



**SCHOOL OF MEDICINE AND HEALTH SCIENCES**

**EXPLORING FACTORS INFLUENCING THE USAGE OF WATER  
FROM SHALLOW HAND DUG WELLS AS OPPOSED TO TAP  
WATER IN CHAZANGA COMPOUND, LUSAKA**

**BY**

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**RESEARCH DISSERTATION CLEARANCE AND DECLARATION**

I Lilian Wamunyima do declare that this research dissertation is my own original work. It has been guided and marked by my supervisor in accordance with the guidelines for Master of Public Health at the University of Lusaka. It has not been submitted elsewhere for a degree at this or another University.

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A handwritten signature in black ink, appearing to be 'Kajun' followed by a horizontal line and two exclamation marks.

**Date: 31<sup>st</sup> July, 2023**

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## **DEDICATION**

This research report is dedicated to my parents and my husband.

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## ABSTRACT

**Background:** “A shallow well is a hole which has been dug, bored, driven or drilled into the ground for the purpose of extracting water. According to World health organisation (2020), about 1.1 billion people worldwide lack access to improved water supply and water sources. A report by (Hunter, 2018) indicated that, about 20% of the world's population lacked access to safe drinking water. Therefore, this study sought to explore factors influencing the usage of water from shallow hand dug wells as opposed to tap water in Chazanga compound, Lusaka.

**Methods:** The researcher employed a quantitative approach. The sample size was 39 using a convenience sampling. Structured questionnaires were used and the data was analysed using SPSS version 16 as well as excel”.

**Results:** “5(13%) of the residents had river as their source of water, 30(77%) of the residents had shallow hand dug well as their source of water. 2(5%) of the residents the distance was 10m, 2 (5%) of the residents the distance was 100m and 30(79%) of the residents the distance was 1km. 4(10%) of the residents had high income level, 5(13%) of the residents had medium income level and 30(77) of the residents had low income level and 30(77%) of the residents liked tap water and 9(23%) didn’t like tap water. The community had no knowledge about the negative impacts of using water from shallow dug wells on human health and general public health”.

**Conclusions:** “Shallow hand dug wells are an affordable source of water for washing clothes, flushing toilets/latrines and irrigation among informal settlements in Chazanga. It is also clear that most residents are aware of the health risks from microbial contamination of such water and use it for purposes other than drinking and cooking”.

**Recommendations:** “The Lusaka city council should conduct regular maintenance of these facilities to ensure their longevity and sustainability. The municipality must implement strategies that incorporate water for productive use in the water distribution plan, as this will foster community development. Handwashing and personal hygiene are important considerations for curtailing the spread of diseases in the municipality. The Lusaka Department of Water Affairs should educate rural communities about the construction, use and maintenance of public pit latrines in line with the environmental health regulations of the country”.

## CHAPTER ONE: INTRODUCTION

### 1.1 Background

“A shallow well is a hole which has been dug, bored, driven or drilled into the ground for the purpose of extracting water. A well is considered to be shallow if it is less than 50 feet deep. The source of a well is an aquifer. An aquifer is an underground layer of permeable soil (such as sand or gravel) that contains water and allows the passage of water (King, 2020). Water (chemical formula H<sub>2</sub>O) is an inorganic, transparent, tasteless, odourless, and nearly colourless chemical substance, which is the main constituent of Earth's hydrosphere and the fluids of all known living organisms in which it acts as a solvent” (Lapworth *et al.*, 2017)

“Among many other natural resources ever known on planet earth, water is one of most important natural resource which supports life on earth and without it there is no life. (Adetunde *et al.*, 2017), drinking good water is one of the essential amenities of life itself. The researcher further indicated that, the supply of safe drinking water to all has therefore engaged the attention of many individuals, groups, governmental organizations and private organizations. According to Alemu *et al.* (2021), the most common and widespread danger related to water is contamination which is caused by direct or indirect introduction of sewage, other wastes and human or animal excrements to the water source. The researcher further explained that, water is vital to all living organisms, it is also important in the ecological systems, human health, food production and economic developments. The safety of drinking water is an on-going concern within the global village. Traditionally, the safety of potable water supplies has been controlled by disinfection, usually by chlorination and coliform population estimates. Agrawal (2017) indicated that, ground water is believed to be cleaner and free from pollution than surface water. A study conducted by Onda *et al.* (2018) revealed that, about two billion of people worldwide lacked access to safe drinking water. The study further revealed that, an increase in human population put an enormous pressure on the provision of safe drinking water especially in developing countries. The consequences of drinking unsafe, contaminated water are numerous and are still not fully understood. According to the World Health Organization (2013), drinking contaminated water is one of the major causes of diarrheal diseases which make up the second leading cause of child mortality. World health organisation (WHO) further indicated that, each year more than 2 million persons, especially children less than 5 years of age die of diarrheal disease. Due to this, World health organisation (WHO) pointed out that, lack of access to clean drinking water has the most critical factor that negatively influences the general health and wellbeing

of populations in developing countries. Lawson, (2017) suggested that, the provision of safe drinking water can help to reduce or eliminate preventable deaths caused by waterborne diseases in low-income households around the world”.

“According to World health organisation (2020), about 1.1 billion people worldwide lack access to improved water supply and water sources. A report by (Hunter, 2018) indicated that, about 20% of the world's population lacked access to safe drinking water. Another report by World health organisation (2021) indicated that, unsafe water together with inadequate sanitation and hygiene was the overwhelming contributor to the 4 billion illnesses and 1.8 million deaths caused by diarrhoea every year, and about 90% of under five children die from this same disease. Furthermore, World health organisation (WHO) suggested that 94% of diarrheal cases are preventable through modifications to the environment and the increase in the availability of clean water. Wafula *et al.* (2017) indicated that, 75% of Africa’s drinking water comes from groundwater and is often used with little or no purification. The researchers further stated that, water quality in African is impacted both by natural processes. These natural processes include: seasonal trends, underlying geology and hydrology, weather and climate, and by human activities, including domestic, agriculture, industry and environmental engineering. In Sub-Sahara region, access to safe water is one of the challenges many people face. According to World health organisation (2020), water in sub-Sahara region is mainly contaminated by human waste because most of the wells are dug near the pit latrines. (Wafula *et al.*, 2017) also pointed out that, water contamination in southern African is caused by inadequate sanitation and hygiene. In Zambia, many people around the country have no access to safe water. According to United Nations Children's Fund (2021), 36% of Zambians do not have access to clean water, and at least half of the population is without sanitation facilities. Different studies have shown that in Zambia, water contamination is highly occurred in communities with low income. World health organisation, (2020) indicated that, inadequate sanitation and hygiene are one of the factors that lead to water contamination in many Zambian communities. UNICEF also added that, water contamination in many communities in Zambia is caused by improper disposal of sewage and other solid and liquid waste”.

“An estimated 4.8 million Zambians lack regular access to clean water, and 6.6 million lack access to adequate sanitation facilities. Poor water and sanitation are a major factor in Zambia’s high rates of childhood malnutrition (40 percent stunting) and mortality (seven percent of live births). In alignment with the Global Water Strategy and USAID Agency

Specific Plan, USAID is assisting Zambia to address the aforementioned challenges through investments that promote sustainable access to safe drinking water and sanitation while strengthening water sector governance, financing, and institutions. USAID addresses these objectives in targeted rural areas through integrated WASH and agriculture investments, and a multi-donor WASH and nutrition project, Scaling up Nutrition Technical Assistance. In addition to USAID's investment, the Millennium Challenge Corporation is supporting major infrastructure improvements and institutional strengthening in water supply, sanitation, and drainage in the capital, Lusaka. USAID also coordinates closely with other donors active in the WASH sector in Zambia, including the European Union, Germany, Ireland, Sweden, the United Kingdom, and UNICEF. In some instances, USAID co-finances activities alongside other donors, to leverage resources and avoid duplication of effort. Overall, these activities are expected to provide 1.7 million Zambians with sustainable water and sanitation services by 2021 (USAID, 2017). Therefore, this study sought to explore factors influencing the usage of water from shallow hand dug wells as opposed to tap water in Chazanga compound, Lusaka”.

