RISK FACTORS FOR ACUTE WATERY DIARRHEA AMONG THE UNDER FIVE IN BENTIU PROTECTION OF CIVILIAN'S SITE, UNITY STATE, SOUTH SUDAN.

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DECLARATION AND APPROVAL

Declaration by the Student

I hereby declare that this thesis, all other information is my original work and has never been presented anywhere for a degree in any other University or for any other award.

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DEDICATION

This research finding is fully dedicated to the vulnerable community of Unity state of South Sudan who have been confined in Bentiu protection of civilian site (POC).

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ABSTRACT

According to current global estimates, 1.7 billion cases of childhood diarrheal diseases occur every year. In Africa, it is estimated that every child, on average, has 5 episodes of acute watery diarrhea per year and about 800,000 children are loss every year from the disease. In South Sudan, acute watery diarrhea is the number one cause of death among the under-five age bracket, accounting for 42.9% of the annual mortality rate. The objectives of this study are to determine the socio-demographic factors which influence the occurrence of acute watery diarrhea in Bentiu internally displaced camp, the level of awareness of acute watery diarrhea, and to investigate environmental factors that influence the occurrence of acute water diarrhea. A descriptive cross- sectional design was applied for this research using mixed approaches of quantitative and qualitative data collection approaches. A cluster random sampling procedure was used to select the research participants. A sample of 439 participants participated in this study. The findings showed that educational level of the caretakers of the under-five children significantly influences the present of watery diarrheal disease within the children below 5 years (p-

Value = 0.007). Additionally, the sex of under- five greatly influences the present of diarrheal diseases among children below 5 years (p-value = 0.007). Vaccinating children with the Rotavirus vaccine has a significant relationship with the present of diarrhea among children below 5 (p-value = 0.000). Water treatment methods also significantly influence the occurrence of diarrhea among under-fives (P value = 0.000). The status and condition of water containers and cups also significantly influence the present of diarrhea among children below 5 (p-value = 0.000). The availability of toilet facilities also significantly influences the present of diarrheal diseases within children below five (p-value = 0.000). Other factors contributed with the present of diarrhea among under-five children include personal hygiene of caretakers (0.000), washing hands before feeding (0.000), and exclusive breastfeeding (0.001). In conclusion, low educational level from the caretakers, sex of the child, lack of child vaccination with Rota Virus vaccine, lack of proper water treatment method, poor status of the water container and absent of hand washing facilities are the caused of acute watery diarrhea in Bentiu Protection of Civilian site. Based on these findings, the United Nations and its agencies need to improve sanitation in POCs through the provision of safe and hygienic toilet facilities. The UN and its agencies need to provide effective water treatment methods. International and national organizations providing WASH activities in POCs need to sensitize communities on hygiene and sanitation. The national Ministry of Health, with the state Ministry, needs to provide immunization services, especially Rotavirus antigens, to boost the immune systems of under-fives against diarrheal diseases in Bentiu Protection of Civilian Site. There is a serious need for more studies regarding diarrheal diseases and the relation of diarrheal diseases with acute malnutrition.

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LIST OF ABBREVIATIONS AND ACRONYMS

DPT – Diphtheria, Pertussis and Tetanus

DRC - Danish Refugees Council

DTM – Data Tracking Matrix

EDHS – Ethiopian Demographic Health Survey

FGD – Focus Group Discussion

HIV/AIDS - Human Immuno-Virus/Acquire Immune Deficiency Syndromes

IDPS – Internally Displaced Persons

ICRC - International Committee of the Red Cross

IMCI - Integrated Management of Childhood Illness

IOM - International Organization for Migration

IRC - International Rescue Committee

MC - Mercy Corps

MCH – Maternal Child Health

MSF - Medicines Sans Frontiers

NGO –	Non-Governmental Organization
NNGO –	National Non-Governmental Organization
NH -	Nile Hope
ORS –	Oral Rehydration Salt
ORT –	Oral Rehydration Therapy
POC -	Protection of Civilian Site
UN –	United Nation
UNDP -	United Nation Development Program
UNESCO -	United Nation Educational Scientific and Cultural Organization
UNFPA -	United Nation Population Funds
UNICEF -	United Nation Children Funds
UNIDOR -	Universal Intervention and Development Organization
UNMISS -	United Nation Mission in South Sudan
UNOPS -	United Nation Office for Project Services
WASH –	Water Sanitation and Hygiene
WFP -	World Food Program
WHO -	World Health Organization
WR -	World Relief

CHAPTER ONE: INTRODUCTION

1.0 Introduction

The topic entailed area of research study, background information of the topic and of course problem statement, purpose of this studies, broad and specific objectives, research questions, Hypothesis, scope of this research, limitation of the research and the delimitation of the research.

1.1 Back ground of this research.

Globally, most death of under five years are due to conditions which are preventable or manageable with access to simple and affordable interventions. Diarrheal disease is among the top five causes of death and suffering in the world. Globally it's the second leading causes of death in children under - five, it accounts for 1 in 9 child deaths worldwide which account for 8% of all deaths among children under-five (Mokomane, 2018).

In Africa region, it has been estimated that each and every child has 5 episodes of acute watery diarrheal disease per year and 800,000 children lost their life each year due to diarrhea and dehydration (WHO, 2015).

In South Sudan the under-five prevalence of acute watery diarrhea is 42.9% compared to Kenya where it is 17.0% (UNICEF,2018)

Locally in Unity state protection of civilian site, the prevalence of acute watery diarrhea in under-five account for 43% which is the highest among other protection of civilian sites (WHO, 2016)

The South Sudan's government had introduced the approach of integrated management of child illness (IMCI) by 2007 to response to the basic need of health and nutrition in South Sudan, so far only four from ten states are currently managing this initiative to some level but not to the satisfaction. With the small support from UNICEF, WHO and the ministry of health, training of health workers has been provided but its only reached some counties (UNICEF, 2016).

Bentiu protection of civilians site is densely populated, United Nation Mission in South Sudan (UNMISS) camp created immediately in 2014 after onset of the ongoing crisis in South Sudan. It is the largest camp in the whole of South Sudan with an estimated population of about 103,424 dominated by Nuer, the second largest tribe in the country (IOM, 2017)

The ongoing crisis in South Sudan has forced most people in Unity state to seek for protection and safety as there were random and targeted killing of civilians, torturing, raping and force recruitments into military. All these forced the residents to leave their home and settle in the overcrowded camp in search for protections in addition to free basic services including food, water and shelter as the insecurity created by the conflict rendered economic activities impossible.

There are many International and National organizations providing much needed services to the IDPs in Bentiu POC which include, United Nation Children Funds (UNICEF). World Health Organization (WHO). United Nation Population Funds (UNFPA). World Food Program (WFP). United Nation Development Program (UNDP). International and National nongovernmental organization like Medicines Sans Frontiers (MSF). Danish Refugees Council (DRC). Mercy corps (MC). Universal Intervention and Development Organization (UNIDOR). NILE HOPE(NH). International Organization of Immigration (IOM). World Relief (WR). International Rescue Committee (IRC). International Committee of the Red Cross (ICRC) and so many more. Among other services provided by the partners to the population of the POC are;

Health and Nutrition services, WASH services, Protection Services, Education services, Food services, none food item services and peace building services.

The camp has 5 primary health care centers own by IOM, World Relief, and IRC respectively and one hospital which is managed by Medicines Sans Frontiers (MSF) Holland. Despite the great efforts inserted by health partners in the Camp, there is high prevalence of acute watery diarrhea and other communicable diseases like malaria and respiratory tract infections. A number of demographic – social factors such as caregiver occupation, maternal education, gender & sex of the child, age of the child, overcrowding as well as mother age at birth have been attributed in the previous studies to the causes of diarrhea. This is mostly in sub-Sahara Africa because of low income generating activities (WHO 2015). In the essence of environmental factors, waste disposal cultures in the locality, the main floor and the roofing used for the household unit are the predisposing factors for acute watery diarrheal disease (UNICEF, 2016). Proper methods and action need to be introduced to improve the Maternal Child Health (MCH) and to lower the burden of diarrhea and diarrhea-related mortalities in children below 5 years. Specific method needs to be introduced to lesser the challenges of impoverished health status of under-five by supplying appropriate health care within impoverished and vulnerable communities. The high authority in the government together with the stakeholders needs to look into the disastrous environmental conditions and should be providing pit latrine and work on house cleanliness and hygiene. In Knowledge and awareness regarding acute watery diarrhea, most of the studies show that lack of caregivers' awareness about the issues interlinked to

individual on food hygiene for diarrhea prevention are significant risk factors for acute watery diarrhea globally. This includes knowledge of proper waste disposal of feces to prevent diarrhea (WHO, 2015).

1.2: Statement of the Problem.

Acute watery diarrhea is a consistent of three or more lose stool with in the day. It signifies the present of intestinal tract infection which is always arrive due to variety of so many microorganisms and basically, it's mostly targeting under-five because of the lower immunity and poor sanitation and hygiene. It is the second leading cause of death in under-five worldwide and every year acute watery diarrhea account for 1 in 9 child deaths worldwide which account for 8% of all deaths among under-five (Mokomane, 2018).

This translates to over 2,195 under five dying each day globally despite the availability of simple effective treatment. Throughout the world, this is about 1.7 billion cases of childhood diarrheal diseases yearly. An in sub-Sahara Africa, it has been estimated that every child has five episode of acute watery diarrhea per year and that 800,000 children die each year from the acute watery diarrhea and dehydration (WHO, 2015).

In South Sudan, diarrheal disease is the number one cause of death with prevalence of 42.9% of under-five while in the study side the prevalence is 43% (UNICE, 2018). Bentiu protection of civilians' site is mostly populated by children and women and each household comprised about 10 to 15 family members in which majority of them are children below the age of 10 years. Most of the people fetches water for domestic consumption from common pipes managed by IOM and Mercy Corps and they use jerry cans and buckets provided to them by Concern worldwide and UNICEF (WHO, 2019).

Majority of the Camp residents are uneducated, having lost their possessions during the conflicts, they entirely depend on the services provided by National and International non-governmental Agencies. Because of the overcrowding as a result of high population, the hygiene state of the camp is very poor as the wash and sanitation facilities are overstretched, this have negatively contributed to the high prevalence of acute watery diarrhea in Bentiu protection of civilians' site (IOM, 2017).

1.3: Significance of the study

This research will intensively look into the predisposing factors of acute watery diarrhea, the causative agents, risk factors, incidences, prevalence and basically the recommendations which will be share with all the partners and agencies that are implementing Health, Nutrition and WASH projects for the purpose and the intention to improve their service provisions and their good intention to the community.

The purpose of this research will be to find out the exact risk factors for acute water diarrhea in Bentiu protection of civilians site and the major predisposing factors. The higher prevalence of acute water diarrhea in Bentiu protection of civilians site has negatively affected the community as its result into morbidity and mortality of underfive for the past 5 years and something need to be done to avert the negative impact imposed to the vulnerable community by this disease. If this problem is not solved, it will seriously lead to loss of many lives which in turn will affect the population of the children in the next years to come (WHO 2016)

The legitimacy of this research is to find out and address the concern of never-ending high prevalence of acute watery diarrhea in Bentiu Protection of civilian's site by leveling it risk factors which enhance the occurrence of acute watery diarrhea in this location. Since its inception in 2014, Bentiu protection of civilian's site has been encountering the wave of acute watery diarrhea including the outbreak of cholera in
2016 which caused unnecessary death and untold suffering to the vulnerable groups in Bentiu Protection of Civilian's Site. This research finding will help to outline the factors that influence the acute watery diarrheal diseases in Bentiu protection of civilian's site that includes, the socio-demographic factors, level of awareness as well as the environmental factors.

This research is important to the host community who may benefitted once the cause of acute watery diarrhea are structure and well explain based on the finding and recommendations

It is important to the health partners, UNICEF, WHO and State Ministry of Health who are the policies makers and change agents in the community. The research findings can be useful and applicable to the health facilities who always provide continuous medical Educations to their patients.

The goal of this research is to improve on the precautions and preventions of acute watery diarrhea to the general populace and particularly to the target population (underfive) who are the vulnerable group as far as acute watery diarrhea is concern.

The study will be useful and applicable to both the State and National Ministry of health who are the policies makers to influence and contribute to the reform of some policies as far as the management of acute watery diarrhea is concern. The findings and recommendations will suggest the possible solutions which will help to minimize the suffering and death causes by acute watery diarrheal disease in South Sudan, particularly in Unity State, Bentiu protection of civilians' site.

The study will also help to inform the civic population of South Sudan and particularly those confined in Bentiu protection of civilians site to choose the best health facility and the best treatment of their choice for their children under five. This study will be informative and innovative in nature.

In the event that all those aforementioned problems are not addressed correctly within the limited time frame, the repercussion could be the diminished of the under-five population in Bentiu protection of civilian's site and of course in Unity State at large since majority of Unity state population are in POC.

1.4 Justifications of the study

Bentiu POC is one of the largest internally displaced camp hosting over 100,000 populations of which majority are children below 18 years and mothers. Because of this overcrowding, there is a need to do more studies to identify the risk factors for acute watery diarrhea in the camp.

Locally in Unity state protection of civilian site, the prevalence of acute watery diarrhea in under-five account for 43% which is the highest among other protection of civilian sites (WHO, 2016). This triggered this study to identified the risk factors which contribute to the rise in prevalence of a cute watery diarrhea. Scientific curiosity to know what is trending in this protection of Civilians site has contributed to the urgency to conducted this study.

1.5. Research Objective

1.5.1 General Research Objective

To determine the risk factors associated with the occurrence of acute watery diarrheal disease among the under-five in Bentiu protection of civilians' site, Unity State, South Sudan**.**

1.5.2 Research Specific Objective

1. To determine the socio-demographic factors of the care givers associated with the present of acute watery diarrheal diseases among the children below 5 years in Bentiu protection of civilians' site.

2. To assess the level of awareness in regard to acute watery diarrheal disease among the children below five years care givers living in Bentiu protection of civilian site

3. To investigate the environmental factors that significantly affect the occurrence of acute watery diarrheal diseases among the children below 5 years care givers living in Bentiu protection of civilian site

1.6 Research questions.

1. What are the socio-demographic factors of the care givers associated with the occurrence of acute watery diarrheal disease among the under-five living in Bentiu protection of civilians site?
2. What is the level of awareness regarding acute watery diarrheal diseases among the children below 5 years care givers living in Bentiu protection of civilian site?
3. What are the environmental factors that influence the occurrence of acute watery diarrheal diseases among the children below 5 years care givers living in Bentiu protection of civilian's site?

1.7 Scope of this research.

The purpose of this research is to determine the risk factors associated with the occurrence of acute watery diarrheal disease among children below 5 years in Bentiu protection of civilians' site, Unity State, South Sudan and advise the health providers and policies makers accordingly. The target population are the care givers of children below 5 years with the sample size of 439 participants from all the five sectors in Bentiu Protection of civilian site.

