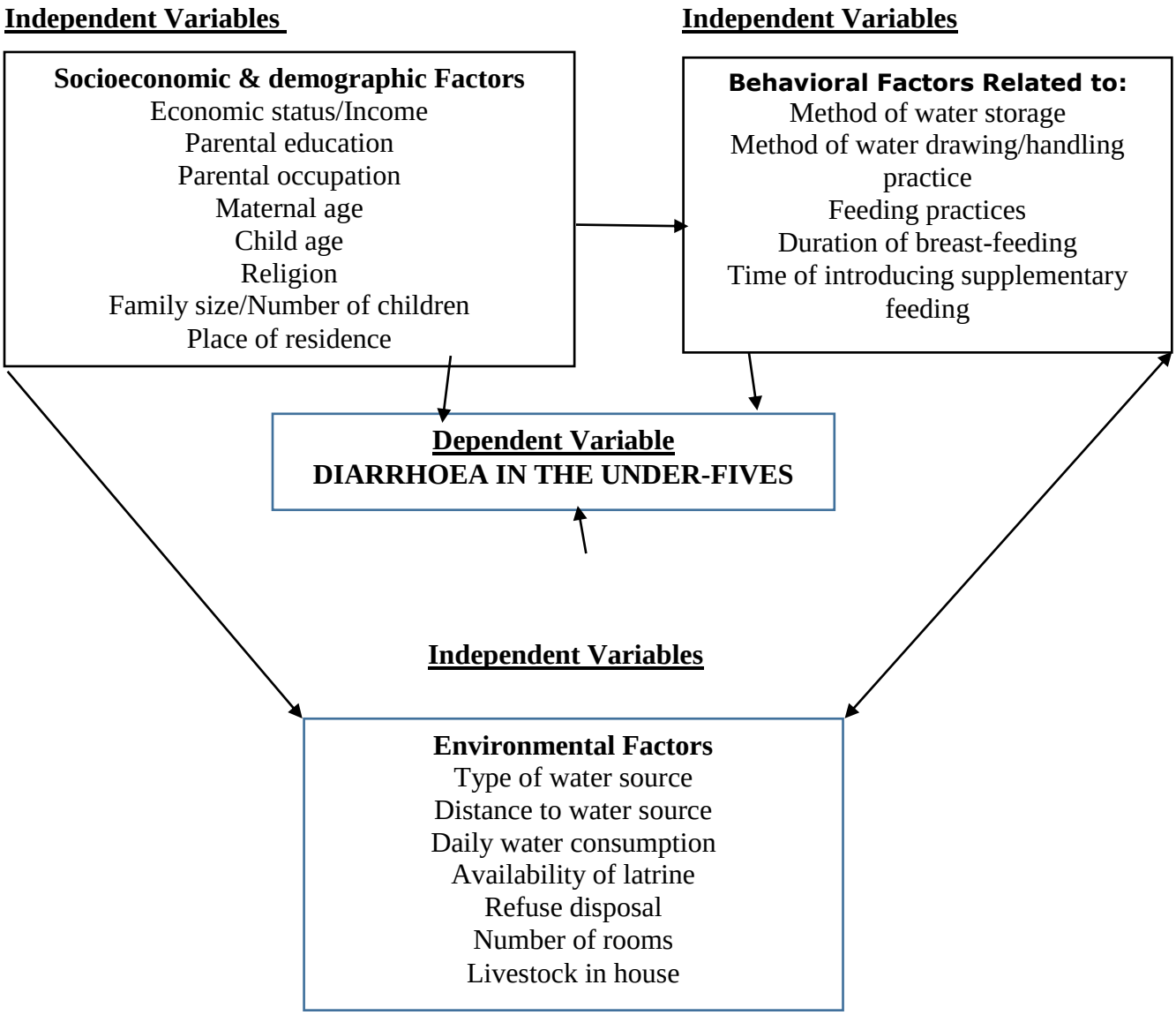

Figure 1:Conceptual Framework on Factors Associated with Diarrhea Among the Under-Fives

CHAPTER TWO: LITERATURE REVIEW

2.0. INTRODUCTION

This chapter looked into the literature reviewed on the prevalence of diarrheal disease among the under-fives, the factors that predispose these children under-five to diarrheal diseases and diarrhea-related deaths.

2.1. PREVALENCE OF DIARHEAL DISEASES AMONG THE UNDER-FIVES.

Diarrheal diseases account for 1 in 9 child deaths worldwide, making diarrhea the second leading cause of death among children under the age of 5. For children with HIV, diarrhea is even more common and deadlier; the death rate for these children is 11 times higher than the rate for children without HIV. About 2195 children die daily of diarrhea each daily. It is estimated that about 801,000 children die from diarrhea every year (CDC, 2012).

Each year, an estimated 2.5 billion cases of diarrhea occur among children under five years of age, and estimates suggest that overall incidence has remained relatively stable over the past two decades. More than half of these cases are in Africa and South Asia, where bouts of diarrhea are more likely to result in death or other severe outcomes. Mortality from diarrhea has declined over the past two decades from an estimated 5 million deaths among children under-fives in 1996 to 1.5 million deaths in 2016, which parallels downward trends in overall under-five mortality during this period. Despite these declines, diarrhea remains the second most common cause of death among children under five globally, following closely behind pneumonia, the leading killer of young children. Together, pneumonia and diarrhea account for an estimated 40 per cent of all child deaths around the world each year. Nearly one in five child deaths is due to diarrhea, a loss of about 1.5 million lives each year. The toll is greater than that caused by AIDS, malaria and measles combined (Wardlaw et al., 2010). This is shown in appendix six.

Pneumonia and diarrhea remain major killers of young children. Together, these diseases account for 29% of all deaths of children less than 5 years of age and result in the loss of 2 million young lives each year (UNICEF, 2013). Proportions contributed by pneumonia and diarrhea to under-five deaths are high as shown in appendix seven.

In a study done in urban slums of India on burden of health morbidities in 2015 it was shown that acute diarrheal infections were number four with a prevalence of 18.33%. this was next to protein energy malnutrition (PEM)(67.62%) followed by Acute Respiratory Infections (ARI)

(40.48%), and pyrexia of unknown origin (PUO)(20.24%) (Lakshminarayanan & Jayalakshmy, 2015).

A study in Eastern Ethiopia showed that the two-week prevalence of diarrhea among children under five years of age was 22.5% (95% CI: 20.3 - 24.6) (Mengistie, Berhane, & Worku, 2013).

In Mkuranga District, Tanzania in 2014 the prevalence of diarrhea in children below the age of five years as reported by heads of households was 6.1% and most affected were children in age groups 12 – 17 and 18 – 23 months (11.6% and 15.8% respectively; p – value 0.001) (Mashoto, Malebo, Msisiri, & Peter, 2014).

