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I **Isaac Sakala** declare that this dissertation herein presented for the Degree of Masters of Public Health (Environmental Health) has not been previously submitted either wholly or in part for other Degree at this or any other University nor is it being currently submitted for any other Degree.

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CERTIFICATE OF COMPLETION OF DISSERTATION

I, **Isaac Sakala**, do hereby certify that this dissertation is the product of my own work and, in submitting it for my Masters in Public Health (Environmental Health) programme further attest that it has not been submitted in part or in whole to another University.

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I, **Allan R. Mbewe**, having submitted and read this dissertation, am satisfied that this is the original work of the author under whose name it is being presented. I, therefore, confirm that the worker has been completed satisfactorily and is hereby ready for presentation to the examiners.

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I, **Professor K. S. Baboo**, having submitted and read this dissertation, am satisfied that this is the original work of the author under whose name it is being presented. I confirm that the worker has been completed satisfactorily and is hereby ready for presentation to the examiners.

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This dissertation of **Isaac Sakala** is approved as fulfilling the requirement for the award of the Degree of Masters of Public Health (Environmental Health) by the University of Zambia.

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ABSTRACT

Many developing countries including Zambia use Water, Sanitation and Hygiene Education (WASHE) programme as a strategy for reducing incidences of diarrhoea and most often, they do this without appropriate review of the programme effectiveness.

WASHE programme was initiated in Monze in 1994, through UNICEF support, with a view of reducing the diarrhoea incidences. The objectives of WASHE in Monze were to promote safe water sources, safe excreta disposal systems, safe hygiene practices and to capacity building among the WASHE implementers. Based on these objectives, a number of activities were planned and implemented. In this paper, intervention areas were called WASHE-serviced areas and non-intervention areas were called non-WASHE areas.

The aim of this study was to compare the diarrhoea incidences between WASHE-serviced and non-WASHE rural areas of Monze district from 2008 to 2012 inclusive. WASHE coverage and diarrhoea incidence data were collected, through annual reports, before intervention (i.e. 2007) both from WASHE-serviced and non-WASHE areas. Same data were collected from the same areas after intervention from 2008 to 2012 inclusive. The two data sets were compared to determine the impact of WASHE - using WASHE indicators - on diarrhoea incidences in the WASHE-serviced areas within the study period.

In the WASHE-serviced areas, the study findings showed that some of the indicators namely *latrines*, and *hand-washing facilities* (though with very low coverage), had significant impact on the incidence of diarrhoea from 2008 to 2012 inclusive. Dish racks, refuse pits and bath shelters did not significantly influence the diarrhoea incidence. On the other hand, in the non-WASHE areas, the latrines and hand-washing facilities did not have significant impact on diarrhoea incidences. Despite their increased coverage in the non-WASHE areas, dish racks, refuse pits and bath shelters, did not show significant influence on diarrhoea incidences.

Using the regression analysis to determine the extent to which latrines and hand-washing facilities influenced diarrhoea incidences in the WASHE-serviced areas, the results showed that latrines and hand-washing facilities significantly influenced the incidence of diarrhoea at 5%

level of confidence. This meant that an increase in the number of latrines and hand-washing facilities reduced the incidence of diarrhoea per 1000 cases by 0.026 and 0.075, with p-values of 0.002 and 0.045 respectively. It was also concluded that the diarrhoea incidence in Monze could not only be attributed to water and sanitation interventions, but also to other confounding factors outside the realm of WASHE programme. This was so because of the increased coverage for other WASHE indicators (refuse pits and bath shelters), which were not as a result of WASHE programme in the non-WASHE areas.

DEDICATION

This work is dedicated to my late mother, Mrs. Veronica Avelesi Mwanza who supported me both mentally and academically from childhood up to the time she answered God's call; may her soul rest in eternal peace.

Special dedication to my wife Mirriam and my daughters: Luniya, Chapewa-Avelesi and Alice, for their unconceivable spiritual and moral support and for allowing me to be away from them for a long period of time.

This work is also dedicated to my sisters: Royda, Royce and Alice for their incredible support in my life.

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Finally, I would like to acknowledge my classmates for their inputs which contributed to the optimal refinement of this work.

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ABBREVIATIONS

CSO	Central Statistical Office
DHO	District Community Development Office (formerly District Health Office)
MDG	Millennium Development Goals
N-WASHE	National Water, Sanitation and Health/Hygiene Education
D-WASHE	District Water, Sanitation and Health/Hygiene Education
V-WASHE	Village Water, Sanitation and Health/Hygiene Education
UNDP	United Nations Development Fund
UNICEF	United Nations Children's Fund
WASHE	Water, Sanitation and Hygiene Education
WHO	World Health Organization
WSSCC	Water Supply and Sanitation Collaborative Council
MLGH	Ministry of Local Government and Housing
CLTS	Community Led Total Sanitation
NRWSSP	National Rural Water Supply and Sanitation Programme
WAZ	Water Aid Zambia
MEWD	Ministry of Energy and Water Development

CHAPTER ONE

1.0 INTRODUCTION

1.1 Background Information

Many developing countries use Water, Sanitation and Hygiene Education (WASHE) programme as a strategy for reducing incidences of diarrhoea and most often, they do this without appropriate review of the programme effectiveness (Clasen 2007).

Diarrhoea is one of the major public health issues in the underdeveloped world. Generally, areas with low reportage on WASHE have high incidents of diarrhoea, with major fatalities among the under-5 children (UNICEF 2010). Diarrhoeal diseases account for about 1.3 million deaths per year among the under-5 children, making them the second most common cause of child mortality worldwide (UNICEF 2014). There are reported 2.2 million deaths due to diarrhoea globally, one million of whom are under-5 children. The report also indicates that lack of or inadequate sanitary facilities, coupled with lack of safe water and poor hygiene contribute to the high incidence of diarrhoea (UNICEF, 2010).

In Zambia, an estimated 4.8 million people live without access to safe water and 6.6 million (60.5% of whom are in the rural areas) are without access to sanitation facilities (CSO, 2010). The 6.6 million people (those without access to sanitation facilities) represent about 50% of the total population of Zambia (ZDHS 2007). This segment of population is susceptible to diarrhoeal diseases as they have low latrine and hand-washing facility coverage at 23% and 2% respectively (ZDHS 2007).

The Monze HMIS report for 2012 indicates diarrhoea non-bloody as the number one cause of morbidity and mortality both among the under-5 children and for all ages (DHIS 2012). It is often not easy to relate the incidences of these diarrhoeal diseases to WASHE reportage due to many other confounding factors that may contribute to the incidences; ranging from economic/political to socio-cultural makings.

In early 1994, Monze district adopted WASHE strategy in selected rural areas through UNICEF support, with the same programme specifications as the other countries which were already implementing it (Abitol 1998).

1.1.1 WASHE strategy

WASHE was initiated to improve health of the people in rural Zambia by collaboration among different sectors and professionals involved in water supply and sanitation services. The aim of WASHE programme was to influence behaviour change of rural communities, with their participation, towards using safe drinking water supply, constructing and using safe latrines for excreta disposal and practicing good hygiene (WHO 2003).

Abitol (1998), in his report states that the government of Zambia set up an inter-ministerial coordination body known as the Programme Coordination Unit (PCU). The PCU was established to spearhead the "Reorganization of the Water Supply and Sanitation Sector" initiative. Three separate organizations were established as an executive arm and support of the PCU:

1. The Water and Sanitation Development Group (WSDG)
2. The Community Management and Monitoring Unit (CMMU)
3. The National WASHE Coordination and Training Team (N-WASHE).

This study focused on N-WASHE, with its subsidiary - the District WASHE (D-WASHE). However, it is worth mentioning that discussing improvement of water and sanitation programmes using WASHE approach is not easy without the integration with the WSDG and CMMU with their subsidiaries (Abitol 1998).

Since its inception, the implementation of WASHE programme in Zambian is done in a multi-faceted manner. First of all, Ministry of Health partnered with other government departments in the formation of WASHE programme. Under the National Health Reform, the government shifted its prioritization from government-managed to community-managed facilities through the coordination of national, district and village WASHE committees (Abitol 1998).

At national and district levels, the WASHE programme was implemented by an inter-ministerial team under the Ministry of Local Government and Housing (MLGH). At the district level, D-WASHE committees were formed by the Local Government under the District Development and Coordination Committee (DDCC). Each D-WASHE committee had six core members drawn from the Department Heads of the Ministries involved, each having a technical role, as well as responsibility for the implementation of the programme in a catchment area. Ministries involved in the D-WASHE committees were (and some still are): the Ministry of Education (MoE); the Ministry of Community Development and Social Services – MCDSS (before the government added the Mother and Child Health (MCH) department); the Ministry of Health – MoH (before the ministry was changed to become Ministry of Community Development, Mother and Child Health – MCDMCH); the Ministry of Energy and Water Development (MEWD) through the Department of Water Affairs (DWA); the MLGH through the Councils, and the Ministry of Agriculture and Cooperatives (MACO) (Kambole 2006).

At the sub-district level, an Environmental Health Technologist (EHT) from the Rural Health Centre (RHC) supervised between three and five Area Community Organizers (ACOs) and on average, ACOs worked with between five to ten villages. The villages formed committees known as Village Water, Sanitation and Hygiene Education (V-WASHE). The EHT was a technical person at sub-district level, supervising the ACOs and the V-WASHE committees. Therefore, the reporting followed the same channel, starting from V-WASHE through to the N-WASHE (Kambole 2006).

1.1.2 D-WASHE Objectives

Due to high incidences of diarrhoea recorded in the rural areas before the WASHE intervention, the D-WASHE set objectives which were used as a diarrhoea prevention strategy, spearheaded by the local authority with the help of UNICEF and WaterAid Zambia. The objectives of the WASHE programme were as follows:

1. Promoting safe water sources through provision of boreholes and hand dug wells
2. Promotion of safe excreta disposal through construction and use of safe latrines

3. Promoting hygiene at every household through the use of: safe drinking water, safe latrines, hand-washing facilities, dish racks, refuse pits, and bath shelters, preferably all made from locally available resources.

4. Building capacity of district and village WASHE implementers through workshops, trainings and meetings.

1.1.3 D-WASHE Planned activities

Following the aforementioned objectives, WASHE activities were planned for the implementation of the programme:

1. Purchase and provision of a borehole per population of 250 by UNICEF in chosen rural areas.

2. Purchase and provision of cement by UNICEF and WaterAid Zambia (WAZ) for triggering latrine construction and use at each household in chosen rural areas.

3. Promoting sustainability of latrine construction /use and hygiene behaviour within local communities.

4. Training of the D-WASHE implementers by WAZ and UNICEF on hygiene promotion

5. Training of ACOs and V-WASHE on hygiene promotion in the chosen rural areas

1.1.4 D-WASHE Targets and Indicators

The threshold for the outcome or performance indicators was set at 85% and baseline was the number of people using safe drinking water, pit latrines, hand-washing facilities, dish racks, refuse pits, and bath shelters (the WASHE basic needs) before the programme (i.e. in 2007). Thus, outcome indicators are: (1) number of people using WASHE basic needs and (2) number of new or/and sustained WASHE basic needs.

The threshold for the impact indicators (i.e. diarrhoea incidence) was set at 25 per thousand population (i.e. 0.25%) and baseline was the diarrhoea incidence per thousand population before the WASHE programme (i.e. in 2007). Thus impact indicator for this study is: incidence of diarrhoea.

