



**PAN-AFRICAN UNIVERSITY  
INSTITUTE FOR WATER AND ENERGY SCIENCES  
(including CLIMATE CHANGE)**

# Master Dissertation

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WATER POLICY

Presented by

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**An Assessment of the Socio-Economic Challenges for the Provision Of WASH Services during Emergency Situations: A Case Study Of The Gado-Badzere Refugee Camp- East Cameroon**

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## DEDICATION

This work is dedicated to my family and loved ones for their constant support.

## STATEMENT OF THE AUTHOR

I hereby declare that this thesis is the original outcome of my research, has been realized to the best of my knowledge and ability. This work has not been submitted for any previous degree or an award. The experimental work is almost entirely my own work; the collaborative contributions have been indicated clearly and acknowledged. Due references have been provided on all supporting literatures and resources.

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## **BIOGRAPHICAL SKETCH**

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## LIST OF ABBREVIATIONS

ADL : Activities of Daily Living

ART : Antiretroviral therapy

BWT : Bulk Water Treatment

HWT : House hold Water Treatment

IDPs: .....**Internally displaced people**

MHM : Menstrual Hygiene Management

NGO'S : Non-Governmental Organizations

NTU : Nephelometric Turbidity Unit

POU : Point-Of-Use

PoUWT : Point of Use Water Treatment

PuR : Purifier

UNHCR : United Nations High Commission for Refugees

UNICEF : United Nations International Children's Fund

UNRWA : United Nations Relief and Works Agency for Palestine Refugees in the Near East

WASH : WAter, Sanitation and Hygiene

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## **ABSTRACT**

Emergency situations can occur as a result of slow or rapid onsets. During such circumstances the affected populations become refugees or Internally Displaced People (IDPs) who often require fundamental and immediate needs such as water, food, sanitation which, when provided to them on time, can help

break the cycle of disease transmission and improve their wellbeing. The present study conducted aims at assessing the socio-economic challenges for the provision of Water, sanitation and hygiene promotion (WASH) standard in the Gado-Badzere Cameroon refugee camp. A total of two hundred and twelve (212) households were surveyed within the camp through a questionnaire. This was accompanied with key interviews, field observation and secondary data. Both descriptive and inferential statistics were used to analyse the data and the findings were compared to international standards. The identified socio-economic hurdles for the provision of WASH services in the camp were Financial constraints, behaviour complexities and cultural factors, refugee's dependence, and others such as geological factors etc. A total of 31 Boreholes, 12 standpipes unevenly distributed were found in the camp, the average volume of water available per person per day was 16 liters which was above that of 15 liters in emergency situations. Water points were located within the perimeters and the waiting time at the source was between 3-5minutes. The total number of used latrines was 817. The average number of persons per this facility was 31people, which is much higher than the standard suggested of 20 people per toilet facility. There were 300 garbage bins available in the camp and 15households per this facility. Faeces of children and menstrual hygiene of women are to an extent tackled. There are still many apprehensions regarding the number of persons per latrines and toilets, number of people per garbage can, access of WASH services to vulnerable groups, and challenges. This study can be very beneficial for the wellbeing of refugees in the world in general and particularly in Africa.

**Keywords:** Refugee, WASH, Challenges, Gado-Badzere, Cameroon.

## RESUME

Des situations d'urgence peuvent se produire à la suite d'incidents lentes ou rapides. Dans de telles circonstances, les populations affectées deviennent des réfugiés ou des personnes déplacées à l'intérieur du pays (PDIP) qui ont souvent des besoins fondamentaux et immédiats tels que l'eau, la nourriture, l'assainissement, et lorsqu'ils leur sont fournis à temps, peuvent aider à briser le cycle de transmission des maladies et améliorer leur bien-être. La présente étude vise à évaluer les défis socio-économiques pour la fourniture de services d'Eau, assainissement et promotion de l'hygiène (WASH) dans le camp de réfugiés de Gado-Badzere au Cameroun. Au total, deux cent-douze ménages ont été interrogés au sein du camp par le biais d'un questionnaire. Cela a été accompagné avec d'entretiens clés, d'observations sur le terrain et de données secondaires. Des statistiques descriptives et inférentielles ont été utilisées pour analyser les données et les résultats ont été comparés aux normes internationales. Les obstacles socio-économique identifiés pour la fourniture de services WASH dans le camp étaient les contraintes financières, les complexités de comportement et les facteurs culturels, la dépendance des réfugiés, et autres comme les facteurs géologiques etc. Un total de 31 forages, 12 bornes fontaines inégalement réparties ont été trouvés dans le camp, le volume moyen d'eau disponible par personne et par jour était de 16 litres, ce qui était supérieur à 15 litres dans les situations d'urgence. Les points d'eau étaient situés à l'intérieur des périmètres et le temps d'attente à la source était de 3 à 5 minutes. Le nombre total de latrines utilisées était de 817. Le nombre moyen de personnes par installation était de 31 personnes, ce qui est beaucoup plus élevé que la norme suggérée de 20 personnes par installation de toilettes. Il y avait 300 poubelles disponibles dans le camp et 15 ménages par installation. Les matières fécales des enfants et l'hygiène menstruelle des femmes sont dans une certaine mesure abordées. Il existe encore de nombreuses appréhensions concernant le nombre de latrines et toilettes par personnes, le nombre de poubelles par personnes, l'accès aux services WASH pour les groupes vulnérables et les défis. Cette étude peut être très bénéfique pour le bien-être des réfugiés dans le monde en général et en particulier en Afrique.

Mots clés: Réfugiés, WASH, Défis, Gado-Badzere, Cameroun

# CHAPTER ONE

## 1.1 Introduction

Emergency can occur as a result of slow or rapid onsets, such as when a sudden flood, earthquake or drought happens and when states tumble apart during conflicts and wars. During such situations people and families are cut out from everything: their shelters, belongings and in some cases their lives and that of their loved ones is at stake. The survivals may become internally displaced people (IDP's) when they decide to move elsewhere and they become refugees when they cross national borders. It is certain that every type of emergency differs irrespective of some similarities. However, the significant demographic variations and the growing nature of armed conflict are leading to more individuals being disturbed by a broader range of types of emergency than ever before. The affected individual during such contexts often require fundamental and immediate needs. Basic services such as shelter, education, health services, food together with water and sanitation could be interrupted when a natural or man-made disaster disturbs people. Continued droughts could diminish stocks of water; flooding and geophysical disasters (for instance earthquakes and volcanic eruptions) may destroy water distribution and sanitation set-ups; industrial accidents may contaminate water resources and any form of human dislocation may lessen people's access to amenities.

All of these calamities, disasters or emergencies greatly affect distinct human beings, their families, their societies, and the nation as a whole in which these events take place. They all request quick and operative response to physical necessity in which water and sanitation fall and also longer-term recovery and reconstruction (Carter, 2015). It is under such conditions that Water, Sanitation and Hygiene (WASH) programme designs and actions help in the provision of these services and also safeguards health by preventing occurrences of water related diseases like cholera and also preserve their dignity.

When refugees run away as a result of civil wars or natural calamities, their future in refugee camps becomes uncertain. Their onset's state can vary intensely, contingent on their prior conditions when they left home and the distance travelled. Their primary exposure to the camp's life is confusing and incomprehensible and at the same time they are unprotected to lots of problems related to basic amenities and also frequently to the absence of sanitation facilities. This stems from the fact that many of the diseases common amongst refugees are caused by inadequate sanitary facilities such as excrete disposal, solid waste management,

domestic wastewater management, vectors and pest control and a poor understanding of hygiene practices (Baghri & Reed, 1998).

UNHCR has been mandated by the international community to support and defend the world's refugees. Whereby at the end of 2005, 20.8 million people consisted of refugees (40%), internally displaced persons assisted by UNHCR (32%), stateless persons (11%), with the remainder made up of asylum seekers, returned refugees and others of concern. (UNHCR, 2006a) With over two million persons, Colombia remained the country hosting the largest population of concern to UNHCR by the end of 2005. The entire population is almost exclusively comprised of internally displaced persons. Iraq is the second largest host country with some 1.6 million persons of concern, followed by Pakistan (1.1million) Sudan (1.0 million) and Afghanistan (912,000). These figures do not include refugees under the mandate of the United Nations Relief and Works Agency for Palestine Refugees in the Near East (UNRWA), that directly assisted 50% of all refugees in 2005 (UNHCR, 2006a). In Africa prominent new movements occurred in the Central African Republic, South Sudan, Nigeria and Eritrea was due to recurring episodes of conflict, political unrest, human rights violations, drought and famine in these countries (Ruaudel & Morrison-Metois, 2017)

As highlighted by the UNHCR, contact to safe water and sanitation is a health problem within the camp, but it is also a guarantor of human dignity in settings of high trauma for refugee residents. and it's mandate entails guaranteeing their human rights, their access to subsistence wants, physical protection (UNHCR, 1992). Contrary to this mandate there has been a lot of backup evidence of inadequate water and sanitation provision in refugee camps of Chad, Uganda, Kenya, DRC, and several other countries, this is also evident in IDP(Cronin & Shrestha, 2006)

It is well known that WASH is the core of human existence, the conditions of its accessibility have a straight effect on human progress, health, nutrition, livelihoods, wealth, the environment, culture, peace(ACF-international, 2016) as such the provision of water services require direct consideration from the onset of a refugee emergency to ensure that enough water of good quality is supplied and as we all know access to water is inseparable from sanitation (presence of latrines, treatment and disposal of wastewater). Water is vital to life, health and dignity and is therefore a basic human right. it is usually not adequately available in quantity and quality, consequently resulting to main health hazard. It is therefore important to note that Water is the prime criteria in site selection for a refugee camp during emergencies setting and helps sustain other sectors such as nutrition, hygiene, sanitation and health.



## **1.2 Statement of the problem**

Cameroon has over the years been welcoming people displaced by cross-border displacements caused by droughts, conflicts, political strife and civil wars in the next-door countries, predominantly from Central Africa, Chad, Nigeria, Niger and Gabon. This is heightened by its geographical site, passive nature as well as eco-friendly and geo-political progresses. The colossal arrival of refugees into Cameroon has been shown to be from diverse sites (approximately 30) with the key entries being Garoua-Boulai, Kentzou and Gbiti, Ngaoui, Gbatoua-Godole and Yamba (Aretouyap et al., 2017).

UNCHR (2014), highlights that approximately 200,000 of Central African refugees had fled to Cameroon as of mid-May 2014, with a great share living in the Gado badzere camp. In total, nearly 276,000 Central African refugees reside in Cameroon and are spread over several hundred of sites and villages mainly in the eastern regions (180,500 people), Adamawa (71,500 people) and North (7,200 people). Out of all the Central African refugees, only 25% (70,000 people) are accommodated in seven developed sites while the remaining 75% (more than 200,000 people) live with host communities (OCHA, 2016). Access to water, sanitation and hygiene remains limited during such emergencies. The increased pressure on scarce resources only exacerbate tensions between refugees and host communities and it is clearly obvious that the Cameroonian government, also the local communes were not ready to carter for the needs of such a huge amount of people.

There has been limited scientific study directed to evaluate the effective application of these standards in the refugee's camps of Cameroon, even though the sphere standard exist and it is set as a parameter by the consortium of humanitarian agencies, the Red Cross Movement and Non-Governmental Organizations (NGO'S) with regards to areas of water supply, sanitation and hygiene promotion; food security and nutrition; shelter, settlement and non-food items; and health action. It is consequently of great importance to do an assessment of socio-economic challenges of WASH provision in the Gado-Badzere refugee camp of Cameroon by looking at these standards.

## **1.3 The importance of WASH in emergencies**

Emergencies and disasters influence WASH services and practices by destroying prevailing infrastructure or by tying moved populations from the services which they had enjoyed. In the case of displacement, host populations are also affected, as greater demands are placed on their

services. Those who are placed under IDPs and refugee camps can stay there for long or even decades before deportation.

**The Humanitarian Charter and Minimum Standards in Disaster Response:**(Sphere handbook, 2011).

Sets out standards and guidance in relation to four fundamentals, of which WASH is the first. The others are Food Security and Nutrition, Shelter, Settlement and Non-Food Items, and Health Action.

The Handbook explains why WASH is so important in disasters: “Water and sanitation are critical determinants for survival in the initial stages of a disaster. People affected by disasters are generally much more susceptible to illness and death from disease, which to a large extent are related to inadequate sanitation, inadequate water supplies and inability to maintain good hygiene. The most significant of these diseases are diarrhoeal and infectious diseases transmitted by the faeco-oral route. Other water- and sanitation-related diseases include those carried by vectors associated with solid waste and water.”

The preservation of good health is admissibly one of the utmost main reasons for incorporating WASH in emergencies and disasters. Nevertheless, just as in long-term development contexts, there are many other motives for doing WASH. Sustained water distribution is a required necessity for drinking and cooking, laundry and personal hygiene. Secured cloistered latrines or toilets are needed for the practice of good hygiene and is not just a way of protecting health, nonetheless a matter of human dignity.

## **1.4 Main Objective**

The overall objective of the research is to assess the level of access to water, hygiene, and sanitation services within the refugee camp, and analyse the socio-economic challenges in meeting the WASH objectives.

## **1.5 Specific objectives**

- ✓ To examine the level and quality of water, sanitation response in the refugee camp
- ✓ To ascertain whether minimum standards of hygiene promotion is met
- ✓ To evaluate if WASH programme designs particularly take into consideration specific needs of vulnerable groups (women)
- ✓ To analyse the socio-economic challenges of WASH during emergency

## **1.6 Research Questions**

- ✓ What is the effectiveness of water and sanitation services in the refugee camp?