Three methods of data collection techniques were applied and these include, questionnaires, focus group discussion and key informant interview. Data collection took two weeks to finalize followed by data analysis.

The research was carried out in Bentiu Protection of Civilian site, Unity state, South

Sudan. This is the largest internally displaced camp in South Sudan situated in Unity State immediately after the onset of 2013 crisis which engulfed South Sudan.

1.8 Theoretical Framework

1.8.1 Health Belief Model

This is a theoretical model which is used to give guidance to diseases prevention and health promotion program. It entails and predict individual changes in health behavior. The health belief model was initiated and developed in 1950 by Social Psychologist Hochbaum Rosenstock and others.

Regards to this, Health planning for diarrhea is the sole function and attributes of both epidemiology patterns and community beliefs of Health, illness and needs. A conceptual framework which brings in the pattern of distress explanatory models, health seeking and treatment practices to seek and put in use the oral rehydration therapy (ORT), Nutrition management, other ways of treatment and health policy issues which explain to us and give us the understanding for the view of study on diarrheal disease related beliefs and practices. There is a serious need to appreciate the local ways of beliefs and the diversity of cultural understanding which enable health workers and communities to be able to grasp the most important things which are value in the community. It also gives us the basis to identify the function of local understanding of diarrheal diseases in regards to its major outcomes and receptive needs. This will practically be useful in Bentiu POC where the culture and beliefs are strong pillars and must be respected without any question, (Kirsch, J.P 1978)

Kamran Sadiq, et al, (2022), conducted the study in Pakistan This study look into the factors associated with diarrhea in children below 5 years in a rural district of Pakistan. They associated the breastfeeding with lower likelihood of diarrheal diseases underfive. Breastfeeding is one of the most approved and effective intervention to prevent child morbidity and mortality. It is approved that about 72% of hospital admission is due to diarrhea and in anyway can be prevented by normal breastfeeding. A metaanalysis discussing the importance of breast milk on diarrhea-related suffering and death showed that any breastfeeding children within the age bracket of 6–23 months is less exposed of dying of diarrhea compare to children who don't breastfeed.

Bui Viet, (2006) conducted the study in Vietnam. In his study, he widely recognized that diarrhea d is a serious cause of suffering and death within under-five, particularly those who are living in impoverished countries like Vietnam. Vietnam is an impoverished country, where diarrheal is the second leading cause of deaths among children below 5 years. Due to lower socio-economic background, poor education status, constrain environmental sanitation and poor hygienic exposures pose dangers to children below five years. Exposure to diarrheal diseases is affected by children age and immunity, the type of microorganism involves, and the location. This is according to the studies conducted in the rural area of Vietnam.

Hanaa H, (2017), in his study conducted in Northern Nigeria found out that mother age was proportionately connected or amalgamated with child diarrheal disease in the northwest and north central regions of Nigeria. When mother of the child is older, there is less chance of under- five to contact diarrheal disease. The Mother standard of education and beliefs were also amalgamated with the present of acute watery diarrheal diseases among the under- five. When Mother has higher educational level, she will be well informed on what to do and the preventive measures of acute watery diarrhea. The study found out that, children from muslim background are exposed to acute watery diarrhea compare to children from Christian background. Sources of drinking water associate with occurrence of acute watery diarrhea among the under- five. The children below 5 years living in resident getting their drinking water from exposed sources had a higher possibility to contact diarrheal disease than those getting their drinking water from protected sources. The present of diarrheal disease diarrheal was a little bit higher within resident that had natural floor as a main floor within their residential areas, they were followed by the floor which is furnished and the last is the one with wooden floor. The present of diarrheal disease was higher within children below 5 years that were never vaccinated against DPT. It was lower with those that were fully vaccinated against Poliomyelitis. This show clearly that vaccination of under-five is one of the preventing measures against the prevalence of acute watery diarrhea. In this study, diarrheal diseases were higher within children or under -five who were not vaccinated and lower within children that were fully vaccinated. The status of mother occupation was associate with the occurrence of acute watery diarrhea in Northern region where the children of working mother were muchly affected by diarrheal diseases compare to the children of none working mothers.

Gorard DA et al 2015, established the relationships among many psychological issues related to acute watery diarrhea. They include, stress or depression, suicidal ideation, anxiety related, personality traits, perceived and bowel movement in children. The study found out that chronic diarrheal diseases and constipation were worsening by stress and depression in person with depression compare to those with no stress or depression. Within these psychological related issues predicting disordered moderate and severe stress or depression, although without anxiety related. In addition to that, moderate stress or depression was an independent predictor of chronic constipation.

The study recommended the need for a cohort study to able to identify and find out the causes and temporal relationships between psychological related issues and bowel habits, (Gorard DA, et al, 2015)

The Government of India (2015), conducted a study for a various demographic and social factor such as those living in rural and urban poor, caste, beliefs, location or region, age of the child and gender. All these were associated with the occurrence of diarrheal diseases in India. It was found out that diarrheal disease was common among those living in remote areas, scheduled caste, Muslim community' children. On the issue of environmental factors, issues like waste disposal in the residential level, on the ground level, hygiene and roof materials of the residential unit are risk factors for diarrheal disease. So many approaches to impact the maternal child health need to be taken into consideration to lesser the negative impact of diarrheal diseases among the under – five. Specific methods need to be put in place to reduce the negative effect of incur by children for offering them with applicable and adequate health care among the impoverished and vulnerable groups. The government and other stakeholders should improve the adverse environmental conditions by providing pit latrine and do something on the housing facilities for these vulnerable groups.

1.9 Conceptual framework

Variables (Independent)

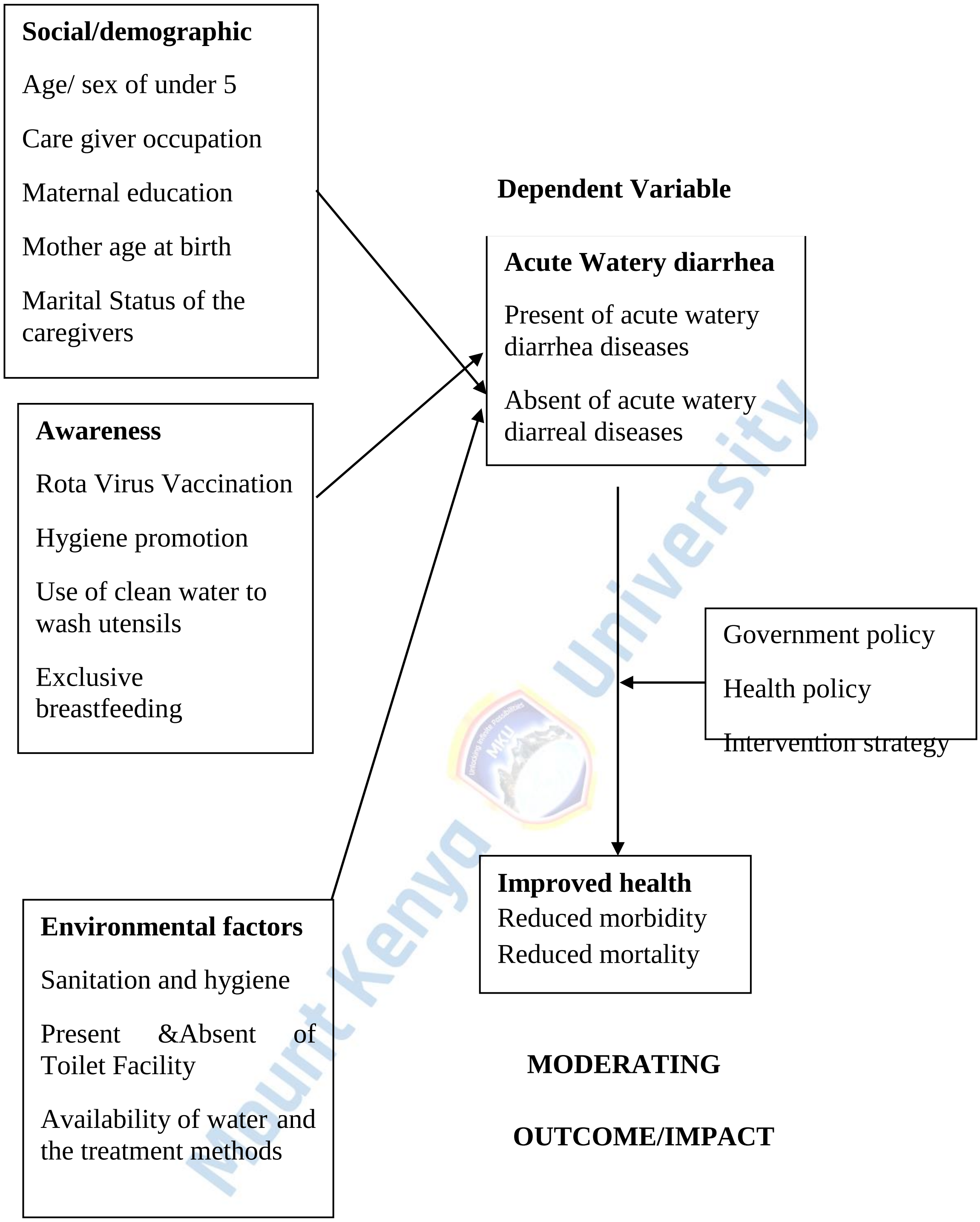

Figure 1: Conceptual framework

1.10 Limitations.

Hostility from the community in POC: These populations in the protection of civilians site are confined in this area for the last five years and majority of them are traumatized and could not cooperate in term of giving data. Therefore, lack of cooperation from the parents or guardians affected the outcome of this study as some totally refused to cooperate or few of them turned up during focus group discussion and during interviews. However, some mechanisms were be put in place e.g., involvement of community leaders, church leaders and security parameters to tackle the issue of hostility and to facility proper community entry.

External insecurity: Unity state is one of the mostly affected state in South Sudan, it is destroyed to ashes and so much affected by this conflict since its genesis in 2013. Some members of the population have been subjected to tortured, gang rape and their relatives were killed. Therefore, External insecurity in this state was still ongoing and had a shortcoming to this research. I was getting all the updates from the security focal person and should it happen that there is insecurity in the area, the study would have been pause for some time until when the security improves.

Constant migration in and out from the camp by civil population whenever there is a little bit of calmness, some parents would dare try to go out since many of these population are not conformable in the protection of civilian site as the food and water is not sustainable and whenever the war intensified again, they would rush back to save their life. These constant migrations in and out of the camp affected this study although this study employed cross sectional study design which was specific in the given time possible without any follow up.

1.11: Delimitations

Hostility from the community in POC; All the community structured in POC were involved like chiefs, camp chair persons, block leaders and wash groups. These reduced and limited the hostility in Bentiu protection of civilian site.

External Insecurity; All the security organs in the camp go involved from the start and them advises were put into consideration during course of this study. This delimited any foreseen threats during the course of the study. Constant migration in and out from the civilian site; The delimitation for this limitation was to applied Cross sectional study to avoid this on and off movement from this Protection of the Civilian site. This was useful during the course of this research.

CHAPTER TWO
LITERATURE REVIEW

2.0 Introduction

The topic emphasized in Empirical literature review, Theoretical Literature and

Conceptual Frame

2.1 Overview

Globally, most death of under five years are due to conditions which are preventable or manageable with access to simple and affordable interventions. Diarrheal diseases are among the top five causes of death and suffering in the entire world. Globally it's is the number two causes of death in children under the age of five and each year, it accounts for 1 in 9 child deaths worldwide which account for 8% of all deaths among children under-five (Mokomane, 2018).

Children who are suffering diarrhea will face many challenges and problem including lack of appetite, loss of electrolytes, dehydration and eventually malnutrition, being vulnerable and risk of developing other infectious or susceptible to other infections and stunted growth. Due to these it will lead to negative impact on the development of the child physically and mentally. Diarrhea can also cause disability as 72.8 million disabilities and adjusted life years. It can also affect the economic due to demand of medication and how expensive it is (UNICEF, 2018)

In Africa region, it has been estimated that every child has 5 episodes of acute watery diarrhea per year and about 800,000 children lost their life each year from the acute watery diarrhea and dehydration (WHO, 2015).

In South Sudan the under-five prevalence of acute watery diarrhea is 42.9% compared to Kenya where it is 17.0% (UNICEF,2018)

Locally in Unity state protection of civilian site, the prevalence of acute watery diarrhea in under-five account for 43% which is the highest among other protection of civilian sites (WHO, 2016)

2.2 Risk factors for acute watery Diarrhea

Diarrhea remain as the common causes of suffering and death in children below 5 years particularly poor and developing countries. Most of the African countries especially in sub-Sahara suffering from diarrhea diseases. Africa According to the study by Sokhna, 2017 regarding the incidence and prevalence of watery diarrheal diseases among the under-five old in Mbour Senegal, it was stipulated that by 2013, about 6.3 million children globally who passed on before their firth birthday of which half of them (3.2 million) passed on due to infectious diseases where diarrheal diseases cause the death of more than 500,000 under- five. By 2030, it is stipulated that 4.4 million young one will die of infectious diseases and 60% of them will be in Africa region. Diarrheal disease is responsible for about 3.6% of the worldwide burden of the diseases, as stipulated by the disability-adjusted life years. Although the death from diarrhea has gone down over the past 25 years worldwide, suffering from diarrheal disease have not gone down in Africa region. So many factors related to lack of enough water, sanitation and hygiene, lack of exclusive breastfeeding and malnutrition still so rampant and extremely high. Overcrowding has been attached with an outbreak of diarrheal disease among under-five as the mostly risk group. Maternal education, refusal disposal system and the effect of health extension programs (Sokhna & Aminata, 2017)

Most of the acute watery diarrheal diseases can be mitigated by proper water cleanliness and and hygiene programs which strengthening fecal oral route transmission

(Gebru, 2017).

2.2.1 Prevalence of acute water Diarrhea in under-five

According to the (WHO, 2017), diarrheal disease is the leading causes od death among the under - five which massively lead to death of about 525,000 children yearly. Diarrhea can last for several days and cause dehydration. Malnourished Children and those with impaired immunity are at higher risk of acute watery diarrhea. In developing countries like South Sudan, diarrhea disease in under-five account for 21% of all death and of this, unsafe drinking water cause about 15% to about 20% of community diarrheal diseases (WHO, 2017). Ethiopian child death rate according to (WHO, 2007) was about 199 per 1000 child births and about 1 of every 5 causes of deaths yearly is due to acute watery diarrhea. Diarrhea is water borne which is expressed as a leading cause of death in young children below five years. It is recorded that 46% of under-five mortality is caused by acute watery diarrhea in which water related cause take the big portion (WHO, 2017).