## **1.2 Statement of the problem**

“According to World Bank Group (2020) Access to water supply and sanitation (WSS) services remains stubbornly low in Zambia. As of 2017, about 67 percent of Zambians had access to an improved water source, and only about 44 percent had access to an improved sanitation facility. However, there are disparities between rural and urban. Access to improved water in rural areas is at 51 percent, whereas urban is 89 percent. Sanitation access in rural areas is at 19 percent, whereas urban is 49 percent. Approximately 19 percent of Zambians practice open defecation. Households receive an average of 16 hours of water supply per day, 6 percent of water samples in urban areas fail bacteriological tests, and sanitation and sewer collection and treatment remain poor. In response to the poor service levels, alternative non-utility providers have taken up the role of bridging gaps in the urban water service provision for low-income communities. In the recent past, some local and international non-governmental organisations (NGOs) have responded to the appalling situation in urban low-income settlements, and attempted to fill the gap. As a result, several models for service delivery and management for the urban poor have emerged. Chazanga compound is one of the low-income, peri-urban settlements in Lusaka with high prevalence of water related diseases with diarrheal as the most common water related illness. Chazanga

compound is located approximately ten kilometres on the northern part of Lusaka City. Chazanga compound has a population of 112000 people (Kristen MR, 2020). The compound has one government health centre (Chazanga clinic). The area has a Water Trust, Private boreholes and Shallow Hand Dug Wells as the main source of water. Cholera and other waterborne diseases are associated with feacally contaminated drinking water and poor sanitation infrastructure (Lapworth *et al.*, 2017; Sorensen *et al.*, 2015). The most recent cholera outbreak in Zambia began in October 2017 and was concentrated in the peri-urban communities of Lusaka, starting in Chipata and spreading to Kanyama (Sladoje, 2018) as well as Garden, Ngombe, Mazyopa, and Chazanga (IFRCRCS, 2018). The outbreak resulted in 5,414 cases and 98 deaths of Lusaka residents between 4 October 2017 and 12 May 2018” (Sinyange *et al.*, 2018).

“SHDW and privately owned boreholes are generally much more contaminated with *E. coli* and nitrate than the water from Water Trust boreholes and kiosks. Despite the provision of a water trust in this compound, it has been observed that some residents of Chazanga compound are still drawing water from SHDW. During the 2017-2018 outbreak of cholera, SHDW were buried because they were proven to be source of drinking water that was responsible for the spread of cholera. However, by June 2019, many residents had dug new SHDW. Most of the SHDW are located less than 30m from pit latrines and are not covered on top. The mostly endangered groundwater resource is the shallow groundwater since the contaminants can easily get into it due to its little depth. The most common contaminants of the shallow groundwater are mainly the different compounds of nitrogen (ammonium, nitrite and nitrate). Additionally, phosphates are also important contaminants; they can derive from sewage, soil or the decomposition of the organic materials. Phosphates usually appear as inorganic orthophosphate ions in shallow groundwater. Bacterial pollution also causes problems; the sources of infection can be the domestic sewage and the livestock farms. Near industrial areas, shallow groundwater can often be contaminated with heavy metals and different hydrocarbon derivatives. To date, there has been no prior study on factors influencing the usage of water from shallow hand dug wells as opposed to tap water in Chazanga compound, Lusaka”.

### **1.3 Justification of the study**

“There seems to be insufficient literature factors influencing the usage of water from shallow hand dug wells as opposed to tap water in Chazanga compound, Lusaka. The purpose of this

study was exploring factors influencing the usage of water from shallow hand dug wells as opposed to tap water in Chazanga compound, Lusaka. The understanding of factors influencing the usage of water from shallow hand dug wells as opposed to tap water is critical for possible consideration in policy formulation and practice to curb the problem and the information obtained for using in academic knowledge”.

## **1.4 Research Objectives**

### **1.4.1 Main Objective:**

The study aims at exploring factors influencing the usage of water from Shallow Hand Dug wells as opposed to tap water in Chazanga compound, Lusaka Urban.

### **1.5 Specific Objectives**

- i. To identify factors influencing the residents in Chazanga Compound for their preference in their daily use of water from the shallow hand dug wells instead of using community tap water.
- ii. To examine the mitigation measures that have been put in place by the relevant authorities to prevent the contamination of water drawn from shallow hand dug wells.
- iii. To assess community’s knowledge about the negative impacts of using water from shallow dug wells on human health and general public health.

### **1.6 Research Question**

- i. What factors are influencing the residents in Chazanga Compound for their preference in their daily use of water from the shallow hand dug wells instead of using community tap water?
- ii. What are some of the mitigation measures that have been put in place by the relevant authorities to prevent the contamination of water drawn from shallow hand dug wells?
- iii. What is the community’s knowledge about the negative impacts of using water from shallow dug wells on human health and general public health?

### **1.7 Scope of the Study**

“This study was limited to factors influencing the usage of water from Shallow Hand Dug wells as opposed to tap water in Chazanga compound, Lusaka Urban. Covid-19 and short period can also limit the study to explore. The study was limited to the variables such as the financial resources, family resources, community resources and the community’s knowledge about the negative impacts of using water from shallow dug wells on human health and general public health”.

### **1.8 Definition of operational terms**

“**Usage** is the use of something, the way in which it is used, or how much it has been used

**Water** is an inorganic, transparent, tasteless, odourless, and nearly colourless chemical substance, which is the main constituent of Earth's hydrosphere and the fluids of all known living organisms in which it acts as a solvent” (Lapworth *et al.*, 2017).

A **shallow well** is a hole which has been dug, bored, driven or drilled into the ground for the purpose of extracting water.

A **shallow hand dug** well is a hole which has been dug.

**Tap water** is water that comes through pipes from the public water system.

## **CHAPTER TWO: LITERATURE REVIEW**

### **2.0 Overview**

“A literature review is defined as an objective summary and explanation of the current state of knowledge on a limited topic obtained from a critical analysis of the relevant available literature on a topic being studied (Cronin, Ryan, & Coughlan, 2018; Polit & Beck, 2018). The purpose of the literature review is to increase the likelihood of getting the best available research evidence on the topic, and to form a foundation on which to guide future research (Polit & Beck, 2017). Moreover, a review of literature serves to identify established knowledge about a phenomenon, and every aspect of such a review is considered important in providing a foundation on which to base new evidence (Boote & Beile, 2019; Polit & Beck, 2019). Through a critical review of the existing body of knowledge, researchers can identify gaps or inconsistencies in research evidence requiring further inquiry. The main focus in this chapter is to factors influencing the usage of water from Shallow Hand Dug wells as opposed to tap water”.

### **2.1 Factors influencing the residents for their preference in their daily use of water from the shallow hand dug wells instead of using community tap water**

“Some of the factors include infrastructure failure, low yields, and poor groundwater quality, which all influence the potential for sustainable groundwater resource development. Reliable access to safe drinking water is critical for maintaining and improving human health and quality of life throughout lower- and middle-income countries. Shallow groundwater is one of the most important water resources in several countries, although the use of it is decreased in the developed countries in the last decades. For example in Hungary, in the 1950s shallow groundwater was the most significant water resource, but recently only 6% of the drinking water derives from shallow groundwater (Steiner, 2017); the decrease is owing to the serious contamination. In the settlements several pollution resources can endanger the condition of shallow groundwater, but contaminants can also derive from agriculture in the outer areas.”