In Kanyanda, Luweero District, the prevalence of childhood diarrhea disease was found to be at a staggering 47.7% (Kakungulu, 2016).

2.2. FACTORS PREDISPOSING TO DIARRHEAL DISEASE AMONG UNDER-FIVES

So many risk factors are associated with diarrheal disease among the under-fives. The causative organisms can gain access through so many pathways as shown in appendix five.

Among factors that have been cited the major ones include environmental contamination and increased exposure to entero-pathogens. Additional risks include young age, immunodeficiency, measles, malnutrition, and lack of exclusive or predominant breast-feeding. Malnutrition increases the risk of diarrhea and associated mortality, and moderate to severe stunting increases the odds of diarrhea-associated mortality 1.6- to 4.6-fold. The fraction of such infectious diarrhea deaths that are attributable to nutritional deficiencies varies with the prevalence of deficiencies; the highest attributable fractions are in sub-Saharan Africa, south Asia, and Andean Latin America. The risks are particularly higher with micronutrient malnutrition; in children with vitamin A deficiency, the risk of dying from diarrhea, measles, and malaria is increased by 20-24%. Zinc deficiency is estimated to increase the risk of mortality from diarrhea, pneumonia, and malaria by 13-21% (Marcdante & Kliegman, 2014).

In a study carried out in Kabul, Afghanistan it was found that the highest risk of diarrheal illnesses was during the summer months (incidence 5.71 episodes per child-year (95%CI 5.48–5.96) and lowest during winter months (2.12 episodes per child year (95%CI 2.02–2.21). The seasonal trends in hazards are illustrated in Fig. 2. The risk of diarrhea was 63% lower in winter as compared to summer (HR = 0.37, 95%CI 0.35–0.39, $p<0.001$).

Among children less than six months of age the incidence of diarrheal episodes was 2.35 per child-year (95%CI 2.15–2.57). For children aged six months to less than one year, the incidence

was 3.89 episodes per child-year (95%CI 3.73–4.06). In univariate analysis, the risk of diarrheal illness was 60% greater among children aged six months to one year in comparison to those less than six months of age. For children greater than one year of age, the incidence of diarrheal illness was 3.48 episodes per child-year (95%CI 3.36–3.60) with a 48% greater risk of recurrent episodes. Malnourished children and those from impoverished households had a greater risk for recurrent illnesses. Children who were born to mothers with greater than primary education had a lower risk recurrent events as compared to those born to mothers with primary education or less. Among children from homes using wells the risk of diarrheal illnesses was lower in comparison to a piped water source. Water treatment with chlorine was found to confer a reduced risk of diarrheal illnesses however no significant difference was found when treatment with boiling was reported. Food storage with refrigeration, having an in-home well, use of a toilet with septic/canalization and maternal hand washing with soap post-toilet use were all associated with a reduced risk of diarrheal disease. In recurrent event multivariate analysis malnourishment and being from an impoverished household were associated with an increased risk of childhood diarrheal illnesses at 15% and 20% respectively (aHR = 1.15, 95%CI 1.03–1.29, p = 0.016 and aHR = 1.20, 95%CI 1.05–1.37, p = 0.006). Level of maternal education, maternal hand washing with soap post-toilet, and use of a toilet with septic/canalization were found to be protective against recurrent illnesses. Maternal education post primary school was associated with 21% lower risk (aHR = 0.79, 95%CI 0.69–0.91, p = 0.001), and hand washing with soap a 17% reduction (aHR = 0.83, 95%CI 0.74–0.92, p<0.001). Children from households using toilets with septic/canalized systems were had a 24% lower risk of diarrheal illnesses (aHR = 0.76, 95%CI 0.63–0.93, p = 0.006). A trend of reduced risk was found among households using an open well versus a piped water source (aHR = 0.87, 95%CI 0.76–1.00, p = 0.053). No significant association was found in relation to diarrheal illnesses and tube wells. Treatment of drinking water, food storage, distance to water source, sleeping with other children and number of rooms in the home were not significantly associated with risk of diarrheal illness in multivariate analysis (Samwel et al., 2014).

In a study conducted among the nomadic populations of Northeast Ethiopia, it was noted that the occurrence of diarrheal disease was associated with the number and age of under-five children in the households. The occurrence of diarrhea was 4.3 times more likely to be higher among households with two children compared with households with only one child [AOR = 4.3, 95%

CI = (2.9, 6.3)]. Similarly, the likelihood of diarrhea occurrence was also 22.4 times higher among households with three children compared with households who had one child [AOR = 22.4, 95% CI = (7.8, 64.5)]. Children aged between 6.0 and 11.0 months had 4.8 times more chance to have diarrhea than children aged under 6 months [AOR = 4.8, 95% CI = (2.1, 10.8)]. Similarly, the occurrence of diarrhea among under-five children aged between 12.0–23.0 and 24.0–35.0 months was 6.0 and 2.5 times more likely to be higher compared with children aged under 6 months [AOR = 6.0, 95% CI = (2.9, 12.2)] and [AOR = 2.5, 95% CI = (1.2, 5.4)], respectively. Furthermore, childhood diarrheal disease was statistically associated with the educational status of mothers and household economic status. The likelihood of diarrhea occurrence was 2.5 times higher among children whose mothers had no formal education compared with their counterparts [AOR = 2.5, 95% CI = (1.2, 5.2)]. The occurrence of diarrhea was 1.6 times higher among children whose families were economically poor compared with children whose families had medium income [AOR = 1.6, 95% CI = (1.0, 2.2)] (Woldu, Bitew, & Gizaw, 2016).

2.3. CASE-FATALITY RATE OF DIARTRHOEA AMONG UNDER-FIVES

Diarrhea kills 2,195 children every day—more than AIDS, malaria, and measles combined. Diarrheal diseases account for 1 in 9 child deaths worldwide, making diarrhea the second leading cause of death among children under the age of 5. For children with HIV, diarrhea is even more deadly; the death rate for these children is 11 times higher than the rate for children without HIV (Centres for Disease Control, 2018).

Diarrhea is a major cause of mortality in children under 5 years of age in developing countries, contributing up to 21 % of deaths. Globally, rotavirus diarrhea causes more than 450,000 deaths annually in children below five years, with 80 % of deaths occurring in sub-Saharan Africa and South Asia (Bwogi et al., 2016).

In 2013, an estimated 47 100 rotavirus deaths occurred in India, 22% of all rotavirus deaths that occurred globally. Four countries (India, Nigeria, Pakistan, and Democratic Republic of Congo) accounted for approximately half (49%) of all estimated rotavirus deaths in 2013 (Tate et al., 2016).These deaths, however, have declined since the advent of Rotavirus vaccinations in children.