2.2.2 Level of awareness of acute watery diarrhea in under-five

According to the study conducted in Omdurman locality, Sudan in regard to attitude and awareness on rehydration and it management as a response toward acute watery diarrhea, a total of 198 mothers participated with a response rate of 89. Majority were not aware on the causes and control of dehydration (Mohammed,2020).

In the study which was carried out by WHO in 2017 regarding the level of awareness of acute watery diarrhea, although majority of mothers know the signs of dehydration, the level of awareness of the causative agents and predisposing factors were very poor. The study carried out (WHO, 2015) in Tanzania and Indonesia also came with the same similar results. Majority of the mothers could not mention all the steps and right preparation of ORS solution. This may be due to mothers' lack of experience on the solution and volume required, lack of proper education and knowledge on diarrhea and its management at home were very poor among the mothers of Musahar in Nepal. Even though they know about the diarrhea and it home management, they have little knowledge for some vital issues such as danger sign of dehydration, the role of rehydration fluid during diarrhea and of course its exact preparation concerning it amount were very poor (Mekonen, 2018). Another study which was carried out within Enemay district, East Gojjam zone in Ethiopia. Within 398 caretakers, at least 62.6% were aware about diarrhea and about 1/3 which is 34.4% of those who participated were able to know and affirmed diarrhea as the passage or loose stool more than one in a day. At least 50% of caretakers agreed that use of latrine (54.8%) and hand washing or hygiene (51.5%) are effective ways to protect against diarrhea. There was enquiry posted against the caretakers on the causes of diarrhea and 70% lamented that it is caused mostly by contaminated food (MD Agegnehu, 2019).

2.2.3 Sociodemographic factors that influence the occurrence of acute watery diarrhea

According to the study conducted in Ethiopia A Getachew (2018), to carried out the impact on social demographic factors within the children under the age of five years in rural areas of North Gondar Zone.A study sample of 736 children below 5 years with their caregivers about 99& response rate from different rural areas of North Gondor Zone. Among all these participants, greater than half (55.7%) who participated were male. Many of the mothers who participated happened to be in the age category of 2534 years with an average age of 30.7%. Most of those who responded were biological mothers 96.4% who were married 94.2% and were house wives 86%. The educational level of these mothers showed 58% could not read and write, meanwhile the least number of 4.5% reached high school and above. All the variations could be because of only targeting those children in rural area and may be variation in provision of health packages within urban and rural density population. Anyway, these finding were little bit greater compare to the outcomes of the Ethiopian study and survey conducted in 2016 (EDHS), where the occurrence of diarrhoeaa among under-five was 12%. Another study facilitated in West Gojjam with 18%, while North Gondar Zone, Amhara region with 15%. The differences could be cause of social differences among the population, economic factors, life styles, behavioral changes and so many more factors.

Concerning most of these studies, the infants were at high risk of developing diarrheal diseases in comparison to children between 4-5 years. The finding agreed with the studies carried out in Arba Minch, southern Ethiopia, India, Sudan, and Thailand.The finding were higher which could be due to lower immunity in under-five, weaning and introduction of weaning food and of course higher chance of ingesting contaminated food and drink.

The study found out that those children with uneducated mothers were exposed to diarrhea than those whose mothers can able to read and write. This is because information is power. Again, it was in line with the study carried out in Jijiga, Somalia region, Hadaleala district, Afar region, northeast Ethiopia, Arba Minch, southern Ethiopia, and Sheko district, southwest Ethiopia. The reason of course is that, education can increase the level of awareness on knowing the preventive measures and early recognition of the diseases.

Inconclusion concerning these studies, the children who were not exclusively breastfeed at early age were at higher risk to die of diarrhea compare to those who were exclusively breastfeed (Int Pediatr,2018).

2.2.4 Environmental factors that influence acute watery diarrhea

According to the study conducted by Int J Pediatr, 2018 to determine the incidence and prevalence of diarrhea and to evaluate the environmental factors of diarrheal disease prevalence within children below 5 years. The prevalence accorded to diarrheal disease in the study was 22.1.

Within the study conducted, a lot of factors were put into consideration which include, hand hygiene, present or absent of latrine, chance of contamination of the storage within the household as well as type of roof material which have significant association with diarrheal prevalence as well as suffering and death.

Among under-five who live in thatched household were two times higher of getting diarrhea than under-five who live in corrugated iron. This could be because of poor sanitation and hygiene in thatched roof than corrugated iron.

Children who had hand washing facility at their vicinity have 48% lower diarrheal disease compare to those with no washing facility. These hand washing facilities are very important mostly to those mothers who wash their hands and breasts when breastfeeding their children. This can cause significant reduction feacal oral route transfer of infection.

Most of the children which have no access to toilet facilities were twice higher and likey to acquiring diarrhea compare to children with access to pit latrines. The research results were in agreement with the study conducted in West Gojam Ethiopia and in Deresha district, Southern Ethiopia. With the present of pit latrine around, there is a likely chance that children will not contaminate themselves with feces and this reduce fecal oral route which minimize the prevalence of acute watery diarrhea.

The possibility of experiencing diarrheal disease among under five who encountered possibility contamination within the residential areas which had 5 times possibility of developing diarrhea more than those with sanitary low possibility of contamination within the family storage. Additionally, under-five that happened to have a greater possibility of sanitary contamination of family storage experience strong evidence of diarrheal diseases. This is in line with the study conducted in Nigeria previously.

Some variable like the type of wash facilities, where they are getting the water for drinking, water supply sources, water mean of treatment, other variables happened not to be involved as far as this study was concern. Although they played a greater in the previous studies which was carried out in different regions of Ethiopia. However, the Signiant differences may arise because of variation in seasonal variation (Int J Pediatr). The gaps for this study include, the overcrowding in household level, safety of drinking water and open defecation which may be the case in the Bentiu protection of civilian site.

2.2.9: Theoretical Framework of acute watery diarrhoea

Cultural Model of diarrheal illness in regards to Mitchell g, 1988, Health planning for diarrhea is the responsibility of both epidemiology patterns and community beliefs of Health, illness and needs. A conceptual framework which brings in the pattern of distress explanatory models, health seeking and treatment practices to seek and put in use the oral rehydration therapy (ORT), Nutrition management, other ways of treatment and health policy issues which explain to us and give us the understanding for the view of study on diarrheal disease related beliefs and practices. There is a serious need to appreciate the local ways of beliefs and the diversity of cultural understanding which enable health workers and communities to be able to grasp the most important things which are value in the community. It also gives us the basis to identify the function of local understanding of diarrheal diseases in regards to its major outcomes and receptive needs. This will practically be useful in Bentiu POC where the culture and beliefs are strong pillars and must be respected without any question, (Kirsch, J.P 1978)

Kamran Sadiq, et al, (2022), conducted the study in Pakistan This study look into the factors associated with diarrhea in children below 5 years in a rural district of Pakistan. They associated the breastfeeding with lower likelihood of diarrheal diseases underfive. Breastfeeding is one of the most approved and effective intervention to prevent child morbidity and mortality. It is approved that about 72% of hospital admission is due to diarrhea and in anyway can be prevented by normal breastfeeding. A metaanalysis discussing the importance of breast milk on diarrhea-related suffering and death showed that any breastfeeding children within the age bracket of 6–23 months is less exposed of dying of diarrhea compare to children who don't breastfeed.

Bui Viet, (2006) conducted the study in Vietnam. In his study, he widely recognized that diarrhea d is a serious cause of suffering and death within under-five, particularly those who are living in impoverished countries like Vietnam. Vietnam is an impoverished country, where diarrheal is the second leading cause of deaths among children below 5 years. Due to lower socio-economic background, poor education status, constrain environmental sanitation and poor hygienic exposures pose dangers to children below five years. Exposure to diarrheal diseases is affected by children age and immunity, the type of microorganism involves, and the location. This is according to the studies conducted in the rural area of Vietnam.

Hanaa H, (2017), in his study conducted in Northern Nigeria found out that mother age was proportionately connected or amalgamated with child diarrheal disease in the northwest and north central regions of Nigeria. When mother of the child is older, there is less chance of under- five to contact diarrheal disease. The Mother standard of education and beliefs were also amalgamated with the present of acute watery diarrheal diseases among the under- five. When Mother has higher educational level, she will be well informed on what to do and the preventive measures of acute watery diarrhea. The study found out that, children from muslim background are exposed to acute watery diarrhea compare to children from Christian background. Sources of drinking water associate with occurrence of acute watery diarrhea among the under- five. The children below 5 years living in resident getting their drinking water from exposed sources had a higher possibility to contact diarrheal disease than those getting their drinking water from protected sources. The present of diarrheal disease diarrheal was a little bit higher within resident that had natural floor as a main floor within their residential areas, they were followed by the floor which is furnished and the last is the one with wooden floor. The present of diarrheal disease was higher within children below 5 years that were never vaccinated against DPT. It was lower with those that were fully vaccinated against Poliomyelitis. This show clearly that vaccination of under-five is one of the preventing measures against the prevalence of acute watery diarrhea. In this study, diarrheal diseases were higher within children or under -five who were not vaccinated and lower within children that were fully vaccinated. The status of mother occupation was associate with the occurrence of acute watery diarrhea in Northern region where the children of working mother were muchly affected by diarrheal diseases compare to the children of none working mothers.

Gorard DA et al 2015, established the relationships among many psychological issues related to acute watery diarrhea. They include, stress or depression, suicidal ideation, anxiety related, personality traits, perceived and bowel movement in children. The study found out that chronic diarrheal diseases and constipation were worsening by stress and depression in person with depression compare to those with no stress or depression. Within these psychological related issues predicting disordered moderate and severe stress or depression, although without anxiety related. In addition to that, moderate stress or depression was an independent predictor of chronic constipation. The study recommended the need for a cohort study to able to identify and find out the causes and temporal relationships between psychological related issues and bowel habits, (Gorard DA, et al, 2015)

The Government of India (2015), conducted a study for a various demographic and social factor such as those living in rural and urban poor, caste, beliefs, location or region, age of the child and gender. All these were associated with the occurrence of diarrheal diseases in India. It was found out that diarrheal disease was common among those living in remote areas, scheduled caste, Muslim community' children. On the issue of environmental factors, issues like waste disposal in the residential level, on the ground level, hygiene and roof materials of the residential unit are risk factors for diarrheal disease. So many approaches to impact the maternal child health need to be taken into consideration to lesser the negative impact of diarrheal diseases among the under – five. Specific methods need to be put in place to reduce the negative effect of incur by children for offering them with applicable and adequate health care among the impoverished and vulnerable groups. The government and other stakeholders should improve the adverse environmental conditions by providing pit latrine and do something on the housing facilities for these vulnerable groups

2.3 Summary

In conclusion, diarrhea is the number one cause of suffering and death among the under-five in South Sudan as stipulated above as well as in the third world countries or sub-Sahara Africa region and its prevalence is still very high. Predisposing and risk factors include, sociodemographic factors of the guidance and the child, low level of awareness among the surrounding areas, environmental factors affecting the community or surrounding and facility-based factors which influence the occurrence of acute watery diarrhea. In summary they include lack of maternal education, less use of pit latrine, lack of handwashing facilities, lack of awareness in the causative and management of diarrhea, poverty level, unsafe drinking water, lack of accessible facilities, lack of enough community health workers, less knowledge in the use of Oral Rehydration Therapy (ORT) and poor sanitation. Improvement of the predisposing factors will certainly save many live as far as the risk factors of a cute watery diarrhea is concern. In Theoretical framework, Health Belief Model and Cultural Model can both help to translate, connect and help to explain the perception of diarrheal illness.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Background

The topic precisely discussed the study design, area of the research of the research, targeting population, procedures applied and techniques, study sampling, research tools, method of data collection and procedures, data analysis skills applied and ethical considerations, budget and timeline.

3.2 Research design:

The research applied an analytical Cross- sectional study design to measure both the outcome and the exposure at the same time as well as it tested the hypotheses and answer why and how. An analytical cross-sectional study is the best suited for this study for its ability to simultaneously collect data on risk factors and outcome of interest. The study applied mixed approach to achieved it objectives (which include qualitative and quantitative data collection methods).

3.3 Location of the study

This study took place in Unity state, Bentiu protection of civilian site which is under the control of UN soldiers. It is the biggest internally displaced persons camp in South Sudan and that is why I choose it because of its high-density population. It is a low land area with two seasons which are rainy and dry season. It borders Sudan to the north at a place call Heglij which is 96 kms from Bentiu town. The diameter of the camp is in square of 1.5kms and an area of 2.25 square kilometers. the estimated population of

Unity State before the crisis was 585,801 while the estimated population in the camp is 103,424 with 35% of this population estimated to be under-five. Before this crisis, most of the inhabitants were cattle keepers and farmers but since then, all their properties were destroyed, looted and they entirely depend on ration food provided to them by

World Food Programs. Majority of them are illiterate and semi-literate. While those with semi-literacy education are able to work with International and National nongovernmental Organizations. All the services including health services are provided by UN agencies and Non-Governmental Organizations (NGOs). The area has five health facilities which include four primary health care centers and one hospital managed by Medicines Sans Frontiers. The major cause of suffering and death in the POC includes acute watery diarrhea, malaria and of course respiratory tract infection. The prevalence of acute watery diarrhea is 42.9%, Malaria is 25% and of course Respiratory infection is 35% respectively (IOM, 2019).

3.4 Study variables

Table 1: Description of independent variables

Type of variable	Variables	Description
Indpendent	Sociodemographic factors	These includes the age, sex marital status, occupation, maternal education
	Level of awareness of acute watery diarrhea	This includes what they know about acute watery diarrhea in term of infection and preventing measures
	Environmental factors	How they store their drinking water, hygiene, overcrowding

3.5 Target population:

In this research study, the target population are the children below the age of five years. 439 house hold were sampled based on Yamane formula of 1967. Only one child below 5 years were targeted in each house hold. The total households in the entire protection of civilians site are 18,140 while the households estimated to have under five are 6377.

The information was provided by the care givers.

3.6 Sample size determination:

In this study, Yamane's formula of 1967 was applied because the population of under five in Bentiu protection of civilian site is more than 10,000.

Yamane's formulae 1967

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

n= desired sample size e = (probability of error that is the desire of precision e.g., 0.05 for 95% confidence level).

N=the estimate population size of the target population.

The total estimated population of Bentiu protection of civilian site is 103,424 with household of 18,140 while the target population which is under-five is 35.1% of this population=36,818.944 and the estimated households with under -five are 6377.

n=36,818.944/ (1+36,818.944) *(0.05)2=399 under five participants plus 10% =439. The camp has 5 sectors, that is sector 1 up to sector 5, so 399 participants were divided into all sectors applying proportionate sampling method since the sectors do not have an equal population.

Due to none respondent which happened in some households, 10% of the sample population were added to the sample size of 399.