- ✓ What are the important hygiene techniques been enforced in order to prevent the outbreak of diseases?
- ✓ How do WASH programme designs effectively take into account needs of vulnerable groups?
- ✓ What are the socio-economic and infrastructural barriers?

### **1.7 Limitation of the study**

The challenge encountered during the study revolves mainly around the effects caused by the ongoing Pandemic situation. There was limited movement of people during this period, and many institutions were not fully operational. Access to the Gado-Badzere camp during this period was difficult, and the period of data collection was limited, and because of this all parameters could not be studied.

Also, the refugees were also not cooperative in the survey exercise. There was a big language problem, and it took a long time to translate the questionnaire to their language. In the midst of these hurdles the researcher overcame all and conducted a study in the frame of the stated objectives to conduct an assessment of the socio-economic challenges for the provision of WASH services.

## CHAPTER TWO

### 2.0 Literature Review

#### 2.1 Conceptual framework

##### 2.1.1 Definition of key terms

- Emergency: According to (Reliefweb, 2008) an emergency is “A sudden and usually unforeseen event that calls for immediate measures to minimize its adverse consequences”
- Refugee: “A person, who owing to a well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or political opinion, or for reasons owing to external aggression, occupation, foreign domination or events seriously disturbing public order in either part or the whole of his country of origin or nationality, is compelled to leave his place of habitual residence in order to seek refuge outside his country of origin or nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of his country of origin or nationality”(Reliefweb,2008)
- Refugee Camp: “A plot of land temporarily made available to host refugees fleeing from an armed conflict in temporary homes. UN Agencies, particularly United Nations High Commission for Refugees (UNHCR), and other humanitarian organizations provide essential services in refugee camps including food, sanitation, health, medicine and education. These camps are ideally located at least 50 km away from the nearest international border to deter camp raids and other attacks on its civilian occupants”(UNHCR, 2006b)
- Refugee Emergency: “Any situation in which the life or well-being of refugees will be threatened unless immediate and appropriate action is taken, and which demands an extraordinary response and exceptional measures”(UNHCR, 2007)
- Water Supply: Water provided for potable uses is nearly always chlorinated, and consequently one of the tests used for water supplied in emergencies is the chlorine residual. Water supplied in emergencies is usually provided free-of-charge to the consumers, a significant difference from normal practice in urban and rural water supply generally. High standard treatment of water, and non-payment for water, are generally true in the acute phase of an emergency, but many IDP and refugee camps last for years or even decades.

### **2.1.2 Drinking / Potable Water All the emergency study**

This is water which is either in its original state or after treatment, intended for human drinking, cooking, food preparation or other domestic purposes, food production, regardless of its origin whether it is supplied from a distribution, from a tank or in bottles (WHO, 2011)

### **2.1.3 Guidelines for drinking Water Quality**

They refer to recommendations provided by the World Health Organization (WHO) for managing the risk from hazards that may compromise the safety of drinking-water. They provide values of optimum concentration of a constituent which does not result in any significant health risk over a lifetime of consumption (WHO, 2011).

#### **2.1.3.1 Access to Water**

Access implies unceasing supply of a minimum amount of water, adequate for drinking, personal and domestic hygiene, for a reasonable price, within a realistic distance. For someone to have access, they must live within 1 km of an improved water source, be able to procure 20 liters per person per day and the time should not exceed 30 minutes round trip (WHO, 2011).

### **2.1.4 Ground Waters**

Groundwater is the water below earth's surface, including underground streams, the water that fills the interstices of rock layers and groundwater. In general, they are naturally safe and fit for consumption. However, they can be contaminated by improper installation of the casing or well casing, after a rupture of the casing or following the entry of contaminated surface water into the well (Margat, 1990). Groundwater is usually exploited in the form of well water or boreholes.

#### **2.1.4.1 Well Water**

Wells are vertical, cylindrical hollow structures for collecting groundwater. Their diameter is generally between 1 and 1.20 m for traditional wells and 1.40 to 1.80 m for modern wells, they are carried out with much less important and costly equipment than that necessary for drilling (Padear, 1997). Two main types of wells are distinguished; these are traditional wells and modern wells. Indeed, traditional wells penetrate only very superficially into the aquifer and over a small height and modern wells have walls which are held by reinforced concrete nozzles with a penetration height in the aquifer much more important. Well water comes from a mechanized or manual vertical earthwork, allowing the exploitation of an underground water table (aquifer). Water can be raised to ground level using a bucket or pump, manual or not. These wells are very diverse in their depth, volume of water or equipment (Thomas, 2001).

### **2.1.4.2 Boreholes**

A borehole is a narrow shaft drilled in the ground, either vertically or horizontally. A borehole may be constructed for many different purposes, including the extraction of water or other liquid (such as petroleum) or gases (such as natural gas), the investigation and sampling of the geological succession for construction, monitoring of groundwater behaviour and composition. Treatment often comprises of aeration and the removal of impurities such as iron, manganese and hydrogen sulphide. Thorough analysis of the water features from the well aids the choice of the accurate filtration system to produce the highest quality potable water (WHO, 2011).

### **2.1.5 Sanitation**

Sanitation is regarded as an access to and use of facilities and services for the secured dumping of human urine and faeces. WHO defines a safe sanitation system as “A system that separates human excreta from human contact at all steps of the sanitation service chain from toilet capture and containment through emptying, transport, treatment (in-situ or off-site) and final disposal or end use (WHO, 2018). UNESCO and the World Bank defined sanitation as "the maintenance of cleanliness and hygiene that help prevent disease (ODOULAMI, 2009). The term ‘sanitation’, throughout the Sphere Handbook, also refers to excreta disposal, vector control, solid waste disposal and drainage. This broad definition is just as appropriate to non-emergency situations as to emergencies. The drive of sanitation in the wide sense is to preserve the environment in which individuals live free of hazardous wastes, and to diminish spread of diseases by insect and animal vectors.

There are different types of sanitation system (toilets) applied in every specific context depending on the socio-economic and political era. They include: pour- and cistern-flush toilets, dry toilets and urine-diverting toilets. The superstructure of the facility may be a stand-alone structure, or the toilet may be located within a building (private house, a school, health care facility, work place or other public setting).

### **2.1.6 Hygiene**

Hygiene is a combination of actions and attitudes aimed at keeping the body and the mind healthy. To stay in good health, it is imperative to maintain a healthy lifestyle involving avoiding substances dangerous to the body. Water hygiene involves taking care of water points, all containers that contain water for all purposes (Afoussath, 2017). According to Vandegrift et

al. (2017), they are different type of hygiene such as hand, environment and menstrual hygiene, through which health is maintained and transmission of diseases avoided.

Hygiene can also be described as the practice through which people maintain or promote good health. Making themselves and their surroundings clean.(AISE, 2017)

The Sphere Handbook describes hygiene promotion as ‘a planned, systematic approach to enable people to take action to prevent and/or mitigate water, sanitation and hygiene-related diseases.’ It highlights three main aspects which permit individuals to take action: a mutual sharing of information and knowledge, the mobilization of affected communities, the provision of essential materials and facilities.

### **2.1.7. Connection between these concepts**

WASH is the acronym for Water, Sanitation and Hygiene. Owing to their inter-reliant nature, these three essential issues are assembled together to represent a growing sector. Each field of work is dependent on the presence of the other. For example, without toilets, water sources become contaminated; without clean water, basic hygiene practices are not possible (UNICEF,2016). World Health Organization (WHO) estimates that still "2.5 billion people-more than one third of the global population live without basic sanitation facilities"(Glass, 2014). Water is not only a vital element of public health, nonetheless also for livelihoods and development, crop production, livestock production, industry, commerce and daily life depend on access to water. Water-supply and sanitation conditions therefore directly affect health and food security and are key components in the fight against Hunger and Malnutrition (ACF-international, 2016).

## **2.2 Review of published evidence: Water quality and supply**

Evidence has demonstrated that the different water provision methods during emergencies situations varies with context specific factors like social, economic, political and environmental constraints, and the effectiveness of this is well measured if it may result to a reduction of water-borne diseases such as cholera. Where there is need for immediate access to potable drinking water, the main focus should be on the sustainability of supply. Selecting from the available technologies during emergencies may not be simple, the process is often tedious and time consuming: installing, admitting the required expertise, to ensure safe drinking water during early stages of intervention (Brown, Cumming, et al., 2012).

There is evidence that sufficient water in quantity is important for improving well-being and health of people, including their hygiene needs. After identifying untreated water as one the main source of cholera and other diseases during emergencies, other conducted studies also associated dirty water storage containers with illnesses. Cronin & Shrestha (2008), viewed that households reporting diarrhoea within the past 24 hours had a mean 26% less water available. Onyango (2013), emphasized on the distribution of sufficient water cans, clean pots during early emergency response can help decrease the risk of cholera by making sure that water stored is protected and food is cooked. Moreover, Walden et al. (2005) carried out a study on 328 households of a refugee camp and substantiated the claim that the cleansing of containers with disinfectant like chlorine has been capable of reducing the occurrence of diarrhoeal epidemic (Sasaki et al., 2008).

Lantagne & Clasen (2012) also pointed out that the link between usage of home chlorination and the prevalence of diseases, the research emphasised on the importance of pathogen safety of water immediately prior to drinking for decreasing instances of diarrheal, in this same light Point of Use Water Treatment (PoUWT) and source treatment has to an extent be proven effective during emergency. A critical review study revealed that Bulk Water Treatment (BWT) was effective at reducing turbidity to less than 5 Nephelometric Turbidity Unit (NTU) with a high flow rate (10 m<sup>3</sup>/h), helped in decreasing chlorine demand , and required less training, moreover, it emphasised that though BWT is an effective response tool, alternative water treatment options such as House hold Water Treatment (HWT) are well suited for short-term dislocations, as BWT items are costly and difficult to run(Yates et al., 2017). Mahamud et al., (2009) carried out research in the kakuma refugee camp also concluded that the treatment of water by means of boiling and also by the use of chlorine before drinking was protective against cholera. the study further highlighted the behavioural pattern of refugees in storing water, most of them used jerry cans for storing water and also measures such as retrieving water from the storage containers by pouring it out, which is to ensure the quality of water.

However in-depth studies also concluded that, water deliveries or supplies must both be safe and generally accepted by all the users. Atuyambe et al., (2011)discover that there was high usage of other sources like river and springs in the camp because of the unreliability of tanked water delivery and also the taste satisfactory issues. In this same light (Arabi, 2019)study concluded that 70 percent of respondents of the Minawao camp also resorted to other sources of neighbouring seasonal rivers due to deficiency and uneven supply of water points at the



camp, and this has often resulted to a confrontation between refugee and the locals and a potential decrease in the flow rate of village boreholes.

### **2.2.1 Water quality intervention (Point-of-Use Treatment and safe storage)**

Numerous studies have emphasized on point-of-use (POU) water treatment in emergency relief, there is proof that drinking water quality at the point of consumption is an essential contributor of risk of disease. The study conducted proofed that uncovered water storage with wide-mouthed containers was linked with outburst of diseases. There is therefore the need for effective water quality intervention and secured storage facility in the decrease of diarrhoeal illnesses with known effects against cholera and diarrhoeal diseases (Hashizume et al., 2008; Shultz et al., 2009; (Gupta et al., 2007; Steele et al., 2008)). Work done by Lantagne & Clasen, (2012) has demonstrated that the use of POU water quality interventions in emergencies is more successful when the right technologies are used, and targeted house-holds with poor water quality, who are familiar with the option prior emergency. They also have sufficient training and support which is a required element with post emergency. The study also demonstrated that although PoUWT selections(boiling or chlorine disinfection) increase water quality and diminishes diarrhoeal illnesses in the development setting, and this success is not yet known or applicable to emergencies situations. From the survey made PoUWT was found to be effective only in small-scale, non-acute and high diarrhoeal illnesses-risk crises, when sensibilisation and equipment were given to beneficiaries, and chlorine dosage been appropriate. There was unfortunately minute documented effectiveness in acute emergencies, with untested products, or during large-scale distributions without training. According to Carter, (2015) Purifier (PuR) is the only PoUWT option shown to be effective in an emergency of a randomized, controlled intervention trial. It has been revealed to reduce diarrhoeal disease in one refugee camp and improve microbiological quality of household water in cyclones. Sodium hypochlorite use improved microbiological quality of water after the tsunami and during a complex emergency. Ceramic filters have been shown to improve microbiological quality of water during and after flooding. In addition, survey respondents' consider the majority of PoUWT options they have used to be successful, suggesting high acceptability of PoUWT among those promoting and distributing them.

Critically, consistency of use or adherence may limit the impact of POU water treatment, and some cases of low adherence exist in studies conducted in humanitarian response. Mong et al., (2001)conveyed that most of the water sample tested showed that households commitment to chlorination Another study reported 45 per cent adherence to a POU associated flocculent-

disinfectant at 3 weeks after distribution (Brown, Cumming, et al., 2012; Jeanne et al., 2007). Water quality interceptions can only safeguard public health if they are used in the right manner and consistently, this is especially imperative when the risk of disease linked with untreated water is high

### **2.2.2 Research needs in terms of water quality and supply**

Research is needed to build and improve technologies for fast distribution in emergencies to ensure a fast, long term and lengthier access to secure drinking water to users in dispersed emergency conditions. This requires both the swift disposition of drinking water treatment and delivery measures for protecting water to the POU. There is need for adequate delivery methods to the POU with the aim of safeguarding the quality of water, since safe water may be subject to recontamination. Secured storage containers are needed to safeguard quality. The difficulties attached to swiftly supplying 15+ litres per person per day of secured water, and to keep it from recontamination.