A study conducted in Mexico, for instance, documented a substantial and sustained decline in diarrhea-related hospitalizations and deaths in Mexican children associated with implementation

of rotavirus vaccination. These results highlighted the public health benefits that could result in countries that adopt rotavirus vaccination into their national immunization programs (Sánchez-Uribe, Esparza-Aguilar, Parashar, & Richardson, 2016). Similar reports came from Botswana where following introduction of RV1 into the national immunization program, significant declines in hospitalizations and deaths from gastroenteritis were observed among children in Botswana, suggestive of the beneficial public health impact of rotavirus vaccination (Enane et al., 2016).

In Uganda, a majority of the under-five deaths are due to malaria, followed by diarrhea, severe/moderate anaemia and severe/moderate malnutrition (Nambuusi, Ssempiira, Makumbi, Kasasa, & Vounatsou, 2019).

CHAPTER THREE: METHODOLOGY

3.0.INTRODUCTION

This chapter describes the study area focusing on Geographical location, population structure and many other aspects including Study design, sample size determination, sampling method, selection criteria, data Collection, data analysis, data presentation, data quality control, study limitation and Ethical consideration.

3.1. STUDY DESIGN

Descriptive cross sectional survey with both qualitative and quantitative components will be used.

3.2. STUDY POPULATION

All children under the age of five years attending Kiryandongo General Hospital (KGH).

3.2.1. INCLUSION CRITERIA

The child should be 0 – 59 months of age, the caretaker should consent and the child should meet the case definition of diarrhea (3 or more abnormally loose stools in the previous 24 hours). The diarrhea should be moderate to severe (MSD) meaning that the child meets at least one of the following criteria: Sunken eyes, confirmed by parents/primary caregiver as more than normal, loss of skin turgor determined by abdominal skin pinch (slow return [less or equal to 2 seconds]) or very slow return [greater than 2 seconds], intravenous rehydration administered or prescribed, dysentery (visible blood in a loose stool), hospitalized with diarrhea or dysentery.

3.2.2. EXCLUSION CRITERIA

Any child who does not meet the set criteria or whose caretaker refuses consent will be excluded.

3.3. SAMPLE SIZE DETERMINATION

The sample size will be determined using Fishers et al., 2006 formula. The formula is used to estimate the smallest possible categorical sample size. A total of 150 respondents will be used. formula. i.e. $N=Z^2PQ/D^2$:

Where N is the desired sample size

Z is the standard normal deviation taken as 1.96 at a confidence interval of 95%.

P is the proportion of the target population estimated to have diarrheal disease = 11% (estimated from WHO prevalence rates, 2015)

D is the degree of accuracy= 0.05.

Q= (1-P) which is the population without the desired characteristics.

Therefore, N= 1.96^2 X 0.11 (1-0.11) / $(0.05)^2$= 150.44, **150 respondents**

3.4. SAMPLING TECHNIQUE

Systematic convenient sampling will be employed in carrying out the study.

3.5. DATA COLLECTION METHOD

A two-pronged approach of data collection will be employed. Patient data will be obtained from history-taking notes from the patient's file and progress records, and physical examination of patients. More information will be obtained through a self-administered questionnaire.

3.6. DATA COLLECTION TOOLS AND PROCEDURE

Patients files will be reviewed to verify a diagnosis of diarrhea. This information will be supported by analysis of the lab reports on possible causative agents of the diarrhea. A self-administered questionnaire will then be used. The data will be collected using both open and close ended structured questions on socio-demographic characteristics and possible risk factors predisposing to diarrheal disease among the under-fives. These will be administered to the caretakers.

3.7. QUALITY CONTROL

Quality control will be ensured through induction and training of the research assistants, who would have been selected based on their knowledge of the field and language. The questionnaire, will also be pre-tested before the primary study. The data collection instrument format will be developed in English by different individuals for its accuracy and desired results.

3.8. DATA ANALYSIS

Each questionnaire will be checked for completeness, missed values and Unlikely responses and then manually cleaned up on such indications. Data will be exported to SPSS version 17. Using double entry, the data will be cross checked for consistency and accuracy. Responses and observations given points and tallied then recorded to obtain means then presented in graphs, charts and tables.

3.9. ETHICAL CONSIDERATIONS

Clearance will be obtained from Kampala International University-Western Campus faculty of clinical medicine & dentistry through IREC. Consent will be obtained, both verbally and in writing from each selected participant's caretaker. Confidentiality will be ensured throughout the

whole process and all information obtained from the respondents will be used solely for the purpose of the study.

CHAPTER FOUR: STUDY FINDINGS

4.0.INTRODUCTION

This chapter presents the study findings as per the objectives and presents them in the form of statements, tables, graphs and charts.

4.1. PREVALENCE OF DIARRHEA AMONG UNDER-FIVES (N=135)

During the six months' period of study, from July 2018 to December 2018, there were a total of 1812 admissions in the pediatric wards and out of these, 135 diagnoses of diarrhea were made. The monthly breakdown is as shown in table 1 below.

MONTH IN 2018	ADMISSIONS (N)	DIARRHEA CASES (N)	PERCENTAGE (%)
JULY	355	11	3.1
AUGUST	344	13	3.78
SEPTEMBER	214	7	3.27
OCTOBER	360	70	19.44
NOVEMBER	287	24	8.36
DECEMBER	252	10	3.97
TOTALS	**1812**	**135**	**7.45**

Table 1: Monthly breakdown of admissions and diarrhea cases (N=135)

The least number of diarrhea admissions were 7 during the month of September while October registered the most diarrhea cases at 70. Over the six months' period, there were a total of 135 diarrhea cases out of a total of 1812 admissions. This gave a total diarrhea prevalence of 7.45% among the under-fives.

4.2. FACTORS ASSOCIATED WITH DIARRHEA AMONG UNDER-FIVES (N=135)

4.2.1. Child-Related Factors

AGE OF CHILD	FREQUENCY (N)	PERCENTAGE (%)
Less than 1 year	6	4.44
1 – 2 years	97	71.85
3 – 5 years	32	23.71

SEX OF CHILD		
Male	86	63.70
Female	49	36.30
EXCLUSIVE BREASTFEEDING		
Less than 6 months	68	50.37
6 months	40	29.63
12 months	27	20
CORMORBIDITIES		
Malnutrition	14	10.37
Anemia	6	4.44
Worm infestation	17	12.59
Malaria	2	1.48

Table 2: Child-related Factors Associated with Diarrhea in Under-fives (N=135)

From table 2 above, it is evident that being between 1 and 2 years old (71.65%), and male child (63.70%), was associated with diarrhea among the under-fives. Nonadherence to exclusive breastfeeding for at least six months was also associated with diarrhea among the under-fives. The two common comorbid conditions were worm infestations (12.59%) and malnutrition (10.37%). Anemia and malaria were the other comorbidities found in these under-fives.

