Full Length Research Paper

Comparing incidences of diarrhoea between WASHE-serviced and non-WASHE rural areas of Monze district from 2008 to 2012

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Abstract

The main objective of this study was to compare incidences of diarrhea between (WASHE)-serviced and non-WASHE (Water, Sanitation and Hygiene Education) rural areas of Monze from 2008 to 2012 inclusive. The year 2007 was used as the 'before intervention' year. The study was achieved by using a Quasi-experimental study (i.e. non-randomized, but controlled before and after) to help in determining the impact of WASHE programme on incidences of diarrhoea in WASHE-serviced areas. The study site was purposively selected. It included all households in rural areas whether WASHE-serviced or not from the 2007 to 2012 inclusive. A census of WASHE annual reports and the diarrhoea Health Management Information System reports (derived from DHIS2 (District Health Information Software)), from 2007 to 2012 inclusive, were used as secondary data. The six WASHE indicators used in the study were water supply, latrines, hand-washing facilities, dish racks, refuse pits and bath shelter. The findings were that in the WASHE-serviced areas, only latrines and hand-washing facilities (though with the least coverage at 11% and 15% respectively), had significant impact on the incidence of diarrhoea from 2008 to 2012. Linear regression showed a negative relationship between some WASHE indicators (latrines and hand-washing facilities) and the diarrhoea incidences: 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 respectively, with p-values of 0.002 and 0.045 correspondingly. Although with least coverage among other indicators in the WASHE-serviced areas, latrines and hand-washing facilities significantly influenced the incidences of diarrhea in the period of study. The study also concluded that the diarrhoea incidence could not be attributed to the functionality of WASHE intervention only but also to other confounding factors outside the realm of WASHE programme.

Keywords: WASHE, Diarrhoea incidence, Monze, WASHE-serviced areas.

INTRODUCTION

Diarrhoea is one of the major public health issues in the developing world. Generally, areas with low reportage on WASHE (Water, Sanitation and Hygiene Education) have high incidences of diarrhoea, with major fatalities among children under the age of 5. Globally, up to 2.2 million deaths occur due to diarrhoea, 1.3 million of whom are children under the age of 5 (UNICEF, 2010). UNICEF (2013) 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 in the developing world.

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). These 6.6 million people represent about 50% of the total population of

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Zambia. This segment of population is susceptible to diarrhoea diseases as they have low latrine and hand-washing facility coverage at 23 and 2% respectively (ZDHS, 2007).

The DHIS 2012 annual report from Monze District Health Office indicates diarrhoea non-bloody as the number one cause of morbidity and mortality both among the children under the age of 5 and for all ages. It is often not easy to relate the incidences of diarrhoea diseases to WASHE programme alone due to other probable confounding factors that may range from economic or political to socio-cultural makings, hence the reason for attaching diarrhoea incidences to factors other than WASHE factors.

In 1994, the District WASHE (D-WASHE) committee adopted the WASHE strategy only for selected rural areas which recorded high incidences of diarrhoea at the time. This was done through UNICEF support, with the same programme specifications as other developing countries which were already implementing WASHE (Abitol, 1998). The committee developed objectives from which specific activities were planned and implemented as a working diarrhoea prevention strategy. The strategy was headed by the local district council (i.e. local authority) with the help of UNICEF and a local Non-Governmental Organization called WaterAid Zambia (WAZ). The WASHE objectives included promotion of:

Safe water sources through provision of boreholes and hand dug wells;

Safe excreta disposal through construction and use of safe latrines;

Hygiene at every household (through the use of stipulated WASHE indicators); and lastly Capacity building to the D-WASHE and village WASHE (V-WASHE) implementers through workshops, trainings and meetings.

MATERIALS AND METHODS

This was a Quasi-experimental study, with two data sets: one on WASHE coverage and another on Diarrhoea incidence. The WASHE coverage data was obtained from the District Health Office, local Council and Water Aid Zambia (WAZ). The diarrhoea incidence data was obtained only from the District Health Office.
Eight pre-designed data collection tools were used to collect data as follows:

i.   The first data collection tool was used to collect data, on WASHE coverage from the WASHE-serviced areas in the 'before intervention' year. The sources of these data were the district health office, local council and WAZ.

ii. The second data collection tool was used to collect data, on WASHE coverage from the non-WASHE areas in the 'before intervention' year. The sources of these data were the district health office, local council and WAZ.

iii. The third data collection tool was used to collect data, on WASHE coverage from the WASHE-serviced areas in 2008 alone and then cumulatively from 2008 to 2012.

iv. The fourth data collection tool was used to collect data, on WASHE coverage from the non-WASHE areas in 2008 alone and then cumulatively from 2008 to 2012.

v.   The fifth data collection tool was used to collect data on incidences and mortality due to diarrhoea per 1000 population, from the WASHE-serviced areas in 'before intervention' year. These data were obtained only from the district health office.

vi. The sixth data collection tool was used to collect data on incidences of diarrhoea per 1000 population, from the non-WASH areas in the 'before intervention' year. These data were obtained only from the district health office.