Furthermore, research is also required on appropriate ways of creating high adherence to POU water treatment and safe storage through operative technology design and behaviour change. High usage of PuR in emergencies is also linked to training session plus additional follow-up education. Research needs to avoid the introduction of an untested water treatment option in an emergency, it should therefore be culturally be acceptable. The available proof from POU interventions in the humanitarian context indicates that water quality interventions can be defensive against disease but high adherence is probably required to maintain health impact.

### **2.3 Review of published evidence: Sanitation**

There is evidence to the fact that during emergency responses, unsecure sewerage disposal and fecal-oral transmission of pathogens are accountable for many avoidable illnesses which includes cholera, intestinal parasites and diarrhoea. Such instances are usually high throughout the community, where multiple households utilize the same latrines. Currently available possibilities may not be suitable to meet the difficulties of rapid response. Some emerging sanitation solutions are not developed or refined enough to be available for immediate dispatch in the first phase of an emergency (Abu Mourad, 2004; Shultz et al., 2009).

Sanitation in most refugee camps is often a defecation field, made up of few pit timber latrines used by many households, pits fill up, disposal of excreta become a hazard, and keeping

hygienic conditions turn out to be a challenge. Research in the Bulucheke camp reported that children under the age of five years often visited bushes and others defecated on bare ground or on leaves (Atuyambe et al., 2011). On the other-hand some women disposed of their children's faeces in latrines. In contrast to this Aretouyap et al., (2017) showed that almost 30% of the respondents throw their children's faeces in the bush.

### **2.3.1 Research needs: Sanitation**

Wastewater and faecal sludge treatment and disposal: There is a clear need for novelty in handling wastewater and faecal sludges that are produced in the humanitarian context. The whole idea of sludges and vector spread of diseases requires sanitation and stabilization as the two main goals of faecal sludge treatment, as a means of lowering the hazard to public and environmental health.

Although there has been the study of advanced, dispersed wastewater treatment options (membrane bioreactors, constructed wetlands, anaerobic filters) but the adoption has not been widespread (Paul 2005; Randall et al. 2008). The current solutions for sludges, like de-sludging and sludge disposal, treatment kits, skilled professionals may be too expensive, this may result in health dangers where the dumping of the sludge is finally been implemented. There has been some innovation with de-sludging but more work remains to be done to drive down costs and expand the range of appropriate, practical options.

Containment and Treatment of faecal matter is a crucial hurdle averse to the dispersal of diarrhoeal diseases specifically during emergencies when the population is more vulnerable. The disinfection of waste and wastewater from cholera- and other disease having consequences on the environments has been incorporated using lactic acid fermentation; urea treatment and hydrated lime treatment, although the effectiveness of these strategies requires heavy attention, especially in the reduction of the microbial contamination which has not yet been officially evaluated.

- Sanitation under challenging conditions: Implementing effective excreta containment under challenging physical conditions such as unstable soils, high water tables, and in flood-prone areas remains a challenge both in the development and post-emergency context. Even though most of the challenges appear to be technical in nature other socio-economic challenges such as the population's behaviour which also hamper the

effective realisation(Djonoputro et al., 2010)). Alternative systems may be needed, which includes, lining of pits to prevent pits from collapsing or building raised latrines (when digging down is not an option). There is a possibility to advance new technologies (like septic tanks that can quickly be belt in places with a high water table) as well as a need for more research on the consequences of existing and developing strategies for sanitation on existing water resources.

There are some instances that will require unorthodox approaches or alternatives. Technical perspectives should be novel and receptive to the specific physical, social and cultural conditions of the disaster-affected population. The use of Biodegradable bags are good workable recourse when there are no toilets in the first few weeks in responding to a disaster, till regular pit latrines are constructed There has been some practise with people utilizing a *Peepoo bag* (is compose of a two bag system made of powdered urea which prevents bad odours and which paces up the process of biodigestion) or simple biodegradable bags(Patel et al., 2011), although more research is required in order to typify the role of Peepoo or conventional bags in meeting emergency sanitation requirements and their implications for sludge treatment and disposal.

- Design: Some sanitation options may benefit from design improvements for specific contexts. A real sanitation answer has a component, a process component and a product component, which all interrelate together Plastic sheeting as a superstructure material, used in rapid response, that gets ripped has implications for dignity and security and often means the latrine isn't used (Johannessen, 2011) Oxfam have set out product themselves to work directly with the supplier in order to develop a stock of standardized kits and the product designer's objective is to develop new options for some innovative work with manufactured superstructure that can be shipped or easily assembled with local materials and easily erected over latrines on site. Sanitation options that are user-friendly for women, men, children, and disabled persons exist, but innovation may increase available options: acceptability, effectiveness in excreta containment, safety, and maintenance over time. Pre-existing preferences and practices for excreta disposal may need to be considered carefully in designing and implementing sanitation options that will be used consistently. This is an area of rapid development by sectoral stakeholders, but focused research is needed to evaluate and implement emerging options, and also this should also include the need to train the population for the design of intervention to be easily maintained.

- **Promotion:** Whilst better design, implementation, and perhaps most importantly, regular maintenance to ensure hygienic conditions, may encourage consistent use of available sanitation options, other activities to support healthy behaviours and safe excreta disposal may be needed. Possible measures for improving latrine use include a better accounting mechanism for functioning latrines and health promotion campaigns focusing on the importance of using a latrine. This must come from an understanding of what drives these behaviours in the target population, and the careful formative research required is often not feasible in the humanitarian context. Methods for rapidly assessing and then incorporating into programming drivers of sanitation adoption, access, and use are needed.

## **2.4 Review of published evidence: Hygiene**

Hygiene interventions can prevent the spreading of diseases and specifically the practise of hand washing with soap may be serious in outbreaks. Sasaki et al., (2008) study proved that the presence of soap in homes and regular handwashing with soap can act as a defensive role for cholera prevention and this also decreases the risk of diarrhoea by 40%. Two studies have also suggested a protective effect of hand washing with soap against cholera in outbreaks.(Hutin et al., 2003; Reller et al., 2001). Curtis & Cairncross, (2003) reviewed revealed that handwashing was also associated with a 48–59% reduced risk of more severe outcomes. A suggested data from a Ugandan emergency response in 2010, emphasised the importance of accessibility of soap and use behaviour. The user preferences and knowledge must be addressed (Atuyambe et al., 2011). Worldwide, an estimate of only 19% of individuals constantly wash their hands with soap and water subsequent contact with faeces. This portrays that wide socio-cultural features may be at play (Freeman et al., 2014). Moreover it has been proven that past experiences to handwashing promotion and information on the linkage between disease prevention and handwashing also affected the acceptance of decent handwashing practises. (Vujcic et al., 2015) remarked that from the statement proposed that residents categorised by high hygiene behaviours before an emergency were more expected to obey to the same hygiene and handwashing practices when soap and water were available. Whereas in refugee camps, these populations made efforts to acquire materials and apply handwashing methods stereotypically used in their home settings. Furthermore, there is evidence on the correlation between absence of soap from a household and negative physical health, and this could contribute to diarrhoeal disease and worsening

physical health (Roberts et al., 2009). Aiello et al., (2008) recommended that future hand-hygiene interventions should seek to incorporate information on the frequency, duration, and triggers for hand hygiene episodes.

Although Contzen & Mosler, (2013) confirmed that hygiene promotional activities such as broadcasting of messages via radio and demonstrations have somehow proved to be effective in ameliorating the behaviour of people towards handwashing, nevertheless these promotional activities must address the factors which influence behaviour. Much have been revealed on the fact that attitude, norm, ability, and self-regulation factors are more critical in explaining handwashing behaviour in an emergency situation than risk factors.

There are instances of innovative hygiene promotion approaches such as Community Health Clubs that have been promoted in IDP camps in Uganda. No peer-reviewed studies exist on the related hygiene “hardware” such as hand washing stations or hygiene kits that may promote healthy hygiene behaviours in an emergency context. Speedily deployable hardware that could help in the promotion of hygiene which is a part of possibly important innovation for WASH backup response. Observations made from many studies highlighted the fact that there has been no specification to the amount of soap that is required for handwashing this might be due to that water and soap might not be accessible for handwashing purposes due to environmental, logistical or financial constraints.

#### **2.4.1 Research needs:**

There is need to develop measures for promoting handwashing and ensuring the success of associated handwashing programs. More importantly there is urgency to create demanding proof concerning facilitators and barriers with hand washing with soap in emergency context. To begin with, to enable the effectiveness of these program experts need to empower and involve communities, specifically the vulnerable groups like women and girls who required more hygienic needs than other groups. A preferred didactic approach or a face to face message by WASH consultants should be done to disseminate health related messages in order to demonstrate proper hand washing.

“Enabling products and technologies are some of the “external factors” that influence individuals’ likelihood to perform a behaviour, regardless of their ability or motivation to take action’ (Biran et al., 2012). The innovative hygiene hardware measures and research may prompt effective behaviour change. It is recommended that handwashing hardware should be integrated with other activities for instance the construction of handwashing stations with

community led total sanitation. Hand-washing stations such as happy tap, tippy tap, spa tap, communal taps/tank taps which are commonly used in schools and camps have been proven to be efficient. The use of personal hygiene kits (tooth brush, jerry containers, towel, sanitary wears) in humanitarian interventions could help uplift the consistency with handwashing. Soap distribution may need to be supplemented by specific supporting activities to be most effective, this is why proposed soap and water alternative to hygiene promotion must be taken into consideration, such as waterless hand sanitizers the use of ash, soil and sand, chlorine

## **2.5 Review of published evidence: Vulnerable groups**

### **2.5.1 Women and girls**

Safety concerns of women and girls have been documented challenges potentially affecting access to and use of sanitation options in a humanitarian context (Atuyambe et al., 2011). Even though there was no published evidence that location (relative to living quarters) of sanitation (or water source), shared sanitation or individual facilities of sanitation selections have been associated with violence against women, there is evidence that this insight exist and could hamper the design and execution of excreta disposal options. These perceptions should be accounted for in areas of sanitation and water points and lighting options should be appropriately considered. No one can be expected to use a latrine if the conditions are perceived to be unsafe.

All-encompassing methods to WASH programming are important towards tackling menstrual hygiene needs for both women and adolescent girls. Women are often in charge for handling water, defending water quality, keeping domestic hygiene, and this is also true in emergency settings. The active participation and empowerment, their needs and preferences in responsive strategies should be the focus point (Nawaz et al., 2010).

Although rules for meeting menstrual hygiene needs exist (e.g., Sphere standards), more effort is needed to typify appropriate approaches (Sommer, 2012). Brown, Cavill, et al. (2012) discovered that there was absence of peer-reviewed studies on emergency Menstrual Hygiene Management (MHM), linked with hygiene ‘hardware’ like hand-washing stations or hygiene kits, and their inference on menstrual health post-disasters. Safe, hygienic, and private options for cleaning or disposal of cloths and other materials are needed and preferences for this may vary.

It is recommended that consultation with local women about their preferred menstrual sanitary materials (with one cloth recommended per woman); the promotion of women’s involvement



in water supply and sanitation approaches; the provision of underwear and a washing basin as additional items; the need for basins and laundry areas for women (for washing of sanitary materials and underwear); the availability of disposal mechanisms for used sanitary materials; and attention to schoolgirls' menstrual-related needs (Sphere handbook, 2011). The Handbook does not provide details on how to conduct the consultations with adolescent girls and women as this may fall beyond its purview as standards (versus guidelines). It also does not include recommendations regarding the placement of water inside latrines/toilets for privacy of washing menstrual-related stains and cloths. Pregnant or lactating women could benefit from water quality interventions and from amplified water access. As with other vulnerable groups, the requirements of women who are pregnant or nursing ought to be well-thought-out in the WASH response.

Research needs to involve women in the designs of programs due to the fact that the transportation and storage of water is the main responsibility of women as such, more work is required to illustrate appropriate strategies to meet needs. The needs and preferences of women should be taking into consideration in the carving and application of facilities for meeting menstrual hygiene needs, and also household water treatment.

### **2.5.2 Children**

Children need different excreta disposal facilities depending on age. If nappies are distributed, waste management is an issue, however with non-disposable nappies there is the problem of washing. Providing potties for children is an option where children are afraid of falling into a pit latrine or the other reasons why children might not want to use a toilet such as darkness, snakes and other animals, the smell, and dirtiness. Few sanitation options have been documented specifically for use by children, although they are among the most susceptible group to faecal-oral disease. Options for safe handling and disposal of children's waste are needed for emergency settings.

### **2.5.3 People with disabilities**

The most thorough evidence in revisions of problems tackled by disabled people inclines to be about the physical challenges of individuals. Ability/ inability in carrying out activities of daily living (ADL) is a mutual emphasis. Many studies and review demonstrated that Physical weakness implies that disabled people depend on tougher household members to gather water for them for their personal hygiene, for their children and other domestic uses. Interviews with people with physical impairments in Bangladesh concluded that collection water is an obstacle



for anyone using assistive devices, some disabled interviewees said they had taps in their house but they cannot use them because the rooms are inaccessible for their wheelchair or trolley (Jones et al., 2002). There is a link between disability and WASH, at the individual and household level. It highlighted the fact the households with persons of disability were more likely to have to spend over 30 min (round-trip) fetching water than those without, and findings also suggest that people with disabilities also live further away from water points (Mactaggart et al., 2018).

The World Bank estimates that 20% of the world's poorest people are disabled, yet little attention has been paid to the needs of unrestricted access to WASH. This is especially true in the humanitarian context. Innovation for sanitation access must include careful consideration of meeting the needs of people with disabilities. Some refugee and displaced persons populations may have a high percentage of people with disabilities, and this may be especially true after natural disasters that have resulted in bodily harm. (Wolbring, 2011).