4.2.2. Family Dynamics as Factors for Diarrhea among Under-fives

NUMBER OF CHILDREN	**FREQUENCY (N)**	**PERCENTAGE (%)**
2 and below	7	5.19
3 to 4 children	79	58.52
5 and above	49	36.29
CHILDREN BELOW 5 YRS.		
2 or less	4	2.96
More than 2	131	97.04
AGE OF THE MOTHER		
Less than 18 years	42	31.11
18 to 30 years	45	33.33

Above 30 years	48	35.56
EDUCATION STATUS OF PRIMARY CARETAKER		
None	37	27.41
Primary	72	53.33
Secondary	22	16.30
Tertiary	4	2.96
OCCUPATION OF PRIMARY CARETAKER		
Housewife / Peasant	92	68.15
Business	31	22.96
Formally employed	12	8.89

Table 3: Family Dynamics and Prevalence of Diarrhea in Under-fives (N=135)

From table 3 above, certain family dynamics were associated with diarrhea among the under-fives. Having three or more children, with 2 or more of them being below five years in a family whose mother had primary level as the highest level of education and hose primary caretaker led a peasant way of life or was a housewife was associated with diarrhea among the under-fives. No significant relationship was found between the age of the mother and diarrhea among the under-fives.

4.2.3. Sanitation as Factors Associated with Diarrhea among the Under-fives

Family sanitation was assessed mainly through questions on water source and human waste disposal. Practices such as handwashing and water treatment before use were also used as indicators of general sanitation.

4.2.3.1. Sources and Handling of Water for Domestic Use (N=135)

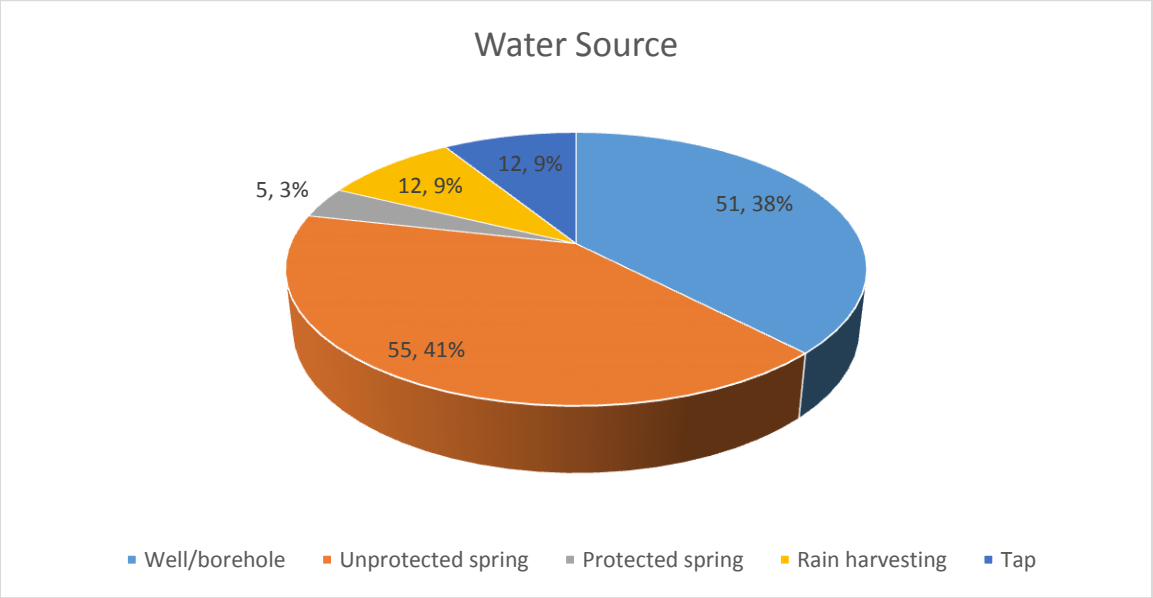

Figure 2: Source of water for domestic use (N=135)

A majority of the families obtained their water for domestic use either from a well/borehole (38%) or unprotected spring (41%). Rain harvesting (9%), protected spring (9%) and tap (3%) were the other water sources mentioned. Only 41% of the households somehow treated their drinking water through either boiling or placing under the sun which they then stored mainly in Jerri cans, plastic or metallic drums.

4.2.3.2. Ownership of a Pit latrine for Disposal of Human waste (N=135)

All the households had a pit latrine for disposal of their human waste. Most of them had the traditional type of pit latrine as shown in the figure below.

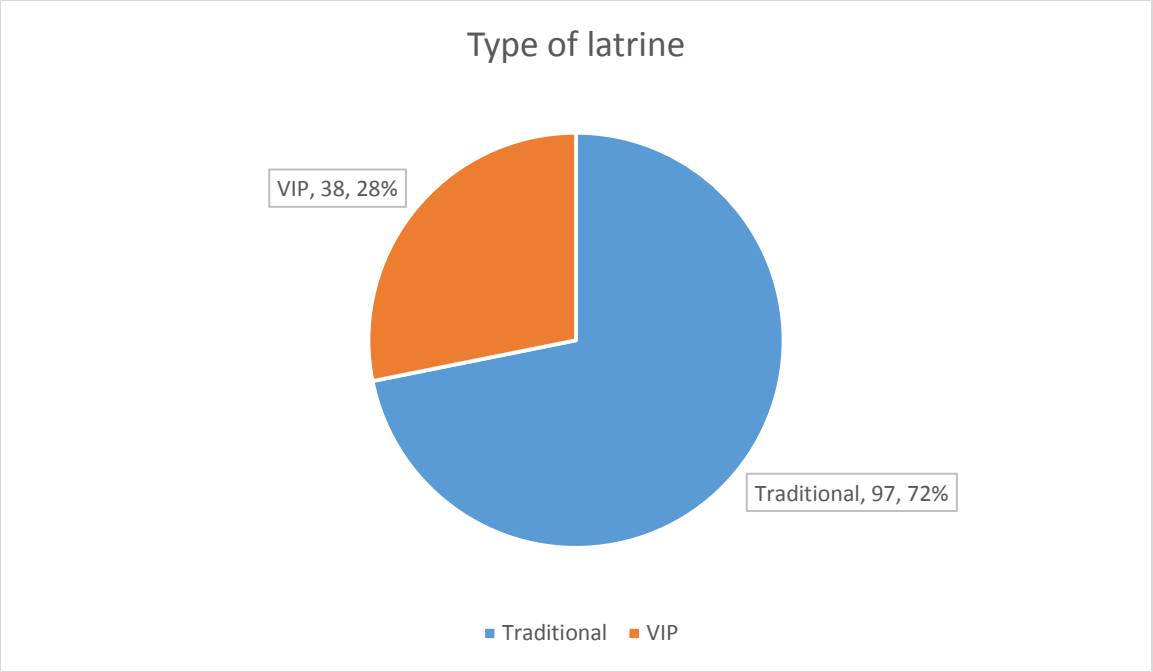

Figure 3: Ownership and Type of Pit Latrine (N=135)

Traditional type (97%) was the common pit latrine type among the households. Those with a ventilated-improved pit latrine made only 28% of the ownership. Only 40 (29.63%) acknowledged having a pit cover for the latrine while 95 (70.37%) did not have. All of them said that they had doors for their pit latrines which were located less than 100 meters from the main house but more than 100 meters from the water sources. All those whose water source was either a well/borehole or spring (both protected or not) had these sources downstream to the latrines.