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

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

Data analysis was done by using Microsoft Office 2013 – Microsoft Excel (MSExcel) and STATA version 12. MS Excel was used to generate graphs on WASHE coverage and diarrhoea incidences. STATA was used to establish the extent of influence WASHE indicators had on diarrhoea incidences within the period of study.

The two data sets from WASHE-serviced and non-WASHE areas were 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 MS Excel spreadsheet. MS Excel was also used to generate graphs, showing 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 MS Excel spreadsheet. These analyses both in WASHE-serviced and non-WASHE areas helped in concluding on the extent to which the WASHE intervention worked.

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 Water and Sanitation interventions on incidences of diarrhoea in the WASHE-serviced and non-WASHE areas.
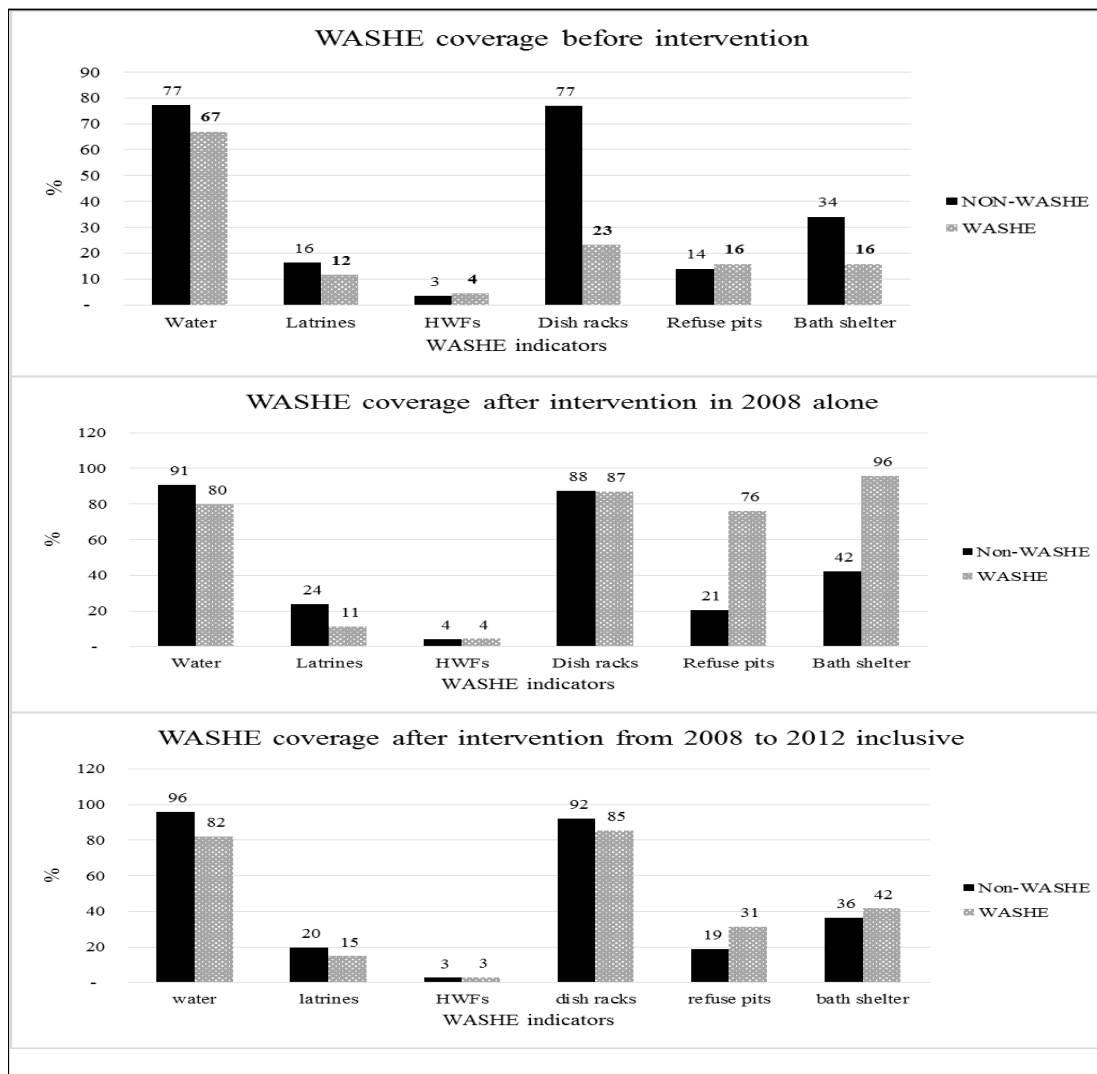
Figure 1. *WASHE coverage before intervention (2007), after intervention (in 2008 alone and on average from 2008 to 2012).*

RESULTS

The study findings were presented in twofold:

▪ Water and Sanitation coverage both in WASHE-serviced and the non-WASHE areas (i.e. before intervention – 2007 and after intervention –from 2008 to 2012).