10%*399= 39.9

Total sample size when 10% is added was 399+39.9= 439 participants

Based on the formula above, 399+ 10% is the desired sample size for under-five which was randomly pick from the under-five population of the civilian site in Bentiu POC and since all the 5 sectors do not have an equal proportion of inhabitants, proportionate sampling was applied to divide 399 to 5 sectors (DTM, 2019).

There were 5 focus group discussions (FGD) conducted based on the 5 sectors and convenience sampling (This is a type of sapling which is available and achievable at that particular time when in need) was applied for selecting the participants. Each sector had one focus group discussion of 8 people mostly parents and guardians of under-five children.

3.7 Sampling procedures and techniques:

This study used both Probability and Non-Probability sampling technique in selecting the samples for this study. Because of its high-density population than any other protection of civilian site in South Sudan, Bentiu protection of civilian site was purposively selected to represent the other sites. In **Quantitative data**, Probability sampling was used, that means all the 439 participants were proportionately selected to represent the 5 sectors in Protection of civilian site (POC) because the population varies in all the 5 sectors. Systematic sampling was applied to select the participant and simple random sampling applied to select the first household/ shelter. These shelters (household) are arranged systematically on a row or line and picking of the participant were done through systematic sampling where the first household (shelter) would be selected randomly. Should it have happened that the selected household (shelter) has no desire under-five, then the next household were considered. To get the desired sampling interval, the population of the shelters/ household were divided to the population of the sample participants in that sector and in sector one, 840/62= 13 That mean in sector 1, there was interval of 13 household/ shelters.

In sector two, it will be 1399/92=15. That mean in sector 2, there were interval of 15 households/ shelters.

Sector three, 1509/101=14 interval.

Sector four, 1120/83=13 interval

Sector five, 1509/101=14 interval.

In **qualitative data**, FGDs were applied and in-depth interview of selected respondents were crucial and applicable. The method of selecting participants for focus group discussion was by **convenience sampling** where I only focus on the one that are available, and I perceived to have information which were helpful.

This protection of civilians site has 5 sectors, and these are sector 1 up to sector 5 and within sectors there are blocks and within block, there are shelters/ households and each shelter/ household have between 5 to 10 members in which majority are children and women. All these sectors do not have equal population of civilians and therefore they do not have equal blocks and shelters/household, that is why I did proportionate sampling for the 399 participants and of course added 10% due to none respondent.

Below is the table for the sectors, blocks and shelters **Table 2: Sectors, Blocks and Shelters, Households of 6377.**

S/n	Sectors	Blocks	Shelters	%	% Of 439
1	1	9	840	14%	62 participants
2	2	15	1399	21%	92 participants
3	3	16	1509	23%	101 participants
4	4	12	1120	19%	83 participants
5	5	16	1509	23%	101 participants

Note: Note that the households with under- five are 6377.

3.8 Data Collection techniques

Quantitative data

There was face to face administered questionnaires based on the three themes of the research specific objectives. I engaged 5 research assistances to speed up the research. The three themes that were captured in questionnaires include:

- Social-demographic factors of the care givers of under-five
- Level of awareness of the care givers of under - five Environmental factors of the under – five

Qualitative data

Focus group discussion (FGD)

For qualitative data, there were 5 focus group discussions on the extracted from the themes on research questions. Each focus group discussion has 8 participants from different sex mostly parents and the care givers of under- five.

Key informant interviews

Key informant interview was design to collect additional information from influential leaders in the state ministry of health, health professionals mostly in five health facilities, World Health Organization focal person in the Protection of civilian 'site and UNICEF focal person in Protection of civilian's site to know their views on the risk factors of acute watery diarrhea stipulated on the three specific objectives.

There were questionnaires specifically designed for the Key informant in Protection of Civilian's site. Below are the designated groups that will be targeted for Key informant interviews:

Director General in the State Ministry of Health (SMOH)

Medical officers and Clinical officers in charge of five health facilities in Bentiu Protection of Civilian's site.

WHO Focal person in the protection of civilian's site

UNICEF focal person in the protection of Civilian's Site

3.9 Selections and orientations of field teams

Prior to the field work, five field teams were selected with in the POC. there were two days' rehearsal and trainings for the five research assistants on the questionnaires, focus group discussions (FGD) as well as key informant interviews. That was very crucial because they need orientation on what to do and how to do it.

3.10 Validity and Reliability

Meanwhile Validity is known as the impact of subtraction and reaching the intended target of what tool and instrument to be use. Regarding this research, the tool used were piloted to see how detailed their contents were. The first thing that was done was to find out or check the whole tools and instruments to contrast it with the objectives of the research and to be really sure you can be able to answer the questions being asked by the researcher. The second step was to hire a consultant to assess the tools mostly the tools and instruments if they are valid and usable for the purpose of the research.

Reliability is to check if tools which are being used for the study yield internally consistent without having very extreme data which may cause a lot of variation. This was applied in this research to check the consistency.

3.11 Piloting of the questionnaires

After completion of the training for research assistants, they conducted piloting of the questionnaires in Juba IDPs which poses the same level of characteristic with Bentiu

Protection of Civilian’s site to check for reliability and validity. They also conducted one piloting of focus group discussion (FGD) in Juba IDP and one piloting for Key Informant interview in National ministry of Health. This process goes on for complete one day and this was very important for the consistent before field work. After piloting interview, we run the trail data through the proposed data analysis below which was appropriate for the data set and this helped to describe the research hypothesis and to test the proposed design feasibility of the study as well as educated myself on different techniques related to the study which can as well be applicable incase the initial does not offer better option.

3.12 Data analysis tools and methods:

Quantitative data

Data cleaning

Once data has been collected, data cleaning was done to identify any missing values, extreme values and internal inconsistency which may occur.

Data importation

Data were digitized and imported using SPSS, a tool recommended for data analysis in academic and research studies and widely used for data management, statistical analysis, graphics, simulations, regression and customer programming.

Data Analysis

Data analysis involved descriptive analysis, bivariate analysis and regression analysis. For descriptive analysis, frequencies were presented, and percentage were presented for categorical variables whereas means and standard deviations were presented for numerical variables which are usually distributed and median and interquartile range for skewed numerical data.

Chi square test was applied on categorical variables while analyzing the data on this study. Example of Categorical variable are individual characteristics like gender and sex of under-five.

Regression analysis

In this study, regression analysis mostly logistic regression was being applied to predict the categorical dependent variable using a given set of independent variables and solving classification problems.

Qualitative data analysis

Content analysis

This involved categorizing verbal data, classify, summarize and tubulate them for presentable and easy way for interpretation.

3.13 Ethical consideration/Issues:

Before the fieldwork, I applied for ethical review from Mount Kenya University and tentatively to South Sudan Research Council who was approved and permitted this research study prior to the field study.

Unique identifier

All the information for this study were basically from under five, and the informants were their parents and guidance. Their names and other details were kept confidential. The computer which was used for analysis was locked with a password and no access granted to outsiders before the end of this study. Alternatively, they were given unique identities as X, Y or Z. These helped to covered their identities from out siders.

Confidentiality

All the data set that was used in this study were not made public because it contained names, houses, numbers and the details of the households. All were kept confident for security reason since this study involved political and socio-cultural factors which may increase the prevalence of acute watery diarrhea

Consents

Participant's consent is paramount and shall be respected. This study never in anyway under look the right of participants. Consent form was signed by the participant to prove that he/she agreed to be part of this study.

CHAPTER FOUR

RESEARCH FINDING AND DISCUSSIONS

1.0 Introduction

The topic precisely discussed and summarize the research presentation, interpretation and discussion of the results and findings. All the discussions are guided by the research objectives as below.

4.1. Demographic factors for caretaker

Response Rate; 99.9%

Table 3: Demographic factors for caretaker n=439

Demographic	Category	Frequency	Percent
Sector	1	62	14.1
	2	92	21
	3	101	23
	4	83	18.9
	5	101	23
Category	Father	10	2.3
	Mother	387	88.2
	grand mother	20	4.6
	Other	22	5
Gender	Male	10	2.3
	Female	429	97.7
Marital status	Single	48	10.9
	Married	360	82
	Widowed	19	4.3
	Cohabiting	12	2.7
Education level	Primary Secondary	102	23.2 12.1
		53	
	College	34	7.7
	not educated	250	56.9
Occupation	Student house	98	22.3
	wife	322 3	73.3
	Employed		0.7
	business personnel	12	2.7
	Unemployed	4	0.9

Source: By researcher 2021

Table 4: Other demographic information

Category	Minimum	Maximum	Mean	Std. Deviation
Age of respondent	13	70	30.99	10.144
Household size	4	25	9.38	4.107
Number of U5	1	9	2.39	1.286
Age of child	1	5	2.73	1.412

Table 5: Age distribution among the under-five children participating in the study

Age category		Frequency	Percent
	1	100	22.8
	2	135	30.8
	3	69	15.7
	4	68	15.5
	5	67	15.3
Total		**439**	**100**

4.1.1. Level of awareness of caretakers on causes and control of acute watery diarrhoea for under-five

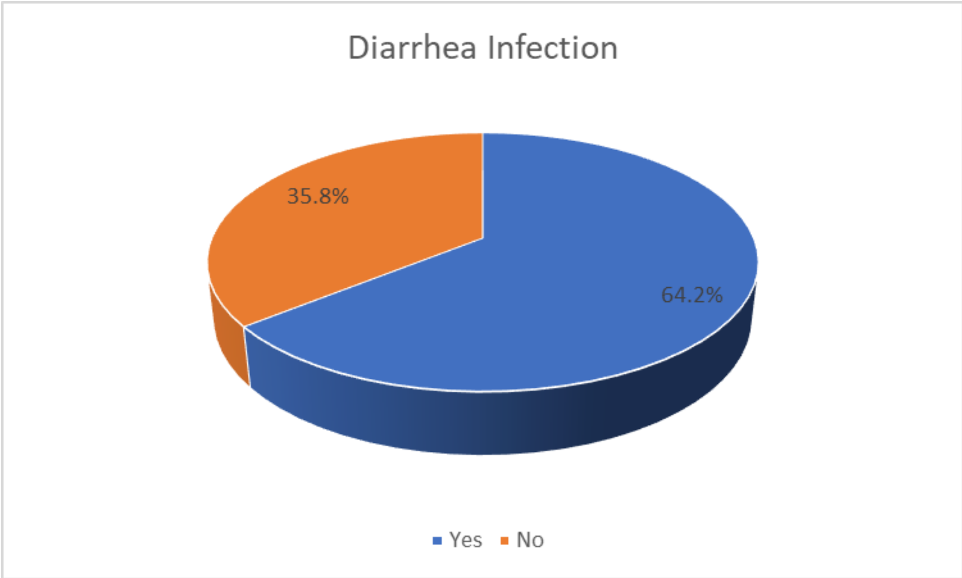

Figure 2: Proportion of under-five children who had diarrhea in the past 2 weeks

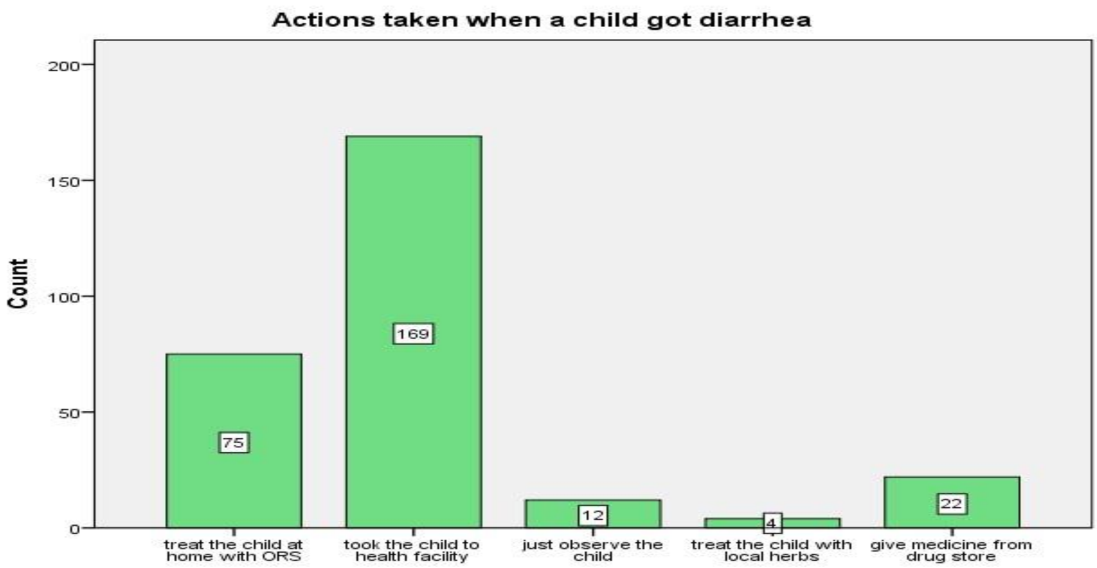

Figure 3: Actions taken when child got diarrhea

Table 6: Factors relating to awareness of the participants regarding acute watery diarrhea

	Options	Frequency	Valid Percent
Question			

What was given to child to drink	much less or	84	29.8
	none about the	61	21.6
	same More don't	125	44.3
	know	12	4.3
	Total	282	100
Attributed factors for diarrhea	poor sanitation poor	218	77.3
	personal hygiene	260	92.2
	poor water quality	251	89.0
	Contaminated food	266	94.3
	Weather	10	3.5
	Spirits	4	1.4
	do not know	4	1.4
	Other	18	6.5
How diarrhea can be prevented	Washing hands more frequently	278	98.6
	Cooking food thoroughly	281	99.6
	Cleaning dishes	274	97.2
	Cover prepared food	211	74.8
	Weather	15	5.3
	I don't know	25	8.9

Source: Researcher 2021

Figure 4: Attitude of the respondent towards prevention of diarrhea

Likert scale coded as: strongly agree (SA) =5, agree (A) =4, Neutral (N) = 3, disagree (D) = 2, strongly disagree (SD) = 1

Table 7: Attitude of the participants regarding prevention diarrhea

Attitude	Category	Frequency	Valid Percent	Mean
maintaining good personal hygiene protect child health	strongly disagree (SD)	9	2.1	4.42
	Disagree (D)	13	3	
	Neutral (N)	14	3.2	
	Agree (A)	150	34.2	
	strongly agree (SA)	253	57.6	
	Total	439	100	
hand washing before feeding child reduces risk of getting diarrhea	strongly disagree (SD)	0	0	4.53
	Disagree (D)	11	2.5	
	Neutral (N)	9	2.1	
	Agree (A)	160	36.4	
	strongly agree (SA)	259	59	
	Total	439	100	
use of clean water to wash utensils is important to child health	strongly disagree (SD)	0	0	4.57
	Disagree (D)	0	0	
	Neutral (N) Agree	4	0.9	
	(A) strongly agree	159	36.6	
	(SA)	272	62.5	
	Total	435	100	
maintaining clean facilities is good for child health	strongly disagree (SD)	0	0	4.63
	Disagree (D)	0	0	
	Neutral (N)	0	0	
	Agree (A)	165	37.6	
	strongly agree (SA)	274	62.4	
	Total	439	100	