4.2.3.3. Handwashing Practices after Visiting the Latrine (N=135)

Despite most caretakers saying that they always washed their hands after visiting the latrine, very few affirmed having a handwashing station near their latrines which was supplied with clean water and soap at all times. This is shown in figure four below.

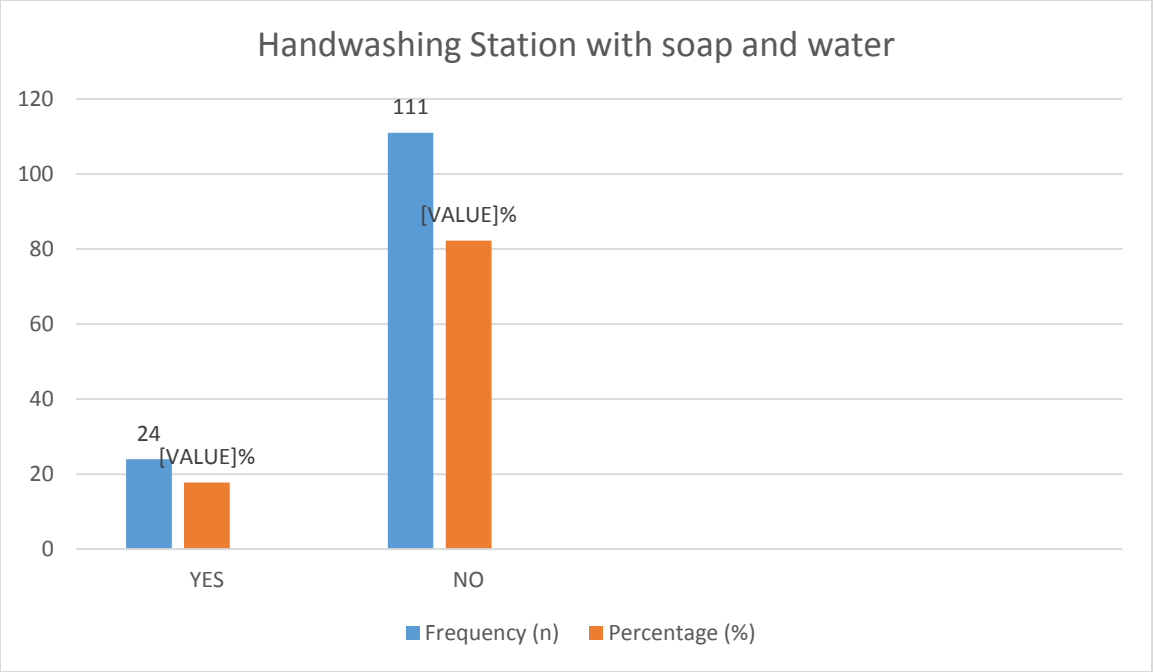

Figure 4: Presence of Handwashing Station with Clean Water and Soap (N=135)

As shown in figure 4 above, ownership of a handwashing station was low despite regular handwashing reported after visiting the toilet. Only 24 (17.78%) affirmed having a handwashing station.

4.3. DIARRHEA-RELATED DEATHS AMONG UNDER-FIVES

Out of the total 135 diarrhea cases admitted and managed at KGH during the study period, not a single diarrhea-related death was reported. The case-fatality rate attributable directly to diarrhea was zero.

CHAPTER FIVE: DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.0.INTRODUCTION

This chapter presents the discussion of the study findings as per the objectives, the conclusions made from these findings and the recommendations made to various stakeholders.

5.1. DISCUSSIONS

5.1.1. Prevalence of Diarrhea among Under-fives

During the six-month period of study, 135 diarrhea admissions were made out of 1812 total admissions, placing under-five diarrhea prevalence at 7.45%. Despite this figure being a bit higher than the 6.1% reported in Mkuranga District, Tanzania in 2014 by (Mashoto et al., 2014), a declining trend is apparent as evidenced by the fact that this value is way lower than the 18.33% reported in the urban slums of India in 2015 (Lakshminarayanan, 2015), the 22.5% reported in Eastern Ethiopia (Mengistie et al., 2013), and way lower than the 47.7% reported in Kanyanda, Luweero District in 2016 (Kakungulu, 2016).

5.1.2. Factors Associated with Diarrhea among Under-fives

Age between 1 and 2 years old (71.65%), and male sex (63.70%), were associated with diarrhea among the under-fives. Nonadherence to exclusive breastfeeding for at least six months was also associated with diarrhea among the under-fives. Those aged 1 to 2 years had an increased risk probably due to introduction of new foods and also at this age the child is very active and playing so much outside with increased interaction with the surrounding environment. This increases exposure to diarrhea causing pathogens. These results agree with those by (Samwel et al., 2014) in Kabul, Afghanistan.

Family factors associated with diarrhea were having three or more children, with 2 or more of them being below five years in a family whose mother had primary level as the highest level of education and hose primary caretaker led a peasant way of life or was a housewife but no significant relationship was found between the age of the mother and diarrhea among the under-fives. These results, on the relationship of family dynamics and diarrhea among under-fives agree with those found by (Woldu et al., 2016) in their study on the sociodemographic determinants of under-five diarrhea among nomadic pastoralist communities of Northeastern Ethiopia.

Environmental correlates to diarrhea among under-fives were low levels of water treatment that was fetched from unprotected wells or springs that were mainly situated downstream to traditional pit latrines.

5.1.3. Diarrhea-related Deaths among Under-fives

There were zero deaths reported in this study. All diarrhea diagnoses were managed and discharged. This is indicative of good diarrhea management at KGH such that no fatalities result from diarrhea and its complications.

This emphasizes the decline in diarrhea-related hospitalizations and deaths as reported in Mexico by (Sánchez-Uribe et al., 2016) and shows improvement on previous Ugandan statistics that diarrhea is second only to malaria as an under-five killer as reported by (Nambuusi et al., 2019).