“In the settlements, one of the most important contaminants is domestic sewage that can cause significant pollution in settlements where the sewer network is not constructed. Hundreds of millions of people across sub-Saharan Africa suffer due to inadequate access to clean water (World health organisation & United Nations Children's Fund, 2017). Three decades ago, the United Nations set a Millennium Development Goal to halve the proportion

of the population without sustainable access to safe drinking water and sanitation, but the goal was not met in Tanzania – the proportion of the population that gained access to safe water was only 29% (World health organisation & United Nations Children's Fund, 2015). Non-functional water distribution points frequently limit access to clean and safe water. The average functionality rate of public distribution points is only 60%” (United Republic of Tanzania 2015).

“Although groundwater supplies two-thirds of all rural water points in Tanzania (United Republic of Tanzania 2015), Tanzania's aquifers are generally of low to moderate productivity (MacDonald et al. 2012). A study conducted by Lapworth *et al.* (2017) found that, throughout Africa, groundwater resources are often more available, dependable and less vulnerable to pollution than surface water; groundwater therefore represents the largest and most important water resource in Africa. This is especially true in drought-prone areas of Africa where climate variability is likely to increase in the future” (Lapworth *et al.*, 2017) “Water supply and pollution issues are becoming more severe in African urban centres. The percentage of the population living in cities of 500,000 people or more is increasing throughout the world, but nowhere faster than in Africa where the current growth rate is about 3.5%. The urban population of Africa was about 824 million in 2018 and is expected to reach about 1.5 billion by 2030 (UNDESAPD, 2019). This rate of urbanization exceeds the capacity of many African cities to provide adequate infrastructure (Adelana *et al.*, 2017), and this has led to an increased demand for water that is not matched by an equal increase in safe water supply, sanitation, and waste disposal services. Groundwater occurs due to industrial discharge and untreated sewage. Groundwater contamination is especially problematic where unimproved sanitation facilities, mainly pit latrines, are in close proximity to wells and springs” (Lapworth et al., 2017).

“Another study conducted by Adelana *et al.* (2018); Adelana & MacDonald (2018) found that aquifer contamination in dense urban areas can also occur from leaking septic tanks, soak pits and sewage lines. This can be especially problematic where people are dependent on untreated surface water or untreated water from private shallow wells, particularly susceptible to contamination from on-site sanitation and waste disposal (Adelana *et al.*, 2017; Adelana & MacDonald, 2018). Due to their shallow depth and location in urban areas (sometimes near pit latrines, waste ditches, and industrial areas) these well are vulnerable to bacteria, nutrients, and heavy metals contamination” (Bäumle & Kang'omba, 2018; Chande & Mayo, 2019).

“The importance of water to humans cannot be overemphasized hence the need for its availability in the right quantity and quality at any given time. It is therefore not surprising that good drinking water and sanitation are used as socio-economic development indicators by the United Nations (Griggs *et al.*, 2013). Unfortunately, many developing countries including Ghana continue to face challenges with regards to access to good quality drinking water. In most instances, the source and quality of water utilized by individuals are dependent on their geographical location and socio-economic status (Adams, Boateng, & Amoyaw, 2016). Accordingly, varied sources of drinking water including harvested rainwater and hand-dug wells are utilized in Ghana to meet water needs (General Social Survey, 2012). The hand-dug well remains a dominant source of drinking water especially amongst the rural and peri-urban poor households in Ghana (General Social Survey, 2014a). It is reported that about one-third (32.3%) of all households’ main source of drinking water comes from the hand-dug wells in Ghana, with a little below one-third (28.9%) using pipe-borne water” (General Social Survey, 2014b).

“Moreover, about 13.9% and 55.3% of urban and rural inhabitants respectively, resort to hand-dug wells as their main source of water (General Social Survey, 2014b) Notwithstanding the poor access to potable water, the limited sanitation facilities that are available are also overstretched (General Social Survey, 2014b). Previous studies have associated the presence of pit latrines with ground water contamination. For instance, Zingoni *et al.* (2017) in a study of groundwater quality in an informal settlement of Zimbabwe associated detectable total and faecal coliforms in boreholes and existing domestic wells to the presence of household latrines. Similarly, nitrate occurrence in the shallow groundwater was associated with on-site sanitation practices in Mahitsy City, Analamanga Region, Madagascar in a study by Rasolofonirina *et al.* (2015). Water quality from shallow wells in sub-Saharan cities such as Dakar, Senegal, Lagos, Nigeria, and Lusaka, Zambia are contaminated with high levels of nitrates (exceeding WHO guidelines) because they sit on vulnerable aquifers that have been contaminated by human activities” (Adelana *et al.*, 2017).

“Lusaka, the capital of Zambia, is a rapidly growing city in south central Africa with a population of over 2 million people (CSO, 2012). Lusaka's population growth is partially driven by migration from rural areas by individuals in search of employment and a better way of life (De Waele *et al.*, 2017). Insufficient housing and inability of rural migrants to pay rent has given rise to rapidly expanding unplanned, peri-urban developments around the capital city. Some of these communities were originally constructed during the colonial period to

segregate native populations from colonialists. Presently, over 60% of Lusaka's population lives in these unplanned, peri-urban settlements, which have poor access to primary services including water, trash collection, electricity, and sewage (De Waele & Follesa, 2017). Due to increasing population size and poor sanitation the region is faced with many water quality and quantity challenges. Continued rural migration to urban centers has led to the rapid growth of high-density, informal settlements making it difficult for Lusaka authorities and the Lusaka Water and Sanitation Company (LWSC) to keep up with demand for water and sanitation services”.

### **2.1.1 The mitigation measures that have been put in place by the relevant authorities to prevent the contamination of water drawn from shallow hand dug wells.**

“A study conducted by Kadimba *et al.* (2017) revealed that after implementation of the 1994 National Water Policy, private investors and non-government organizations (NGOs) began to supplement services provided by the LWSC. Cooperative for Assistance and Relief Everywhere (CARE) International, an NGO, was invited by the government of the Republic of Zambia to help address water provision in peri-urban communities. CARE sought to improve living situations for low-income residents by increasing community involvement, improving the status of women, updating physical infrastructure and assisting the LWSC in providing water and sanitation to peri-urban communities (Kayaga & Kadimba-Mwanamwambwa, 2017). Working closely with the Lusaka City Council and the LWSC, CARE developed the Water Trust model to create independent, sustainable water supply systems that could be managed by community members” (Kadimba-Mwanamwambwa *et al.*, 2017).

“The Water Trust model was implemented in several peri-urban communities surrounding Lusaka (Kadimba-Mwanamwambwa *et al.*, 2017). Initially, CARE supplied all necessary equipment and trained community members who later took full control of all aspects of management and service delivery (Franceys & Gerlach, 2017). A tiered community management system was formulated to ensure continuation of the project (Kadimba-Mwanamwambwa *et al.*, 2018). Water Trusts extract groundwater via boreholes located throughout the peri-urban communities. Boreholes obtain water from aquifer depths that are less likely to be affected by surface and near surface contamination. After extraction, the water is treated with chlorine, stored in elevated storage tanks, and distributed through underground pipes to public tap stands (also known as kiosks) where it is sold to residents at

a cost of about \$0.04 per 20 L containers” (according to the Water Trust managers in 2016) “The purpose of this research was to investigate the water quality in Lusaka's peri-urban communities and to assess the efficacy of the provision of clean drinking water to residents of those communities by the Water Trusts. For characterizing water quality, we chose to focus on *Escherichia coli* (*E. coli*) and nitrate, both potential indicators of faecal contamination, the largest source of contamination in both urban and rural groundwater in Africa, especially in high-density areas with poor sanitation (Lapworth *et al.*, 2017). Waterborne bacterial pathogens are a major threat to public health throughout lower and lower-middle-income countries (Sorensen *et al.*, 2015). Recent cholera epidemics in this area highlight the risks associated with faecal contamination of drinking water (Sladoje, 2018). Nitrate is also a widely used proxy for anthropogenic contamination from a variety of sources”.