#### **2.5.4 People living with HIV/AIDS**

Wars, movement, occurrence of disasters can intensify the threat of contracting HIV by the use of unsafe blood, deprived global precautions in health care facilities, and also inadequate treatment of sexual transmitted illnesses that promotes the transmission of HIV (Onyango, 2013). As such people affected by HIV/AIDS are especially vulnerable to WASH-related illnesses, there is therefore the need for WASH responses to be appropriate and to also take into consideration other vulnerable populations in response. Increased levels of HIV itself can lead to disruption in WASH services and amplified vulnerability to disease (Moss, 2004). Co-infections, like diarrhoeal diseases, are identified as pro influencers of HIV disease progression and are linked with higher risk of mortality, even though more evidence is required to fully typify the relations amid WASH and HIV/AIDS. Diarrheal sicknesses may also make individuals on antiretroviral therapy (ART) not to absorb therapeutic amounts of the medication.

## **2.6 Review of published evidence: Socio-economic/infrastructural barriers to the provision of WASH services**

For long now, the main infrastructural challenge for emergency sanitation was the swift installation of raised latrines in flooded or high water table areas and hard rock sites. The utmost prominent instances are the floods in Greater Manila, the Philippines, in 2009, the Haiti earthquake in Port au Prince in 2010 and some of the areas affected by the Pakistan floods in 2010. The barrier in these town places is not only the extra time required to build raised latrines in areas where pit latrines are not feasible but also that in a dense, crowded city ensuring regular desludging can be a major challenge (Bastable & Lamb, 2019).

Unicef (2020), updates found out that inadequate funding could actually act as a hindrance and also hamper humanitarian WASH during crisis. The survival of WASH interventions relies on the suitability and flexibility of financial resources. It was reported that most of United Nations International Children's Fund (UNICEF) projects had a 81% funding gap which was hindering the institution's capacity to implement wash programs. These restrictions prevent UNICEF and humanitarian partners from applying solutions to challenges as they arise.

There is also the identification of conflict sensitivity during humanitarian WASH provision, UNICEF recognizes that, despite good intentions, WASH interventions in fragile and conflict-affected contexts can inadvertently exacerbate conflict or contribute to wider conflict dynamics, as such issues like where to drill boreholes; how to share and manage resources among refugee populations and host communities; whether to allow water points to be used for crops or livestock; and how to govern water resources can all be problematic.

An emergency requires preparedness and increase resources, both capacity building and sufficient funding to maintain it. This has been a continuous challenge for an effective deployment of WASH services even after post emergency. Ongoing investment is needed for training, maintenance, human resource roster management and programme coordination and implementation. It also highlighted that service delivery to people and children with disabilities have always been a constant barrier (UNICEF, 2012).

According to a report done by Newborne et al., (2007) on identifying the barriers to hygiene and sanitation. Their study highlighted the main hurdles which are as follow.

- **Lack of information:** Problems may be caused in many developing countries by lack of recent, reliable information on the condition of existing sanitation and hygiene infrastructure, including whether or not it is actually functioning. Official statistics on sanitation coverage are often inconsistent or even hopelessly inflated. Needs and demands, particularly in more remote rural areas, are frequently unknown, making the task of setting a coherent and balanced agenda more difficult.
- **Lack of human and technical capacity:** The multi-faceted nature of WASH means that a wide range of different disciplines and skills is required to improve sanitation and hygiene provision. There is need to deploy experts from different background for adequate provision of WASH during emergency situation. There are many experts in water engineering, health but very few with skills on hygiene. The Promotion of behavioural change at household level is an area where most countries have few skills and limited capacity
- **Complexities of behaviour change:** There is a correlation between knowledge and the adoption of hygienic practises about issues like the use of latrine and handwashing with soap, it was declared that use of vessels with covers for water storage is as high or higher than awareness of the benefits of such a practice. This emphasises the fact that mindfulness does not interpret directly into deeds. Lessons from projects in Burkina Faso and Zimbabwe suggest (WSP 2002) that: ‘The key to changing behaviour is first to understand what drives and motivates it. This issue is far more complex than was once thought. Behaviour change is difficult to achieve and requires considerable resources’ (WSP 2002). Different cultural contexts will require different solutions.
- **Cultural factors:** Cultural difference arises from gender: variations in the perspectives of women and men on sanitation facilities are noted by many commentators. The views of adults and children vary too. Household circumstances are also diverse. Different ethnic groups may have varying beliefs and customs, while attitudes to sanitation and hygiene may vary substantially between urban and rural contexts.
- **Inadequate service providers:** The reality in many locations in Africa is that there is limited choice of sanitation and hygiene providers, whether agencies of local government, community associations, NGOs or private suppliers. In cities in some

developing countries, empirical studies have highlighted the activities of small private suppliers (e.g. Collingnon and Vézina, undated; WSP 2005). In relation to sanitation, these include, for example, bricklayers (or ‘masons’) for latrine construction and people to empty pits manually. There are still some doubts as to slum populations’ willingness to pay, but the significance of the role of small private providers in meeting the needs of poor populations is now more widely recognised, where they are able to offer the right product for the right price.

### **2.6.1 Research needs:**

There is an actual need to focus on effective planning, strengthening of national readiness system, partnerships and building local and organisational response capacity, as well as human resources. A sustained means of funding, an active partnership with all involved stakeholders, like international organisations (UNICEF, UNHCR, etc) non-governmental organisation (NGO’s), together with government will promote an effective distribution of WASH services during emergency and post emergency context.

Research is also needed to strengthen those institutions that helps create awareness and participation of all end users and beneficiaries. The focus point should be educating and triggering the behavioural change of individuals who might be non- receptive to the WASH services by understanding their motive behind. WASH programme designs should also take into account the cultural factors such as beliefs and customs of different ethnic groups, and also factor the needs of vulnerable groups (women, children, elders, disabled people) so as to facilitate the usage of these WASH services. Looking at Menstrual hygiene management, research needs to promote for active participation of girls and women in order for them to define their needs and cultural practises so as to increase their understanding of these issues.

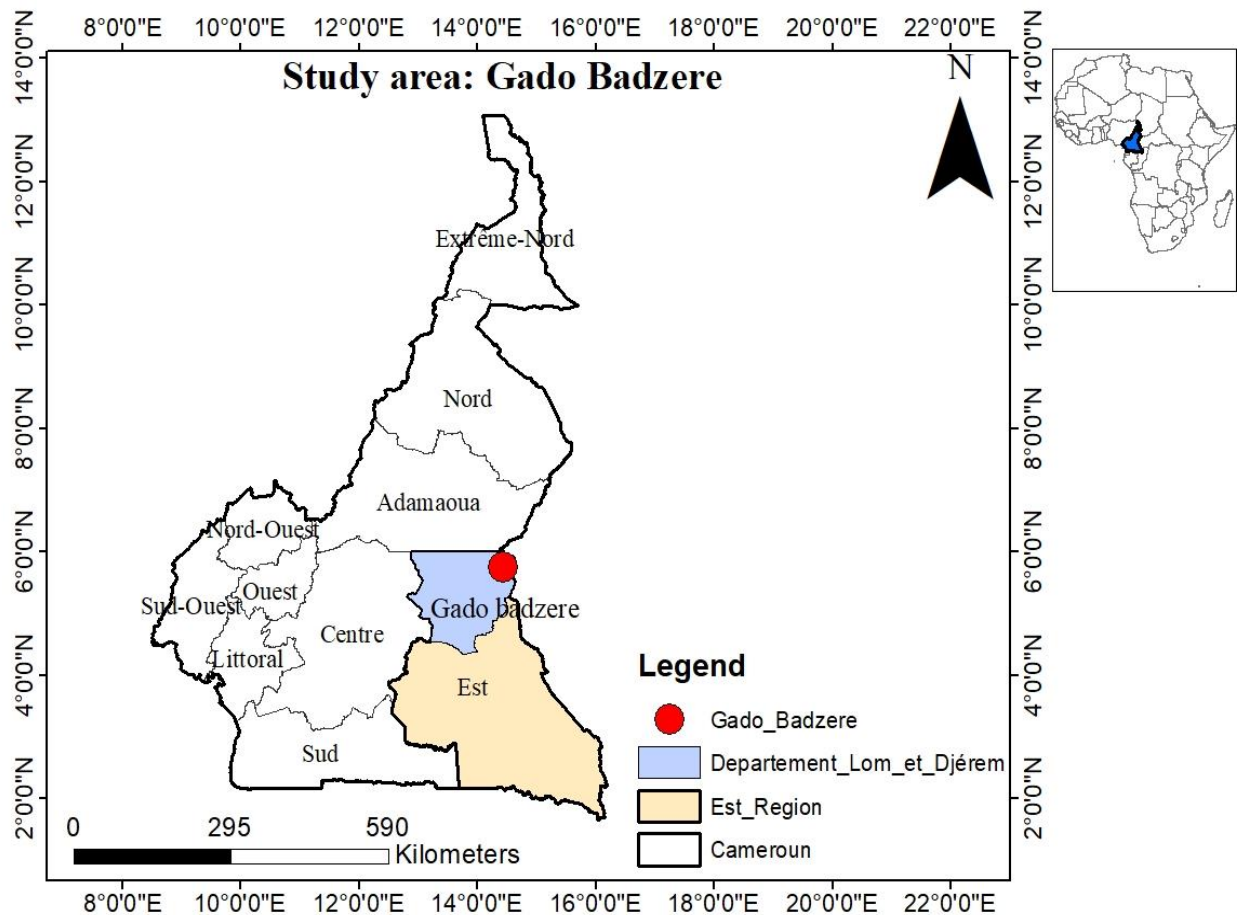
## **CHAPTER THREE**

### **3.0 Materials and methods**

#### **3.1 Geographical location**

The geographical location of Garoua-Boulai is a district where the Gado-Badzere camp is located. It gives this city a strategic position in the transition zone between South Cameroon (dense forest area) and the far North (savannah area). Considered as a border town (with the Central African Republic), it is also a crossroads with regard to the destinations of Bertoua, Ngaoundéré, Garoua, Maroua and N'djaména in Chad. Gado-Badzéré is located in the department of Lom-et-Djérem and the Eastern Region, near the Central African border. It is part of the district of Garoua-Boulai and the canton of Doka. It has an altitude of 1020m with coordinates (5° 45' 00" north, 14° 26' 00" east), (Figure 1).

The camp covers about 55 hectares. It was opened on the 1<sup>st</sup> of March 2014, hosting fleeing refugees from Central African Republic. As of the 31<sup>st</sup> of May 2020, the population of the camp is estimated to be 25667. The camp is subdivided into eleven demarcated sectors with 8037 households. Majority of the camp population have more than 18 years and above plus there is more women than men in the camp. Furthermore, 18% of the population is made up of household women, 5% of livestock producers, 19% of manual workers and sellers, 4% of traders, 4% of farmers, 50% unskilled (UNHCR, 2018).



**Figure 1: A map showing the study area**

### 3.2 Climate

The Municipality is located on the edge between the equatorial forest and the Sahelian zone but is influenced by a Guinean-type equatorial climate with four seasons of unequal durations: a long dry season from December to February, a short rainy season from March to June, a short dry season from July to August, a long rainy season from September to November. The average annual precipitation is around 1400 mm. The annual average temperature is 20 ° C with an annual average amplitude of 2.5 ° C. This climate is favorable for two (2) agricultural campaigns during the year: from mid-August to mid-June and from mid-August to mid-November (GREFAAD, 2016, p. 16).

### **3.3 Relief and Soils**

Located in the transition zone between the south-eastern plains and the Adamawa plateau, the relief of Garoua-Boulaï is generally relatively uneven. It consists of plateaus notched with shallow valleys and large areas of depression that are the shallows. Not very marked and hardly present towards the south, the highlands mark out most of the northern zone. (GREFAAD, 2016, p. 16).

The soils are mostly feralitic and lateritic in places, brown, with very different horizons. We generally distinguish from top to bottom: The shallow (dark) horizon, The brown horizon more or less impoverished due to leaching. From hills to plains, we have two main types of soil: Firm soils (not marshy)

### **3.4 Vegetation**

The vegetation in this commune alternates from grassy savannah, shrubby savannah and trees in places. Many gallery forests have been identified, especially along rivers and swamps. The dominant grassy species are Pennisetumpurpleum, Hyparhényarufa, Chromolaenaodorata (Bocassa), Mimosa sp and many grasses. The main plant formations encountered are The herbaceous plain dotted with shrubs: Swamp forest (periodically flooded areas in the vicinity of rivers, shallows and valleys, The marshy raphid (raffia) marshy areas.

### **3.5 Socio economic activity**

#### ✓ Agriculture

Agriculture is the main economic activity of the town. It involves more than 80% of the population. These are mainly food crops used for local consumption and with very little processing. Among the cultures we can cite: roots and tubers such as cassava, yam or potato (produced in all the villages of the commune); cereals, in particular corn (with four production areas: Nandoungué, Mborguene, Bindiba and Gado Badzere); oilseeds (peanut).

#### ✓ Breeding

The vast grassy savannahs of Garoua-Boulai offer pastures suitable for the breeding of cattle, goats and sheep. Cattle breeding nevertheless remains preponderant from the economic point of view and the space occupied. To improve the productivity and profitability of their activities, the actions to be undertaken are: Adequate supervision of breeders; Material support in veterinary products and appropriate production equipment; The installation of hydraulic and treatment facilities;

#### ✓ Fishery

Fishing is very little developed in the commune of Garoua-Boulai. It is practiced in an artisanal way around the Lom and other rivers. Fisheries production does not cover local needs for fish. Fish ponds are poorly developed and streams are mostly drained during the dry season. Most of the populations practice small-scale subsistence fishing and use less mechanized techniques (line fishing, basket fishing, etc.). some of the fish species are the captain, catfish, tilapias, shrimps and crabs.