Environmental factor	Category	Frequency	Valid
	Boiling	47	
	use of chlorine/water guard use of	118	
	water filters (ceramic filters) solar	10	
	disinfection let it stand and settle	14	
Drinking Water		231	
	filter with cloth	11	
	Others	8	
	Total	439	
Toilet	Yes	55	
	No	384	
	Total	439	
	pit latrine flash	31	
	toilet	14	
Method of human waste disposal	Bushes	325	
	Others	69	
	Total	439	
	very clean	5	
	Clean	15	
Sanitary condition of toilet	Dirty	35	
	Total	55	
Adequacy of toilet facility for everyone at home	Yes No	4	
		51	
	Total	55	
Why toilet facility is not available	too expensive to construct	112	
	is not important to have on	16	
	no space for toilets	262	
	Total	390	
	Yes No	124	
Children able to use toilet		315	

	Total	439
What is done to help children who can not use toilet	use baby diaper	77
	assisted by care givers on the use of straight legs stooling	171
	use baby portable toilet	71
	Total	**319**

Table 8: Level of awareness of the caretakers on causes and control

Level	Category	Count	Percent
High	Strongly	261	59.6
Average	Agree	156	35.6
Low	Strongly disagree + Disagree	22	5.0
Total		439	100.0

4.1.3. Environmental factors

Table 9: Environmental characteristics associated with the respondents

4.1.4. Bivariate analysis

Table 10: Correlation between demographic factors and occurrence of watery diarrhea among the under-five

Demographic factor	**Occurrence of Diarrhea**						
	Category	yes	No	Total	Pearson Chi-Square value	P-Value	Likelihood ratio
Sex of child	Male	162(36.9%)	69(15.7%)	231(52.6%)	7.37	0.007	7.4
	Female	120(27.3%)	88(20.0%)	208(47.4%)			
	Total	282(64.20%)	157(35.8%)	439(100.0%)			
Age of child	1 year	69(15.7%)	31(7.1%)	100(22.8%)	12.5	0.014	12.3
	2 years	83(18.9%)	52(11.8%)	135(30.8%)			
	3 years	49(11.2%)	20(4.6%)	69(15.7%)			
	4 years	49(11.2%)	19(4.3%)	68(15.5%)			
	5 years	32(7.3%)	35(8.0%)	67(15.3%)			
	Total	282(64.2%)	157(35.8%)	439(100.0%)			
Marital Status	Single	32(7.3%)	16(3.6%)	48(10.9%)	5.5	0.138	5.3
	Married	236(53.8%)	124(28.2%)	360(82.0%)			
	Widowed	8(1.8%)	11(2.5%)	19(4.3%)			
	Cohabiting	6(1.4%)	6(1.4%)	12(2.7%)			
	Total	282(64.2%)	157(35.8%)	439(100.0%)			
Occupation	Student	69(15.7%)	29(6.6%)	98922.3%)	15	0.005	19.7
	House wife	198(45.1%)	124(28.2%)	322(73.3%)			
	Employed	0(0.0%)	3(0.7%)	3(0.7%)			

	Business personnel	12(2.7%)	0(0.0%)	12(2.7%)			
	Unemployed	3(0.7%)	1(0.2%)	4(0.9%)			
	Total	282(64.2%)	157(35.8%)	439(100.0%)			
Education Level	Primary	78(17.8%)	24(5.5%)	102(23.2%)	12.1	0.007	12.5
	Secondary	38(8.7%%)	15(3.4%)	53(12.1%)			
	College	20(4.6%)	14(3.2%)	34(7.7%)			
	Not educated	146(33.3%)	104(23.7%)	250(56.9%)			
	Total	282(64.2%)	157(35.8%)	439(100.0%)			

Source: researcher 2021

Table 11: Correlation between awareness factors and occurrence of diarrhea among under-five

Awareness		**occurrence of Diarrhea**					
	Category	**yes**	**No**	**Total**	**Pearson Square value**	**Chi- P-Value**	**Likelihood ratio**
Child breastfed for 6 months	Yes No	172(39.2%)	70(15.9%)	242(55.1%)	11	0.001	10.9
		110(25.1%)	87(19.8%)	197(44.9%)			
	Total	282(64.2%)	157(35.8%)	439(100.0%)			
Child vaccinated with Rota Virus	Yes	28(6.4%)	154(35.3%)	182(41.7%)	332.3	0.000	410
	No	236(54.1%)	0(0.0%)	236(54.1%)			
	I don't know	18(4.1%)	0(0.0%)	18(4.1%)			
	Total	282(64.7%)	154(35.3%)	439(100.0%)			

Maintaining good personal hygiene protect child health	strongly not	9(2.1%)	0(0.0%)	9(2.1%)	15.2	0.004	17.8
	agree not agree	8(1.8%)	5(1.1%)	13(#3.0%)			
	neutral agree	4(0.9%)	10(2.3%)	14(3.2%)			
		90(20.5%)	60(13.7%)	150(34.2%)			
	strongly agree	171(39.0%)	82(18.7%)	253(57.6%)			
	Total	282(64.2%)	157(35.8%)	439(100.0%)			
Handwashing before feeding child reduces risk of getting diarrhea	not agree	11(2.5%)	0(0.0%)	11(2.5%)	48.7	0.000	54.5
	neutral agree	0(0.0%)	9(2.1%)	9(2.1%)			
	strongly agree	79(18.0%)	81(18.5%)	160(36,4%)			
		192(43.7%)	67(15.3%)	259(59.0%)			
	Total	282(64.2%)	157(35.8%)	439(100.0%)			
Use of clean water to wash utensils is important to child health	strongly not	0(0.0%)	1(0.2%)	1(0.2%)	14.6	0.002	15.8
	agree neutral	0(0.0%)	4(0.9%)	4(0.9%)			
	agree strongly	93(21.3%)	66(15.1%)	159(36.5%)			
	agree	189(43.3%)	83(19.0%)	272(62.4%)			
	Total	282(64.7%)	154(35.3%)	439(100.0%)			

Table 12: Correlation between occurrence of watery diarrhea and environmental factors

Environmental factors		**Occurrence of Diarrhea**					
	Category	yes	No	Total	Pearson ChiSquare value	P-Value	Likelihood ratio
Source of drinking water	piped water water	85(19.4%)	55(12.5%)	140(31.9%)	8.2	0.086	10.4
	from open well	21(4.8%)	6(1.4%)	27(6.2%)			
	water from borehole	6(1.4%)	0(0.0%)	(1.6%)6			
	rain water	26(5.9%)	9(2.1%)	35(8.0%)			

	water vendors	144(32.8%)	87(19.8%)	231(52.6%)			
	Total	282(64.2%)	157(35.8%)	439(100.0%)			
Water treatment method	boiling	30(6.8%)	17(3.9%)	47(10.7%)	37.7	0.000	42.9
	use of chlorine/water guard	58(13.2%)	60(13.7%)	118(26.9%)			
	use of water filters (ceramic filters)	10(2.3%)	0(0.0%)	10(2.3%)			
	solar disinfection	4(0.9%)	10(2.3%)	14(3.2%)			
	let it stand and settle	167(38.0%)	64(14.6%)	231(52.6%)			
	filter with cloth	5(1.1%)	6(1.4%)	112.5%)			
	others	8(1.8%)	0(0.0%)	8(1.8%)			
	Total	282(64.2%)	157(35.8%)	439(100.0%)			
Sanitary status of the cup used for fetching water	very clean	114(26.0%)	88(20.0%)	202(46.0%)	17.9	0.000	18.3
	clean dirty	143(32.6%)	47(10.7%)	190(43.3%)			
		25(5.7%)	22(5.0%)	47(10.7%)			
	Total	282(64.2%)	157(35.8%)	439(100.0%)			
Toilet facility available	yes no	51(11.6%)	4(0.9%)	55(12.5%)	22.2	0.000	20.8
		231(52.6%)	153(34.9%)	384(87.5%)			
	Total	282(64.2%)	157(35.8%)	439(100.0%)			

4.5.1. Logistic regression analysis

Table 13: Regression analysis – classification table

Classification Table[a,b]					
	Observed		**Predicted**		
			Had diarrhea		Percentage Correct
			Yes	**No**	
Step 0	Had diarrhea	yes	282	0	100.0
		no	157	0	.0
	Overall Percentage				64.2

a. Constant is included in the model.
b. The cut value is .500

Table 14: Regression analysis- Variables in the Equation

Variables in the Equation							
		B	S.E.	Wald	df	Sig.	Exp(B)
Step 0	Constant	-.586	.100	34.592	1	.000	.557

The coefficients and odds ratios are shown in the "Variables in the Equation" table above. As indicated, the odds ratio is 0.557 that the under-five in the study had watery diarrhea.

Table 15: Regression analysis - Omnibus Tests of Model Coefficients

Omnibus Tests of Model Coefficients				
		Chi-square	Df	Sig.
Step 1	Step	8.624	2	.007
	Block	8.624	2	.007
	Model	8.624	2	.007

The overall test of the model is shown in the "Omnibus Tests of Model Coefficients" table above. As shown in the table the overall model is statistically significant, χ^2 at df 2 = 8.624, and p = 0.007 which is <0.05.

Table 16: Regression analysis - Model Summary

Model Summary			
Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
1	68.870[a]	0.485	0.613

a. Estimation terminated at iteration number 3 because parameter estimates changed by less than .001.

The table above explain the Cox & Snell R Square and Nagelkerke R Square values, which are both methods of calculating the explained variation. These values are also referred to as pseudo R^2 value. Therefore, the explained variation in the dependent variable (Watery diarrhea) based on our model ranges from 48.5% to 61.3%, according to Cox & Snell R^2 or Nagelkerke R^2 methods, respectively.

Table 17: Regression analysis - Hosmer and Lemeshow Test

Step	**Chi-square**	**Df**	**Sig.**
1	0.318	2	1.000

The Hosmer-Lemeshow tests the null hypothesis (there is significant relationship between Watery diarrhea and sex, occupation, marital status and awareness) that predictions made by the model fit perfectly with observed group memberships. A chisquare statistic is computed comparing the observed frequencies with those expected under the linear model. A no significant chi-square indicates that the data fit the model well. As indicated in the table above, X^2 of 0.318 at df 8 has P-Value of 1.000 which is >0.05 therefore, chi-square is not significant meaning the data fits the model well.

4.2. Discussions Of The Results

4.2.1 Socio-Demographic factors

In this study results have pointed out that 64.2% of the respondents confirmed that their under – five children encountered acute watery diarrhea in the past 2 weeks. This is a clear indication that diarrhea is one of the most causes of morbidity among the underfive in the POC and its prevalence is higher (64.2%). Majority of the caretakers who participated in the study were mothers (88.2%) who were married (82%) as housewives (73.3%) and had no formal education (56.9%). We can say these mothers were housewives and jobless since they have no formal education. They solemnly rely on their spouses or had limited access to employment opportunities. Because of the lack of education which limited them to lack of resources, they entire depend on the food ration offer by United Nation. They cannot afford to offer balance diets to their children under five and this predisposed them to acute watery diarrhea. These research results were consistent with the study conducted in Ethiopia by A Getachew (2018), to carried out the prevalence of diarrheal disease and sociodemographic factors within the children with in the age bracket of 5 years in rural areas of North Gondar Zone in which maternal lack of education, overcrowding and maternal age at birth predisposed the child to acute watery diarrhea (Getachew, 2018).

Among all the five focus group discussions conducted in the five sectors of the protection of civilian’s site, majority of the respondents stressed the issue of overcrowding as the serious cause of acute watery diarrhea in protection of civilians’ site. One of the participants gives example of her family which are 16 members residing in small tukul. Majority of the respondents also talked about lack of education which is preceded by unemployment and eventually lead to low income which affect the growth and immunity of children under the age of five. Other social concerns that were raised by the respondents include; under age marriages as many young girls are forced to get married below the age of 18 years and they could not take care of their children properly. Many children under the age of five lost their parents during the war in South Sudan which left so many of them under the care of their grandparents who can hardly provide for them. Issue of polygamy was also raised by few participants as the social factors which support the occurrence of acute watery diarrhea in sense that one man may have about 10 wives and few concubines which he may not supported financially. This will increase the poverty line which mostly affect under five children, even if the child is sick, the father will not afford the medications and good health services.

These research results are in line with the study conducted by Gebru (2017) who found that Most of the acute watery diarrheal diseases can be mitigated approving proper water sanitation and hygiene programs which all aim at preventing fecal oral route transmission. (Gebru, 2017).

In correlation analysis between demographic factors of the caretakers and occurrence of watery diarrhea among under five. The association was tested at alpha 0.05 level of significance with 95% level of confidence. As indicated, sex of the child is associated with occurrence of watery diarrhea (p value 0.007) and the likelihood ratio is 7.4 that diarrhea occurred among the males (boys). This is so because male boy gender plays a lot compare to female gender. These findings were consistent with the Dhaka study conducted by Adam C in 2018 who found out that male child suffered acute watery diarrhea than female child (Adam c ,2018).

Age of the under-five is also associated with occurrence of watery diarrhea (P-value 0.014) and the likelihood ratio is 12.3 that diarrhea occurred among the under-five who were aged between 1-2 years.

Marital status of the caretakers had no much effect on the occurrence of watery diarrhea since the p-value 0.138 is greater than 0.05.

Occupation of the mothers is also a line with the present of acute watery diarrheal diseases among the under-fives (p-value 0.005) and the likelihood ratio is 19.7 that diarrhea occurred among the under-five children whose mothers were unemployed.

Education level of the caretakers (p-value 0.007) also influences the occurrence of diarrhea among the under-fives and the likelihood ratio is 12.5 that diarrhea occurred among the under-five children whose mother's education level was primary or not educated.

4.2.2. Attitude and awareness of the respondent towards prevention of diarrhea.

In this research study, results have found out that majority of the caretakers had high level of awareness (59.6%) and average (35.6%) level of awareness on causes and control of diarrhea. These findings are consistent with the study by Agegnehu 2019 in which 62.6% were aware about diarrhea and about 1/3 which is 34.4% of those who participated were able to know and affirmed diarrhea as the passage or loose stool more than one in a day (Agegnehu, 2019).

The mothers (caretakers) were able to give the sick child from diarrhea more fluids (44.3%) to drink which was a prerequisite for rehydration for children suffering from diarrhea. The attributed factors included, poor sanitation (77.3%), poor personal hygiene (92.2%), poor water quality (89%), Contaminated food (94.3%) among others.