▪ Diarrhoea incidences both in WASHE-serviced and the non-WASHE areas (i.e. before intervention – 2007 and after intervention –from 2008 to 2012).

The indicators used in this study to determine the impact of WASHE programme on incidences of diarrhoea in rural areas of Monze were: water supply, latrines, hand-washing facilities, refuse pits, dish racks and bath shelters. Figure 1 shows the WASHE indicator coverage both in WASHE-serviced and the non-WASHE areas of Monze. It shows improved water supply coverage in the WASHE-serviced areas from the 'before intervention' year (2007) to 2012. This was exemplified

by 80% in 2008 alone and 82% cumulatively from 2008 to 2012. Latrine and hand-washing facility coverage faltered in the same period at 11% and 15%, in 2008 alone and cumulatively from 2008 to 2012 respectively. However, dish racks, refuse pits and bath shelters showed noticeable improved coverage.

The indicators used to measure incidences of diarrhoea were bloody and non-bloody diarrhoea, severe diarrhoea and mortality due to diarrhoea both among children under the age of five and the people aged five and over. Ideally, the Water and Sanitation intervention reduces the diarrhoea incidences whenever it is managed well. Figure 2 also shows reduced incidences of diarrhoea in the WASHE-serviced areas from 2007 to 2012.

However, the study also showed increased mortality due to diarrhoea among the children under the age of five within the period of study.
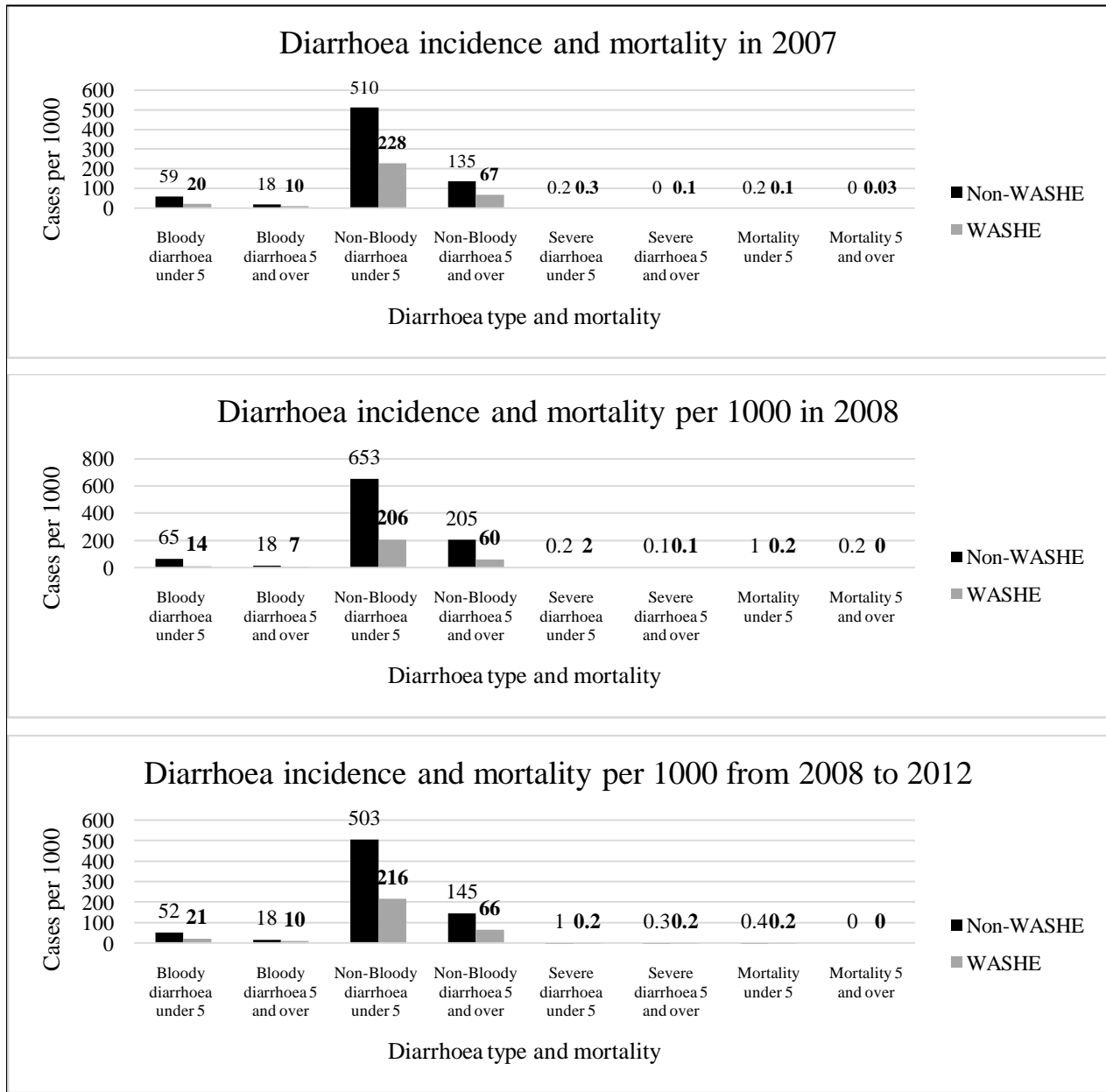
Figure 2. *Diarrhoea incidence and mortality in base year (2007), 2008 alone and on average from 2008 to 2012*