#### ✓ Small business

Most of the trade is based on agropastoral and basic necessities. The sale of basic necessities (soap, oil, sugar, meat, fish, etc.) seems to have a greater economic weight. The proximity of CAR makes the Garoua-Boulai market a Central African market. Central African households get their supplies regularly, especially on weekends.(GREFAAD, 2016, p. 24)

### **3.6 Characteristics of the refugee Camp**

The Gado-Badzere refugee camp is a temporary settlement built to receive refugees and people in refugee-like situations. This camp actually accommodates displaced persons who have fled their home country and are seeking asylum in Cameroon. The refugee camp was built and run by the Cameroon government, the UNO, and international organizations or NGOs. The refugee camp was developed with the aim of meeting the basic human needs of the population for a short time. Main characteristics of the camp are listed in Table 1.



**Table 1: Main characteristics of the Gado-Badzere camp.**

Parameter	Value
Principal religion	Muslims(98,8%),christian(0.8%),others(0.4%)
Principal ethnical group	Peulh(92.9%), Haoussa(2.6%),other (4.5%)
Study level	50.4% persons without prior education,37.4 informal education(52% of women and 48% men), 0.80% did university studies
Number of sector	11
Distance from the border	75km
sex	53% female and 47% men

### 3.7 Methods

#### 3.7.1 Study Population

The study population crossed over every age group and gender especially those in charge of supplying services and every adult person in various households in the refugee camp. The fact of taking into consideration every gender and age group will give a better representation of the WASH situation of the site. The study population was determined by the COCHRAN formula illustrated which is :

$$SS_{adj} = (SS) / 1 + [(SS - 1) / population]$$

where: SS: Simple Size = (z-score)<sup>2</sup>xp(1-p); p = 0.5 and z-score = 1.96. Furthermore, materials such as camera and survey sheets were used to carry out this study.

#### 3.7.2 Data collection

Primary and secondary data were used in this study, with the first collected through a structured questionnaire, key informant interviews (phone call interviews), and field observation. Representative was implemented, due to the large number of refugees. However, the sampling was done in such a way that there was an even distribution of interviewees from the 11 sectors of the camp. The questionnaire was translated from English to French, but a field assistant was needed to translate from French to Fulfulde due their poor fluency in both languages .The first

section contains questions relevant to the socio-demographic characteristics of the respondents; the second one covers questions related to water collection and storage; the third section encloses questions about hygiene of water, its quality and its treatment and the final section is made of questions related to hygiene and sanitation. A structured interview was conducted with key stakeholders and also WASH experts mainly involved in the management of the refugee camp.

### **3.7.3 Analytical approach of results**

Replies from the questionnaire were entered in Microsoft excel spread sheet then analysed using SPSS. Both descriptive and inferential statistics were utilised to examine the data obtained from the questionnaire. The descriptive statistics used included percentage distribution, bar & pie chart, tables, inferential statistics included chi square and paired sample t-test, khi-two test, hypothesis, charts, tables and figures were used to enhance explanation.

The Crosstabulation technique was used to quantitatively display a breakdown of the data in order to analyse the relationship between multiple variables. It helped to understand the correlation between different variables. It also showed how correlations change from one variable grouping to another. This analysis was critical in finding underlying relationships within the surveyed results while the Chi square results showed whether or not the results of crosstabulation are statically significant or revealed the difference between expected frequencies and the observed frequencies in one or more categories. Therefore if the p-value is less than or equal to the alpha-value, then the two variables are associated. But if the p-value is greater than the alpha value, we conclude the variables are independent.

Hypotheses testing was conducted to compare variables and draw conclusions:

1. Age statistics: let V2= Men, V3= women be the variable studied. Let Ho be the hypothesis that there is no difference between men and women, H1 that shows there is a difference.
2. Association between the survey of households' and literacy level: let V2 = Men; V3 = Women; V20 = FSLC; V21 = O-level's; V22 = Advanced level and V23 = Bachelor be the variable studied. Let Ho be the hypothesis that there is no association between the households surveyed and the level of education, H1 shows that there is indeed an association.

## CHAPTER FOUR

### 4.0 RESULTS AND DISCUSSION

#### 4.1 Global WASH situation in the refugee camp

Through questionnaires, interviews and field observations, local WASH situation was investigated in terms of sphere standards. Results are summarized in the following tables.

Our study carried out in the GADO BADZERE refugee camp revealed that the latter has around 25,665 refugees who are spread over 8037 households and are only Central African.

Table 2: WASH situation in the Gado-Badzere camp

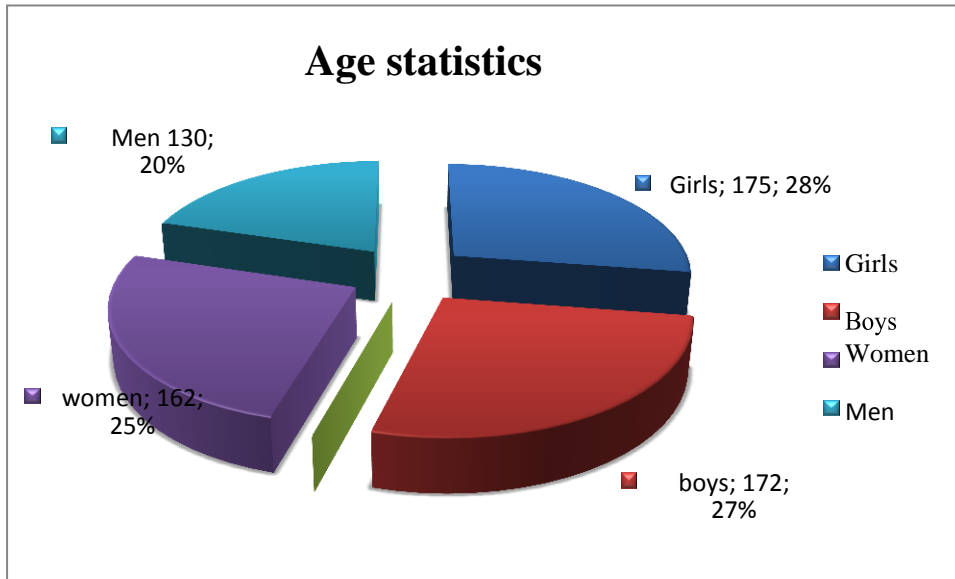
Categorisation	Parameter	Sphere Standards	Situation in Gado
Water	Average # of liters of potable water available per person per day	15 liters/person/day	16liters/pers/day
	Number of persons per water collection point	250-500 pers/water collection point	597pers/water point
	Distance between farthest targeted beneficiary household and the nearest water collection point	500 m	Water points found in the camp
Sanitation	Number of persons per toilet/latrine with functioning hand washing facility	20pers/latrine	31pers/latrine
	Number people per garbage bin	10 households per garbage bin	87 per/garbage bin
	Number of refugees per hygiene promotor	500	484per/hygiene promoter

**Table 3: Number of WASH Infrastructure**

Parameter	Value
Number of Boreholes	31
Number of wells	0
Number of Standpipes	12
Total number of used latrines	817
Number of latrine booths to rehabilitate	312
Number of used showers	750
Total number of garbage pits	38
Number of garbage bins available	300
Number of hygiene promoter	53

## **4.2 Age Distribution of Sampled Population**

The sample size of 212 households surveyed reported a population of 639 individuals, the composition of which is illustrated in the graph below:



**Figure 2: Age distribution of sampled population**

From this figure 2, the population is dominated by girls (28%) followed by boys (27%). Women and men were respectively 25% and 20%.

**Validation of Hypothesis:**

To validate this hypothesis (let  $H_0$  be the hypothesis that there is no difference between men and women,  $H_1$  the one that there is a difference).  $V_2$ (Men) and  $V_3$ (women) was cross tabulated to show whether the results are statically significant.

**Cross tabulation**

Count		V3		Total
		Women	Yes	
V2		11	0	89
	Men	0	1	1
	Yes	111	0	111
Total		122	1	89

### Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	<b>3,837E2<sup>a</sup></b>	<b>4</b>	<b>,000</b>
Likelihood Ratio	230,731	4	,000
N of Valid Cases	212		

a. 5 cells (55,6%) have expected count less than 5. The

From the SPSS software results, tests showed that there is a difference between the two groups of individuals which is significant (Chi-square = 3.837, dof = 4 and  $p = 0.000 < 0.005$ ),  $H_0$  is therefore rejected and  $H_1$  accepted. So, there are more women than men.

### 4.3. Association Between the Survey of Households' and Literacy Level

#### Validation of hypothesis:

To validate this hypothesis (Let  $H_0$  be the hypothesis according to which there is no association between the households surveyed and the level of education,  $H_1$  that according to which there is indeed association). The level of education of the sampled population will help us determine how well the refugees understand WASH related issues.

#### V2 \* V20 Crosstabulation

Count					
		V20			Total
		FSLC	Yes		
V2		35	0	65	100
	Men	0	1	0	1
	Yes	35	0	76	111
Total		70	1	141	212

### Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	<b>2,123E2<sup>a</sup></b>	<b>4</b>	<b>,000</b>
Likelihood Ratio	12,994	4	,011
N of Valid Cases	212		

a. 5 cells (55,6%) have expected count less than 5.

### V2 \* V21 Cross tabulation

Count					
		V21			Total
		O-level's	Yes		
V2		77	0	23	100
	Men	0	1	0	1
	Yes	80	0	31	111
Total		157	1	54	212

### Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	<b>2,127E2<sup>a</sup></b>	<b>4</b>	<b>,000</b>
Likelihood Ratio	13,382	4	,010
N of Valid Cases	212		

a. 5 cells (55,6%) have expected count less than 5.

### V3 \* V20 Cross tabulation

Count					
		V20			Total
		FSLC	Yes		
V3		46	0	76	122
	Women	0	1	0	1
	Yes	24	0	65	89
Total		70	1	141	212

### Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	<b>2,147E2<sup>a</sup></b>	<b>4</b>	<b>,000</b>
Likelihood Ratio	15,418	4	,004
N of Valid Cases	212		

a. 5 cells (55,6%) have expected count less than 5.

### V3 \* V21 Cross tabulation

Count		V21			Total
		O'levels	Yes		
V3		91	0	31	122
	Women	0	1	0	1
	oui	66	0	23	89
Total		157	1	54	212

### Chi-Square Tests

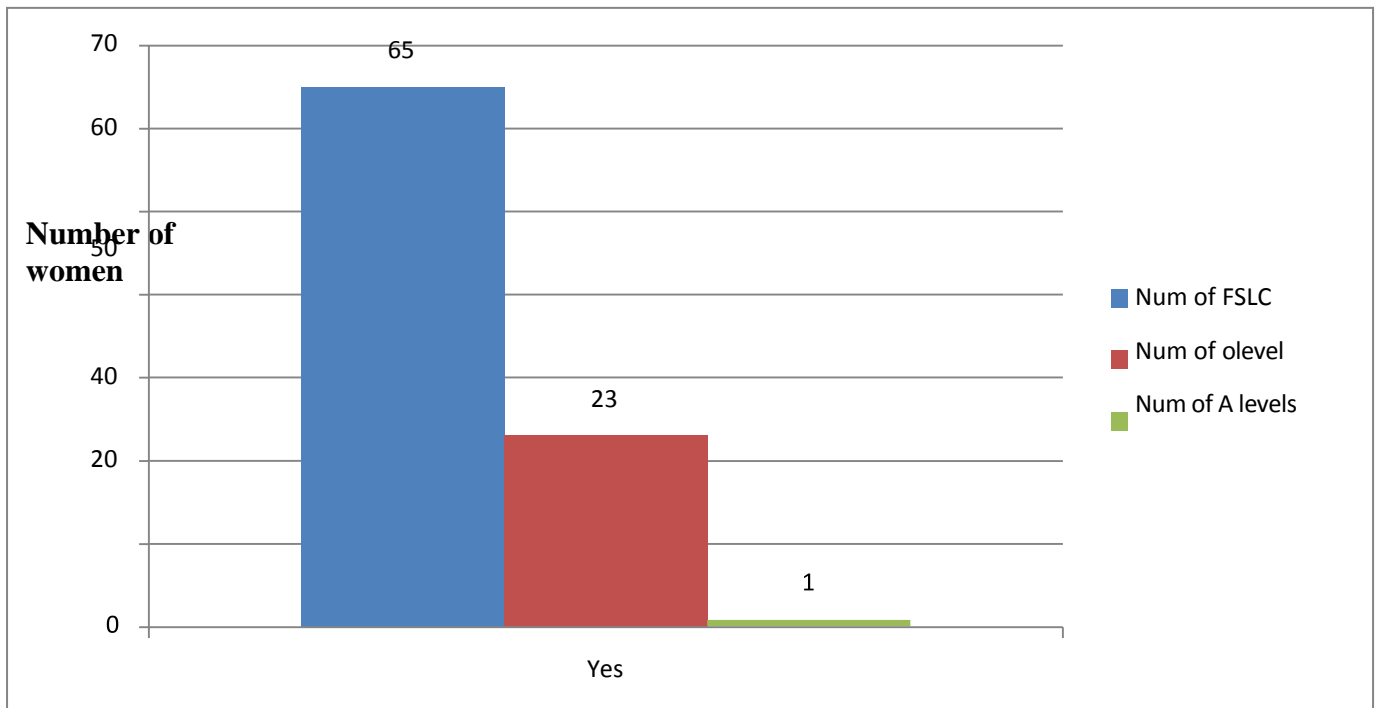
	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	<b>2,120E2<sup>a</sup></b>		<b>4,000</b>
Likelihood Ratio	12,714	4	,013
N of Valid Cases	212		

a. 5 cells (55,6%) have expected count less than 5.