Out of 282 of the mothers who's Under- five young one encountered diarrheal disease in the past 2 weeks before the study, 169 (59.9%) took the child to health facility 75

(26.6%) treated the child with ORS, 22 (7.8%) gave the medicine from the drug store. This indicates high level of awareness. However, this study is inconsistence with the study conducted by Mohamed in Omdurman locality, Sudan in regard to awareness and attitude towards the management of dehydration in the mother's and factors influence in under five children (Mohamed, 2020).

The study is also in disagreement with the study conducted by WHO in Tanzania in 2017 in regard to the level of awareness of acute watery diarrhea, although majority of mothers know the signs of dehydration, the level of awareness of the causative agents and predisposing factors were very poor (WHO, 2017). Another study carried out

(WHO, 2015) in Tanzania and Indonesia also came with the same similar results. Majority of the mothers could not mention all the steps and right preparation of ORS solution. This may be due to mothers' lack of experience on the solution and volume required, lack of proper education and knowledge on diarrhea and its management at home (WHO, 2015). Among the mothers of Musahar in Nepal, even though they know about the diarrhea and it home management, they have little knowledge for some vital issues such as danger sign of dehydration, the role of rehydration fluid during diarrhea and of course its exact preparation concerning it amount were very poor. (Mekonen, 2018).

Out of 282 of the mothers whose young one encountered diarrheal diseases in the past 2 weeks before the study, 169 (59.9%) took the child to health facility 75 (26.6%) treated the child with ORS, 22 (7.8%) gave the medicine from the drug store. This indicates high level of awareness.

The caretakers were able to give the sick child from diarrhea more fluids (44.3%) to drink which is a prerequisite for rehydration for children suffering from diarrhea. The attributed factors as cause of acute watery diarrhea included, poor sanitation (77.3%), poor personal hygiene (92.2%), poor water quality (89%), Contaminated food (94.3%) among others. The possible preventive measures for diarrhea include: Washing hands more frequently (98.6%), Cooking food thoroughly (99.6%), Cleaning dishes (97.2%) and covering prepared food (74.8%). This demonstrated high level of knowledge and awareness among the caretakers.

As indicated, on figure 4 above, 97.7% of the caretakers of the under-five acknowledged that children's feaces are potential hazard for diarrheal diseases. This indicates high level of awareness regarding causes of diarrhea.

A 5-point ordinal scale was used to rate the degree to which the respondents agreed, Disagreed, Uncertain, Strongly Agreed and Strongly disagreed with a statement

Calculation of the average mean response from the Likert scale

(9×1) +(13×2) +(14×3) +(150×4) +(253×5)/439=
1942/439 = ***4.42***

Interpretation of the mean score

Mean score from

- 0.01 - 1.00 implies (strongly disagree);
- 1.10 - 2.00 implies (disagree);
- 2.01 - 3.00 implies (neutral);
- 3.01 – 4.00 implies (agree);
- 4.01 - 5.00 implies (strongly agree)

As indicated all the mean values are >4.00 implying that all the respondents **strongly agreed** with the statements: maintaining good personal hygiene protect child health, hand washing before feeding child reduces risk of getting diarrhea, use of clean water to wash utensils is important to child health and maintaining clean facilities is good for child health

As seen above those participants who stated strongly agree were graded as having high level of awareness, those who stated agree were graded as average and those who stated strongly disagree and disagree were graded as low level of awareness regarding personal hygiene, control of diarrhea, use of clean water and maintaining clean toilet facility. This was so because these were the basic standard operating procedures required to control and prevent diarrheal diseases among the under-five. As indicated, majority of the participants had high level of awareness (59.6%) and average (35.6%) level of awareness on causes and control of diarrhea.

According to focus group discussion, majority of the respondents' argued out that diarrhea is cause by flies which may contaminated the food as well as drinking water. Some said diarrhea is due to contaminated utensils, open defecation lack of latrines and eating uncooked food. Some respondents said UN food can cause diarrhea as well as contaminated breastmilk. Improper hygiene like lack of handwashing, weather changes like during rainy season and malaria can all cause diarrhea. Some respondents said, lack of proper waste disposal which is so much experienced in Bentiu POC is the serious causes of acute watery diarrheal diseases in Bentiu protection of civilian site while others said lack of covering food in the POC is the major cause of acute watery diarrheal diseases in the protection of civilian site. In a nutshell, majority of the respondents are aware about acute watery diarrhea. They may not know the exact causes like viruses, bacteria and fungi but many of them know the transmitting agents which is also a good sign and a stepping stone. They also know the mean of protecting their young one from contacting acute watery diarrhea by washing utensils, proper hand hygiene, proper waste disposal, proper feeding the young one, exclusive breastfeeding and full immunization of their children under the age of five years.

In correlation analysis between awareness factors and occurrence of diarrhea among under-five. The association was tested at alpha 0.05 level of significance with 95% level of confidence. As indicated, breast feeding a child for 6 months from birth is associated with occurrence of watery diarrhea (p value 0.001). The likelihood ratio is 10.9 that watery diarrhea occurred among the under-five children whose mothers did not exclusively breastfeed them for 6 months.

Vaccination of the child with Rota virus vaccine is greatly amalgamated with the present of acute watery diarrheal disease among the under-five children (p value 0.000). The likelihood ratio is 410 that diarrhea occurred among the under-five children who were not vaccinated with Rota virus vaccine.

Maintaining good personal hygiene is also amalgamated with the present of acute watery diarrheal disease among the under-five children (p-value 0.004). The likelihood ratio is 17.8 that diarrhea occurred among the under-five children whose mothers had poor personal hygiene.

Washing hand before feeding child (p-value 0.000) significantly influences occurrence of diarrhea and the likelihood ratio is 54.5 that watery diarrhea occurred among the under-five children whose mothers did not wash hands before feeding them.

Cleaning utensils with clean water (p value 0.002) significantly influence the occurrence of watery diarrhea among the under-five and the likelihood ratio is 15.8 that diarrhea occurred among the under-five children of the mothers who did not wash utensils with clean water.

4.2.3. Environmental factors

In this study, the findings for the possible environmental factors that are attributed to watery diarrhea occurrence among the under-five are discussed below. As indicated, 52.6% of the participants had no means of treating water for drinking instead they just leave it stand and settle. 87.5% confirmed that they did not have toilets and use open defecation (bush). Meanwhile, for those who use toilets (12.5%) lamented that sanitary condition of their toilets was very dirty and this predisposes the children to diarrheal diseases. The reason why a majority of the participants did not have toilet facilities in POC is because there was no space (67.2%) to construct the toilets and its very expensive to construct a toilet (28.7%). The under five were being assisted by the caretakers (71.8%) to collect feaces and throw to the bush. In conclusion, there is poor sanitation in the POC, no access to safe water, toilet facilities that predisposes the people most especially the under-five to diarrheal diseases.

The following environmental factors that are attributed to watery diarrhea occurrence among the under-five included, 87.5% confirmed that they did not have toilets and use open defecation (bush) and this predisposes their children to get watery diarrhea. Meanwhile, for those who use toilets (12.5%) lamented that sanitary condition of their toilets was very dirty and this predisposes the children to diarrheal diseases.

These results are inconsistent with the study conducted by Guarino, 2018 to determine the prevalence of diarrheal disease and to evaluate the environmental factors of diarrheal disease prevalence within children below 5 years (Guarino, 2018)

According to the focus group discussion, majority of the respondents argued out the lack of wash facilities like toilets and pit latrines are the major cause of acute watery diarrhea. Before this camp was turn into internally displace camp, it was a protection of civilian’s site under the care of United Nation Mission in South Sudan, there used to be pit latrines which were services by the UNMISS and its agencies. Since it was turned into IDP camp, those services were cut short. All those pit latrines were full and no agency to provide the hygiene and sanitation services and therefore they are no longer use. All the population in the protection of civilian's site resorted into open defecation and since then, there is high prevalence of acute watery diarrhea among the under-five residing in the POC. Lack of treated drinking water; Previously when this camp was under the control of United Nation, they use to provide treated drinking water but since the camp was turned into internally displace camp and handed over to the government, those services they used to render to the civilians were stopped including the treated drinking water. This has forced the communities inside the POC to fetch the water from the stagnant sources and the rainy water. Those who have incomes are able to buy drinking water while those who have no incomes could not afford to buy the drinking water and had no option rather to fetch from the stagnant rainy water which already mixed with feces since the entire population resorted to open defecation. According to the respondents, this is one of the leading causes of acute watery diarrhea among the children under-five in Bentiu Protection of civilians' site. Lack of wastes disposal in the camp; majority of the respondents argued out that there is no organized wastes disposal in the camp. They just throw the wastes at the close proximity which attract so many flies and lead to the outbreak of acute watery diarrhea. Open defecation; According to the vast majority of respondents, the entire population of the camp resorted to open defecations in the bushes. This could be due to the lack of wash facilities as well as cultural beliefs and practices which support the open defecations.

Improper hygiene in the camp; due to the status of the camp with overcrowding, the hygiene status of the camp was so poor and this can easily lead to high prevalence of acute watery diarrhea as per the respondents during the focus group discussions.

In correlation analysis between environmental factors and occurrence of diarrhea among under-five. The association was tested at alpha 0.05 level of significance with 95% level of confidence. As indicated, source of water does not significantly influence the occurrence of watery diarrhea among the under-fives. (p value 0.086). Water treatment method (p value 0.000), greatly influences occurrence of water diarrhea among the under-fives and likelihood ratio is 42.9 that caretaker who do not treat water, diarrheal will occur among their children who are under-five.

Condition and sanitation status of the cup used to fetch water significantly influences the occurrence of watery diarrhea among the under-fives with p-value of 0.000. The likelihood ratio is 18.3 for diarrhea to occur among the under-fives for the mothers whose cups for fetching drinking water are dirty.

Availability of toilet facility is also associated with occurrence of watery diarrhea with p-value 0.000. The likelihood ratio is 20.8 that diarrhea will occur among under-five children whose mothers have no toilet facility at home.

Logistic regression was performed to estimate the probability of present of watery diarrhea that is significantly affected by the independent variables. If the estimated probability of watery diarrheal disease occurring is greater than or equal to 0.5 (better than even chance), Statistically we classify the watery diarrheal diseases as occurring. If the probability is less than 0.5, Statistically we classify the watery diarrhea as not occurring. A binomial logistic regression was applied to classify whether diarrhea cases can be correctly classified (predicted) from the independent variables. In anyway, it was really necessary to have this method to assess the effectiveness of the predicted classification against the actual classification.

CHAPTER FIVE

SUMMARY CONCLUSIONS AND RECOMMENDATIONS

5.1. Conclusions

Bases on this research finding, the following conclusions are made

5.1.1 Sociodemographic factors of the care takers that are associated with occurrence of acute watery diarrhea

This study found out that education level of the caretakers of the under-five significantly influences the present of acute watery diarrheal disease among the underfive (p-Value = 0.002) and the children of caretakers with primary education level or no education, chances of getting diarrhea are 3.1 times higher than other caretakers with other education levels.

This study found out that the gender or sex of the under- five significantly influences the present of diarrhea among the under-five (p value = 0.006) and for the male child, chances of getting diarrhea are 2.8 times higher than the female child.

5.1.2 Level of awareness of the care takers

This study found out that vaccination of a child with Rota virus vaccine has significant relationship with occurrence of diarrhea among the under-five (p value = 0.000) and children who are not vaccinated with Rota virus, chances of getting diarrhea are 36.6 times higher than those who are vaccinated.

The study found out that water treatment methods significantly influence occurrence of diarrhea among the under-five (P value = 0.002) and caretakers who leave water to stand and settle down as a method of water treatment chances of their children getting watery diarrhea are 3.1 times higher than those who use other water treatment methods like boiling, chlorination.

5.1.3 Environmental factors that are associated with occurrence of acute watery diarrhea

The research study results found out that the status and condition of the water containers significantly influences occurrence of diarrhea among the under-five (p value = 0.003) and the children of those caretakes with dirty water containers, chances of getting diarrhea are 3 times higher than those with clean water containers

The study found out that availability of hand washing facility significantly influences occurrence of diarrhea among the under-five (p value = 0.000) and the children of those caretakes without handwashing facility, chances of getting diarrhea are 9.3 times higher than those with handwashing facilities

The study found out that availability of toilet facility significantly influences occurrence of diarrhea among the under-five (p value = 0.002) and the children of those caretakes without toilet facilities, chances of getting diarrhea are 3.1 times higher than those with toilet facilities

5.2. Recommendations

Basing on the findings and conclusions, the following recommendation are made:

United Nation and its Agencies need to improve the sanitation in the POC through Provision of safe and hygienic toilet facilities

United Nation and its Agencies need to Provide effective water treatment methods

The International and National Organization providing WASH activities in POC Need to sensitize the community on hygiene and sanitation

The National Ministry of Health with the State Ministry Need to provide immunization services especially Rota virus antigens to boost the immune systems of the under-five against diarrheal diseases

There is a serious need for more studies regarding acute watery diarrhea and relation of acute watery diarrhea with acute malnutrition.

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APPENDICES

Appendix I: Consent form for parents and caregiver questionnaires

Good morning/afternoon, my name is Gabriel Boum Tap, I am a Master degree student at Mount Kenya University pursuing Master of Public Health, Epidemiology and the Diseases control. I am currently carrying out research on Risk factors for acute watery diarrhea in Bentiu protection of civilian's site

Why doing this research: The research is meant to exactly find out the risk factors of acute watery diarrhea in Bentiu protection of civilian 'site. The study will help to outline the factors that influence the acute watery diarrhea in Bentiu protection of civilian site and will suggest the possible recommendations for prevention.

The study will be useful to the state ministry of health and national ministry of health to influence and contribute to the reform of some policies as far as the management of acute watery diarrhea is concern. The findings and recommendations will suggest the possible solutions which will help to reduce the suffering and death related to diarrheal diseases in South Sudan and particularly in Unity State, Bentiu protection of civilian site.

The study will also help to inform the civic population of South Sudan and particularly those who are confined in Bentiu protection of civilian site to choose the best health facility and the best treatment of their choice for their children under five. This study will be informative and innovative in nature.

Discomfort and risk: This issue that we are going to talk about is about acute watery diarrhea. The level of awareness, social economic factors and environmental factors. Some of the questions which will be ask might be sensitive but just know that your decision to participate is completely willingness and voluntarily, should you have any concern, discomfort or would like to withdraw, kindly do not hesitate to let me know, you are free to decline.

Duration of participation

The interviews will last for 1-hour utmost

Confidentiality

The interview will take place in a private environment. The interview with you will be strictly confidential. The responses will not be shared with anyone. Your name will only be recorded in this form, which will be kept separate from the interviews. Your responses will be combined with responses of other people and no one will be able to identify your specific responses. The information gathered will only be used for the stated purpose. The interview will be tape recorded to ease data analysis.