5.2. CONCLUSIONS

The prevalence of diarrhea in under-fives was 7.45%, a value lower than previous statistics with evidence of a significant decline in diarrhea-related hospitalizations and death. Factors found significant in diarrhea among under-fives included age between 1 and 2 years, male sex, poor adherence to exclusive breastfeeding, 3 or more children in a family with more than 2 children being below five years, low education status and lack of employment of primary caretaker. Environmental factors included unsafe, unprotected drinking water sources and poor treatment measures for drinking water. The age of the mother was found to have no statistically significant association.

5.3. RECOMMENDATIONS

5.3.1. To the Caretakers of Under-fives

Improve on hand sanitation particularly after visiting the latrine by increasing use of handwashing stations equipped with soap and clean water. Ensure adherence to exclusive breastfeeding for at least 6 months for it has been proven to be of tremendous benefit to the child. Always attempt to protect their water sources such as wells and springs from possible contamination and in as much as possible make sure that the sources are not situated downstream to the latrines. Always treat their drinking water by boiling and not placing under the sun.

5.3.2. To the Staff of Kiryandongo General Hospital

Increase awareness on diarrhea prevention practices such as handwashing after visiting the latrine, before and after preparing meals for the family and the under-five children. Revitalize campaigns for exclusive breastfeeding.

5.3.3. To the Local Leaders and Governance

Ensuring ownership and use of pit latrines in every homestead possibly with upgrading of all traditional pit latrines to the more sanitary ventilated-improved pit latrines. Protection of all collective water sources such as community wells and springs so as to minimize contamination.

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APPENDICES

APPENDIX ONE: CONSENT FORM

CONSENT FORM

STUDY TITLE: PREVALENCE, ETIOLOGY & DETERMINANTS OF DIARRHEAL DISEASES AMONG CHILDREN UNDER FIVE YEARS ATTENDING KIRYANDONGO HOSPITAL.

I have read and understood the research topic above on the planned study and the explanations given to me. I understand what I have been requested to do in respect to this study.

I have asked questions and clarifications that existed about the study and got satisfied with the answers. I have, after due consideration, willingly consented to take part in this study as explained.

I also understand that my participation is voluntary, with the freedom to opt out of participating at any time during the study.

Participant's signature …… Date ……...

Investigators name …… Signature ……

Date ……

APPENDIX TWO: DATA COLLECTION TOOL

STUDY QUESTIONNAIRE

SERIAL NO: …….

INTRODUCTION

STUDY TITLE: PREVALENCE, ETIOLOGY & DETERMINANTS OF DIARRHEAL DISEASES AMONG CHILDREN UNDER FIVE YEARS ATTENDING KIRYANDONGO HOSPITAL.

CONFIDENTIALITY: I am **Sebunya Alex**, a final year medical student at Kampala International University – Western Campus carrying out the above research. I would hereby wish to assure you that the information you will provide will be accorded the confidentiality it deserves and will not be used for purposes other than those meant for this research. You have the right not to answer any questions you feel uncomfortable to and you are free to pull out of the study at any time you wish.

PART ONE: SOCIO-ECONOMIC CHARACTERISTICS

AGE OF CHILD ……

AGE OF MOTHER ……...

RELIGION ……

PLACE OF RESIDENCE …….

NUMBER OF ROOMS ……...

FAMILY SIZE …….

NUMBER OF CHILDREN …….

NUMBER OF CHILDREN 5 YEARS AND BELOW ……

RELATION OF CARETAKER ……...

EDUCATION STATUS OF MOTHER
- ☐ NO FORMAL EDUCATION
- ☐ PRIMARY
- ☐ SECONDARY
- ☐ POST SECONDARY

EDUCATION STATUS OF FATHER
- ☐ NO FORMAL EDUCATION
- ☐ PRIMARY
- ☐ SECONDARY
- ☐ POST SECONDARY

OCCUPATION OF MOTHER ……..……

OCCUPATION OF FATHER …….…….

PART TWO: MAIN BODY ASSESSING FACTORS ASSOCIATED WITH DIARRHEA AMONG THE UNDER-FIVES

1. where do you get your water from?

Rain ☐ Well/bore hole ☐ Spring ☐ Tap ☐

Protected spring ☐

Others (specify) ……

---

2. how far is the water source from the homestead?

……

3. Do you treat your drinking water? YES ☐ NO ☐

If yes, How?

Boiling ☐

Heating under the sun ☐

Putting water guard ☐

Filtering ☐

Any other (specify) ……

4. How do you store your water for drinking? ……..
5. On average, how much water do you use in a day? (estimate in liters) ……
6. For how long have you exclusively breastfed your child?

Less than six months ☐

Six months ☐

Nine months ☐

One full year ☐

18 months ☐

7. At what age did you stop breastfeeding your child completely? ……
8. At what child's age did you introduce new feeds/ weaned the child? ……

9. What did you wean your child on?
   ……..
10. Do you have a pit latrine in your homestead? YES ☐ NO ☐
    If yes, which type?
    Traditional ☐
    Ventilated Improved Pit (VIP) latrine ☐
11. Does it have a cover for the pit? YES ☐ NO ☐
12. Does it have a door? YES ☐ NO ☐
13. How far is it from
    a. The main house? …….
    b. The water source? ……
14. Do you have a station with water and soap that can be used after visiting the pit latrine? ☐
    YES ☐ NO
15. In relation to the water source, the location of the pit latrine is?
    Upstream ☐
    Downstream ☐
16. Do you own livestock? YES ☐ NO ☐
    If yes, do you have a separate house/shed for them?
    YES ☐ NO ☐

Do you have anything else you want to add, any question, clarification, concern etc.?

Otherwise,

THANK YOU.