Although WHO (2004) reported that WASHE interventions can account for a 45% global reduction of diarrhoeal diseases, Michelle and Daniel (2012) report that these global figures do not show the evaluation of the effectiveness of water and sanitation on diarrhoea. In addition, they mask massive disparities between regions, between countries in the regions, and within countries between urban and rural settings, as well as between rich and poor. Monze district has been using WASHE programme as one of the main diarrhoea prevention strategies at community level from 1994. However, there is no evidence in the district of the established WASHE evaluation system on diarrhoea incidence.

1.2 Problem Statement

In Zambia, diarrhoea is the leading cause of mortality in the under-five children, and is attributed to compromised water and sanitation interventions. The mortality is among the highest in the world at 182/1000 live births (UNICEF 2010), yet Zambia is among the countries in the world implementing WASHE programme.

In spite of the WASHE strategy, there is no evaluation system on diarrhoea incidence, which is reportedly high by Monze DHO: diarrhoea non-bloody, in the top 10 ranking, is the number one cause of mortality and the number two cause of morbidity in the children under the age of five. It is also the number one major cause of mortality and number two major cause of morbidity in the district for all ages (Monze DHIS 2012). The report also stated that majority of diarrhoea, mostly in children, emanated from Monze rural, where WASHE programme was being implemented. Even if diarrhoea occurs without being analyzed, it accounts for many health conditions both directly and indirectly: WHO/UNICEF (2012) states that diarrhoea still caused up to 11% of mortality among children under the age of five in rural population of Zambia. Diarrhoeal diseases cause a heavy economic burden on health conditions, including physical expenditure of liquid cash on patients' medical services and medicines (Park 2007). WSP (2012) states that

Zambia loses ZMK946 billion annually due to poor sanitation each year, which is equivalent to US$194 million. This sum is the equivalent of ZMK 90.2 per person in Zambia per year, meaning 1.3% of the national Gross Domestic Product (GDP).

While much attention has been given to management of diarrhoea, dominated by advances in oral rehydration techniques (UNICEF 2008), evaluation of water and sanitation interventions on diarrhoea in rural Zambia attracts less attention. This somewhat explains why it is difficult to notice how these interventions influence the diarrhoea incidence, hence the abovementioned diarrhoea-related problems (Fried 2012).

1.3 Justification of the Study

This is an academic research paper, being done in partial fulfilment of the Master of Public Health degree program at the University of Zambia. The study outcome will add to the body of knowledge for the evaluation of WASHE programmes including other various health intervention programmes.

Monze has been using WASHE as one of the main diarrhoea prevention strategies since 1994 through the joined efforts of different stakeholders working in different rural areas of the district, integrating their work with the goal of reducing diarrhoea. However, diarrhoea incidence in the district has not been measured to identify the difference from the baseline incidence (i.e. before interventions).

Sometimes the district recorded high water supply reportage, eventually high WASHE coverage in some parts of rural areas (EH Annual Report 2012). However, this was coupled with high incidence of diarrhoea (Monze DHIS, 2012) in the same areas, creating unexplained discrepancies.

Presently, Monze DHO does not have any comprehensive evaluation programme for the WASHE interventions on diarrhoea; but only the data on incidence of diarrhoea collected through the Health Management Information System (HMIS). Consequently, it is not easy to attribute the diarrhoea pattern or incidence to the implemented WASHE programme or even

other interventions. The intention of this study is to provide a comprehensive analysis of the WASHE intervention on diarrhoea in rural areas of the district. It is also to identify possible gaps between WASHE coverage and the diarrhoea incidence so that a disease trend could be developed and framework be designed on which future programme impact evaluations could be based.

Studies which were conducted in the district by UNICEF were focusing on diarrhoea, malnutrition and their impact among the children under the age of 5. These studies were emphasizing on diarrhoea management, based on rehydration therapy and food supplementation. Of these studies conducted, none focused on evaluation of WASHE on incidence of diarrhoea, hence this study.

1.4 Research Question

Did WASHE interventions have impact on the incidence of diarrhoea in the rural areas of Monze from 2008 to 2012?

1.5 Research Objectives

1.5.1 General Objective

The main objective of this study was to compare incidences of diarrhoea between WASHE-serviced and non-WASHE rural areas of Monze district from 2008 to 2012

1.5.2 Specific Objectives

The specific objectives of the study were as follows:

1) To review water and sanitation coverage both in WASHE-serviced and non-WASHE areas before intervention (i.e. 2007).

2) To review water and sanitation coverage both in WASHE-serviced and non-WASHE areas after intervention from 2008 to 2012 inclusive.

3) To review the incidence of diarrhoea both in WASHE-serviced and non-WASHE areas before intervention (i.e. 2007).

4) To review the incidence of diarrhoea both in WASHE-serviced and non-WASHE areas after intervention from 2008 to 2012 inclusive.

5) To relate water and sanitation coverage with the incidences of diarrhoea before and after intervention, both in WASHE-serviced and non-WASHE areas.

1.6 Operational Definitions

Base year — In this study, it is the year 2007 considered as the period which was fixed to be the starting point for collecting the *'before intervention'* data and does not imply that there was absolutely no Water and Sanitation activities before 2007, but for the purpose of serving as baseline for evaluating the impact of WASHE in the period between 2008 and 2012.

Before Intervention — Means in the year 2007 (from January to December of 2007).

After intervention — Means the period from January of 2008 to December of 2012 inclusive

WASHE: — Water, Sanitation and Hygiene Education. It is a programme managed by different stakeholders with the aim of influencing behaviour of people towards using the 'WASHE basic needs', thereby preventing diarrhoea, and other water and sanitation-related diseases.

The WASHE basic needs: In this study, the concept "WASHE basic needs" implies hand-washing facilities, safe latrines, safe water sources, dish racks, refuse pits, and bath shelters.

WASHE coverage: This is the proportion of households with the WASHE basic needs of the total number of households expected to have the WASHE basic needs in a given area.

Safe Water Sources: The water used for domestic purposes, drawn from Protected Water Sources.

Protected Water Sources: In this study, protected water sources are, by the nature of their construction, sources which are adequately secured from outside contamination, particularly from faecal matter. They include boreholes, piped water; lined hand dug wells and protected springs with brick-work.

Diarrhoeal diseases: This refers to various kinds of enteric diseases, which manifest by patients passing watery or mucous stool, which can emerge due to unsanitary conditions. They include dysentery, cholera, Typhoid fever, Paratyphoid fever and other forms of diarrhoea.

Sanitation: In this paper, Sanitation means use of latrines as way of disposal of human excreta, thereby reducing diarrhoeal diseases. The latrines are also known as sanitation facilities.

Service Provider: This is the team comprising technocrats from different governmental and non-governmental organizations within the district. They form the D-WASHE which oversees the implementation and evaluation of the water, sanitation and hygiene programmes.

WASHE-Serviced Areas: These are rural areas in Monze district where water, sanitation and hygiene programmes were implemented regardless of the funding organizations, within the period of study.

Non-WASHE areas: These are rural areas in Monze district where water, sanitation and hygiene programmes were not implemented by any organization within the period of study.

1.7 Conceptual Framework

Firstly, 2007 baseline data on WASHE coverage and incidence of diarrhoea was collected from the WASHE-serviced (intervention) and the non-WASHE (non-intervention) rural areas of Monze and then reviewed. Then the same data was collected from the same rural areas but this time from 2008 to 2012 inclusive, and reviewed on an annual basis. These two data sets were compared focusing on WASHE coverage and diarrhoea incidence to establish whether the WASHE programme influenced the diarrhoea incidence in the WASHE-serviced areas or not. Figure 1 illustrates a model, which was used to evaluate the impact of WASHE on incidence of diarrhoea in rural areas of Monze:

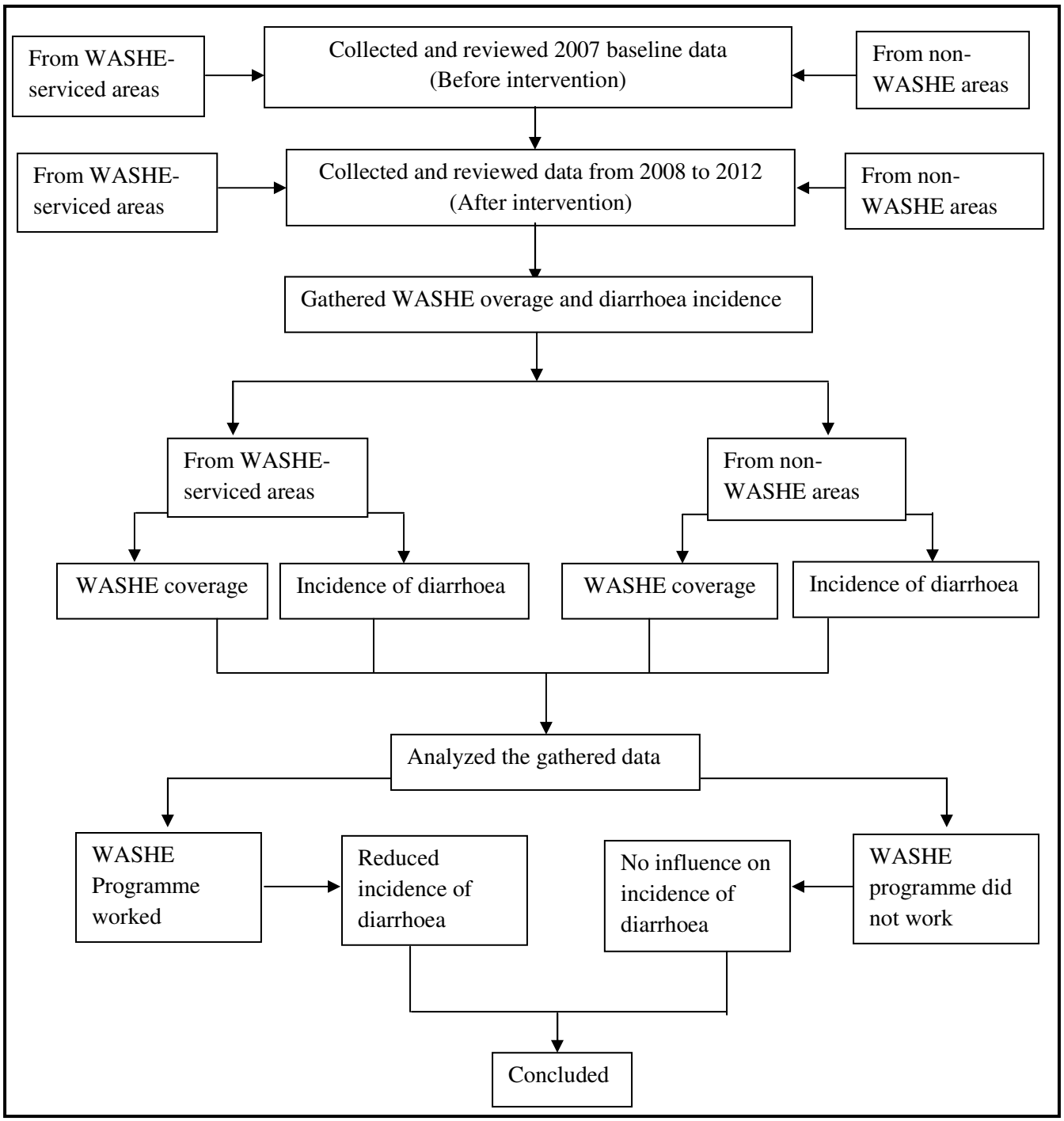

Figure 1: A model showing Evaluation of WASHE on incidence of diarrhoea

CHAPTER TWO

2.0 LITERATURE REVIEW

This chapter describes the historical perspective of WASHE and its coverage in different regions; it provides information on trends of diarrhoea incidences including mortality. Not only does it describe the promotion of WASHE in Monze district, it also gives details of how other researchers evaluated similar studies.