Tests of KHI-DEUX using SPSS software show that: Chi-square  $\pm$  2.12, dof = 4 and p = 0.000 overall, then the Ho hypothesis is rejected and H1 accepted.

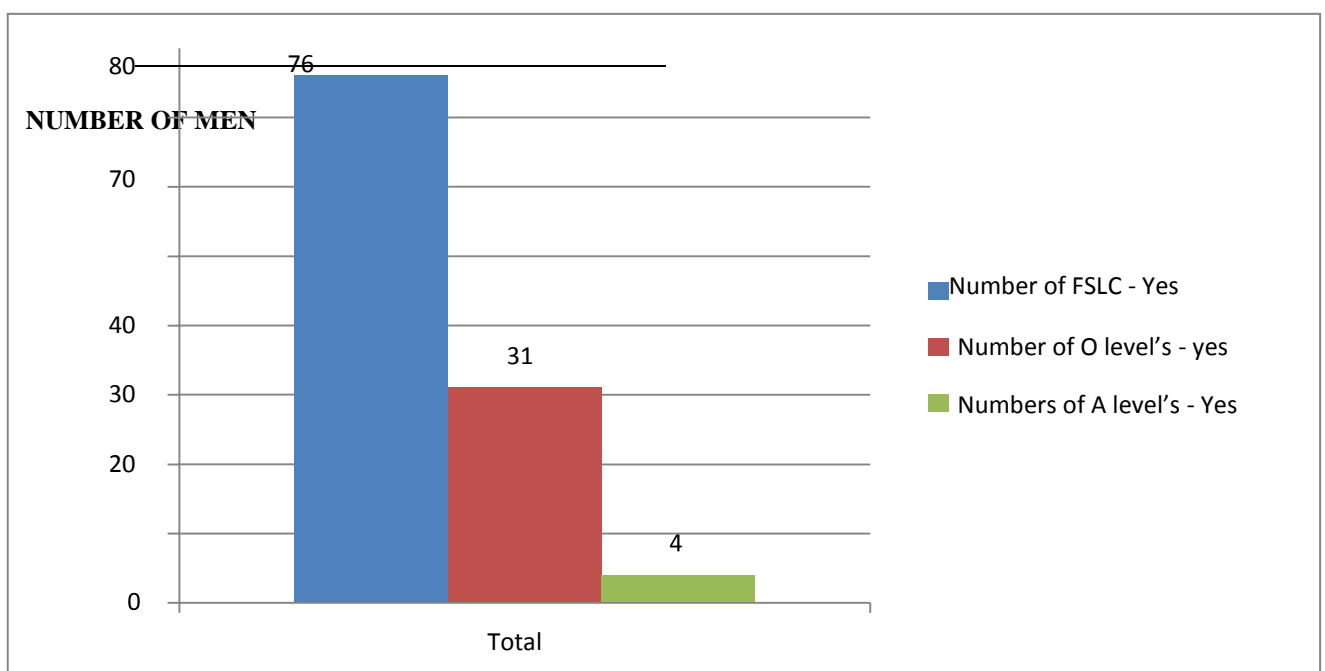
This analysis showed that in the 212 households surveyed, individuals had at least the First school leaving certificate (FSLC) and at most the ordinary level certificate (O level's). The low rate of advanced level holders (A level's) and the absence of bachelor holders (BSC) could be explained by the instability in the Central African Republic which did not promote a climate of peace and education, from which it was difficult for both to continue studies after the Ordinary level certificate.





**Figure 3: Distribution of educational attainment among women**

From the above figure 3 it is evident that FSLC was the highest form of educational level women had attained, then followed O level's, the low rate of A level's showed that women in the camp did not attend Universities



**Figure 4: Distribution of educational attainment among men**

From the above figure 4, it is evident that FSLC was the highest form of educational level men had attained, then followed O level’s, the low rate of A level’s showed that men in the camp did not attend Universities.

**4.4. Water, Sanitation & Hygiene in the Gado-Badzere camp**

During the study, we were interested in the presence of water-borne diseases (V6), the presence of latrines (V7), the storage of waste (V9) and finally the menstrual hygiene of women (V24), where v6, v7, v9 and v24 are variables coded in the SPSS software. The study of the associations between these variables by Chi-Square Tests gave the following results.

- 1) Link between Water-borne diseases and latrines (chi-square test)

**V6 \* V7 Cross tabulation**

Count		V7				Total
		Latrine?	No	Yes		
V6 Diseases?	No	11	0	0	0	11
	Yes	0	1	0	0	1
	No	0	0	1	172	173
	Yes	0	0	1	26	27
Total		11	1	2	198	212

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	<b>4,264E2<sup>a</sup></b>	<b>9</b>	<b>,000</b>
Likelihood Ratio	100,658	9	,000
N of Valid Cases	212		

a. 12 cells (75,0%) have expected count less than 5.

From the results, it emerged that 172 households out of 212 had indeed latrines and did not present cases of water-borne diseases, and the chi-square test showed that  $p = 0.000 < 0.005$ , which could be explained by the good management of excreta which makes it possible to

avoid contamination of water sources and consequently the proliferation of water-borne diseases.

2) Chi-square test between disease variable and waste variable

**V6 \* V9 Cross tabulation**

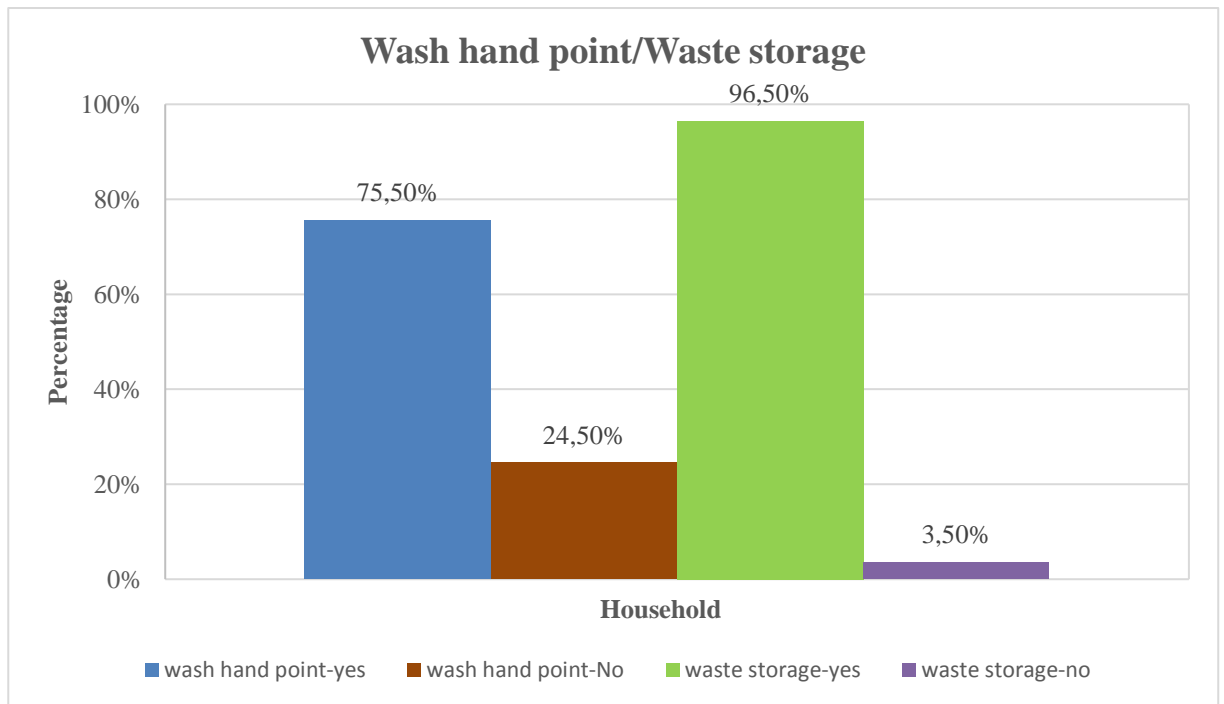
Count		V9				Total
		Storing of wastes?	No	Yes		
V6		11	0	0	0	11
	Diseases?	0	1	0	0	1
	No	0	0	6	167	173
	Yes	0	0	1	26	27
Total		11	1	7	193	212

**Chi-Square Tests**

	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	<b>4,240E2<sup>a</sup></b>	<b>9,000</b>	
Likelihood Ratio	99,116	9,000	
N of Valid Cases	212		

a. 11 cells (68,8%) have expected count less than 5.

Result of this test in our sample, illustrated that 167 out of 212 households had a good waste management system, moreover  $p = 0.000 < 0.005$ . Result also show that hygiene promotion is to an extent met in the camp. The proliferation of diseases is also a function of the waste management system within the refugee camp.



**Figure 5: Hand wash point and waste storage**

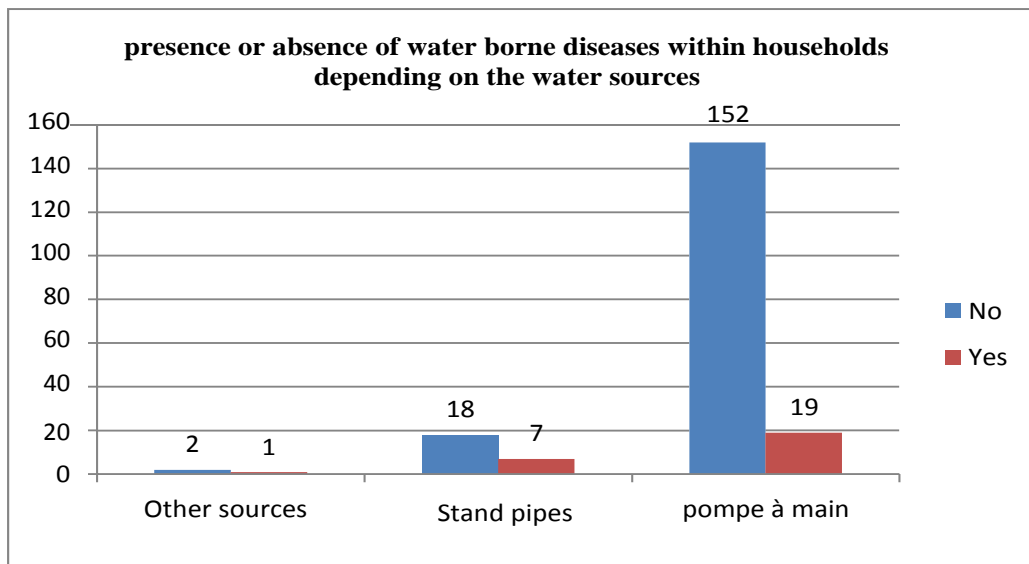
From the above figure 5, it is clear that 75.50% and 96.50% of the studied households have access to wash hand devices and waste storage cans and only small proportion of refugees (24.50%,3.50%) did not have access to these facilities. We can deduce that the practise of hygiene in the camp is to an extent effectively implemented.

### 3) Link between variable diseases and water sources

#### Chi-Square Tests

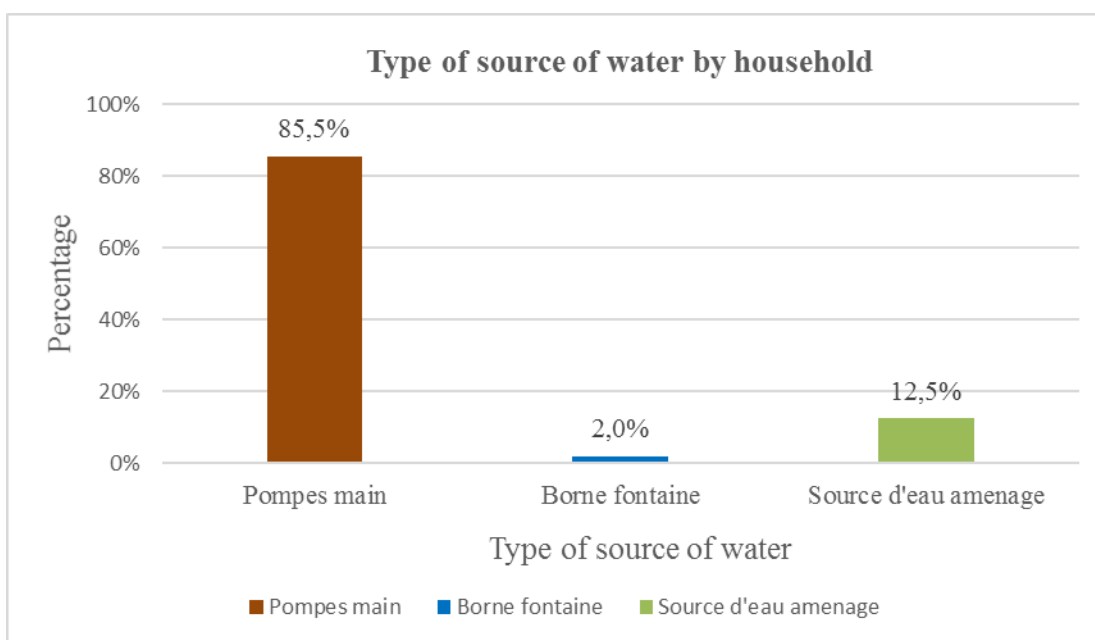
	Value	df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	<b>4,181E2<sup>a</sup></b>	<b>21,000</b>	
Likelihood Ratio	102,574	21,000	
N of Valid Cases	212		