The group discussion will take place in a private environment. All the views and opinions you give during the group discussion will be strictly confidential. The responses will not be shared with anyone and among the participants, agreements on confidentiality will be set. You will be asked to respect the privacy of others in the group and not disclose whatever they said in this discussion. Your name will not be recorded in any of my notes or any of the reports and I will not share any of the information with anyone. Your responses will be combined with responses of other people and no one will be able to identify your specific responses. The information gathered will only be used for the stated purpose. The group discussion will be tape recorded to ease data analysis.

Benefits and Compensation

The intention of this research is to improve the high prevalence of acute watery diarrhoea in Bentiu protection of civilians site by digging deep on the risk factors which influence the occurrence of acute watery diarrhoea in Bentiu POC. There is no direct benefits and compensation to you as a participant apart from the water which will be provided to all participants. You will render your services free of charge and no compensation.

Do you have any question?

1 Yes 2 No

Respondent declaration:

You will be required to write your name and sign in the space provided below only if you agree to participate in this process.

"I have been given an opportunity to ask any questions I may have, and all such questions or inquiries have been answered to my satisfaction. I have been informed orally and in writing of whom to contact in case I have questions. I hereby consent to participate in this study".

Name……………………………………………………………………

Signature…………………... Date……………………

Witness signature……………. Date…………………….

Interviewer's Declaration:

I………………………………………… Date ………………….…………

hereby declare that I have explained clearly to the participant the objectives, possible benefits and the risks of the research. I have received his/her consent.

Questions asked (if any):

Appendix II: Questionnaires

You are welcome to this interview of today. My name is Gabriel Boum Tap, working for UNICEF. I am currently researching on the risk factors for acute watery diarrhea in Bentiu protection of civilians site as many of you are aware that diarrhea poses serious threat to our young ones mostly below five years, therefore this research is to determine those factors which expose our young ones to get infected by diarrhea disease. After determining the factors, a recommendation will be disseminated to possibly prevent them. Therefore, you will be asking some questions and you will provide the answers.

During the interview, I will be asking you some questions on demographic factors, your social background, economic, level of awareness, environmental factors as well as health facility-based factors. Please feel free to bring up any issues you think are relevant to this study, I am ready to listen to your view and perspective regarding this research.

A risk for participants may be that someone outside the research team could read about responses you have given out during the research interview; however, you do not need to worry as appropriate steps shall be put in place to protect your privacy.

There are no direct benefits to you other than the opportunity to participate in the research and include your perspective, however every information you give will help to improve the general situation in Bentiu protection of civilian site once this research is published and its recommendations are shared to all agencies providing health and wash services.

Your participation is voluntary, and you can decide not to answer any question or stop the interview any time or for any reason, nobody will penalize you.

Do you have any question? Yes ☐ ☐No

Do you agree to participate in this interview? Yes ☐No ☐

Is it okay if I record the interview? $\boxed{\text{Yes}}$ No☐

Date of interview…………………………………. Interviewer Name…………………………………………………………
Sector……………………………….Block……………………….
Shielter………………………………………………………….....

NO	QUESTIONNAIRES	CODING CATEGORIES		SKIP
	Social demographic factors of under-five in Bentiu POCs			
1	Respondent category (one respondent only)	Father	1	
		Mother	2	
		Grand mother	3	
		Grand father	4	
		Other	5	
2	Sex	Male	1	
		Female	2	
3	Age of respondent	……….. Years		
4	Marital status	Single	1	
		Married	2	
		Divorced	3	
		Widowed	4	
		Widower	5	
		Cohabiting	6	
5	Level of education	Primary	1	
		Secondary	2	
		College	3	
		Not educated	4	
6	What is the occupation of the care giver?	Student	1	
		House wife	2	
		Employed	3	
		Business personnel	4	

7	How many people live in your household?	……………………………..	
8	How many people are under the age of 5?	……………………………..	

9	Age of the child	……………………………...	
10	Sex of the child	Male	1
		Female	2
Level of awareness of acute watery diarrhea among the under-five care givers			
11	Is this child on breastfeeding or breast fed for 2 years?	Yes	1
		No	2
12	Since this time yesterday, did the child received any of the following	Vitamin Supplement Plain Water Sweeten Water or Juice ORS Infant formula Fresh Mild Any other liquid Solid or semi solid food	1 2 3 4 5 6 7 8
13	Nutrition status of the child	Malnourished	1
		Well nourished	2
14	Has any of your child under the age of 5 encountered diarrhea in the past 2 weeks?	Yes	1
		No	2
15	If yes, which of your child had diarrhea in the past two week?	……………………………………	
16	Was there blood in the stool?	Yes	1
		No	2
17		Treat the child at home with ORS	1

	What did you do after the child got diarrhea?	Took the child to health facility	2	
		Just observe the child	3	
		Treat child with local herbs	4	
		Give medicine from drug store	5	
		Others	6	

18	During the last episode of diarrhea, did the child drink any of the following	A fluid from the packet called ORS	1	
		Government recommended homemade fluid	2	
19	During the time of diarrhea illness, did the child drink much, less, about the same or more than usual?	Much less or none	1	
		About the same	2	
		More	3	
		Don't know	4	
20	During the diarrhea illness, did the child eat less, about the same or more than usual?	None	1	
		Much less	2	
		Somewhat less	3	
		About the same	4	
		More	5	
		Don't know	6	
21	Has the child been vaccinated with rotavirus?	Yes	1	
		No	2	
		I don't know	3	
22	What did you attribute the diarrhea illness to?	Poor sanitation	1	
		Poor personal hygiene	2	
		Poor water quality	3	
		Do not know	4	
		Others	5	
23	Have you ever heard of diarrhea?	Yes	1	
		No	2	

24	From whom did you hear about diarrhea?	Health facility		
		Friends		
		Radio		
		Others		
25	How long did the diarrhea last before stopping	No of days…………………		

26	Can you tell me the biggest problem your family face in this POC?	Poor Health	1	
		Insufficient food	2	
		Lack of money	3	
		Unemployment	4	
		Homeless	5	
		Lack of access to health services	6	
		Diarrheal disease	7	
		Others	8	
27	What is the second biggest problem your family face in this POCs?	Poor Health	1	
		Insufficient food	2	
		Lack of money	3	
		Unemployed	4	
		Homeless	5	
		Lack of access to health services	6	
		Diarrheal diseases	7	
		Others	8	
28	What is the most frequent disease in this POCs?	Diarrhea	1	
		HIV/AIDS	2	
		Malaria	3	
		Trauma/Injuries	4	
		Respiratory diseases	5	

		Anemia	6	
		Others	7	
		Don't know	8	
29	What cause diarrhea	Drinking dirty water	1	
		Eating contaminated food	2	
		Flies/ Insect	3	
		Poor hygiene	4	
		Weather	4	
		Spirits	6	

		Others	7	
		Don't know	8	
30	How do you prevent diarrhea?	Wash hand more frequently	1	
		Cooking food thoroughly	2	
		Cover prepared food	3	
		Cleaning dishes	4	
		Weather	5	
		Others	6	
		Don't know	7	
Environmental factors that influence the occurrence of acute watery diarrhea				
31	What is the main source of drinking water for members of your household?	Piped water	1	
		Water from open well	2	
		Water from borehole	3	
		Surface water	4	
		Rain water	5	
		Water vendors	6	
32	Who is providing water at the source?	Authority	1	
		CBO/NGO	2	
		Private operator	3	

		Don’t know	4	
33	Do you do anything to make water safe for drinking?	Yes	1	
		No	2	
34	What do you usually do to make the water safe for drinking?	Boiling	1	
		Use of chlorine (water guard)	2	
		Use of water filters (ceramic filters)	3	
		Solar disinfection	4	
		Let it stand and settle	5	
		Filter with cloth	6	
		Others	7	

35	Why do you use this method for making water safer?	Cost effective	1	
		I don’t know other options	2	
		The method is effective	3	
		Cheap	4	
		I don’t know	5	
		Others	6	
36	Why don’t you treat your drinking water?	Availability	1	
		Costs	2	
		Bad taste and smelly of treated water	3	
		I believe water is safe from the source	4	
		We are used to drinking untreated water, nothing happens to us	5	
		I don’t know	6	
		Others	7	
37	Is there water storage container in home/house?	Yes	1	
		No	2	
38	What is the type of container for storing the water?	Mental	1	
		Plastic	2	

		Others	3	
39	What is the container sanitary state?	Very clean	1	
		Clean	2	
		Dirty	3	
40	Do you store water for drinking separately from water for other domestic purpose?	Always	1	
		Some time	2	
		Never	3	
41	Which container do you store water for drinking?	Bucket with lid	1	
		Bucket without lid	2	
		Small pan	3	
		Jerry cans	4	
		Others	5	
42	Do you use water for drinking or for other purposes?	Yes	1	
		No	2	
43	How do you pour water from the storage container?	Use small pan	1	
		Pour directly from container	2	
		Use cup	3	
		Others	4	
44	Do other in the family members access the storage container?	Yes	1	
		No	2	
45	What is the sanitary state of a cup to draw water from water storage container?	Very clean	1	
		Clean	2	
		Dirty	3	
46	Is the water storage container used to store any other liquid like what other liquid?	None	1	
		Gasoline	2	
		Naphtha	3	
		Others	4	

47	Do you enjoy the taste and smell of your cleaned drinking water?	Yes	1	
		No	2	
		Don't know	3	
48	Who use the water once its treated?	Mother	1	
		Father	2	
		Children	3	
		Elders	4	
		Guest	5	
		Others	6	
49	When do you wash hands?	After using the toilet	1	
		Before meal	2	
		Before cooking food	3	
		Others	4	

50	Do you use soap?	Yes	1	
		No	2	
51	Is there place for handwashing?	Yes	1	
		No	2	
52	Is there soap in the place for handwashing?	Yes	1	
		No	2	
53	Is a toilet available in the home/house?	Yes	1	
		No	2	
54	If yes, in what sanitary state is the toilet?	Very clean	1	
		Clean	2	
		Dirty	3	
55	Is the toilet facility adequate for the household?	Yes	1	
56		No	2	
57		Too expensive to construct	1	

	If no, why does the family not have a toilet?	Its not important to have one	2
		Others	3
58	What kind of toilet facility do members of the household use?	Pit latrine	1
		Flush toilet	2
		Bushes	3
		Others	4
59	Are your children of under-five able to use latrine on their own?	Yes	1
		No	2
60	If no, explain how they attend the call of nature	Use baby diaper	1
		Assist by caregivers on the use of straight legs stooling	2
		Baby portable toilet	3
61	How are the faeces of under-five children disposed of?	Disposed of the toilet	1
		Burry in the trenches	2
		Collect and throw away into washed wastes	3
62	Do you think children feaces are harmful?	Yes	1
		No	2
63	Maintaining good personal hygiene protect a child's health	Strongly not agree	1
		Not agree	2
		Neutral	3
		Agree	4
		Strongly agree	5
64	Handwashing before feeding to a child reduces a risk to developed diarrhea	Strongly not agree	1
65		Not agree	2
		Neutral	3
		Agree	4

		Strongly agree	5	
66	Use of clean water to wash utensils are important to child's health	Strongly not agree	1	
		Not agree	2	
		Neutral	3	
		Agree	4	
		Strongly agree	5	
67	Maintaining cleaned sanitary facilities are pre-requisite for good health of a child	Strongly not agree	1	
		Not agree	2	
		Neutral	3	
		Agree	4	
		Strongly agree	5	

Appendix III: Focus Group Discussions

Appreciation to everyone who accepted to be part of this focus group discussions today. My name is Gabriel Boum Tap, working for United Nation Children Funds (UNICEF). I am currently researching on the risk factors for acute watery diarrhea in Bentiu protection of civilians site as many of you are aware that diarrhea poses serious threat to our young ones mostly below five years, therefore this research is to determine those factors which expose our young ones to get infected by diarrhea disease. After determining the factors, a recommendation will be disseminated to possibly prevent them.

During this FGD, we will be discussing on some questions on demographic factors, social background, economic, level of awareness and environmental factors which can lead to the rise of acute watery diarrhea. Please feel free to bring up any issues you think are relevant to this study, I am ready to listen to your view and perspective regarding this research.

A risk for participants may be that someone outside the research team could read about responses you have given out during this FGD; however, you do not need to worry as appropriate steps shall be put in place to protect your privacy.

There are no direct benefits to you other than the opportunity to participate in the research and include your perspective, however every information you give will help to improve the general situation in Bentiu protection of civilian site once this research is published and its recommendations are shared to all agencies providing health and wash services.

Your participation is voluntary, and you can decide not to answer any question or stop the interview any time or for any reason, nobody will penalize you.
Any question so far?

1. What is the socio-demographic factors of the care givers associated with the occurrence of acute watery diarrhea among the under-five children living in Bentiu protection of civilians' site?

2. What is the level of awareness of acute watery diarrhea among the under-five care givers living in Bentiu protection of civilian site?

What are the environmental factors that influence the occurrence of acute watery diarrhea among the under-five care givers living in Bentiu protection of civilians' site

Appendix IV: Key Informant Interview Guide

Appreciation to everyone who accepted to be part of this Key Informant Interview. My name is Gabriel Boum Tap, A Master degree student at Mount Kenya University pursuing Master of Public Health, Epidemiology and the Diseases Control. I am currently researching on the risk factors for acute watery diarrhea in Bentiu protection of civilians site as many of you are aware that diarrhea poses serious threat to our young ones mostly below five years, therefore this research is to determine those factors which expose our young ones to get infected by diarrhea disease. After determining the factors, a recommendation will be disseminated to possibly prevent them.

During this Key Informant Interview, we will be asking some questions on demographic factors, social background, economic, level of awareness and environmental factors which can lead to the rise of acute watery diarrhea. Please feel free to bring up any issues you think are relevant to this study, I am ready to listen to your view and perspective regarding this research.

A risk for participants may be that someone outside the research team could read about responses you have given out during this Key Informant Interview; however, you do not need to worry as appropriate steps shall be put in place to protect your privacy.

There are no direct benefits to you other than the opportunity to participate in the research and include your perspective, however every information you give will help to improve the general situation in Bentiu protection of civilian site once this research is published and its recommendations are shared to all agencies providing health and wash services.

Your participation is on voluntary basis, and you can decide not to answer any question or stop the Key Informant Interveiw any time or for any reason, nobody will penalize you.

Any
Question?...
....
....
....

Any other
concern?..
....
....
....

Name…………………………………………………………………………

Signature…………………...   Date……………………

Researcher's Declaration:

I………………………………………………… Date ……………………………………… hereby declare that I have explained clearly to the participant the objectives, possible benefits and the risks of the research. I have received his/her consent.