2.1 Historical Perspective of WASHE Programme

WASHE, as used in local and international development programs, refers to "Water, Sanitation and Hygiene Education". According to Christine and Rheingans (2006), it was initiated by an organization called the Water Supply and Sanitation Collaborative Council (WSSCC) in Geneva, Switzerland. This was at the end of the United Nations International Drinking Water and Sanitation Decade between 1981 and 1990. WSSCC works to improve the lives of poor communities in the developing world by enhancing collaboration among sector agencies and professionals that are involved in water supply and sanitation. Precisely, it refers to water, sanitation and hygiene advocacy campaigns.

The vision of the WSSCC is centered upon a principle that WASHE programme is a universal right, which would help change hygiene practices in communities; and that communities are themselves catalysts of change. The WSSCC seeks to achieve its mission through working towards the following key outcomes:

1. **Access and Use** – Not only do people access the sanitary facilities but they are also able to use and sustain them.
2. **Equity** – Among those who achieve access, the poor, marginalized and other special groups of people are identified and preferentially supported.

3. **Involvement** – More individuals, communities, organizations and businesses get involved in water supply, sanitation and hygiene programmes.

4. **Knowledge and Skills** – As water supply, sanitation and public health issues are dynamic, individuals and agencies working in WASHE programmes need to improve their knowledge and skills (Michelle and Daniel 2012).

2.2 Coverage of WASHE

While Water, Sanitation and Hygiene Education are discrete variables, these three factors are considered together although many writers, researchers and interventions report aspects of each (WHO 2008). It is quite not easy to strictly confine to water supply without mentioning the other related variables such as sanitation and hygiene (Clasen 2007). In this paper, coverage of each of the variables are illustrated separately but are connected in many ways. According to the arrangements made in this study, proportions (%) were used as a measure of coverage of water supply, sanitation and hygiene in different regions.

2.2.1 Water Supply

The water supply coverage has varying disparities between regions. Generally, even if its coverage is higher than sanitation and that of hygiene, water supply coverage alone is relatively insufficient to restrain diarrhoea burden, especially in the developing world. This is so because tackling diarrhoea would work well if there is integration of interventions on water, sanitation and hygiene promotion.

The Millennium Development Goal 7, Target 7c calls on countries to *"Halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation."*

The global estimates have barely changed; the coverage for drinking water, in 2011 remained at 89%. Even though this meant a 1% increment above the MDG drinking water target in 2011, 768 million people still relied on unimproved drinking water sources (WHO/UNICEF 2013).

Michelle and Daniel (2012) also state that over 8 out of 10 people who use unimproved sources of drinking water live in rural areas (Michelle and Daniel 2012).

In Africa, approximately 340 million people are without access to safe drinking water and only 26 countries will reach the MDG water target; and the rural areas of Sub Saharan Africa in 1990, 2000 and 2011 had drinking water coverage, with a steady increase of accessibility, of 35, 42 and 51% respectively (WHO/UNICEF 2013). The WHO/UNICEF report (2013) also indicates that rural Zambia in 1990, 2000 and 2011 had drinking water coverage of 22, 36 and 50% respectively, indicating a steady increase in accessibility.

2.2.2 Sanitation

The WHO/UNICEF (2012) reports that almost two thirds of the world population (i.e. 64%), in 2011, relied on improved sanitation facilities, while 15% continued to defecate in the open. Since 1990, almost 1.9 billion people have gained access to improved sanitation facilities. The greatest progress has been made in Eastern Asia, where sanitation coverage has increased from 27% in 1990 to 67% in 2011. This interprets into more than 626 million people gaining access to improved sanitation facilities over a period of 21 years. The WHO/UNICEF (2012) however, states that the world remains off track to meet the MDG sanitation target, which requires reducing the proportion of people without access from 51% in 1990, to 25% by 2015.

Generally, sanitation, like hygiene has lower coverage than water supply. Globally, up to 2.5 billion people use unimproved sanitation. Even though open defecation rates have decreased globally from 24% in 1990 to 15% in 2011, the decrease differs from region to region, with the sub-Saharan Africa being the only place where the number of people practising open defecation is still increasing (WHO/UNICEF 2013). WHO/UNICEF (2008) reports that Africa has only six countries, which will achieve the MDG target for sanitation.

In 1990, 2000 and 2011, only 19, 20 and 24% respectively of rural populations of Sub Saharan Africa had access to improved sanitation facilities; and in the same period, only 29, 31 and 33% respectively had improved sanitation facilities in Zambia's rural areas. The Millennium Development Goal progress assessment, which was conducted in 2011, shows that Zambia is not on track to meet the goals (WHO/UNICEF 2013).

2.2.3 Hygiene

WHO/UNICEF (2009) reports that accessible and plentiful water has been shown to encourage better hygiene, particularly hand-washing , although the extent to which access to improved water sources reduces diarrhoea incidences often depends on the type of water source available, such as protected dug wells, boreholes or public taps.

On the one hand, studies have shown that washing hands with water alone is much less effective in preventing disease than using soap. On the other hand, washing hands with soap has proved to be a high-impact, cost-effective intervention. Not only does the use of soap break down grease and dirt that carry germs and disease-causing pathogens, but using soap also increases the amount of time spent washing hands thereby increasing the possibility of completely removing germs from the hands, compared to water alone (UNICEF/WHO 2009). About 95% of mothers in the developing world with the under-5 children have some sort of soap product in their homes but no records prove that this soap is being used for hand-washing (UNICEF/WHO 2009). Ejemot et al (2009) reports that interventions which promote hand-washing can reduce diarrhoea episodes by about one third and that this significant reduction is comparable to the effect of providing clean water in rural areas. This means that in situations where there is integrated and concerted water and sanitation interventions, diarrhoea could significantly drop. However, evaluation is significant to determine whether interventions are effective on diarrhoea or not.
While WHO/UNICEF (2012) reports that interventions to improve water quality at the source, treatment of water at household level and safe storage systems have been shown to reduce diarrhoea incidence by as much as 47%, UNICEF (2012) also reports that evidence from various researches consistently point to hand-washing with soap as one of the most effective ways to prevent diarrhoea, the number two cause of mortality among children under five in the developing world, while also reducing the risk of acute respiratory infection, which is the number one cause of under-five mortality. However, the UNICEF platform report (2013) states that the proportion of householders who by the previous day washed their hands with soap after defecation, eating, feeding and preparing food in the same areas is 0%.

While the proportion of households reached by hygiene promotion (food hygiene, disposal of excreta, etc.) is 0%, the proportion of children whose stools are disposed of safely in the same area is 66.3%. Therefore, from the various studies which were conducted, it may be concluded that hand-washing, at critical times, may still be a problem in Zambia, and it may be contributing to the persistence of diarrhoea in many rural districts of the country, hence the significance of this evaluation study.

Many diarrhoea intervention programmes, such as WASHE, Community Lead Total Sanitation (CLTS) and others, have been introduced to the rural communities, with emphasis on latrine construction coverage based on number of latrines constructed and their use, rather than hand-washing (UNICEF 2013).

2.3 Drifts of WASHE and Diarrhoea Incidence

Diarrhoea remains the second leading cause of mortality among the under-5 children globally. Nearly one in every five child-mortality, which is about 1.5 million each year, is due to diarrhoea. Diarrhoeal diseases kill more young children than AIDS, malaria and measles combined. About 88% of these deaths are attributable to unsafe water, inadequate sanitation and poor hygiene (UNICEF/WHO 2009).

While Brikké and Bredero (2003) report that information on evaluation of WASHE programmes in many rural areas of developing countries is scanty; and that monitoring and evaluation of the same programmes has been vague, diarrhoea which is linked to poor water and sanitation programmes, is still a global health and economic problem. WHO (2012) reiterates that there are 5 billion cases of diarrhoea among children each year in developing countries, which claim the lives of 1.8 million under-5 children each year; and that by 2011, it is still 88% of the world's diarrhoeal deaths that are caused by unsafe water, poor sanitation, or hygiene. The estimated global mortality of the 1.8 million is approximately 19% of total child deaths (Boschi-Pinto et al 2008). Boschi-Pinto also points out that the average global diarrhoea-proportional mortality in 2004 was 18.7%; and that Africa had diarrhoea-proportional mortality, in the same year, of 17.8% with estimated diarrhoea mortality of 402 thousand.

Clasen (2007) states that acute diarrhoeal diseases are among the top causes of mortality in early childhood in the world; and that they were a leading cause of childhood mortality in South Africa, being responsible for 10% of all causes of death in 2000.

In the WHO African Region, a total of 631 million people (40%) had no access to any kind of improved sanitation facilities in 2000. This figure is about the same (36%) in 2002 for Sub-Saharan African nations (Andale et al 2010).

The vast majority of these under-5 child deaths are in rural areas of the low and middle-income countries. Interventions to prevent diarrhoea include provision of safe water, hand-washing with soap, and the use of sanitation facilities (Ahs 2010). Hand-washing with soap at critical times, such as after contact with faeces and before handling food, is considered an important component of the WASHE programme (Alexandra 2011). Additionally, more than 95% of mothers in the developing world with children under the age of five have some sort of soap product in their homes. However, its use for hand-washing does not approach that percentage of having it (WHO/UNICEF 2009).

The practice of using multiple interventions involving water supply, sanitation and hygiene produce an average reduction, in diarrhoea incidence, of 30%, with greater effects on children over 5 years of age. Hand-washing alone, at critical times, substantially reduces the incidence of severe diarrhoea health risks by up to 48% and Shigellosis by 59%, even when families might not have access to basic sanitation and water supply (Clasen 2007). Despite this benefit, information on hand-washing in developing countries, including Zambia, as a component of WASHE, is scanty (Alexandra 2011).

2.4 WASHE Coverage and Diarrhoea Patterns

The National Water Sanitation and Hygiene Education (N-WASHE), works in collaboration with the National Rural Water Supply and Sanitation Program (NRWSSP), whose objective is to provide sustainable and equitable access to safe water supply and proper sanitation to meet basic needs for improved health and poverty alleviation for Zambia's rural population (MoE 2012).

The N-WASHE coordinates all the activities performed by the D-WASHE countrywide (MoE 2012). To the best knowledge of the principal researcher, information at national level on evaluation of the effectiveness of WASHE on diarrhoea is scanty. However, data on coverage of water and sanitation could be obtained from Monze DHO, Monze District Council and WAZ routine reports.

Zambia, with the UNICEF support, has been using WASHE to prevent diarrhoea in the rural areas (UNICEF 2008). With the intention of influencing people to change their behaviour towards using "WASHE basic needs", WASHE programme defined a set of interventions, which included *use of latrine, refuse pit, bath shelter, hand-washing facility, adequate safe water supply and dish rack*. The ideal situation is that the attainment of high coverage of WASHE programme should bring about reduced incidence of diarrhoea in the rural areas (UNICEF 2003).

Whilst Zambia's coverage of WASHE is reported to be steadily increasing (CSO 2007), and therefore on track to meet MDG on water and to some extent sanitation, three issues emerge;

- The national coverage masks the varying low and/or high coverage figures in different districts, creating a false complacency (Michelle and Daniel 2012).
- Monitoring systems remain weak and poorly implemented (UNDP 2009)
- Diarrhoea still remains a big threat, especially in children under the age of five (UNICEF 2008).