### **2.1.2 Community’s knowledge about the negative impacts of using water from shallow dug wells on human health and general public health**

“Cholera and other waterborne diseases are associated with feacally contaminated drinking water and poor sanitation infrastructure (Lapworth *et al.*, 2017; Sorensen *et al.*, 2015). The most recent cholera outbreak in Zambia began in October 2017 and was concentrated in the peri-urban communities of Lusaka, starting in Chipata and spreading to Kanyama (Sladoje, 2018) as well as Garden, Ngombe, Mazyopa, and Chazanga (International Federation of Red Cross and Red Crescent Societies, 2018). The outbreak resulted in 5,414 cases and 98 deaths of Lusaka residents between 4 October 2017 and 12 May 2018 (Sinyange *et al.*, 2018). In some parts of Lusaka, the aquifer is also contaminated with bacteria and is classified as vulnerable to pollution (Adelana *et al.*, 2017; Chande & Mayo, 2019). In Kabwe, Zambia, a variety of bacterial biomarkers, including *Vibrio cholerae*, were detected in urban groundwater samples using PCR (Sorensen *et al.*, 2015). Liddle *et al.* (2015), on the other hand, found that the town of Ndola in Zambia had widespread usage of shallow wells that met the World Health Organization (WHO) safe guidelines for both coliform and metals. The study concluded that shallow wells if properly located (in the right geological units) and managed can provide safe drinking water. Liddle *et al.*'s study showed that rocks with lower permeability are good for digging shallow wells for drinking water supply. These findings show that more research is needed on the groundwater quality and management in urban and peri-urban areas of cities in less industrialized nations such as Zambia. Lapworth *et al.* (2017) stated that the vulnerability of groundwater to anthropogenic contamination in Sub-Saharan

African urban centers has not received enough attention and that more data are needed to develop proper groundwater management and policy”.

“In peri-urban communities in Lusaka, cholera cases have been associated with lack of household latrines, limited safe water sources and lack of personal hygiene practices (Sasaki *et al.*, 2018) as well as insufficient coverage of storm runoff drainage networks (Sasaki *et al.*, 2009) resulting in substantial flooding. Waterborne diseases have been directly linked to the consumption of drinking water from shallow wells (Sasaki *et al.*, 2018). Shallow wells, common to peri-urban communities, are created by digging through the top layer of substrate until groundwater is reached. Untreated groundwater is then collected and often consumed by residents of these communities. During the cholera outbreak of 2017–2018, 220 drinking water sources were randomly chosen and tested. Of the shallow wells tested, 91% tested positive for *E. coli* but so did 34% of the tested boreholes (Sinyange *et al.*, 2018). These findings suggest that those who use shallow wells are at greater risk for waterborne diseases; however, boreholes, including those run by the Water Trusts, are not necessarily free of bacterial contamination. The Zambia Red Cross Society took many actions in response to the 2017–2018 outbreak including ensuring that residents acquired safe water from protected sources. They observed that some residents of the peri-urban communities were drawing water from shallow wells and joined the government ministries in providing more access to public taps, kiosks, and municipal water tanks. According to Water Trust managers, many shallow wells throughout the area were buried to prevent further spread of disease; however, by June 2019, many residents had dug new shallow wells. It is currently unknown whether the shallow wells were the only source of drinking water that was responsible for the spread of cholera or whether private boreholes were also to blame”.

### **2.1.3 The Gap in literature**

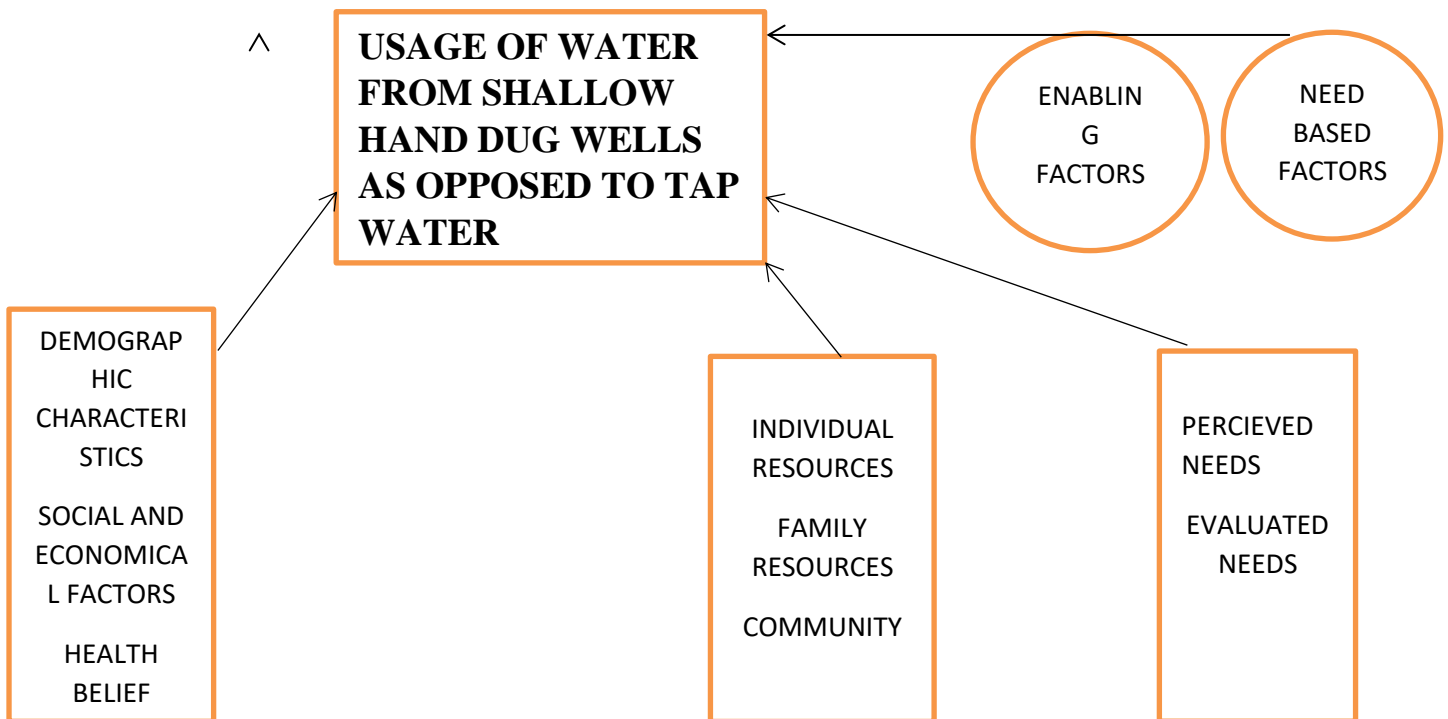
“This literature has revealed that studies are needed to understand the multiple complex physical factors that limit clean groundwater access in rural areas. These physical factors include infrastructure failure, low yields, and poor groundwater quality, which all influence the potential for sustainable groundwater resource development. While socioeconomic and political factors, climatic changes (low rainfall pattern and higher temperatures), over extraction of ground water, geological dynamics also influence water access”.