This key informant interview guide will be use to collect some additional information from the Unity state ministry of Health, WHO focal person, UNICEF focal person as well as the medical officers and Clinical officers in charge of the Five Health Facilities in the State.

i) What is your name?...
ii) Where do you work?..
iii) What is your current position?...

QUESTIONS

1a) Is acute watery diarrhea a major concern in Bentiu Protection of Civilian's site?...
....
....

b) If yes, what have the government done to response to the concern of acute watery diarrhea…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………
…………………………………………………………………………………

…………………………………………

2) What do you think is the cause of acute watery diarrhea in Bentiu

POC?...

....

....

....

....

3) What can be done to prevent acute watery diarrhea in Bentiu

POC?...

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....

....

....

4) Which is the commonest condition in Bentiu

POC?...

....

....

5) How many cases of diarrhea is estimated to be receive per day in Bentiu

POC?...

....

....

.... 6) Is diarrhea among the leading cause of morbidity and mortality with in Bentiu

POC?...

....

....

7) How are the health seeking behaviors of the mothers when their under-five children have diarrhea?

....

....

....

....

8) How are the capacity of health facilities in Bentiu POC?

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

……………………………………………………………………………………………

9) Which disease is the leading cause of death in Bentiu POC?

....

....

....

10) What is the recommended treatment method of drinking water in POC?

....

....

....

11) What is the mostly recommended treatment of acute watery diarrhea in Bentiu

POC?...

....

....

....

12a) Is there anything that the state government is doing to reduce the high prevalence of a cute watery diarrhea?

....

....

....

....

....

.... b) If yes, what is that?

....

....

....

....

....

13) What is the main source of drinking water in POC?..

....

....

....

14) Who is providing the water in POC?

....

....

15) Which method is recommended by the government in regard to the prevention of acute watery diarrhea?

....

....

....

....

16) Do you have any questions/comments/additional information that would you like to add?

....

....

....

....

Appendix V: Ethical Clearance Certificate

Mount Kenya University

REF: **MKU/ERC/1866**
TO: **GABRIEL BOUM WILLIAM**

Date: 29 July 2021

REG: **MPH/2018/27612**

Dear Sir/Madam,

RE: RISK FACTORS FOR ACUTE WATERY DIARRHEA IN BENTIU PROTECTION OF CIVILIAN'S SITE, UNITY STATE, SOUTH SUDAN.

This is to inform you that **Mount Kenya University** has reviewed and approved your above research proposal. Your application approval number is **939.** The approval period is **28/07/2021 - 27/07/2022.**

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 **Mount Kenya University**
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 **Mount Kenya University** within 72 hours of notification
iv. Any changes, anticipated or otherwise that may increase the risks or affect the safety or welfare of study participants and others or affect the integrity of the research must be reported to **Mount Kenya University** 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 **Mount Kenya University**

Prior to commencing your study, you will be expected to comply with any additional requirements from relevant authorities in the country where this study will be conducted.

Yours sincerely,

The Chairman
Mount Kenya University
Ethics Review Committee
P. O. Box 342 - 0100, Thika

Dr. Peter G. Kirira
Chairman, Mount Kenya University IERC

Main Campus, General Kago Road, P.O. Box 342-01000 Thika. Tel: +254 67 2820 000,

Appendix

VI: Introduction Letter

Mount Kenya University

DIRECTORATE OF GRADUATE STUDIES

MPH/2018/27612

13th August, 2021

The Director, Research Coordination Division
National Commission for Science, Technology & Innovation
Utalii House, 8th & 9th Floor
P.O Box 30623- 00100
NAIROBI

Dear Sir/Madam,

RE: GABRIEL BOUM WILLIAM – REGISTRATION NO. MPH/2018/27612

The purpose of this letter is to introduce the above named student who is pursuing **Master of Public Health** in the **Department of Epidemiology and Biostatistics** in the **School of Public Health.**

The title of his research is ***"Risk Factors for Acute Watery Diarrhea in Bentiu Protection of Civilian's Site, Unity State, South Sudan."***

He has been cleared by the University's Ethics Review Committee (Certificate attached) and now has to proceed to the field to collect data for his research between **August and October, 2021.**

Any assistance accorded to him will be highly appreciated.

Thank you.

Mount Kenya University
P. O. Box 342 - 01000, THIKA
Office of the Director
Graduate Studies

Dr. Samuel M. Karenga, Ph.D
Director, Graduate Studies
Enc.

Main Campus, General Kago Road, P.O. Box 342-01000 Thika. Tel: +254 67 2820 000,
Cell: +254 720 790 796, 0709 153 000
Email:info@mku.ac.ke Web: www.mku.ac.ke

VII: Research Approval Letter from The Ministry of Health, Ethics

Appendix

Review Board, South Sudan

REPUBLIC OF SOUTH SUDAN

Ministry of Health, Research Ethics Review Board (MOH-RERB), Juba.

Date: 12th July 2021

RERB NO:39/08/2021- MOH/RERB/ A.40//2021

Principal Investigator (PI): Gabriel Boum William, Mount Kenya University

Supervisor: Dr. John Kariuki, MKU,

Research Approval Letter

Dear All;

Sub: "Risk Factors for Acute Watery Diarrhea in Bentiu Protection of Civilian's Site, Unity State"

This is in response to the request for authorization of the study Risk Factors for Acute Watery Diarrhea in Bentiu Protection of Civilian's Site, Unity State, South Sudan. As part of emergency preparedness and response to the high incidences of acute watery in South Sudan.

The Ministry of Health Research Ethics Review Board at its A.15th meeting held on 11th August 2021 reviewed your research proposal and has given a favorable ethical opinion for implementation.

The approval was based on the quality of your application form, protocol and supporting documents that complied with the conditions and principles established by the International and national guidelines for carrying out research involving humans as research participants.

This approval shall be valid until 12th/09/2021. In this regard, you are expected to commence implementation of this research. The progress report should not exceed five pages.

In addition, any serious problem related to implementation of this research protocol should be promptly reported to the MOH-RERB, and any changes to the protocol should not be implemented without the MOH-RERB approval except in instances where such a change is necessary to eliminate or prevent an immediate hazard to the research participants. I wish you all the best in implementing this research.

MINISTRY OF HEALTH, RESEARCH ETHICS REVIEW BOARD
MOH-RERB
12 AUG 2021
JUBA, SOUTH SUDAN

Amanya Jacob Kasio Iboyi, MOH/SMU

#. Deputy Director Research-MOH, Juba,

#. Deputy Chairperson MOH-RERB/Juba/RSS

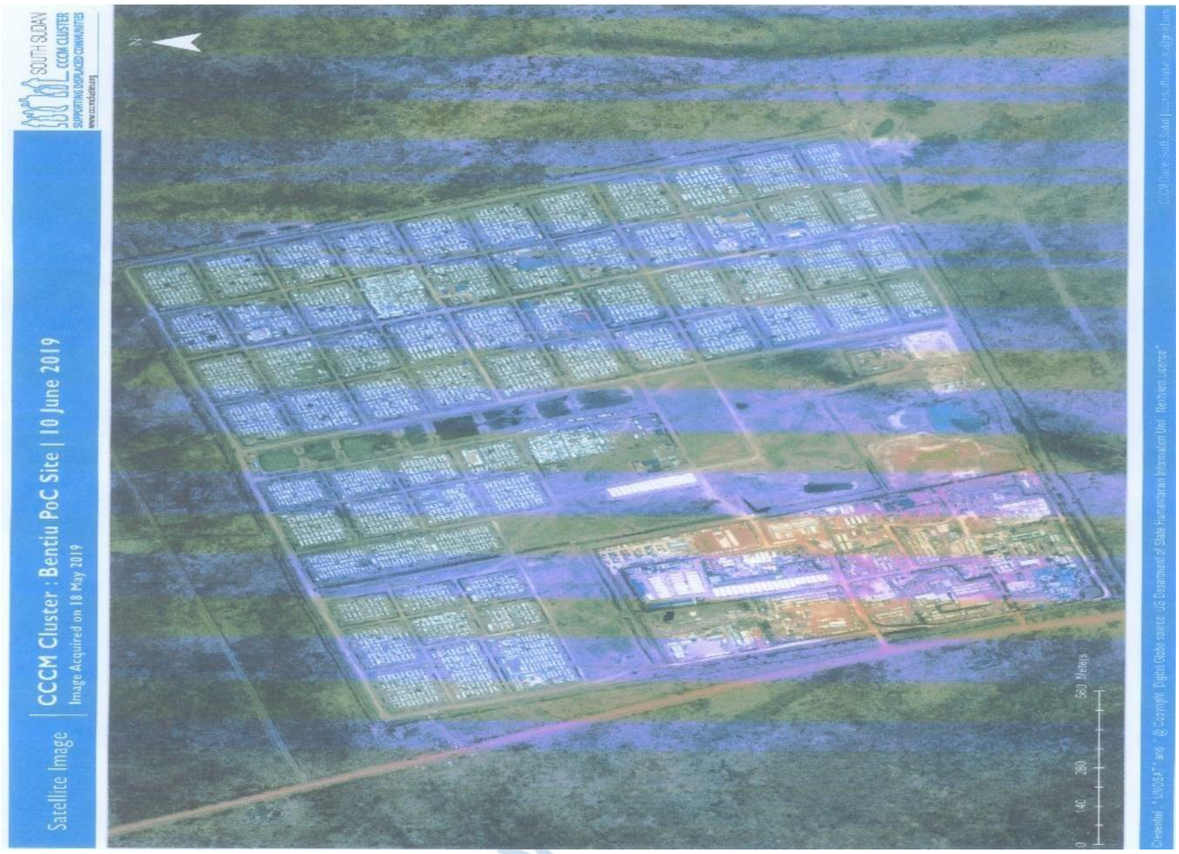
Cc: D/G SMOH/CHD, Bentiu, Unity State

Cc: Camp Management, Bentiu, POCs

Tel: +211920536030 Email: ministryofhealthrerb@gmail.com

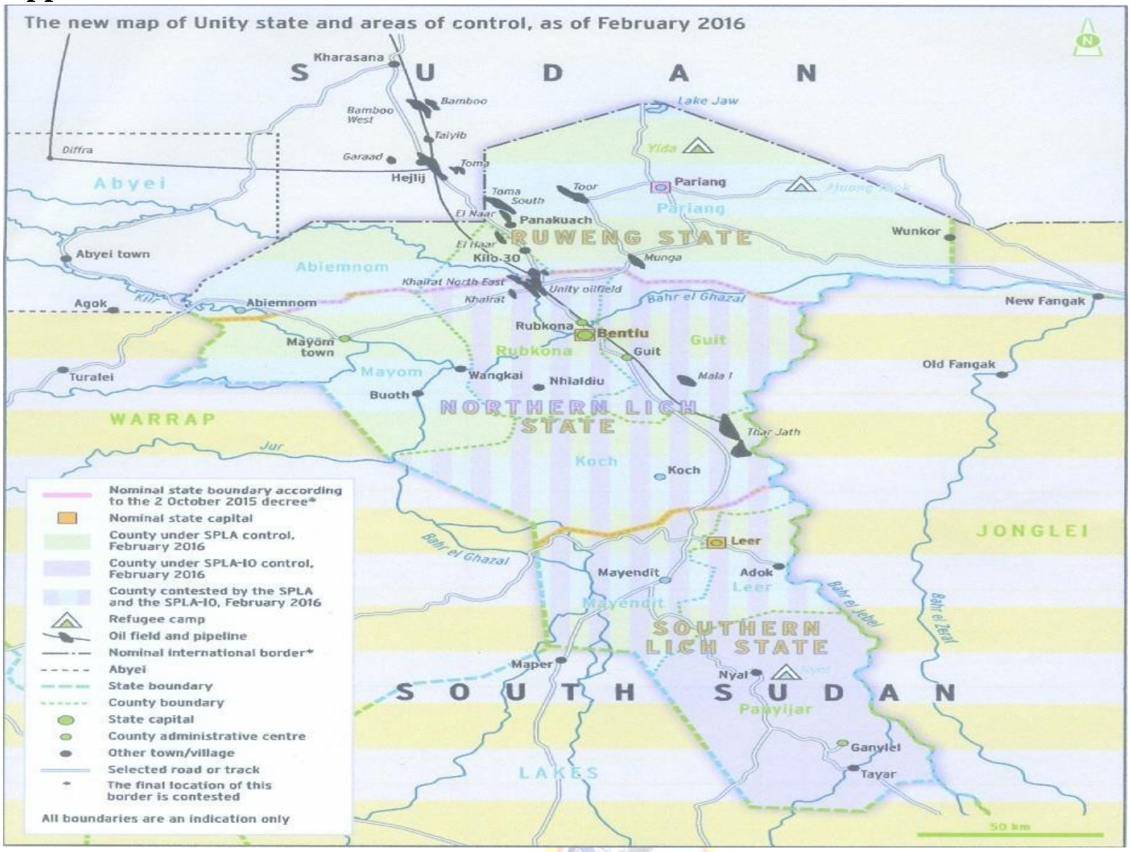
Appendix

VIII: Protection Of Civilians Site Map (POC)



IX: Unity State Map

Appendix


The new map of Unity state and areas of control, as of February 2016
SUDAN
SOUTH SUDAN
Kharasana
Bamboo
Bamboo West
Taiyib
Garaad
Toma
Hejlij
Diffra
Abyei
Abyei town
Agok
Abiemnom
Turalei
WARRAP
Jur
Lake Jaw
Yida
Pariang
Toor
Toma South
Panakuach
El Naar
El Haar
RUWENG STATE
Munga
Kilo-30
Wunkor
Khalrat North East
Khalrat
Unity oilfield
Bahr el Ghazal
New Fangak
Old Fangak
Rubkona
Bentiu
Guit
Mayom town
Mayom
Wangkai
Nhialdiu
Buoth
Mala 1
NORTHERN LICH STATE
Thar Jath
Koch
JONGLEI
Leer
Mayendit
Adok
Bahr el Jebel
Bahr el Zeraf
SOUTHERN LICH STATE
Maper
Nyal
Panyijar
Ganylel
Tayar
LAKES
50 km
Nominal state boundary according to the 2 October 2015 decree*
Nominal state capital
County under SPLA control, February 2016
County under SPLA-IO control, February 2016
County contested by the SPLA and the SPLA-IO, February 2016
Refugee camp
Oil field and pipeline
Nominal international border*
Abyei
State boundary
County boundary
State capital
County administrative centre
Other town/village
Selected road or track
* The final location of this border is contested
All boundaries are an indication only

Appendix

X: Similarity Index From Supervisors

RISK FACTORS FOR ACUTE WATERY DIARRHEA IN BENTIU PROTECTION OF CIVILIAN'S SITE, UNITY STATE, SOUTH SUDAN

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Appendix