2.5 Water, Sanitation and Hygiene Promotion in Monze

WASHE programme in Monze was formed in 1994 and was operational in the same year (Kambole 2006). It was around the time of National Health Reforms. Under the National Health Reform programme, the Government shifted its prioritization from government-managed to community-managed facilities through the coordination of National, District and Village WASHE Committees (SNV 2006).

Although the WASHE programme in Monze was primarily initiated with UNICEF support, WAZ supplemented the programme by using the 'Model village' approach. WAZ has been working with Monze DHO and the Local Authority in WASHE programme since its inception (SNV 2006). It helped with training of extension staff, provision of construction tools and other field equipment, and motor motorbikes. DHO supervised the WASHE activities, repaired and maintained the motorbikes. Monze District Council received funding from UNICEF for drilling boreholes and for staff trainings. The inter-sectoral collaboration ideally was to help in sustaining the WASHE programme through time (Ibid 2006). Through the multilevel inter-sectoral approach, the aim of the programme is to reduce incidence of diarrhoea especially in the rural areas of the district where people, comprising the Village WASHE committees, live (Zgambo 2000).

In spite of the WASHE programme having been operational since 1994, the diarrhoea pattern is reported to have not changed over time (Monze DHIS 2012).

2.6 Mortality Due to Diarrhoea

The Millennium Development Goals call for reduction in child mortality by two thirds between 1990 and 2015. As the deadline approaches, the reality is that although progress is being made, much more remains to be done (UNICEF 2009). Globally, diarrhoea is the number two major killer of the children under the age of five, accounting for 15% of the global under-5 mortality, second from pneumonia which accounts for 18% of the global under-5 mortality. Nearly nine million children who are under the age five years die each year (UNICEF 2011). According to WHO (2011), 88% of diarrhoea cases are attributable to poor environmental factors, essentially from poor excreta disposal systems (i.e. poor WASHE).

An estimated 2.5 billion cases of diarrhoea occur annually among the children under the age of 5, and the estimates suggest that overall incidence has remained relatively stable in the last two decades. More than half of these cases are in Africa and South Asia, where episodes of diarrhoea are likely to result in death or other severe outcomes. The incidence of diarrhoeal diseases varies greatly with the seasons and a child's age. The youngest children are most vulnerable. The

incidence is highest in the first two years of life and declines as a child grows older. Africa and South Asia account for over half cases of childhood diarrhoea (UNICEF 2009).

According to UNICEF (2012), approximately 8,700 Zambians, including 6,600 children under the age of five, die each year from diarrhoea, nearly 90% of which is directly attributed to poor WASHE approaches.

In spite of the economic instability, Zimbabwe has a lower under-5 mortality of 57 per 1000 live births than Zambia which is at 182 per 1000 live births (UNICEF 2010). This explains the fact that improvement of economic engines may not have influence on diarrhoea incidences, but diarrhoea is credibly influenced by individual and community mindset.

Bearing in mind the mortality due to diarrhoea, Zambia is not different from many other developing countries. An example of mortality due to diarrhoea can be given from Monze rural district where mortality for all ages was number one in 2012 (HMIS 2012).

2.7 Details of Similar Studies

Clasen et al (2008) conducted a study (Randomized Controlled Trial) titled: *'Water Quality Interventions to Prevent Diarrhoea: Cost and Cost-Effectiveness'*. Their findings were that diarrhoeal disease killed an estimated 1.8 million people each year, and accounted for 17% of deaths of the under-5 children in developing countries. Ninety-four percent of this disease burden was attributable to the environment, including risks associated with unsafe water, lack of sanitation and poor hygiene. The findings further indicated that among all water quality interventions employed in the study, household-based chlorination was the most cost-effective in reducing diarrhoea incidences. Solar disinfection was only slightly less cost-effective, owing to its almost identical cost but lower overall effectiveness.

Garrett et al (2008) conducted a study titled: *'Diarrhoea prevention in a high-risk rural Kenyan population through point-of-use chlorination, safe water storage, sanitation, and rainwater harvesting'*. This was a quasi-experimental design where the researchers evaluated the impact of household water treatment, latrines, shallow wells, and rainwater harvesting on diarrhoea

incidence in rural Kenyan children. They compared diarrhoea rates in 960 children aged <5 years in 556 households in 12 randomly selected intervention villages and six randomly selected comparison villages. On multivariate analysis, chlorinating stored water, latrine presence, rainwater use, and living in an intervention village, were independently associated with lower diarrhoea risk. Diarrhoea risk was higher among shallow well users. Chlorinating stored water, latrines, and rainwater use all decreased diarrhoea risk; and combined interventions may have increased health impact.

Begum et al (2011) conducted a research titled: *'Do Water and Sanitation Interventions Reduce Childhood Diarrhoea? New Evidence from Bangladesh'*. In this study, propensity score matching (PSM) technique was used as principal deign. The findings were that combined access to improved water and sanitation had strong effects on reducing the incidence of diarrhoea among children aged below five years. It was also noted that only the combined access (and not the isolated use of either improved water or improved sanitation) mattered in reducing childhood diarrhoea. The combined access to improved water and sanitation only emerged as the statistically significant factor underlying the difference in diarrhoea incidence between the treatment and control groups in the PSM-matched sample.

CHAPTER THREE

3.0 METHODOLOGY

This chapter describes the study methodology: study design, setting, population, sampling and the criteria for inclusion and exclusion. It also describes the plans used for data collection, processing and analysis including details of the variables. Finally the chapter provides details of ethical consideration, utilization of study findings and lastly, data quality control.

3.1 Study Design

Since the principal researcher did not have full control over the implementation of the intervention (WASHE), the study was a Quasi-experimental (non-randomized, but controlled before and after) study, which involved prospective review of quantitative data on WASHE coverage and incidences of diarrhoea per year, in rural areas of Monze district from 2008 to 2012, with 2007 as a 'before' year (base year).

Firstly, two sets of data on WASHE coverage and incidence of diarrhoea in the 'before' year from WASHE-serviced and non-WASHE areas were collected and reviewed.

Secondly, the same data from the same areas but this time from 2008 to 2012 inclusive were collected and reviewed. These data sets from the two areas were collated, compared and analyzed to establish whether WASHE programme had impact on the incidence of diarrhoea in the rural areas of Monze in the period of study.

3.2 Study Setting

The study was conducted in Monze district, which is in the Southern Province of Zambia, about 180km South-West of the capital city, Lusaka. The district is along the Great North Road (also known as Livingstone Road) which connects the capital city; and through Livingstone city, to the neighbouring Zimbabwe in the South; and Botswana and Namibia in the South-West.

3.3 Study Population

The study population was the rural population of the district, which accounted for 78.2% of the district population as at end of 2012 (ZDHS 2007).

The study population was dealt with in twofold:

- The population of the rural areas which were serviced by WASHE programme in the base year and after the intervention (i.e. from 2008 to 2012 inclusive).
- The population of the rural areas of Monze which were not serviced by WASHE programme in the base year and after the intervention (i.e. from 2008 to 2012 inclusive).

This meant that the 'before and after' intervention data was collected from both the WASHE-serviced and non-WASHE rural areas of the district.

3.4 Sample Size

Quantitative data in terms of WASHE coverage (proportion of households with WASHE basic needs: latrines, hand-washing facilities, safe water supply, dish racks, refuse pits and bath shelters out of the total number of households) and incidences of diarrhoea were obtained from annual reports, per year, from Monze DHO, Monze District Council and the office of WAZ from 2007 to 2012. Thus, a census of annual reports on WASHE coverage was obtained from Monze District Council; and data on incidences of diarrhoea from Monze DHO.

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion Criteria

- All data from villages and settlements in rural areas of Monze from 2007 to 2012 were included in the study

3.5.2 Exclusion Criteria

- All incomplete or missing data from villages and settlements that were included in 3.5.1 were not included in the study

3.6 Data Collection

The data collection process was done in threefold as follows:

⇒ **Permission to proceed with data collection** – Consent was obtained from Monze DHO, Monze District Council and WAZ before the study commenced. This was done by writing request letters to the heads of institutions.

⇒ **Data collection** – When collecting data, the principal researcher considered logistics and data quality control.

- Logistic arrangement involved identifying individuals who would collect data, how long it would take to collect the data for each component of the study.
- Data quality control involved producing an instruction sheet, which was given to the two research assistants after they had been trained.

⇒ **Data handling** - Once data was collected and checked for completeness and accuracy, they were stored in soft copies (MS Excel and MS Word) by the principal researcher.

Eight pre-designed data collection tools were used to collect data as follows:

⇒ The first data collection tool was used to collect data, by proportions, on WASHE coverage from the WASHE-serviced rural areas of Monze in the base year. The sources of these data were annual reports from Monze DHO, Monze District Council and WAZ.

⇒ The second data collection tool was used to collect data, by proportions, on WASHE coverage from the non-WASHE rural areas of Monze in the base year. The sources of these data were annual reports from Monze DHO, Monze District Council and WAZ.

⇒ The third data collection tool was used to collect data, by proportions, on WASHE coverage from the WASHE-serviced rural areas of Monze in 2008 and then cumulatively from 2008 to 2012.

⇒ The fourth data collection tool was used to collect data, by proportions, on WASHE coverage from the non-WASHE rural areas of Monze in 2008 and then cumulatively from 2008 to 2012.

⇒ The fifth data collection tool was used to collect data on incidences and mortality due to diarrhoea per 1000 people, from the WASH-serviced rural areas of Monze in base year. These data were obtained only from Monze DHO.

⇒ The sixth data collection tool was used to collect data on incidences of diarrhoea per 1000 people, from the non-WASH rural areas of Monze in the base year. These data were obtained only from Monze DHO.

⇒ The seventh data collection tool was used to collect data on incidences of diarrhoea per 1000 people, from the WASH-serviced rural areas of Monze in 2008 and then cumulatively from 2008 to 2012.

⇒ The eighth data collection tool was used to collect data on incidences of diarrhoea per 1000 people, from the non-WASH rural areas of Monze in 2008 and then cumulatively from 2008 to 2012.

These eight data sets were carefully collected, collated and analyzed, taking into account the 'before and after' reconciliation.

3.7 Data Processing and Analysis

The analysis was started by checking completeness and accuracy. The process involved sorting, quality control checks, and finally actual scrutiny. This assisted the principal researcher to ensure that at the end of data collection and collation process:

⇒ All the needed data was collected in a standardized way

⇒ No unnecessary data, which should not be analyzed, was collected

The analysis process was done after all the required data had been collected. Data analysis was done by using MS Excel and STATA version 12.

The analysis was done in twofold:

(I) Analysis of the data from non-WASHE areas

The water and sanitation coverage and diarrhoea incidence data from the non-WASHE areas were collected, collated and scrutinized. The scrutiny was first started with the 2007 data (i.e. the base year – before intervention). Then the data for the recurrent years (i.e. 2008, 2009, 2010, 2011 and 2012 – after intervention) were firstly scrutinized on an annual basis, then scrutinized on average basis covering 2008 to 2012 inclusive. Microsoft Excel application used to generate graphs to establish the water and sanitation coverage pattern from 2007 to 2012.

(II) Analysis of the data from WASHE-serviced areas

Similarly, the water and sanitation coverage and diarrhoea incidence data from WASHE-serviced areas were collected, collated and scrutinized, starting with 2007 data (before intervention) then the data for the recurrent years were scrutinized on an annual basis, then scrutinized again on average basis covering 2008 to 2012 inclusive (i.e. after intervention). Microsoft Excel was again used to generate graphs from 2007 to 2012.