APPENDIX THREE: PATHWAYS OF DIARRHEA TRANSMISSION

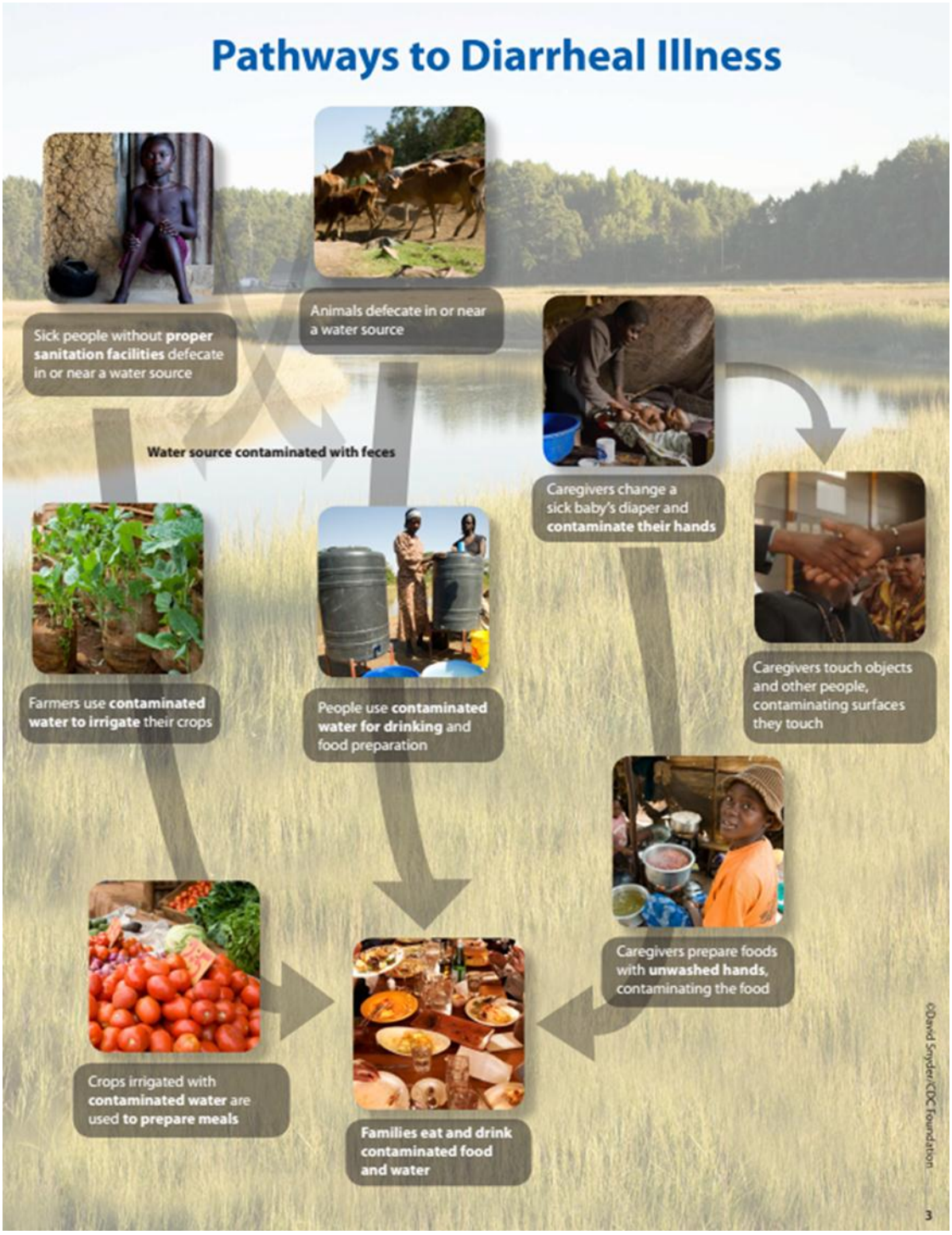


Figure 5: Pathways to Diarrheal Illness; courtesy of Centers for Disease Control and Prevention

APPENDIX FOUR: TOP CAUSES OF DEATH AMONG UNDER-FIVES

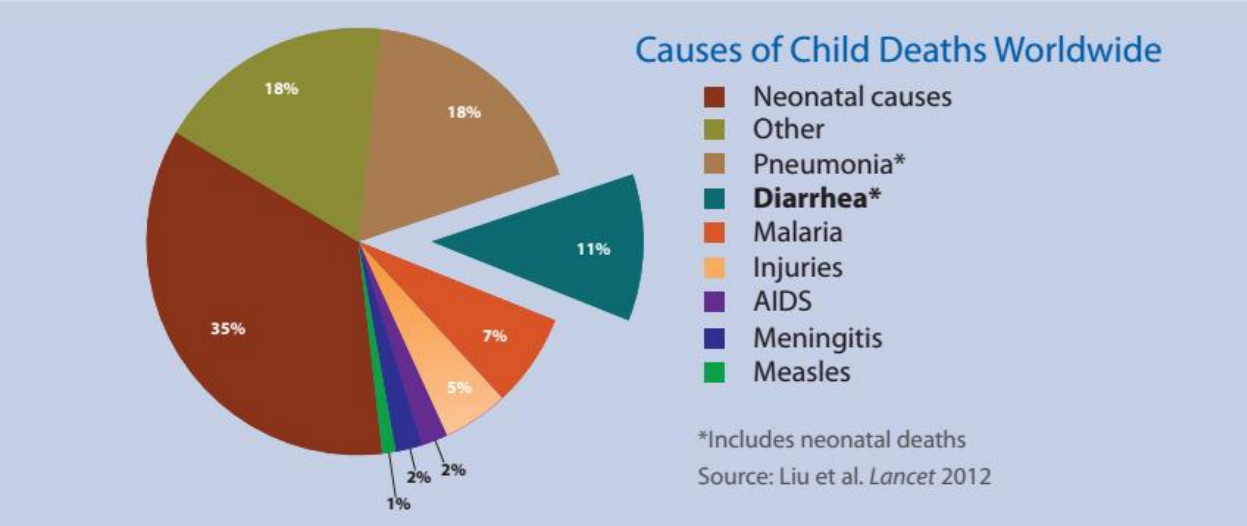


Figure 6:Top Causes of Child Deaths Worldwide; Courtesy of Liu et al. Lancet, 2012