## 2.2 Theoretical framework

“This study will be guided by Andersen’s Health Seeking Behavioural Model developed in 1968. Andersen model is a conceptual model aimed at demonstrating the factors that lead to the utilization of health services; it is determined by the following three categories; Predisposing factors, enabling factors and the Need based factors” (Andersen,1968).

### 2.2.1 Conceptual framework

The Behavioural Model adopted is depicted in the conceptual framework figure below. This conceptual framework demonstrates factors influencing the use of water from the shallow hand dug wells instead of using community tap water.



**SOURCE:** (Andersen1968)

“The purpose of this model is to discover the conditions that either facilitate or deter utilization of the service. The original model was developed by Ronald M Andersen, a health services professor in 1968. It was expanded through numerous stages. The initial behavioural model attempted to study why a family prefers the use of water from the shallow hand dug wells instead of using community tap water. Andersen explained that the model function both to predict and explain use of health services”.

## **CHAPTER THREE: RESEARCH METHODOLOGY**

### **3.1 Research Approach**

“The researcher employed a quantitative approach. A quantitative research is the process of collecting and analysing numerical data. It can be used to find patterns and averages, make predictions, test causal relationships, and generalize results to wider populations (Pritha, 2020). The quantitative approach fits this study for it will quantify and analyse the data that will be collected”.

### **3.2 Research design**

“This study was a descriptive cross-sectional design which employed single method approach of quantitative study to explore factors influencing the usage of water from Shallow Hand Dug wells as opposed to tap water in Chazanga compound, Lusaka Urban. A descriptive cross-sectional design is a study in which the disease or condition and potentially related factors are measured at a specific point in time for a defined population (Ranganathan et al., 2018). Data was collected from many different individuals at a single point in time. The variables were observed without influencing them”.

### **3.3 Research setting**

“The area of study for this research was in Chazanga compound, Lusaka Urban. The reason for choosing this area is because no study had been conducted yet or documented which makes it the suitable setting for conducting this research. Chazanga compound is located approximately ten kilometres on the northern part of Lusaka City. Chazanga compound has a population of 112000 people” (Kristen MR, 2020).

### **3.4 Study population**

“Chazanga compound has a population of 112000 people. Both male and female were recruited in the study at household level provided that they met the minimum age of 18 years old and above of Chazanga compound, Lusaka Urban”.

### **3.5 Sample size determination**

The sample size was calculated using the Leslie-Kish formula:

$$N = \frac{Z^2 P(1-P)}{d^2}$$

Population size comprised both sexes (Above 18years).

Household size	;	14,771(Chazanga clinic, 2021)
Estimated proportion	;	50%
Margin of error	;	5%
Confidence interval	;	95%
Formula	;	$N = Z^2 P (1-P)/d^2$
	;	$= (1.96)^2 \times 0.2 (1-0.2) / (0.05)^2 = 38.416$
		$38.416 / 1 + (38.416) / 14771 = 39.42$

Therefore, sample size was 39

### 3.6 Sampling techniques

“A convenience sampling was used in the study because mother’s come to the facilities at different time intervals and this sampling methods involves the population being selected because it’s readily available”.

### 3.7 Data collection techniques

“Structured questionnaires were used to collect information from the participants who consented to participate in the study. The structured questionnaires were audio-recorded and then later be transcribed”.

### 3.8 Data management and analysis

“This research used SPSS version 16 and analysed using descriptive statistics as well as excel for the generation of appropriate graphs to depict the parameters of interest. It was hoped that SPSS would generate the necessary evidence that is needed to draw inferences on the existing issues. The student’s t-test was used to analyse the data. Analysis was conducted at 95% confidence interval”.

### **3.9 Reliability and validity**

“Reliability refers to the consistency of a measure (whether the results can be reproduced under the same conditions (Fiona, 2019). Validity refers to the accuracy of a measure (whether the results really do represent what they are supposed to measure (Fiona, 2019). Reliability and validity will be ensured in the study through the use of standardized data collection tools and techniques. The data collection tools were designed to measure the clearly defined objectives of the study so that the results are stable and consistent”.

### **3.10 Ethical considerations**

“Ethical clearance was obtained from University of Lusaka Research Ethical Committee. Written permission to conduct the research was obtained from Lusaka City Council (LCC) Each participant was briefed about the purpose of the study and was also informed that all information shared with the researcher was confidential. Consent was obtained from every participant spoken with. The researcher adhered to principles of autonomy, respect for individual and their right to determine their lives. Anonymity and confidentiality was ensured by use of serial numbers. Names of participants did not appear on the data collection tools. Participants volunteered to participate in the study without any coercion. Participants had the right to decide at any point to terminate their participation, refuse to give information, or to ask for clarification about the purpose of the study or specific study procedures without any repercussions”.

## CHAPTER FPOUR: PRESENTATION RESULTS AND ANALYSIS

### 4.0 Introduction

“The following chapter presents the findings of the study carried out in Chazanga Compound Lusaka. These findings are analysed in line with the aim and objectives stated in the study, which focuses on factors influencing the usage of water from Shallow Hand Dug wells as opposed to tap water in Chazanga compound, Lusaka Urban”.

This study looked at the following specific objectives:

1. To identify factors influencing the residents in Chazanga Compound for their preference in their daily use of water from the shallow hand dug wells instead of using community tap water.
2. To examine the mitigation measures that have been put in place by the relevant authorities to prevent the contamination of water drawn from shallow hand dug wells.
3. To assess community’s knowledge about the negative impacts of using water from shallow dug wells on human health and general public health.

### 4.1 Social demographic characteristics of the study population

“This section lists the respondents' characteristics by age, gender, marital status, level of education, and occupation. 39 respondents participated in the study, yielding a response rate of 100%. With regards to age, majority of the respondents of were in the age range of 27-32 were 14(47%), those in the age range of 21-26 were 6(20%), those in the age range of 33-44 were 8(27%) and those in the age range of 45-49 were 2(6.6%), With regards to gender, majority all the respondents were females 30(100%). With regards to marital status, majority of the respondents were married with 19(63%), those singles were 9(30%), those divorced were 2(6%0 and widowed there was none. With regards to number of children, those with children in the range 1-3 were 25(873%) and those in the range 4-6 were 5(17%). With regards to occupation, those who were employed were 5(16%), those who were not employed were 18(60%) and those who were self-employed were also 7(23%). With regards to residential area, those who stay within Chazanga compound were 23(77%) and those who stay outside Chazanga compound were 7(23%). With regards to the level of education, many of the respondents are those with primary education were 22(73%), those with secondary education were 8(27%), those with tertiary education there was none”.