As indicated above, the two data sets from WASHE-serviced and non-WASHE areas were then analyzed and then compared for the following:

- ***Coverage of water and sanitation before and after the intervention***. The difference of coverage between WASHE-serviced and non-WASHE areas between the period before intervention and the period after intervention was established by subtraction using

Microsoft Excel spreadsheet. Microsoft Excel was also used to generate graphs, indicating all WASHE indicators.

- ***Incidences of diarrhoea before and after the intervention.*** The difference of diarrhoea incidences between WASHE-serviced and non-WASHE areas between the period before intervention and the period after intervention was established by subtraction using Microsoft Excel spreadsheet. These analyses both in WASHE-serviced and non-WASHE areas helped in making judgment on whether the intervention worked or not.

The differences of water and sanitation coverage and diarrhoea incidences between WASHE-serviced and non-WASHE before and after interventions helped the principal researcher to compare the impact of WASHE interventions on incidences of diarrhoea in the WASHE-serviced and non-WASHE areas.

3.7.1 Variables

Below are the dependent and independent variables, their indicators and scale of measurement which were used as shown in table 1:

Table1: Variables

VARIABLE TYPE	VARIABLE	INDICATOR	MEASUREMENT SCALE
Dependent	Influence of WASHE	No. WASHE basic needs	Coverage (%)
		Diarrhoea incidence	Cases per 1000
Independent	Coverage of WASHE before intervention	No. WASHE basic needs	Proportion (%)
	Coverage of WASHE after the intervention	No. WASHE basic needs	
	Incidence of diarrhoea before intervention	No. new cases	Per 1000 people
	Incidence of diarrhoea after intervention	No. new cases	

3.8 Ethical Consideration

The principal researcher acknowledged that data originated from individual members of communities in the rural areas of Monze district, and that such data should be kept well to uphold people's respect and confidentiality.

Since the study was only review reports from Monze DHO, Monze District Council and Water Aid Zambia (WAZ), no physical harm was observed from handling the reports since there was no physical contact with the members of the communities where the data originated. However, confidentiality and fidelity which possibly related to personal or community privacy was maintained.

Data on coverage of WASHE programme were obtained from Monze DHO, Monze District Council and WAZ. Other Data on incidences of diarrhoea were obtained only from Monze DHO. Therefore, permission concerning data collection was sought from Monze District Council, Monze DHO and WAZ before commencement of the study. Approval for this study was sought from ERES CONVERGE IRB committee.

3.9 Utilization of Study Findings

Report of the study findings was compiled and copies were made which were disseminated to Monze District Council, Monze DHO and WAZ. Other copies were submitted to the University of Zambia libraries for academic references.

3.10 Data Quality Control

The pre-designed data collection tools were used in the study to collect the required data. To ensure control of quality, the data collection tools were subjected to tests. Field editing of data collection tools was done through checking completeness and conducting pre-testing of the designed tools at Monze DHO in the district. Training of Research Assistants on how to use the instruction sheet was also a way of ensuring data quality.

CHAPTER FOUR

4.0. STUDY FINDINGS

This chapter describes the study findings. It compares WASHE coverage, diarrhoea incidences and mortality between the WASHE-serviced and the non-WASHE rural areas from base year (2007) to 2012 inclusive. This comparison helped the principal researcher to determine whether WASHE intervention had influence on incidences of diarrhoea and by what margin. These findings are presented in twofold:

I. Water and sanitation coverage both in WASHE-serviced and the non-WASHE areas in:

   (i) Base year (before intervention) – 2007,

   (ii) 2008 alone (after intervention) and

   (iii) Average from 2008 to 2012 inclusive (after intervention).

II. Diarrhoea incidence both in WASHE-serviced and the non-WASHE areas in:

   (i) Base year (before intervention) – 2007,

   (ii) 2008 alone (after intervention) and

   (iii) Average from 2008 to 2012 inclusive (after intervention).

4.1 The WASHE coverage before intervention (2007), and after intervention (i.e. both in 2008 alone, and on average from 2008 to 2012) both in the WASHE-serviced and non-WASHE areas

The study revealed that, before intervention (2007), WASHE indicators in the WASHE-serviced areas had lower coverage than those of the non-WASHE areas. However, coverage for some

WASHE indicators like hand-washing facilities and refuse pits showed insignificant differences between WASHE-serviced and the non-WASHE areas as shown in figure 2. The base year (2007) coverage formed the reference point for ascertaining coverage of WASHE in the recurrent review periods (i.e. in 2008 alone and from 2008 to 2012 inclusive).

The findings of the study in figure 2 also revealed that WASHE coverage in 2008 alone showed an increase from the base year, in the WASHE-serviced areas. There was an increase in the number of dish racks, refuse pits and bath shelter. However, the number of latrines reduced and the number of hand-washing facilities remained static, indicating no improvement.

The rationale for assessing the aggregated data across 2008 to 2012 was that in the same period, Monze DHO recorded what was perceived as high diarrhoea incidences, while WASHE was reporting high coverage within the same period. Thus, the findings showed in the period between 2008 and 2012, reduced numbers of latrines and hand washing facilities and increased numbers of dish racks, refuse pits and bath shelters as shown in figure 2. In the same period again, results showed that non-WASHE areas had higher coverage of water, latrines and dish racks at 96, 20 and 92% respectively than WASHE-serviced areas which had 82, 15 and 85% of the same indicators respectively. Both the WASHE-serviced and the non-WASHE areas had 3% of hand-washing facilities (HWFs). From 2008 to 2012 again, WASHE-serviced areas had slightly higher coverage of refuse pits and bath shelters at 31 and 42% respectively than non-WASHE areas which was at 19 and 36% respectively.

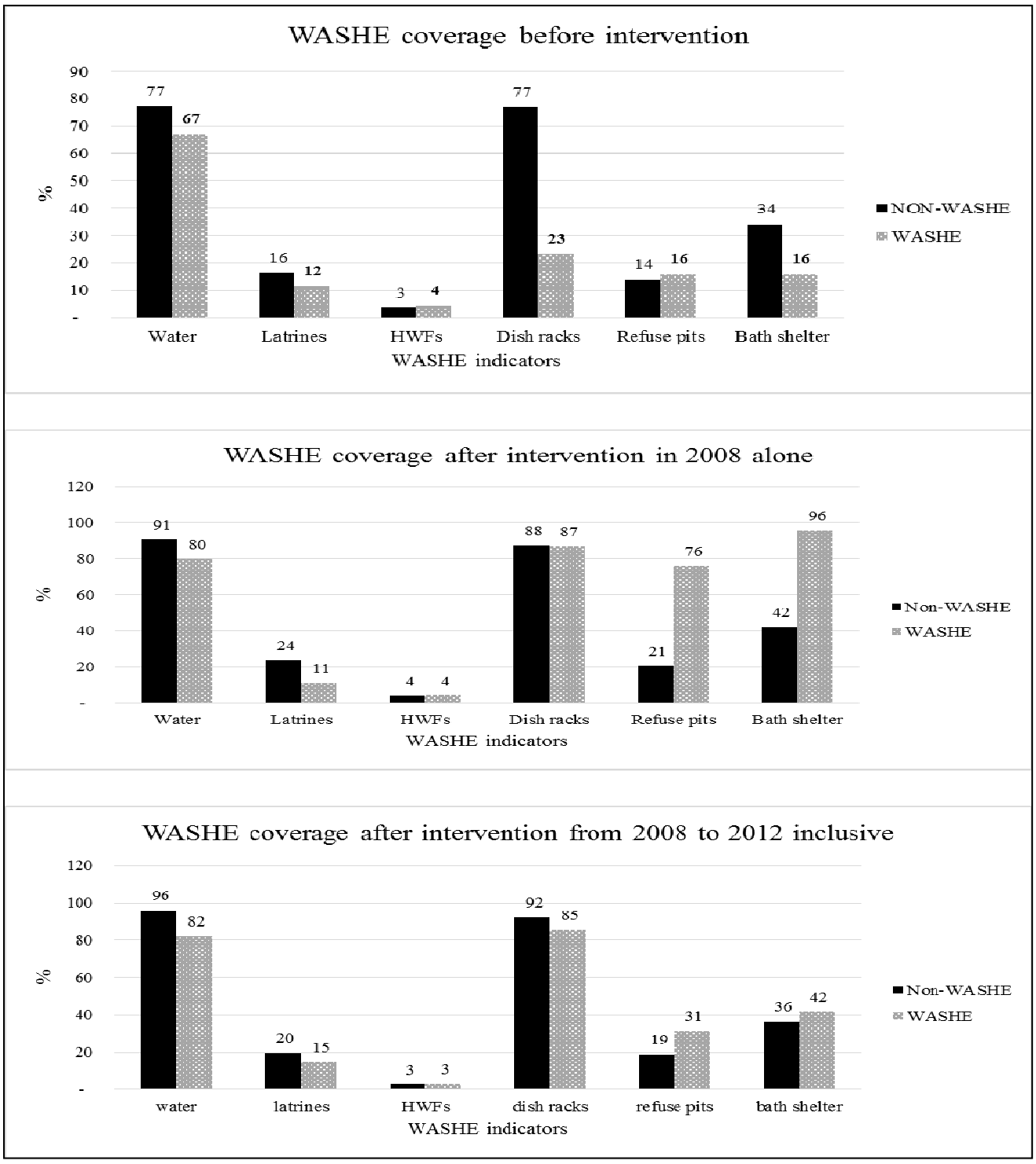

Figure 2: WASHE coverage before intervention (2007), after intervention (in 2008 alone and on average from 2008 to 2012).

4.2 Diarrhoea incidences and mortality before intervention (2007), and after intervention (i.e. both 2008 and on average from 2008 to 2012 inclusive).

Figure 3 shows the diarrhoea incidences including mortality from the base year, in 2008 alone and on average from 2008 to 2012 inclusive. The findings showed that generally, in 2008, WASHE-serviced areas had lower incidences of diarrhoea than the non-WASHE areas except for severe diarrhoea among the under-5 children which recorded high at 2 cases per 1000 compared to the 0.3 cases per 1000 in the non-WASHE areas in the same period, as indicated in figure 3.

Figure 3 indicates that in 2008 alone, WASHE-serviced areas had greater reduction in diarrhoea than the non-WASHE areas. In WASHE-serviced areas, bloody diarrhoea among under-5 children and bloody diarrhoea among the '5 and over' age group reduced by 54 and 158 resulting into 14 and 7 cases per 1000 correspondingly; non-bloody diarrhoea among the under-5 children and non-bloody among the '5 and over' age group reduced by 20 and 38 resulting into 206 and 60 cases per 1000 respectively.

However, the average finding from 2008 to 2012 inclusive, showed increased incidences of diarrhoea per 1000 cases in the WASHE-serviced areas among under-5 children with bloody diarrhoea and non-bloody diarrhoea at 21 and 216 cases per 1000 respectively, as indicated in figure 3. The study also revealed that bloody diarrhoea among the under-5 children in the non-WASHE areas reduced from 59 to 52 per 1000 cases from 2008 to 2012 inclusive; non-bloody diarrhoea among the under-5 children indicated a slight improvement in the WASHE-serviced areas from 228 to 216 per 1000 cases; non-bloody diarrhoea among the '5 and over' age group also indicated a slight improvement in the WASHE-serviced areas from 67 to 66 per 1000 cases; the rest of diarrhoea cases showed an upsurge.

The study findings also indicated an increase in mortality per 1000 cases in the WASHE-serviced areas from 0.1 in the base year to 0.2 per 1000 cases from 2008 and 2012 inclusive.