a. 27 cells (84,4%) have expected count less than



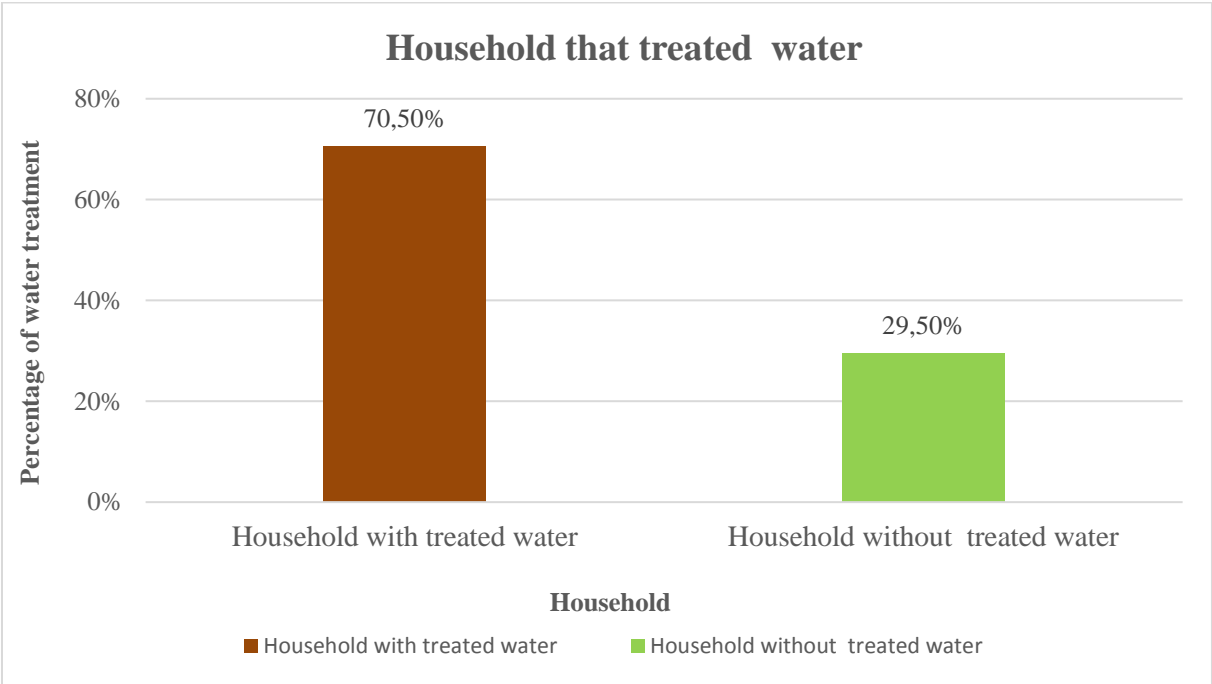
**Figure 6: Presence or absence of water borne diseases within households**

The chi-square test and the graph above show that there is indeed a link between these two variables, moreover these water sources are being well managed, so they could not be the major cause of diseases within the households.



**Figure 7: Type of water source available to households**

From the above figure 7, it is clear that hand pumps are widely used (85.5%) then follows supply water source( 12.5%), and then standpipes(2.0%).



**Figure 8: Households that treat water**

From the above figure 8, we can vehemently say 70.50% of the studied sample treated water in the camp while just 29.50% did not treat their water. This implies that the level and quality of water response in the camp is attained and refugees are also conscious and aware of the different methods of improving the quality of water, even after they carry it from the water point.

4) Menstrual hygiene of women

**V3 \* V24 Crosstabulation**

Count		V24			Total
		latrine	Yes		
V3		12	0	110	122
	Women	0	1	0	1
	Yes	0	0	89	89
Total		12	1	199	212

### Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
<b>Pearson Chi-Square</b>	<b>2,213E2<sup>a</sup></b>		<b>4,000</b>
Likelihood Ratio	26,382		4,000
N of Valid Cases	212		

a. 5 cells (55,6%) have expected count less than

This test reveals that only 89 households where women live, present an average menstrual hygiene, as such permanent and accentuated sensitizations would be necessary to educate these women in this direction. This average hygiene management shows that the needs of this type of vulnerable group is been implemented.

#### 4.5. Water quality

The survey showed that refugees get potable water from boreholes, and also from standpipes. There are 31(72%) drilling systems and 12(28%) standpipes which are unevenly distributed within the 11 sectors of the camp. Observation showed that the average water consumption of household per day varied from 10 to more than 25 liters. According to WASH experts point of view, 16liters of water per person per day was supplied, this complies with sphere standards (Sphere handbook, 2011). This does not however the UNHCR standards of 20 liters(Unhcr, 2006). A study done in another refugee camp revealed that daily water consumption varied between 20 to 23 liters (Mahamud et al., 2009). One reason for this insufficiency was attributed to the fact that water was pumped only during the day and from this observation it is evident that some extra efforts needs to be put forth. The water points were located within the perimeters of the camp. From the administered questionnaire, we concluded that waiting time at the source was between 3 to 5 minutes this was a great parameter that helped in decreasing occurrence of conflicts between refugees.

From the interview conducted with key informants and WASH experts, water supplied in the camp was of good quality. The water quality was certified during the construction of each structure by bacteriological and physicochemical analysis tests and by laboratories approved by

the Ministry of Water and Energy. There were two systems of water production in the camp, boreholes which were equipped with hand pumps and a water supply which was fed by a spring catchment. Furthermore, a chlorine chemical was used as a treatment. This treatment was used daily in tanks where water is stored before distribution. Water from the boreholes which were equipped with hand pumps was monitored quarterly, and this was neither contaminated by sanitary installations put on place nor by maintenance interventions which was carried out at the water point.

In this same light, the refugees population were also sensitized on the different techniques of water potabilization, which was referred to be simple and accessible to them, for instance solarization, or by boiling, and they were also educated on how water was to be treated with chemicals like chlorine or granulate tablets, even though the usage of these methods often depended on the possibility to obtain or purchase these type of chemicals. Such methods have also been identified by similar studies done by Lantagne & Clasen (2012), in which HWTs methods was effective in preventing diseases. A few number respondents complained to have suffered from diarrhea or water related diseases, according to WASH officers and medical personnel on the field such instances were minimal and cannot be ascribed to polluted water sources but instead to poor hygiene and poor nutrition. Given the small occurrence of water borne illnesses and the struggle that was put in place to treat water, the quality of water distributed was not bad. It was tasteless and colourless, with no smell.

#### **4.6 Water storage and Hygiene**

90% of respondents actually use plastic containers to carry water and the rest use buckets. Most of the refugees admitted to be cleaning their recipients daily with water only and this method proves that even though the water at the source may be free from any particles, this can however be polluted when water is carried and stored. This has also been discovered by similar studies like (Aretouyap et al., 2017). Methods of washing recipients like using a cloth or washing it with a detergent has been proven to be effective against any recontamination. The respondents also reported that carrying of water was often the duty of women and children(11-18years).(Cronin & Shrestha, 2008), study also revealed that 60% of respondents in both surveys were women and they along with their children, are charged with water collection in the vast majority of cases.





**Photo 1: Photograph of Boreholes and Standpipes**

#### **4.7. Sanitation Situation at the Gado-Badzere Camp**

There were 817 latrines, 312 were to be rehabilitated and 750 toilets on the Gado site. 100% of respondents had access to latrines, toilets, however the average number of persons per this facility (31 people per facility) did not reflect the norms of sphere standards of 20 people per facility (Sphere handbook, 2011). They were traditional in nature, constructed in two types that is straws and tolls. From the field observation made, the toilets and latrines had doors, offered privacy and security, this actually matched with responses derived from the questionnaire. These facilities were away from water sources in order to avoid potential contamination, in this same vein the 97% of respondents also admitted to be throwing children faeces in latrines, and not in bushes. (Atuyambe et al., 2011), conducted research also showed that 94.5 % of refugees threw children's faeces in pit latrines.



**Photo 2: Different type of sanitary installation**

#### **4.8 Hygiene practises at the Gado-Badzere camp**

Looking at the hygiene practises in the camp, from the field observation we concluded that every household had access to soap for handwashing, and personal hygiene, which goes in line with the sphere standards of (250g). In the absence of soap respondents agreed to be using ash, and using hand washing devices like tippy taps to wash their hands. They also agreed to be washing their hands after defecation, before breastfeeding and cooking, this is a reflection of the effectiveness of the sensibilization system implemented, and implies that having soap and hand hygiene education was vital intervention for disease prevention. This finding was consistent with observations from other studies conducted in similar settings (Mahamud et al., 2009). According to our results they were 87 persons (15 households) per dumpsite in the camp, and this did not reflect sphere standards of 10 households per dumpsite. This mis-management of waste showed that the camp was not too clean and thus prone to environmental pollution, even though 300 baggage cans were provided in the camp, pits were dug all over the camp to ensure proper disposal of dirt.

From the interview conducted with WASH officers we observed that there was a hygiene promotion program and new measures that was implemented to prevent the spread of COVID19. In the first part of this program, included a face to face awareness whereby they organized mass awareness campaigns, home visits (door to door campaign) and discussed with the populations on hygiene practices and different preventive COVID methods such as (constant washing of hands with soap, wearing of mask no shaking of hands, social distancing etc), access to the sanitary facilities, their comfort in using these sanitary facilities. They further broadcasted and displayed relevant message on panels in order to ameliorate hygiene practises of the refugees. All of these measures were directed to promote behavioral change.



**Photo 3: Hand washing points and methods of storing of excreta and waste**



## **4.9 Vulnerable Groups**

According to WASH officials, an approach based on vulnerability is used, so the design of facilities and infrastructure are visible and these infrastructures meet the needs of these set of people, but to an extent contradicted what has been discovered from field observation. Many infrastructures like latrines constructed did not take into consideration the needs of physically challenged individuals.

## **4.10 Challenges**

According to our results, there were so many challenges to the delivery of WASH services that go beyond the socio-economic aspect. To begin with, an increase in the refugee population at the site (24000-2500) had led to a decrease in resources, specifically financial resources to be rented to UNHCR to address the concerns of the refugees, and this depletion of resources also affected the water and sanitation sector. Insufficiency of these resources was diminishing and did not allow WASH experts to support the needs that will increase with time. In this same vein refugee's customs was also identified as a setback to the implementation of WASH services. In addition to this, the professionals on the field also commented that refugees were strongly attached to their customs and beliefs, which most atimes hampered the implementation of these services. For example their attitudes to sanitation and hygiene practises does not go in line with minimum standards of International organisations. Some of these challenges were also highlighted in the study made by(Newborne et al., 2007)

On the hydro-geological level, Gado camp did not offer a great capacity for mobilizing groundwater resources, and there was also insufficient surface water to be able to supply underground water sources on the environment where the site was located. Futhermore, the general absence of hydrological and hydrogeological data in Cameroon also made it difficult to carry out campaigns or to complete the realization of boreholes by companies, which would have resulted to high productivity of water supply.

The low purchasing power of refugees was another hindrance to the maintenance of WASH infrastructures. It is the task of communities, the users or the beneficiaries of this service should ensure their maintenance through management committees, but their financial situation, and continous dependence of the refugees did not facilitate a mechanism that could be put in place in order to support the maintenance actions, due to the limited funds of such programs. (Li & Elliott, 2016) research also pointed out that individual's low social economic status also affected their access to safe water and sanitation. There is need for humanitarian actors to

develop programs that will promote or reduce the dependence and reliance of refugee population.

In terms of sanitation, one of the major difficulties was that Gado is located in a village quite far from the regional capital of Bertoua. Sanitation services such as emptying services for excreta were not available. In a situation where humanitarian resources are decreasing, these replacements became difficult to achieve and there is therefore a risk that the humanitarian actors will be unable to bear the cost of the continual replacement of the latrines that may occur.

## **CHAPTER FIVE**

### **5.0 Summary, conclusion and recommendation**

#### **5.1 Summary**

The study was conducted to assess the Socio-economic challenges for the provision of WASH services during emergency situations. A case study of the Gado-Badezere refugee camp, East region of Cameroon was conducted. A total of 212 questionnaires was administered in the refugee camp in order to determine basic evidence regarding the level and effectiveness of access to WASH services.

The product of the study is characterised under four objectives; the first objective involves determining the level of quality of water and sanitation response. To answer this objective, we did observation walks of the different water, and sanitation infrastructures, we also conducted interviews with WASH experts on the different methods to treat water and how solid waste is been managed in the camp whether this conforms to minimum standards of international organisation and data was also collected by administering questionnaire to the refugee population on matters concerning the most reliable source of water in the camp, average water usage in their households, time taken to go one direction to collect water, the type of recipient they carry water, how they clean their water containers and what type of chemicals they use to treat their water. Looking at sanitation inquiries we were looking at whether refugees practise open defecation and if not the area where household usually defecate, and what was done with faeces of children under five years.

The second objective is to ascertain whether minimum standards of hygiene promotion is met. In order to tackle this objective, questionnaire was administered, interviews and observation walks was conducted. The main focus was to know whether refugees have soap, have access to hand washing devices, where households dispose of their domestic wastes, also whether the courtyard was clean and food covered and protected from flies.

The third objective is to evaluate if WASH programme designs particularly take into consideration specific needs of vulnerable groups. Our goal was to know if the infrastructures installed in the camp take into consideration the needs of vulnerable groups, in addition to this we were also looking at how and where women dispose of their menstrual hygiene management products, who is in charge of carrying water, and also whether sanitation facilities provided some privacy and security for women this was to prevent the occurrence of gender based violence. The last objective is to analyse the socio-economic challenges of WASH during

emergency. A critical survey and interview with WASH professionals on the field was conducted.