**4.1.1 Table 1: Social Demographic Characteristics of Study Population**

	Variable	Frequency (N=30)	Percentage (%)
<b>Age</b>	15-20	0	0
	21-26	6	20
	27-32	14	47
	33-44	8	27
	45-49	2	6.6
<b>Total</b>		39	100
<b>Sex</b>			
	Female	30	100
<b>Total</b>		39	100
<b>Marital status</b>			
	Single	9	30
	Married	19	63.3
	Divorced	2	6.7
	Widowed	0	0
<b>Total</b>		39	100
<b>Number of children</b>			
	1-3	25	83
	≥4	5	17
<b>Total</b>		39	100
<b>Occupation</b>			
	Employed	5	16
	Not employed	18	60
	Self-employed	7	23
<b>Total</b>		39	100
<b>Residential address</b>			
	Within Chazanga	23	77
	Outside Chazanga	7	23
<b>Total</b>		39	100
<b>Education Status</b>			
	No formal education	0	0
	Primary	22	73
	Secondary	8	27
<b>Total</b>		39	100

## 4.2 Factors influencing the residents in Chazanga Compound for their preference in their daily use of water from the shallow hand dug wells instead of using community tap water

“With regards to the source of water, 5(13%) of the residents had river as their source of water, 30(77%) of the residents had shallow hand dug well as their source of water. With regards to distance of tap water from their homes, 2(5%) of the residents the distance was 10m, another 2(5%) of the residents the distance was 10m, 1(3%) of the residents the distance was 20m, another 1(3%) of the residents the distance was 40m, and another 1(3%) of the residents the distance was 60m, 2 (5%) of the residents the distance was 100m and 30(79%) of the residents the distance was 1km. With regards to income level, 4(10%) of the residents had high income level, 5(13%) of the residents had medium income level and 30(77) of the residents had low income level. With regards to liking tap water, 30(77%) of the residents liked tap water and 9(23%) didn’t like tap water. With regards to liking Shallow hand dug water, 30(77%) of the residents didn’t like Shallow hand dug water and 9(23%) liked like Shallow hand dug water”.

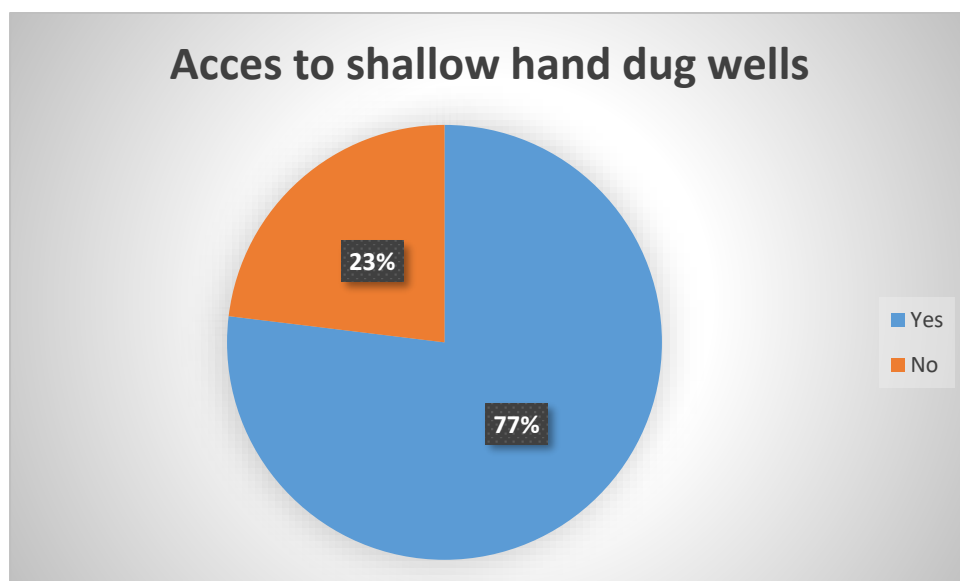
### 4.2.1

Variable	Frequency (N=30)	Percentage (%)
<b>Source of water</b>		
River	5	13
Shallow hand dug Well	30	77
Tap water	4	10
<b>The distance of tap water from your Home</b>		
10m	2	5
20m	2	5
40m	1	3
60m	1	3
100m	2	5
1km	30	79
<b>Income level</b>		
High	4	10

Medium	5	13
Low	30	77
<b>Liking tap water</b>		
Yes	30	77
No	9	23
<b>Liking Shallow hand dug water</b>		
Yes	9	23
No	30	77

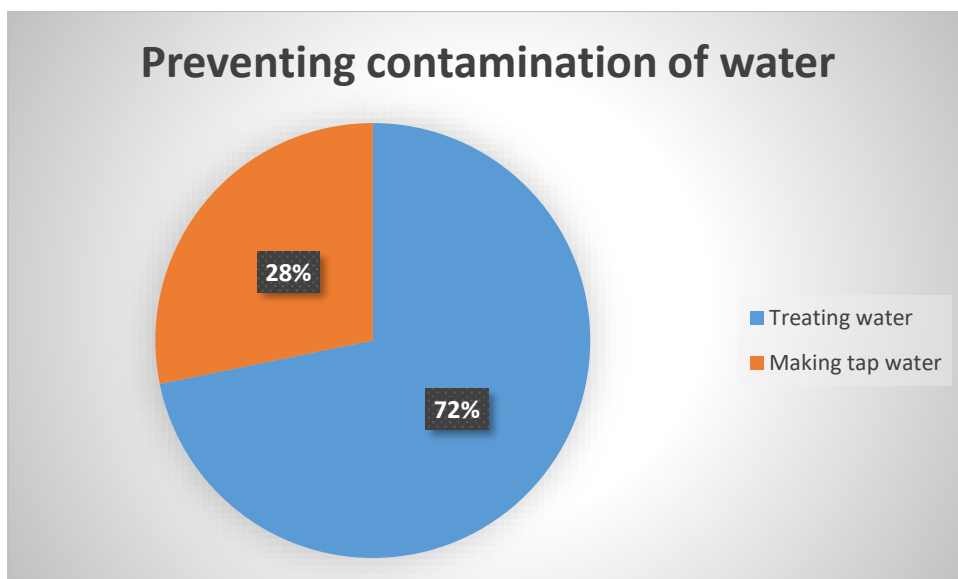
#### 4.3 Mitigation measures that have been put in place by the relevant authorities to prevent the contamination of water drawn from shallow hand dug wells

Figure 1: Access to shallow hand dug wells



From the figure above, those who had access to shallow hand dug wells were 30(77%) and those who didn't have access were only 9(23%).

Figure 2: Preventing contamination of water



From the figure above, 28(72%) of the respondents said that the government has put in mitigation measures of treating water.

#### 4.4 Community’s knowledge about the negative impacts of using water from shallow dug wells on human health and general public health

From the table below, the community had no knowledge about the negative impacts of using water from shallow dug wells on human health and general public health. There is significant variation in hand-dug wells.

**4.4.1 Table: Community’s knowledge about the negative impacts of using water from shallow dug wells on human health and general public health**

	Shallow hand dug wells			Tap water		
Knowledge	Mean	t-test statistic	Sig.	Mean	t-test statistic	Sig.
<b>Risk of using water</b>	7.240	-0.767	0.446	6.722	6.277	0.003
<b>Impact of using</b> 1	4.010	2.603	0.012*	1.942	4.349	0.012

<b>water</b>							
<b>Attitude towards the impact of using water</b>	8.830	0.814	0.419	5.000			
<b>Overall attitude towards the impact of using water</b>	483.170	-5.763	0.000*	334.800	4.540	0.011	

## CHAPTER FIVE: DISCUSSION OF THE RESULTS

### 5.0 Overview of Findings

The discussion is based on the results of interviews conducted during the study and based on three objectives:

1. To identify factors influencing the residents in Chazanga Compound for their preference in their daily use of water from the shallow hand dug wells instead of using community tap water.
2. To examine the mitigation measures that have been put in place by the relevant authorities to prevent the contamination of water drawn from shallow hand dug wells.
3. To assess community's knowledge about the negative impacts of using water from shallow dug wells on human health and general public health.