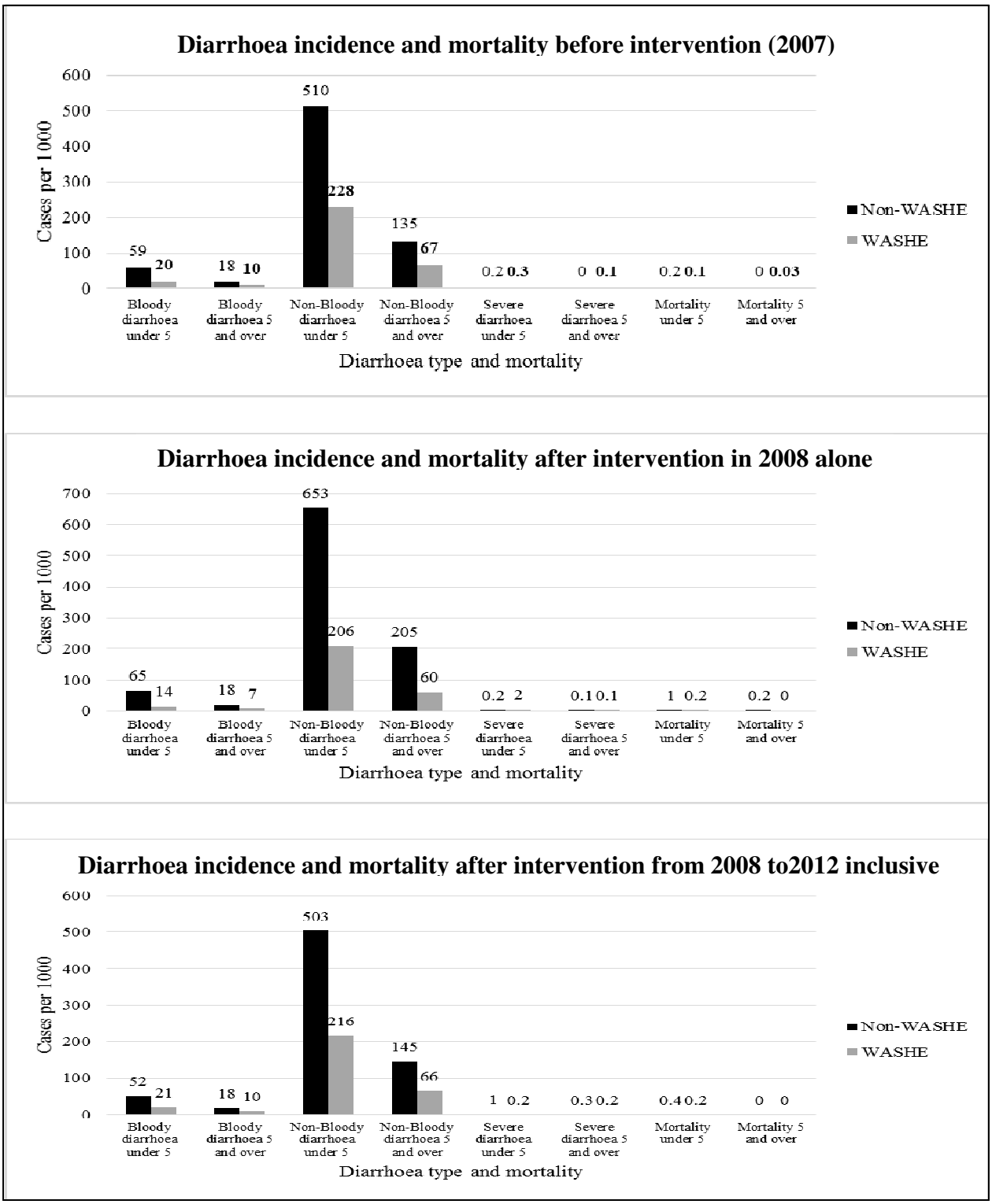

Figure 3: Diarrhoea incidence and mortality in base year, 2008 and average from 2008 to 2012

One thing which was certain about the study findings in figure 2 and 3, was that some of the WASHE indicators namely; water supply, latrines and hand-washing facilities had influence on the incidence of diarrhoea in rural areas of Monze from 2008 to 2012. However, it was not clear about the extent to which these indicators influenced the incidence of diarrhoea in the area. Therefore, two regression analyses were done to ascertain how much influence these indicators had on diarrhoea incidence. Firstly, linear regression model was done for number of diarrhoea cases per 1000, both in WASHE-serviced and non-WASHE serviced areas as shown in table 2.

Table 2: Linear regression model for the number of diarrhoea cases per 1000 (N=12)

	Coef.	Robust Std. Err.	t	P>t	[95% Confidence]	
Latrines	-0.036	0.010	-3.550	0.008	-0.060	-0.013
Hand-washing facilities	-0.175	0.056	-3.120	0.014	-0.305	-0.046
Water supply points	-0.004	0.001	-3.650	0.007	-0.006	-0.001
Constant	122.608	13.314	9.210	0.000	91.906	153.311

Table 2 shows regression results for the combined data both from WASHE-serviced and non-WASHE areas. The results of the regression model showed that the number of latrines, hand-washing facilities and water supply significantly influenced the incidences of diarrhoea at 5% level of significance with p-values of 0.008, 0.014 and 0.007 respectively. The findings further revealed that there was a negative relationship (derived from the negative coefficient) between diarrhoea incidence (dependent variable) and WASHE indicators (independent variables). Thus, the increase in the number of latrines, hand-washing facilities and water supply points resulted into reduced incidences of diarrhoea by 0.036, 0.175 and 0.004 per 1000 cases.

From the study findings, it was possible to think that the low coverage of latrines and hand-washing facilities in figure 2 accounted for the increased numbers of the bloody and the non-bloody diarrhoea in figure 3. This was proved by the results of the regression analysis shown in table 3. This linear regression analysis was done on data from WASHE-serviced areas only. Diarrhoea incidence was set as the dependent variable; the number of latrines, hand-washing facilities and water supply points (i.e. WASHE indicators) as independent variables.

Table 3: Linear regression model for the number of diarrhoea cases per 1000 (N=6)

	Coef.	Robust Std. Err.	t	P>t	[95% Confidence]	
Latrines	-0.026	0.001	-21.530	0.002	-0.031	-0.021
Hand-washing facilities	-0.075	0.016	-4.560	0.045	-0.146	-0.004
Water supply points	0.000	0.000	0.470	0.682	-0.002	0.002
Constant	53.689	7.742	6.930	0.020	20.376	87.002

Out of the three independent variables, only latrines and hand-washing facilities significantly influenced the incidence of diarrhoea at 5% level of significance with p-values of 0.002 and 0.045 respectively. The result meant that an increase in latrines and hand-washing facilities resulted in the reduction of the incidence of diarrhoea per 1000 cases by 0.026 and 0.075 correspondingly as shown in table 3.

CHAPTER FIVE

5.0 DISCUSSION

Water, Sanitation and Hygiene-education are three discrete variables which are usually considered separately or sometimes considered as one integrated approach to handling diarrhoea diseases (Clasen 2007). In this study, these variables were considered separately: they were divided into: water supply (tap, borehole, hand-dug well etc.), sanitation (latrines) and hygiene Education (hand-washing facilities, refuse pits, dish racks and bath shelter).

The study revealed that, among the WASHE indicators, water supply recorded higher coverage than other indicators. This is in conformity with WHO/UNICEF report (2013) which stated that water supply coverage was usually higher than sanitation and that of hygiene and that water supply coverage alone proved to be relatively insufficient to restrain diarrhoea burden, especially in the developing countries. The findings of the study also indicated that some of WASHE indicators in the non-WASHE areas recorded higher coverage than those in the WASHE-serviced areas in the base year as indicted in figure 2. The study findings also indicted that WASHE-serviced areas had a bigger population size than non-WASHE areas, from the base year to 2012.

Discussion of the findings in this paper is handled in four-fold, namely; the base year data, the 2008 data, the average data from 2008 to 2012 and the study limitations.

5.1 The base year data (2007 data)

The study findings in figure 2 indicated that, in the base year, non-WASHE areas had higher water and sanitation coverage (not as a result of WASHE programme) than the WASHE-serviced areas except for two WASHE indicators namely: hand-washing facilities and refuse pits, which recorded 4 and 14% respectively. The general impression for the WASHE-serviced areas is that the base year (2007) recorded low water and sanitation coverage. In the same period,

the non-WASHE areas had higher incidences of diarrhoea than the WASHE-serviced areas (figure 3). The simple judgment for this scenario can be explained in twofold: (1) the high water, sanitation and hygiene coverage in the non-WASHE areas in the base year was by coincidence (since there was no intervention) and (2) the high diarrhoea incidences in the non-WASHE areas was attributed to the lack of the intervention.

The study also revealed that in the base year, there were minimal differences of severe diarrhoea and mortality between the under-5 children and the '5 and over' age group both in the WASHE-serviced and the non-WASHE areas as indicated in figure 3.

5.2 The 2008 alone (first inference period) data

As indicated in figure 2, some WASHE indicators in 2008 showed an increase from the base year. Particularly, numbers of dish racks, refuse pits and bath shelters in the WASHE-serviced areas showed 87, 76 and 96%, indicating upsurges by 64, 60 and 80 WASHE indicators respectively compared to the base year data. The latrines and hand-washing facilities were the only WASHE indicators with faltering coverage in the WASHE-serviced areas in 2008 alone at 11 and 4% respectively. The latrines reduced by 1 and hand-washing facilities were static at 4 from the base year data. WHO/UNICEF (2013) also states that latrine coverage, like hygiene (such as hand-washing) has lower coverage than water supply and globally, up to 2.5 billion people use unimproved excreta disposal systems.

The study findings also revealed that in 2008 alone, WASHE intervention helped in reducing the number of non-bloody diarrhoea cases in the WASHE-serviced areas which was at 206 per 1000 compared to the non-WASHE areas, which recorded highest increase at 653 per 1000 cases among the under-5 age group in the same year. This is indicated well in figure 3.

5.3 The average data from 2008 to 2012 inclusive (final inference period)

This section presents the average figures from 2008 to 2012 inclusive. The findings in figure 2 indicated that WASHE-serviced areas recorded lower water supply, latrine, hand-washing facilities and dish rack coverage at 82, 15, 3 and 85% respectively than the non-WASHE areas which recorded 96, 20, 3 and 92 respectively. Generally the impression was that the WASHE coverage faltered in the period from 2008 to 2012 inclusive as shown in figure 2.

Despite its low coverage in WASHE-serviced areas, hand-washing facilities played a significant role in reducing the incidences of diarrhoea in Monze rural as evidenced by the regression model in table 3. Ejemot et al (2009) reports that interventions which promote hand-washing can reduce diarrhoea episodes by about one third and that this significant reduction is comparable to the effect of providing clean water in rural areas. UNICEF (2012) also reports that evidence from various researches consistently point to hand-washing with soap as one of the most effective ways to prevent diarrhoea incidences.

The study findings also showed that only non-bloody diarrhoea among under-5 children in the non-WASHE areas showed reduction of up to 21 cases per 1000. The rest of diarrhoea cases both from the non-WASHE and WASHE-serviced areas showed an increase from the base year data as shown figure 3. This is in line with Monze HMIS (2012) reported which stated that diarrhoea non-bloody when ranked in the top 10, was the number one cause of mortality and number two cause of morbidity in all age groups. The report also indicated that majority of these preventable diarrhoea cases emanated from the WASHE-serviced areas. WHO/UNICEF (2009) states that diarrhoea remains the second leading cause of death among children under five globally. Brikké and Bredero (2003) report that diarrhoea which is linked to poor water and sanitation programmes is still a global health and economic problem.