APPENDIX FIVE: CONTRIBUTIONS OF DIARRHEA AND PNEUMONIA TO UNDER-FIVE DEATHS

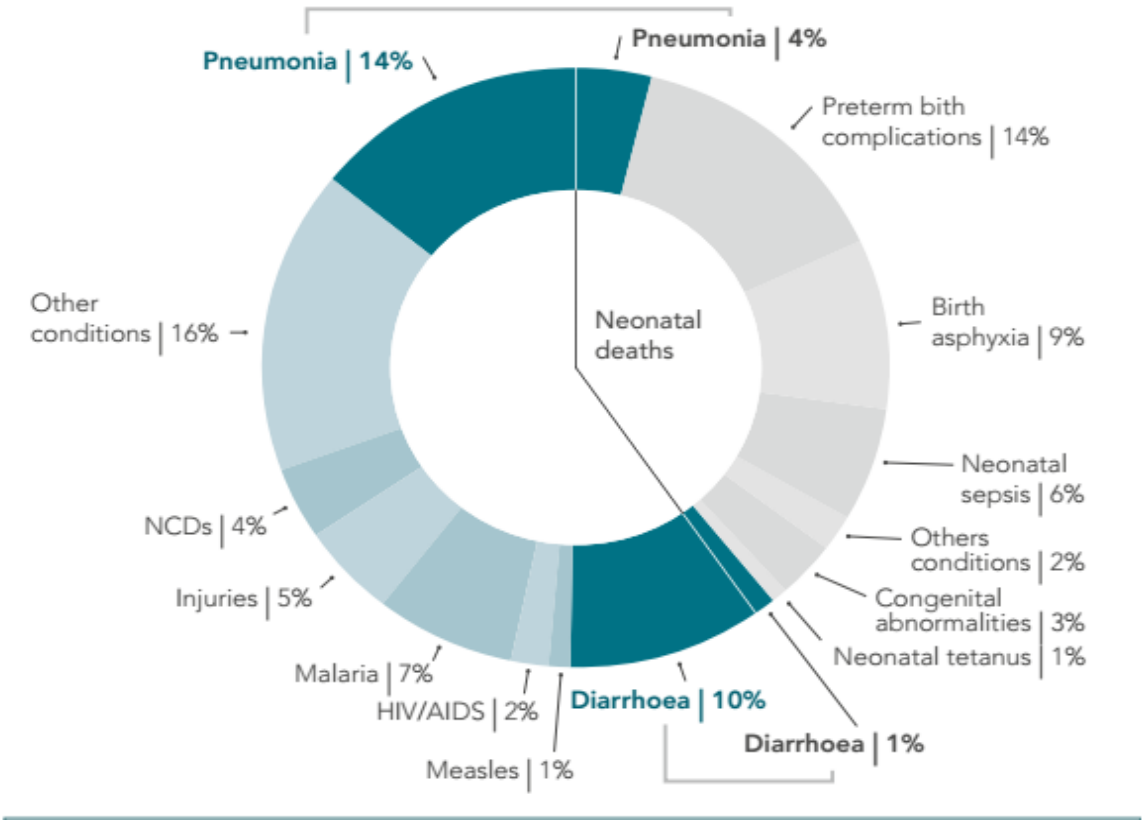
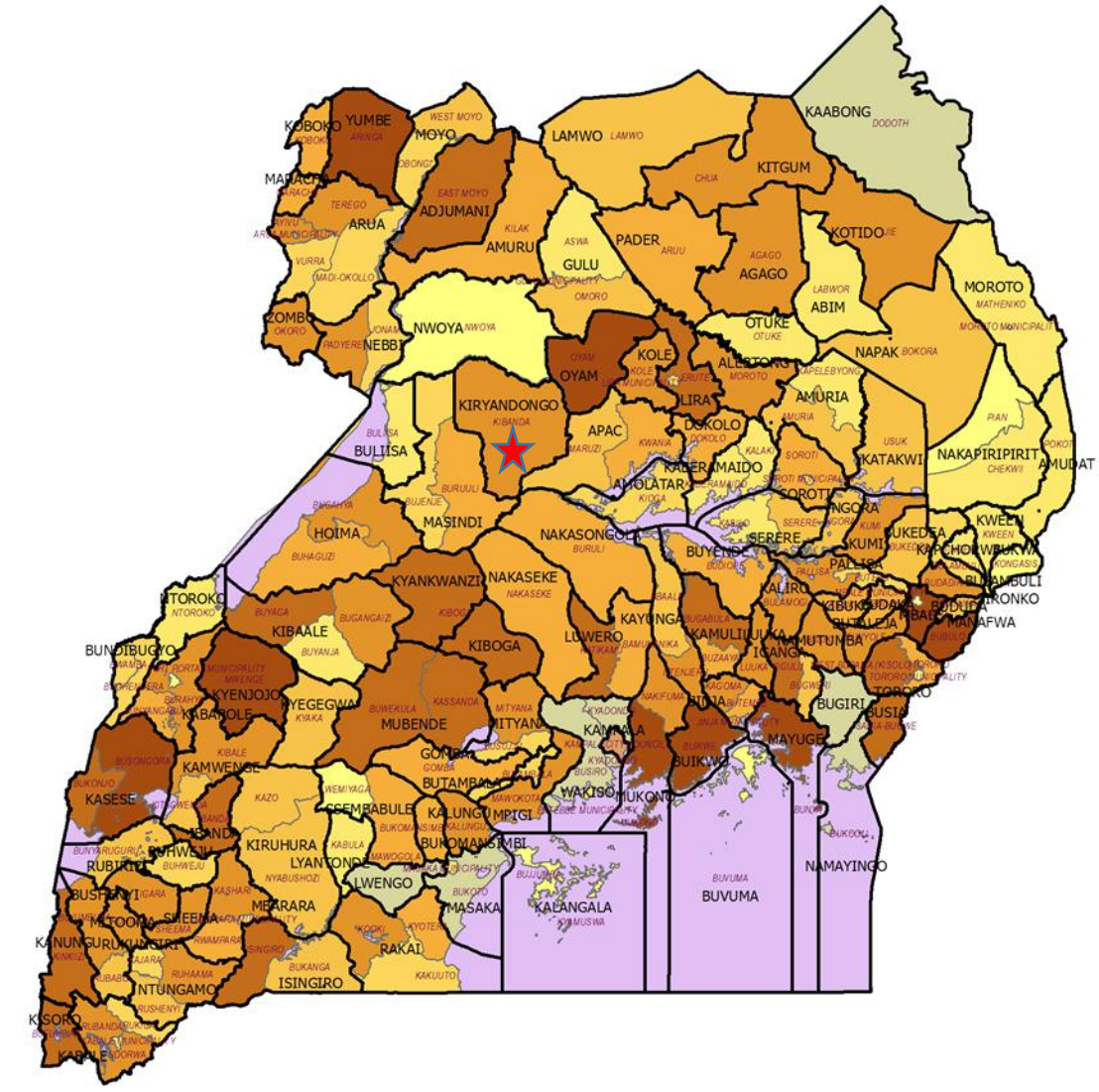


Figure 7: Proportionate contribution of pneumonia & diarrhea in child mortality worldwide

APPENDIX SIX: MAP OF UGANDA SHOWING THE LOCATION OF KIRYANDONGO DISTRICT (RED STAR AND RED INSET)



APPENDIX SEVEN: APPROVAL LETTER

KAMPALA INTERNATIONAL UNIVERSITY – WESTERN CAMPUS

OFFICE OF THE DEAN
FACULTY OF CLINICAL MEDICINE & DENTISTRY

08/01/2019

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

RE: SEBUNYA ALEX (BMS/0009/141/DU)

The above named person is a fifth year student at Kampala International University pursuing a Bachelor of Medicine, Bachelor of Surgery (MBChB) Programme.

He wishes to conduct his student research in your hospital

Topic: *Prevalence, etiology and determinants of diarrhea disease among children under five years attending Kiryandongo district hospital from January to December 2018*

Supervisor: *Dr. Atuhairwe Michael*

Any assistance given will be appreciated.

Yours Sincerely,

08 JAN 2019

Prof. Ssebuufu Robinson
Dean Faculty of Clinical Medicine and Dentistry