### 5.1 Factors influencing the residents in Chazanga Compound for their preference in their daily use of water from the shallow hand dug wells instead of using community tap water

“The study found that, 5(13%) of the residents had river as their source of water, 30(77%) of the residents had shallow hand dug well as their source of water. The study found that 2(5%) of the residents the distance was 10m, another 2(5%) of the residents the distance was 10m, 1(3%) of the residents the distance was 20m, another 1(3%) of the residents the distance was 40m, and another 1(3%) of the residents the distance was 60m, 2 (5%) of the residents the distance was 100m and 30(79%) of the residents the distance was 1km. the study found that 4(10%) of the residents had high income level, 5(13%) of the residents had medium income level and 30(77) of the residents had low income level. The study found that 30(77%) of the residents liked tap water and 9(23%) didn't like tap water. The results give credence to the above findings are similar to Hemson's (2016) study which found that in rural settlements, people walk 3 to 4kms (approximately 50 min or more daily) to rivers and streams to fetch water and dispose of waste. This is due to the grossly inadequate provision of safe drinking water and hygiene services for their households. The results confirm Mudau et al. (2016) who found that people who access tap water at the Vhembe District Municipality complained of problems related to back pain, resulting from the distances they had to travel to either dispose of waste or fetch water from different sources like taps, rivers, springs or boreholes”.

“The study found 30(77%) of the residents didn’t like Shallow hand dug water and 9(23%) liked like Shallow hand dug water. This is similar to a study conducted by It is reported that about one-third (32.3%) of all households’ main source of drinking water comes from the hand-dug wells in Ghana, with a little below one-third (28.9%) using pipe-borne water (General Social Survey, 2014b). Moreover, about 13.9% and 55.3% of urban and rural inhabitants respectively, resort to hand-dug wells as their main source of water (General Social Survey, 2014b). Notwithstanding the poor access to potable water, the limited sanitation facilities that are available are also overstretched” (General Social Survey, 2014b) “Previous studies have associated the presence of pit latrines with ground water contamination. For instance, Zingoni *et al.* (2017) in a study of groundwater quality in an informal settlement of Zimbabwe associated detectable total and faecal coliforms in boreholes and existing domestic wells to the presence of household latrines. Similarly, nitrate occurrence in the shallow groundwater was associated with on-site sanitation practices in Mahitsy City, Analamanga Region, Madagascar in a study by Rasolofonirina *et al*” (2015).

## **5.2 Mitigation measures that have been put in place by the relevant authorities to prevent the contamination of water drawn from shallow hand dug wells**

“The study found that those who had access to shallow hand dug wells were 30(77%) and those who didn’t have access were only 9(23%). 28(72%) of the respondents said that the government has put in mitigation measures of treating water. This is similar to a study conducted by Kadimba et al. (2017) revealed that after implementation of the 1994 National Water Policy, private investors and non-government organizations (NGOs) began to supplement services provided by the LWSC. Cooperative for Assistance and Relief Everywhere (CARE) International, an NGO, was invited by the government of the Republic of Zambia to help address water provision in peri-urban communities. CARE sought to improve living situations for low-income residents by increasing community involvement, improving the status of women, updating physical infrastructure and assisting the LWSC in providing water and sanitation to peri-urban communities (Kayaga & Kadimba-Mwanamwambwa, 2017). Working closely with the Lusaka City Council and the LWSC, CARE developed the Water Trust model to create independent, sustainable water supply systems that could be managed by community members” (Kadimba-Mwanamwambwa et al., 2017).

### **5.3 Community's knowledge about the negative impacts of using water from shallow dug wells on human health and general public health**

“The study found that the community had no knowledge about the negative impacts of using water from shallow dug wells on human health and general public health. Significant variations were observed in hand-dug wells. The findings highlight that educating the people about water and sanitation matters could be an important strategy for improved health, water quality and sustainability, especially in developing communities of the municipality. It can have implications on the people's health, water conservation, socio-economic and development prospects of communities. Poor hygiene practice which is linked to the pollution of freshwater sources could probably be due to the low education levels of the people. Similarly, low education levels can affect compliance to water and sanitation regulations and standards. This is also highlighted by SDG6 of the United Nations (2015)”.

### **5.4 Limitations of the Study**

This study was limited to time constraints. Because there was need to balance between work and school, data could only be collected during weekends which resulted in the study only focusing on a smaller group of subjects in order to limit the amount of time spent in the field. Risk of non-responsiveness was also another limitation. The people in this community were hiding their true thoughts and feelings about the study, as they were aware that these shallow wells were buried during the outbreak of cholera in 2018 and the local authority had prohibited the usage of shallow wells as a source of water. Another limitation of the study was the fact that there has been no prior study on factors influencing the usage of water from shallow hand dug wells as opposed to tap water in Chazanga compound, Lusaka. Therefore making it difficult to find enough literature on this Study. The last one was insufficient funds. There was no enough funds especially for printing out questionnaires which resulted in the study having a smaller sample size which was manageable for the researcher.

## CHAPTER SIX: CONCLUSION AND RECOMMENDATIONS

### 6.1 Conclusion of the study

“The conclusions from the above findings are that shallow hand dug wells are an affordable source of water for washing clothes, flushing toilets/latrines and irrigation among informal settlements in Chazanga. It is also clear that most residents are aware of the health risks from microbial contamination of such water and use it for purposes other than drinking and cooking. However, a minority of residents continue to drink untreated well water. Thus, interventions that seek to improve well water quality, such as wellhead chlorine dispensers and well protection and lining programmes, may still benefit the poorest households, provided attention is given to post-collection contamination of groundwater and its subsequent use. Although the public health risks from shallow hand-dug wells are well documented, they provide a means of increasing the quantity of water available to poorer households for purposes other than consumption. However, poorer households do require an alternative, affordable means of securing safe water for drinking and cooking alongside such well water, such as through effective home water treatment or hygienically vended piped water. It may thus be premature to consider closure of such wells before there is an affordable alternative for poorer households to use for purposes such as washing clothes and irrigation. Until affordable safe water becomes accessible to all urban households, the interim challenge remains to manage the contamination risks to urban shallow wells and springs as far as possible, and promote safer handling, storage, and treatment by groundwater consumers”.

## **6.2 Recommendations**

From this study's findings, the following recommendations could be made;

**6.2.1** "Access to clean water is a basic human right and the Lusaka city council has a responsibility to ensure that rural communities have access to safe drinking water".

**6.2.2** "Improving water and sanitation facilities can lead to improved health outcomes and economic development in these communities. This will not only provide safe drinking water but also help in irrigation and other agricultural activities, which are the main source of income for these communities".

**6.2.3** "The Lusaka city council should also conduct regular maintenance of these facilities to ensure their longevity and sustainability".

**6.2.4** "The municipality must implement strategies that incorporate water for productive use in the water distribution plan, as this will foster community development. Handwashing and personal hygiene are important considerations for curtailing the spread of diseases in the municipality".

**6.2.5** "The Lusaka Department of Water Affairs should educate rural communities about the construction, use and maintenance of public pit latrines in line with the environmental health regulations of the country".

**6.2.6** "The Lusaka Department of Water Affairs should implement suitable WASH programmes within Chazanga for health education and awareness in the communities, to promote the well-being of the communities at large".

**6.2.7** "To ensure equity in water allocation and bring demand and supply into balance, water tariffs should either be waived or adjusted for extremely poor rural residents".

**6.2.8** "The government of the Republic of Zambia should be committed to water and sanitation improvements at all levels".

**6.2.9** "Increased funding and capacities should be made available for improvement, particularly in rural water and sanitation facilities, to make them accessible and safe for human use".

**6.2.10** “Moreover, social mobilisation, dialogue and stakeholder involvement should be strengthened for effective water and sanitation service delivery in rural communities. We call on civil society organisations to intensify efforts of educating the residents on the relevance of clean water, basic sanitation, and health hazards”.

**6.2.11** “The water and sanitation agencies and departments of the municipality should ensure the provision of environmentally friendly energy sources and enforce bylaws to curtail the pollution of water sources and the environment”.