As indicated above, six discrete WASHE indicators were used both in the WASHE-serviced and non-WASHE areas, namely; water supply, latrines, hand-washing facilities, dish racks, refuse pits and bath shelters. Out of the six indicators, three namely water supply, latrines and hand-washing facilities showed to have had influence on incidences of diarrhoea. The other three

indicators did not significantly influence the diarrhoea incidences. However, the extent to which water supply, latrines and hand-washing facilities impacted on the incidences of diarrhoea was not clear. Therefore, two linear regression analyses were done to ascertain how they impacted on the incidence of diarrhoea in the period under review:

- The first analysis was linear regression model for the number of diarrhoea cases per 1000 both in the WASHE-serviced and non-WASHE areas (combined data sets). The results of the combined data set revealed that the number of water supply points, latrines and hand-washing facilities significantly influenced the incidence of diarrhoea at 5% level of significance. The regression model showed that there was a negative relation between diarrhoea incidence and the WASHE indicators (i.e. water supply, latrines and hand-washing facilities). The interpretation was that increase in the number of water supply points, latrines and hand-washing facilities reduced the incidence of diarrhoea per 1000 by 0.036, 0.175 and 0.004 with p-values of 0.008, 0.014 and 0.007 respectively as shown in table 2.

- The second analysis was the linear regression model for the number of diarrhoea cases per 1000 in the WASHE-serviced areas only. Diarrhoea incidence was set as a dependent variable and water supply, latrines and hand-washing facilities as independent variables. Out of the three independent variables, only latrines and hand-washing facilities significantly influenced the incidence of diarrhoea at 5% level of significance with p-values of 0.002 and 0.045 respectively. The relationship between diarrhoea incidence and WASHE indicators was also negative, derived from the coefficient value. This meant that an increase in latrines and hand-washing facilities resulted into reduction of diarrhoea incidence per 1000 cases by 0.026 and 0.075 respectively as shown in table 3.

The standpoint for this study was to review and compare the water-sanitation-hygiene coverage to diarrhoea incidence-mortality in areas where WASHE interventions were implemented and there after compare to similar indicators from the non-WASHE areas. The study findings revealed a decrease in coverage of WASHE indicators from 2008 to 2012 and the increased diarrhoea incidences in the same period.

5.4 Study Limitations

The limitations of this study included the following:

1. It was difficult to obtain 2007 to 2008 data on diarrhoea incidences as the updated DHIS2 data base application was only starting from 2009. There was no data in the system from 2008 going backwards.

2. Incomplete water and sanitation (merged urban/rural) data, which were collected from Monze District Council, made it difficult for the principal researcher to come up with annual coverage.

3. There were challenges of overlapping areas of jurisdiction for diarrhoea incidences data (from Monze DHO) and WASHE coverage data (from Monze District Council): Monze District Council was using constituencies and wards while Monze DHO was using catchment areas.

4. It was quite difficult to find literature concerning evaluation of water and sanitation on incidences of diarrhoea in Zambia.

6.0 CONCLUSION

From the aforementioned findings and discussion, it was clear that among the WASHE indicators in the non-WASHE areas, water supply recorded the highest coverage at 91% in 2008 alone, 96% between 2008 and 2012 period compared to 77% in the base year (2007 – before intervention). WASHE-serviced areas recorded similar water supply coverage at 80% in 2008 alone, 82% between 2008 and 2012 compared to 67% in the base year.

Latrines and hand-washing facilities recorded the least coverage in the WASHE-serviced at 11 and 15% respectively compared to the respective indicators for the base year which was at 12%. However, the non-WASHE areas recoded slightly higher latrine and hand-washing coverage at 24 and 20% respectively, compared to base year coverage which was 16 and 3% respectively. It was also clear that it is a global pattern of high water coverage but very low coverage for the latrines and hand-washing facilities. This is also shown by WHO/UNICEF report (2013) which stated that latrine coverage, like hygiene had lower coverage than water supply globally.

Once in 2008 alone, as shown in figure 2 and 3, WASHE-serviced areas tremendously improved both in WASHE coverage and diarrhoea incidences compared with non-WASHE areas. However, the recurrent years showed faltered coverage, with marked increase in diarrhoea incidences (figure 3). This meant that WASHE programme did not work well within the average period from 2008 to 2012 inclusive. From the study findings, decrease in coverage of WASHE indicators was recorded from 2008 to 2012 and the increased diarrhoea incidences in the same period. However, the low coverage in WASHE indicators and high diarrhoea incidences from 2008 to 2012 in WASHE-serviced areas could not imply that WASHE did not have impact on diarrhoea incidences since water supply, latrines and hand-washing facilities in fact did have influence on diarrhoea incidences as shown in table 2. Therefore, it can be concluded that only some of the WASHE indicators like latrines, and hand-washing facilities (though they had low coverage), had impact on the incidence of diarrhoea from 2008 to 2012 as indicated in table 3. It is for this reason that other studies are recommended to establish why there was low coverage of latrines and hand-washing facilities in rural areas of Monze district within the period of study.

From the fact that other WASHE indicators (i.e. refuse pits, dish racks and bath shelters) did not have significant influence on diarrhoea incidence, it can also be concluded that the diarrhoea incidence in Monze might not only be attributed to water and sanitation interventions, but also to other possible confounding factors outside the realm of WASHE programme.

RECOMMENDATION

As a result of this study, a number of limitations were observed, whose recommendations are hereunder:

1. Recommendation for Monze District Health Office

    - Update or create data base from 2008 going backwards in the new DHIS2 application which starts only from 2009.

2. Recommendation for Monze District Council:

    - Create separate data bases for urban and rural WASHE programmes and segregate them per year so it could be used easily.

3. Recommendation for Ministry of Local Government and Housing and Ministry of Health

    - To have an inter-sectoral meetings or agreement so that both ministries should be using either catchment areas or the constituencies and wards for reporting to avoid overlapping issues in the areas of jurisdiction.

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APPENDICES

Appendix I: WASHE coverage in WASHE-serviced areas in base year: 2007

I. Coverage of WAHSE indicators before 2008

1. Coverage of water supply in the year……%
2. Coverage of latrines in the year…….%
3. Coverage of hand-washing facilities in the year……%
4. Coverage of dish racks in the year……..…%
5. Coverage of bath shelters in the year…….……%
6. Coverage of refuse pits in the year…….%
7. Coverage of Hygiene education topics in the year…….%

II. Aggregate data for the rural areas

1. Total number of households ……
2. Number of households with at least safe water, latrine and hand-washing facility…….
3. Coverage of households with at least safe water, latrine and hand-washing facility.……%
4. Number of households with all WASHE basic needs…….
5. Coverage of WASHE ……%

Date of data collection …… Name of data collector…….….

Appendix II: WASHE coverage in WASHE-serviced areas from 2008 to 2012

I. Coverage of WAHSE indicators

1. Coverage of water supply in the year……%
2. Coverage of latrines in the year…….%
3. Coverage of hand-washing facilities in the year……%
4. Coverage of dish racks in the year……..…%
5. Coverage of bath shelters in the year……..……%
6. Coverage of refuse pits in the year…….%
7. Coverage of Hygiene education topics in the year…….%

II. Aggregate data for the rural areas

1. Total number of households ……
2. Number of households with at least safe water, latrine and hand-washing facility…….
3. Coverage of households with at least safe water, latrine and hand-washing facility.……%
4. Number of households with all WASHE basic needs…….
5. Coverage of WASHE ……%

Date of data collection …… Name of data collector……..….

Appendix III: WASHE coverage in non-WASHE areas in base year: 2007

I. Coverage of WAHSE indicators before 2008

1. Coverage of water supply in the year……%
2. Coverage of latrines in the year…….%
3. Coverage of hand-washing facilities in the year……%
4. Coverage of dish racks in the year……..…%
5. Coverage of bath shelters in the year……..……%
6. Coverage of refuse pits in the year…….%
7. Coverage of Hygiene education topics in the year…….%

II. Aggregate data for the rural areas

1. Total number of households……
2. Number of households with at least safe water, latrine and hand-washing facility…….
3. Coverage of households with at least safe water, latrine and hand-washing facility.……%
4. Number of households with all WASHE basic needs…….
5. Coverage of WASHE ……%

Date of data collection …… Name of data collector……..….

Appendix IV: WASHE coverage in non-WASHE areas from 2008 to 2012

I. Coverage of WAHSE indicators

1. Coverage of water supply in the year……%
2. Coverage of latrines in the year…….%
3. Coverage of hand-washing facilities in the year……%
4. Coverage of dish racks in the year……..…%
5. Coverage of bath shelters in the year……..……%
6. Coverage of refuse pits in the year…….%
7. Coverage of Hygiene education topics in the year…….%

II. Aggregate data for the rural areas

1. Total number of households……
2. Number of households with at least safe water, latrine and hand-washing facility…….
3. Coverage of households with at least safe water, latrine and hand-washing facility.……%
4. Number of households with all WASHE basic needs…….
5. Coverage of WASHE ……%

Date of data collection …… Name of data collector……..….

Appendix V: Incidence of diarrhoea in WASHE-serviced rural areas in base year: 2007

I. Incidence of diarrhoea in rural areas before 2008, base year: 2007

1. Total population of rural areas of Monze district……..…… ☐
2. Number of households ……..……..… ☐
3. Incidence of bloody diarrhoea among under-5 children in the year (per 10000)…….…. ☐
4. Incidence of bloody diarrhoea in all ages in the year (per 1000)……. ☐
5. Incidence of non-bloody diarrhoea among under-5 children in the year (per 1000)…….. ☐
6. Incidence of non-bloody diarrhoea in all ages in the year (per 1000)……..... ☐
7. Incidence of severe diarrhoea among under-5 children in the year (per 1000)……. ☐
8. Incidence of severe diarrhoea in all ages in the year (per 1000)…… ☐

II. Data on mortality due to diarrhoea in the rural areas

1. Mortality due to diarrhoea among under-5 children in the year (per 1000)…… ☐
2. Mortality due to diarrhoea in all ages in the year (per 1000)…… ☐

Date of data collection …… Name of data collector……..….

Appendix VI: Incidence of diarrhoea in WASHE-serviced rural areas from 2008 to 2012

I. Incidence of diarrhoea in rural areas before

1. Total population of rural areas of Monze district……..…… ☐
2. Number of households ……..……..… ☐
3. Incidence of bloody diarrhoea among under-5 children in the year (per 10000)…….…. ☐
4. Incidence of bloody diarrhoea in all ages in the year (per 1000)……. ☐
5. Incidence of non-bloody diarrhoea among under-5 children in the year (per 1000)…….. ☐
6. Incidence of non-bloody diarrhoea in all ages in the year (per 1000)……..... ☐
7. Incidence of severe diarrhoea among under-5 children in the year (per 1000)…… ☐
8. Incidence of severe diarrhoea in all ages in the year (per 1000)…… ☐

II. Data on mortality due to diarrhoea in the rural areas

1. Mortality due to diarrhoea among under-5 children in the year (per 1000)…… ☐
2. Mortality due to diarrhoea in all ages in the year (per 1000)…… ☐

Date of data collection …… Name of data collector……..….