## **5.1 Conclusion**

This study sought to look at the socio-economic hurdles for the provision of WASH services and also aimed to assess the effectiveness of these services in the the Gado-Badzere's refugee camp and the extent to which it respects sphere standards. In regards to access to water and quality. It is found that parameters such as the average amount of water needed per person per day conforms to the international sphere standards and this might increase as result of refugee's needs or because of climatic conditions. In addition to this, the distance between the households and water point, including queuing time also conforms to the standards. In terms of quality of water, the same methods of treating water like PoUWT(chlorine based treatment) and HWT(boiling, solarisation) which are mentioned by the standards are also utilised in the camp. Nevertheless, parameters such as the number of water point per person does not reflect sphere standards, this might be because of the flow rate and the increase in population. This therefore implies that refugees have access to water both in quantity and quality.

On a general note, it appears that open air defecation is not yet a practise in the camp, because households have access to latrines, thus reflecting the good management of excreta which makes it possible to avoid contamination of water sources and consequently the proliferation of water-borne diseases, but there are still many facilities to rehabilitate and also high number of people sharing this facility, which might be a vital decisive element that will push people to defecate in the air. Whatever the case, it is therefore essential to deliver additional boreholes and build more latrines that conforms to international standards.

Furthermore, we can conclusively say minimum standards of hygiene promotion is met. The number of households per hygiene promoter in the camp is met conformingly to the sphere standards, Hygiene promotional measures or programs such as face to face training, broadcasting of messages on panels are also implemented in the camp and have been effective against the spread of diseases such as cholera, malaria, Covid19, diarrhoea. The excess number of households per garbage clearly shows that the environment is not free from solid waste pollution.

The study also discovered that the needs of vulnerable groups are to an extent catered for. Some women have access to and also dispose of their Menstrual hygiene products properly, there is a vigilance committee in the camp and the WASH facilities installed to provide security and privacy. On the other hand, the installed sanitation facilities do not take into account the needs

of the physically challenged. This research revealed that the main socio-economic challenges for the provision of WASH services in the camp are limited resources, complexities of behaviour change, cultural factors, low purchasing power of refugees, poor coordination and information management and also other constraints such as environmental

### **5.3 Recommendations**

Based on the outcome of the study, the appropriate stakeholders should take the following actions:

- ✓ Capacities of local actors need to be strengthened and the awareness of private sector needs to be raised so as to support humanitarian projects. Partners in Cameroon should participate in humanitarian actions because they also have the financial capacity to implement medium- and long-term projects, since humanitarian actors no longer have sufficient resources to be implementing large-scale interventions. Their contribution and funds can help boost the WASH sector, specifically by increasing the number of latrines, boreholes and also skilled experts. For instance, in order to reduce the risk of water insufficiency in the camp, the government can carry out drinking water supply projects that would switch from a borehole water supply system with hand pumps to a water supply systems of high flow boreholes which are attached to mini water supply systems. This will ensure that water is supplied to villages or site.
- ✓ More emphasis should be put in preparing countries for emergency situations and the arrival of refugees and IDPs. This comprises of the domestication of standards, policies and institutions linking to movement and usually strengthening local actors so that they are able to respond to emergency situations. Sustainable WASH management models will be constrained if government does not deliver clear and practical policy guidance.
- ✓ The research revealed that the disposition of waste in the camp is not properly managed, as such UNHCR and other donor organisation need to reduce expenses and prioritize and focus on certain key activities and sustainable projects. A better controlled waste management model should be gradually implemented through the creation of landfills through a sorting collection mechanism, and waste treatment which will allow better protection of the environment. These interventions carried out by development and state actors in these localities who receive refugees could help fill the gaps which are currently observed and to quickly reach the minimum standards which are recommended.



- ✓ The survey also identified complexities in behavior change and culture as one of the main hurdles to the provision of WASH services and in order to tackle this, development actors as well service providers must implement first aid projects that adapt to the refugee's culture. The aim is not to modify their culture but to intervene to improve their living conditions while respecting their cultures. Focused trainings and awareness raising could help identify elements of these cultures that could be dangerous for the health and well-being of populations.
- ✓ There should be promotion of community-based approaches that link refugees, IDPS, and host communities to ease tension.
- ✓ Humanitarian organisations should empower and advocate for the right of refugees to work in host communities. This can be done through trainings and promoting activities where refugees can excel and make money. This will increase their capability to pay for service provisions and cost of maintenance of existing infrastructures, thus reducing the reliance and dependence on humanitarian aid.
- ✓ There should be a constructive discourse between humanitarian actors, government, service providers, users and regulators working on incorporating sustainable technologies and processes that minimize long-term operational costs.
- ✓ It would be useful to develop a sustainability audit tool for use by the wider WASH sector. The audit tool could be used to guide agencies through a process that looks at the enabling environment and technical, commercial and financial requirements that affect sustainability. It could also be used to guide agencies to set realistic and acceptable levels of performance for WASH service provisions
- ✓ To the readers, it is time to take actions, and your time to participate in the achievement of SDGs, sustain lives by guaranteeing that human rights and access to basic needs such as water, sanitation and health are provided to refugees and IDPS during situations of current and post emergencies. In depth and further studies need to be undertaken to ensure that the WASH services provided in Cameroonian camps are in line with minimum standards of international organisation.

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## Appendix

### A - General Information and Demographics

Questions
A1) Did the household give its consent to be interviewed? <input type="checkbox"/> YES <input type="checkbox"/> NO
A2) please kindly state your sex <input type="checkbox"/> Female <input type="checkbox"/> Male
A3a) How many people live in this house? _____ people  A3b) How many children less than 5 years old live in this house? _____
A4) Are there any persons with disabilities and / or elders in this household? <input type="checkbox"/> YES → How many? Kindly state number of disabled and elders _____ <input type="checkbox"/> NO
A5) Please tell me what your country of origin is: _____
A6a) Have your family members received prior education before arriving at the camp? <input type="checkbox"/> yes <input type="checkbox"/> no A6b) What is the level of education in your family <input type="checkbox"/> Lowest: _____ <input type="checkbox"/> The highest: _____

### B - Water Collection and Storage

B1) What is the principal source of domestic drinking water for members of your household? (Consider water for drinking, cooking, bathing, personal hygiene, laundry and cleaning only – NOT for non-domestic use.) <input type="checkbox"/> Public tap/standpipe <input type="checkbox"/> Handpumps/boreholes <input type="checkbox"/> Water seller/kiosks <input type="checkbox"/> Surface water (lake, pond, dam, river) <input type="checkbox"/> Protected spring <input type="checkbox"/> Rain water collection <input type="checkbox"/> Bottled water, water sachets <input type="checkbox"/> Other (please specify): _____ <input type="checkbox"/> Don't know
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B1/A) apart from the main source what other type of second source for your domestic drinking water?

- Public tap/standpipe
- Handpumps/boreholes
- Water seller/kiosks
- Surface water (lake, pond, dam, river)
- Protected spring
- Rain water collection
- Bottled water, water sachets
- Other (please specify): \_\_\_\_\_
- Don't know

B2/a) Are there situations where water is rationed or pumped at given times?

- o Yes  During the day  
 During the night
- o No

B2/b) From your point of view which source of water is safe or secure?

- Public tap/standpipe
- Handpumps/boreholes
- Water seller/kiosks
- Surface water (lake, pond, dam, river)
- Protected spring
- Rain water collection
- Bottled water, water sachets
- Other (please specify): \_\_\_\_\_
- Don't know

B3) What is the average water use for drinking, cooking and personal hygiene in your household per day?

- 10 liters
- 15 liters
- 20 liters
- 25 liters
- more than 25 liters
- don't know

B4) How long does it take to go one direction to get water? (On the way to the source, not the way back. Not including time spent socializing)

- \_\_\_\_\_ Number of minutes
- Water is available on premises
- Don't know

B5) What is the queuing time at the water source, considering that water is not available on premises?

- 3 - 5 minutes
- 6 -10 minutes
- 11 – 20minutes
- More than 20 minutes
- Don't know

B6) Do you collect enough water to meet all your households' needs – not for animal use, agriculture, gardening, etc.?

- Yes
- NO → Why not?( select the main reasons only)
  - There are water shortages
  - Water source is too far
  - It is too dangerous to get water
  - Can't afford to buy enough
  - Waiting time at the water point is too long
  - Don't have enough storage containers
  - Don't know

B7) Who usually collects water for your household?

- Adult female
- Adult male
- Child (11-18 years)
- 10 years or younger
- Don't know

B8a) Where do members of your household collect and store water?

Plastic containers  
buckets

B8b) How often do you clean drinking water containers? (Check one)

- Every time we use them
- At least once a week
- At least once a month
- At least once a year
- Don't know
- Never or less than once a year

## C- Drinking water hygiene

### Questions

C1) How do you remove water from the container?

- Cupped dipped
- Hose/Tap
- poured
- Other

C2) Do you or someone else in the household do anything to your water to make it ready for drinking?

- Yes, sometimes treat it before drinking
- Yes, sometimes treat it before drinking
- No, do not treat it before drinking
- Don't know

C3) how do you or someone else in the household treat the water before drinking?

- Boil it
- expose it to sunlight
- Use disinfectant products (water purification tablets, liquid chlorine, granular chlorine)
- Filter it( Bio-sand filter, ceramic pot filter, bucket filter)

C4) When was the last time someone or you treat the drinking water? (Choose one. Treating means of boiling, filtering, disinfecting, and/or other actions taken to clean water.)

- Today
- Yesterday
- Before yesterday
- Don't know

## D-hygiene

<b>Questions</b>
D1) Do you have a soap? <input type="checkbox"/> Yes <input type="checkbox"/> No
D2) Where did you get the soap from? <input type="checkbox"/> Purchased <input type="checkbox"/> Traded <input type="checkbox"/> Distributed by an NGO <input type="checkbox"/> Other
D3) In the absence of soaps what do you use for hand washing? <input type="checkbox"/> water only <input type="checkbox"/> ash <input type="checkbox"/> Don't use anything <input type="checkbox"/> Other
D4) Can you state at least three important times when one should clean his hands? <input type="checkbox"/> After breast-feeding <input type="checkbox"/> before eating <input type="checkbox"/> After defecation <input type="checkbox"/> Before cooking <input type="checkbox"/> Don't know
D5) Is there any handwashing device in your household or camp? <input type="checkbox"/> Yes <input type="checkbox"/> No
D6) What kind of installed hand device is found? <input type="checkbox"/> Pouring device (Tap) <input type="checkbox"/> Bucket <input type="checkbox"/> Other
D7) where do your household members dispose of their domestic waste? <input type="checkbox"/> Street bin <input type="checkbox"/> Designated open area <input type="checkbox"/> undesignated open area <input type="checkbox"/> Bury it <input type="checkbox"/> House-hold/ communal pit <input type="checkbox"/> Burn it <input type="checkbox"/> Other (please specify): _____

D8) Have you or any member of your household ever contracted cholera disease (diarrhea, vomit) once? When is the last time?

- less than one week
- less than a month
- approximately a year
- Other: \_\_\_\_\_
- Don't know

D9) select the different ways to prevent members of your household from getting diarrhoea?

- Receive a vaccine
- Store water safely
- Cook food well
- Wash fruits and vegetables
- Cover food
- Boil or treat your water/drink clean water
- Wash hands with soap and water
- Use toilet/latrine facility to defecate
- Dispose of children's faeces in toilet/latrine
- Bury faeces

D10) How do the women in this household dispose of their menstrual hygiene management products?

- Wash and reuse
- Burn them
- Dispose in open areas
- Trash bin
- Latrine

D11) Where do the women of the household change their menstrual hygiene management products?

- Home
- Latrine
- Other: \_\_\_\_\_

## E- Sanitation

Questions
<p>E1) Please state where you and the household members usually go to defecate?</p> <ul style="list-style-type: none"><li><input type="checkbox"/> plastic bag</li><li><input type="checkbox"/> Open defecation</li><li><input type="checkbox"/> Bucket Toilet</li><li><input type="checkbox"/> Household latrine</li><li><input type="checkbox"/> Other</li><li><input type="checkbox"/> Communal latrine</li></ul>
<p>E2) What is the facility where your household members usually defecate?</p> <ul style="list-style-type: none"><li><input type="checkbox"/> A single facility used by your household only</li><li><input type="checkbox"/> A shared facility used by a number of households→ Please the number of Household that use this facility</li><li><input type="checkbox"/> Communal latrine _____</li><li><input type="checkbox"/> Other please specify_____</li></ul>
<p>E3) Does the latrine provide enough privacy for members of your household, especially women?</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Yes</li><li><input type="checkbox"/> No→ please state the reason<ul style="list-style-type: none"><li><input type="checkbox"/> too close to the house</li><li><input type="checkbox"/> Doors nor curtains are not available</li><li><input type="checkbox"/> lock not working</li><li><input type="checkbox"/> Other</li></ul></li><li><input type="checkbox"/> No latrine</li></ul>
<p>E4) Do adult in your house hold usually defecate outside, especially in the night?</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Yes→ Why<ul style="list-style-type: none"><li><input type="checkbox"/> Latrine is too far</li><li><input type="checkbox"/> Too dark at night</li><li><input type="checkbox"/> Too tired</li><li><input type="checkbox"/> Don't know/not sure</li><li><input type="checkbox"/> Other (please specify):_____</li></ul></li><li><input type="checkbox"/> No</li></ul>
<p>E5) what is done with faeces of children under five years?</p> <ul style="list-style-type: none"><li><input type="checkbox"/> Bury it</li><li><input type="checkbox"/> Nothing is done</li><li><input type="checkbox"/> disposed in the latrine</li><li><input type="checkbox"/> Disposed elsewhere</li></ul>