From the coverage in figure 1 and 2, water supply, latrines and hand-washing facilities had influence on the incidence of diarrhoea in rural areas of Monze from 2008 to 2012. Two regression analyses were done to ascertain how much influence these indicators had on diarrhoea incidence. Firstly, linear regression model was done for combined number of diarrhoea cases per 1000, both in WASHE-serviced and non-WASHE serviced areas as shown in (table 1).

The results for the combined data both from WASHE-serviced and non-WASHE areas showed that the number of latrines, hand-washing facilities and water supply significantly influenced the incidences of diarrhoea at 5% significance level with p-values of 0.008, 0.014 and 0.007 respectively. The findings further revealed that there was a negative relationship between diarrhoea incidence (the dependent variable) and WASHE indicators (independent variables = water supply, latrines, hand-washing facilities, refuse pits, dish racks and bath shelters). 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.

The study findings also showed that the low coverage of latrines and hand-washing facilities in figure 1 accounted for the increased numbers of the bloody and the non - bloody diarrhea in figure 2 . This was proved by the results of the regression analysis done on

Table 1. *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. *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

data from WASHE-serviced areas only shown in table 2.

Out of the three independent variables (water supply, hand-washing facilities and latrines), only latrines and hand-washing facilities significantly influenced the incidence of diarrhoea at 5% significance level 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.

DISCUSSION AND CHALLENGES

Discussion

Water, Sanitation and Hygiene-education are three discrete variables which are usually considered separately or sometimes considered as one integrated approach to the handling of 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 also confirmed by WHO/UNICEF (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 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 'before intervention' year data. WHO/UNICEF (2013) also

confirms 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. 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 2. 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.

Out of the six discrete WASHE indicators which were used in the study, only latrines and hand-washing facilities showed influence on incidences of diarrhoea in WASHE-serviced areas. The other indicators did not significantly influence the diarrhoea incidences. However, the extent to which the latrines and hand-washing facilities impacted on the incidences of diarrhoea was not clear. Thus, two regression analyses were done to ascertain how they impacted on the incidence of diarrhoea in the period under review:

I. The first analysis was linear regression model for the number of diarrhoea cases per 1000 population 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 and the interpretation was that an increase in the number of water supply points, latrines and hand-washing facilities reduced the incidence of diarrhoea per

1000 population by 0.036, 0.175 and 0.004 with p-values of 0.008, 0.014 and 0.007 respectively as shown in table 1.

II. The second analysis was the linear regression model for the number of diarrhoea cases per 1000 population 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 population by 0.026 and 0.075 respectively as shown in table 3.

The study findings revealed a decrease in coverage of WASHE indicators from 2008 to 2012 and the increased diarrhoea incidences in the same period.

Challenges

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.

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

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.

CONCLUSION

This study established that in WASHE-serviced areas, the latrines and hand-washing facilities (though with the least coverage), had significant influence on the incidences of diarrhoea. The relationship of diarrhoea incidences and the WASHE indicators was negative: an increase in the number of latrines and hand-washing facilities reduced diarrhoea incidences per 1000 population at 5% confidence interval by 0.026 and 0.075 respectively. The study concluded that only some of the WASHE indicators significantly influenced the incidence of diarrhoea in the period of study.

RECOMMENDATIONS

The local stakeholders that are involved in Water and

Sanitation programmes should conduct studies to establish why there is low coverage of latrines and hand-washing facilities despite the WASHE programme so that the problem of high diarrhoea incidences could be addressed.

Ministry of Local Government and Housing and Ministry of Health should mobilize to have inter-sectoral meetings or agreements 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

Monze DHO should update or create data base from 2008 going backwards in the new DHIS2 application which starts only from 2009. Old data is often needed during researches.

Monze District Council should create separate data bases for urban and rural WASHE programmes and segregate them per year so it could be used easily.

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