Appendix VII: Incidence of diarrhoea in non-WASHE rural areas in base year: 2007

I. Incidence of diarrhoea in rural areas before 2008, base year: 2007

1. Total population of rural areas of Monze district……..…… ☐
2. Number of households ……..……..… ☐
3. Incidence of bloody diarrhoea among under-5 children in the year (per 10000)…….…. ☐
4. Incidence of bloody diarrhoea in all ages in the year (per 1000)……. ☐
5. Incidence of non-bloody diarrhoea among under-5 children in the year (per 1000)…….. ☐
6. Incidence of non-bloody diarrhoea in all ages in the year (per 1000)……..... ☐
7. Incidence of severe diarrhoea among under-5 children in the year (per 1000)……. ☐
8. Incidence of severe diarrhoea in all ages in the year (per 1000)…… ☐

II. Data on mortality due to diarrhoea in the rural areas

1. Mortality due to diarrhoea among under-5 children in the year (per 1000)…… ☐
2. Mortality due to diarrhoea in all ages in the year (per 1000)…… ☐

Date of data collection …… Name of data collector……..….

Appendix VIII: Incidence of diarrhoea in non-WASHE rural areas from 2008 to 2012

I. Incidence of diarrhoea in rural areas

1. Total population of rural areas of Monze district……..…… ☐
2. Number of households ……..……..… ☐
3. Incidence of bloody diarrhoea among under-5 children in the year (per 10000)…….…. ☐
4. Incidence of bloody diarrhoea in all ages in the year (per 1000)……. ☐
5. Incidence of non-bloody diarrhoea among under-5 children in the year (per 1000)…….. ☐
6. Incidence of non-bloody diarrhoea in all ages in the year (per 1000)……..... ☐
7. Incidence of severe diarrhoea among under-5 children in the year (per 1000)……. ☐
8. Incidence of severe diarrhoea in all ages in the year (per 1000)…… ☐

II. Data on mortality due to diarrhoea in the rural areas

1. Mortality due to diarrhoea among under-5 children in the year (per 1000)…… ☐
2. Mortality due to diarrhoea in all ages in the year (per 1000)…… ☐

Date of data collection …… Name of data collector…….…

Appendix IX: Information Sheet for Monze District Council

University of Zambia

Ridgeway Campus

P.O. Box 50110

LUSAKA

REF: INFORMATION SHEET FOR DATA COLLECTION

My name is Isaac Sakala, a student at the University of Zambia, currently pursuing a Master of Public Health (MPH), with specialization in Environmental Health. This study is in partial fulfillment of the requirements for my MPH programme.

I believe this study will contribute greatly to the knowledge about evaluating Water, Sanitation and Hygiene Education (WASHE) programme on diarrhoea in the rural areas of Monze. Therefore, I would like to request for permission to review the WASHE coverage from 2007 to 2012, in line with preparation of my study. I am certain that the contribution rendered through your office will be helpful to the development of policies concerned with governing service provision around Water and Sanitation programmes.

The data from your office will be treated as confidential as possible, during collection, processing up to the last use. By granting me permission to collect data from your office, you will be considered participating in the study. Therefore, you have the right to withdraw from the study before commencement of the data collection. Any data or information about you will be treated in the strict confidence and will not be able to be linked to you at any stage of the study.

Thank you for your willingness to contribute to the success of this study.

For more details, please contact me on +260 977 706 303, or you can contact the Chairperson, ERES Converge, 33 Joseph Mwilwa Road, Rhodes Park, Lusaka on +260 955 155 633/ +260 955 155 634.

Appendix X: Informed Consent Form for Monze District Council

This informed consent form is for Monze District Council Public Health Office or any concerned officer who I am inviting to participate in my research titled "An Evaluation of WASHE on Incidences of Diarrhoea in Rural Areas of Monze District".

Statement by the Principal Researcher

I have given or accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the data on WASHE coverage from 2007 to 2012 will be freely given.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I further confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this Informed Consent Form has been provided to the participant.

Name of Principal Researcher: Isaac Sakala
Signature of Principal Researcher:…….....
Date (D/M/Y):……...

Statement by the Potential Participant

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Name of participant:……

Signature of participant:……..

Date (D/M/Y):…….

Appendix XI: Information Sheet for Monze District Health Office

University of Zambia

Ridgeway Campus

P.O. Box 50110

LUSAKA

REF: INFORMATION SHEET FOR DATA COLLECTION

My name is Isaac Sakala, a student at the University of Zambia, currently pursuing a Master of Public Health (MPH), with specialization in Environmental Health. This study is in partial fulfillment of the requirements for my MPH programme.

I believe this study will contribute greatly to the knowledge about evaluating Water, Sanitation and Hygiene Education (WASHE) programme on diarrhoea in the rural areas of Monze. Therefore, I would like to request for permission to review the incidence of diarrhoea from 2007 to 2012, in line with preparation of my research paper. I am certain that the contribution rendered through your office will be helpful to the development of policies concerned with governing service provision around Water and Sanitation programmes.

The data from your office will be treated as confidential as possible, during collection, processing up to the last use. By allowing me to collect data from your office, you will be considered participating in the study. Therefore, you have the right to refuse to participate in the study before commencement of the data collection. Any data or information about you will be treated in the strict confidence and will not be able to be linked to you at any stage of the study.

Thank you for your willingness to contribute to the success of this study.

For more details, please contact me on +260 977 706 303, or you can contact the Chairperson, ERES Converge, 33 Joseph Mwilwa Road, Rhodes Park, Lusaka on +260 955 155 633/ +260 955 155 634.

Appendix XII: Informed Consent Form for Monze District Health Office

This informed consent form is for Monze Health Office or District Medical Officer who I am inviting to participate in my research titled "An Evaluation of WASHE on Incidences of Diarrhoea in Rural Areas of Monze District".

Statement by the Principal Researcher

I have given or accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the data on incidences of diarrhoea from 2007 to 2012 will be freely given.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I further confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this Informed Consent Form has been provided to the participant.

Name of Principal Researcher: Isaac Sakala
Signature of Principal Researcher:…….....
Date (D/M/Y):……...

Statement by the Potential Participant

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Name of participant:……

Signature of participant:……..

Date (D/M/Y):…….

Appendix XIII: Information Sheet for WaterAid Zambia Monze Office

University of Zambia

Ridgeway Campus

P.O. Box 50110

LUSAKA

REF: INFORMATION SHEET FOR DATA COLLECTION

My name is Isaac Sakala, a student at the University of Zambia, currently pursuing a Master of Public Health (MPH), with specialization in Environmental Health. This research is in partial fulfillment of the requirements for my MPH programme.

I believe this study will contribute greatly to the knowledge about evaluating Water, Sanitation and Hygiene Education (WASHE) programme on diarrhoea in the rural areas of Monze. Therefore, I would like to request for permission to review the coverage of WASHE from 2007 to 2012, in line with preparation of my research paper. I believe that the contribution rendered through your office will be helpful to the development of policies concerned with governing service provision around Water and Sanitation programmes.

The data from your office will be treated as confidential as possible, during collection, processing up to the last use. By allowing me to collect data from your office, you will be considered participating in the study. Therefore, you have the right to refuse to participate in the study before commencement of the data collection. Any data or information about you will be treated in the strict confidence and will not be able to be linked to you at any stage of the study.

Thank you for your willingness to contribute to the success of this study.

For more details, please contact me on +260 977 706 303, or you can contact the Chairperson, ERES Converge, 33 Joseph Mwilwa Road, Rhodes Park, Lusaka on +260 955 155 633/ +260 955 155 634.

Appendix XIV: Informed Consent Form for WaterAid Zambia, Monze Office

This informed consent form is for WaterAid Zambia, Monze Office or any concerned officer who I am inviting to participate in my research titled "An Evaluation of WASHE on Incidences of Diarrhoea in Rural Areas of Monze District".

Statement by the Principal Researcher

I have given or accurately read out the information sheet to the potential participant, and to the best of my ability made sure that the participant understands that the data on WASHE coverage from 2007 to 2012 will be freely given.

I confirm that the participant was given an opportunity to ask questions about the study, and all the questions asked by the participant have been answered correctly and to the best of my ability. I further confirm that the individual has not been coerced into giving consent, and the consent has been given freely and voluntarily. A copy of this Informed Consent Form has been provided to the participant.

Name of Principal Researcher: Isaac Sakala
Signature of Principal Researcher:…….....
Date (D/M/Y):……...

Statement by the Potential Participant

I have read the foregoing information, or it has been read to me. I have had the opportunity to ask questions about it and any questions I have asked have been answered to my satisfaction. I consent voluntarily to be a participant in this study

Name of participant:……

Signature of participant:……..

Date (D/M/Y):…….

Appendix XV: Instruction Sheet for the Research Assistants

To ensure data quality, please read through the following instructions and adhere to them:

1. Carefully read the instructions on the data collection tools before entering any data.
2. Note that there are two sets of data collection tools: those that require data from WASHE-serviced areas and those that require data from non WASHE areas.
3. Each data collection tool only allows data for one year. Therefore, data should be collected per year from 2007 to 2012 inclusive.
4. Do not fill in data from your own judgment if the required data are unavailable.
5. Always ask the principal researcher about any areas of the data collection tool which are unclear to understand
6. Remember to write your name, date of reporting and the year being reported.

Thank you

Appendix XVI: Request for Permission from Monze District Health Office

The University of Zambia

Ridgeway Campus

P.O. Box 50110

LUSAKA

2nd December, 2013

The District Medical Officer

Monze District Health Office

P.O. Box 660144

MONZE

Dear Sir/Madam,

RE: PERMISSION TO CONDUCT AN EVALUTION RESEARCH OF WATER SANITATION AND HYGIENE EDUCATION (WASHE) ON INCIDENCE OF DIARRHOEA IN RURAL AREAS OF MONZE DISTRICT

Reference is made to the above subject matter.

I am a student at the University of Zambia, computer number 512807915, pursuing Master of Public Health degree (with specialization in Environmental Health). My study area is Monze rural where WASHE intervention is implemented. I hereby request for permission from your good office to conduct the said research.

I will be grateful if my request is put to your consideration

Thanking you in anticipation

Yours faithfully,

Isaac Sakala

MH/HA/1447 (+260 977 706 303)

Appendix XVII: Request for Permission from Monze District Council

The University of Zambia

Ridgeway Campus

P.O. Box 50110

LUSAKA

2nd December, 2013

The Council Secretary

Monze District Council

MONZE

Dear Sir/Madam,

RE: PERMISSION TO CONDUCT AN EVALUTION RESEARCH OF WATER SANITATION AND HYGIENE EDUCATION (WASHE) ON INCIDENCE OF DIARRHOEA IN RURAL AREAS OF MONZE DISTRICT

Reference is made to the above subject matter.

I am a student at the University of Zambia, computer number 512807915, pursuing Master of Public Health degree (with specialization in Environmental Health). My study area is Monze rural where WASHE intervention is implemented. I hereby request for permission from your good office to conduct the said research.

I will be grateful if my request is put to your consideration

Thanking you in anticipation

Yours faithfully,

Isaac Sakala

(+260 977 706 303)

Appendix XVIII: Request for Permission from WaterAid Zambia, Monze Office

The University of Zambia

Ridgeway Campus

P.O. Box 50110

LUSAKA

2nd December, 2013

The Programme Officer

WaterAid Zambia, Monze Office

MONZE

Dear Sir/Madam,

RE: PERMISSION TO CONDUCT AN EVALUTION RESEARCH OF WATER SANITATION AND HYGIENE EDUCATION (WASHE) ON INCIDENCE OF DIARRHOEA IN RURAL AREAS OF MONZE DISTRICT

Reference is made to the above subject matter.

I am a student at the University of Zambia, computer number 512807915, pursuing Master of Public Health degree (with specialization in Environmental Health). My study area is Monze rural where WASHE intervention is implemented. I hereby request for permission from your good office to conduct the said research.

I will be grateful if my request is put to your consideration

Thanking you in anticipation

Yours faithfully,

Isaac Sakala

(+260 977 706 303)