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## **APPENDICES**

### **Appendix 1: Participant general information sheet**

Dear Respondent,

My name is **LILIAN WAMUNYIMA** a student of University of Lusaka. I'm conducting a research on "**EXPLORING FACTORS INFLUENCING THE USAGE OF WATER FROM SHALLOW HAND DUG WELLS AS OPPOSED TO TAP WATER IN CHAZANGA COMPOUND, LUSAKA**" leading to the award of the Master's Degree in Public Health.

The purpose of this research is exploring factors influencing the usage of water from Shallow Hand Dug wells as opposed to tap water in Chazanga compound, Lusaka Urban.

This will further help to inform policy in accelerating the promotion of maternal and child health care services for mothers and new-born. All the information obtained from you during the course of this research will be kept confidential and used only for the purpose of the study as no names are required.

### **Appendix 2: Participant Consent form**

Your voluntary participation in this research is therefore being requested for. You are free to withdraw your participating in this research at any time. Should you be happy and willing to participate in this research, you are highly welcomed. By signing below, you confirm your understanding and participation in the study after all the relevant information concerning this research have been explained to your satisfaction. And thank you for your consent.

Signature/Right hand thumb print of respondent: ..... Date: .....

### Appendix 3: Questionnaire

#### Section A: demographic data

Questionnaire Code: .....

Date: .....

1. Sex (tick the appropriate box)

a) Male

b) Female

2. Age in years (tick)

a) 18—24

b) 25—34

c) 35—44

d)  $\geq 45$

3. Marital status?

a) Single

b) Married

e) Divorced

c) Widowed

4. What is your highest level of education attained?

a) No formal education

b) primary

c) secondary

d) college and above

Specify.....

5. Occupation (tick the appropriate box)

a) Self-employed

b) Not employed

c) Employed

Specify

.....

**Section B: Factors influencing the residents in Chazanga Compound for their preference in their daily use of water from the shallow hand dug wells instead of using community tap water**

1. What is the source of your water?
  - a) River
  - b) Shallow hand dug Well
  - c) Tap water
  
2. How far is the tap water from your place?
  - a) 10m
  - b) 20m
  - c) 40m
  - d) 60m
  - e) 100m
  - f) 1km
  
3. What is your income level?
  - a) High
  - b) Medium
  - c) Low
  
4. Do you like tap water?
  - a) Yes
  - b) No
  
5. Do you like Shallow hand dug well water?
  - a) Yes
  - b) No

**Section B: The mitigation measures that have been put in place by the relevant authorities to prevent the contamination of water drawn from shallow hand dug wells.**

1. Do you have access to shallow hand dug wells?
  - a) Yes
  - b) No
  
2. Do you put chlorine in water?
  - a) Yes
  - b) No
  
3. Is the water treated?
  - a) Yes

b) No

4. What measures has the government put in place to prevent contamination of water?

a) Treating water

b) Making tap water

**Section C: Community's knowledge about the negative impacts of using water from shallow dug wells on human health and general public health**

1. Do you know the risk of using water from shallow dug wells on human health and general public health?

a) Yes

b) No

2. What is the impact of using water from shallow dug wells on human health and general public health?

a) Diarrheal diseases

b) Death

3. Using a Likert scale of 1 — 3 to rate the following alternatives for negative or positive

Tick where appropriate

**STATEMENTS**

**NEGATIVE**

**POSITIVE**

Attitude towards the impact of using water from shallow dug wells on human health and general public health

Attitude towards the impact of using water from shallow dug wells on human health and general public health

Overall attitude towards the impact of using water from shallow dug wells on human health and general public health

## Appendix 4: UNILUS Research Ethics Committee Approval Statement



Plot No. 37413, Off Alick Nkhata Mass Media, P. O. Box 36711, Lusaka  
Phone: +260 211 233407, 258409, Fax: +260 211 233409, E-mail: [vicechancellor@unilus.ac.zm](mailto:vicechancellor@unilus.ac.zm),  
[registrar@unilus.ac.zm](mailto:registrar@unilus.ac.zm)

Website: [www.unilus.ac.zm](http://www.unilus.ac.zm)

All correspondence should be addressed to the Vice Chancellor

6<sup>th</sup> December 2022

Lilian Wamunyima

### RESPONSE LETTER

IORG0010092-1223/22: Exploring Factors Influencing the Usage of Water from Shallow Hand Dug Wells as Opposed to Tap Water in Chazanga Compound, Lusaka

Dear Lilian Wamunyima:

This letter serves to inform you that the UNILUS REC reviewed your research proposal submitted in November 2022.

The proposal was approved subject to adherence to ethical considerations highlighted in your submission.

Wishing you well in your research,

Signature. ....

A handwritten signature in black ink, appearing to be 'K. Bowa', written over a light blue rectangular background.

Professor Kasonde Bowa

Chairman of UNILUS REC.

Lilian Wamunyima

In your data analysis, you are supposed to state what statistical tests you will carry out and what you intend to achieve based on those tests.

Be consistent with your citations. In Harvard referencing, initials are not allowed.

**Appendix 5: UNILUS Authentication Statement to conduct Research**



Plot No 17986, Off Leopards Hill Rd, Leopards Hill, and P.O. Box 36711, Lusaka-Zambia.  
Phone: +260 211 258505 / +260 211 258409, Fax: +260 211 233409, Email: [ictar@zamnet.zm](mailto:ictar@zamnet.zm),  
[Unilus@zamnet.com](mailto:Unilus@zamnet.com)

09<sup>th</sup> January, 2023

.....  
.....  
PERMISSION FOR **LILIAN WAMUNYIMA – MPH211463100** TO CONDUCT A RESEARCH STUDY  
AT YOUR FACILITY/ INSTITUTION/ ORGANIZATION

Reference is made to the above subject matter

The University of Lusaka, School of Medicine and Health Sciences here by requests for permission for **Lilian Wamunyima** a postgraduate student to conduct research at your facility/ institution/ organization, entitled; **EXPLORING FACTORS INFLUENCING THE USAGE OF WATER FROM SHALLOW HAND DUG WELLS AS OPPOSED TO TAP WATER IN CHAZANGA COMPOUND, LUSAKA.**

The research is in partial fulfilment of the requirements for the Master of Public Health. This is purely for academic purposes and information gained in such a way will not be used in the public domain without prior authorization from the institutions/ organizations involved.

The research topic has been cleared by the University of Lusaka, School of Medicine and Health Sciences Research Ethics Committee as per the attached copy. Data collection is expected to be done from **09<sup>TH</sup> January, 2023 to 06<sup>th</sup> February, 2023.**

The University of Lusaka avails itself of this opportunity to review to your office the assurances of its highest considerations and looks forward to your timely and favourable response.



Francisca N. Kawamya

MPH Research Co-ordinator

## Appendix 6: Budget

Source of the funds will come from own pocket. Table below shows detailed estimation of the research budget.

S/N	ITEM /DESCRIPTION	QUALITY	UNIT COST (K)	TOTAL COST (K)
1.	Printing of proposal	1	K100	100
2.	Stationery (pen, pencil and note book)	10	K50	50
3.	Printing of data collection tools (questionnaires)	38	K300	300
4.	Transport		k500	k500
5.	Bucket of water	1	k190	k190
6.	2 Tablets of soap	2	k25	k25
7.	Hand-sanitizer	2	K100	K100
8.	Gloves	5	K100	K100
10.	Facemasks	50	K60	K60
10.	Helper	1	K500	500
	miscellaneous costs		K100	K100
	<b>TOTAL COST</b>			<b>K2,025</b>

**THANK YOU FOR YOUR PARTICIPATION.**