

Research Article

Assessing Factors Contributing to Inadequate Number of Handwashing Facilities in Shimano Ward of Nkeyema District in Western Province, Zambia

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Abstract

The research study was conducted in Shimano ward in Nkeyema District of Western Province in the Republic of Zambia demarcated into 8 wards with 11 Health facilities. The aim of the study was to assess factors contributing to inadequate number of handwashing facilities and its effects on diarrheal diseases and failure to attain Open Defecation Free (ODF) status. It is documented that washing hands with soap at all critical times is needed to prevent diseases. Currently statistics shows that only 47% of Zambian people have access to adequate sanitation including hand-washing facilities and use, further in 2005, it was estimated that only 13% of the rural households in Zambia had access to proper household sanitation facilities but there is limited data available on hand-washing practices. Hand washing with soap is the most cost effective intervention in preventing and control diarrheal related disease outbreaks as compared to toilet use and drinking clean, adequate safe water supply. The study used a questionnaire survey combined with field observation method to collect raw or primary information and reviewing of reports. A descriptive cross-section study design was implored targeting 30 villages of the Shimano ward and Health catchment area. A study population involved 300 household heads in 30 villages and the purpose of the study was to assess factors contributing to inadequate number of handwashing facilities and its effect on attaining Open Defecation Free (ODF) villages and disease incidences in Shimano ward. The study results revealed that a total of 101 households 67.33% of the households had handwashing facilities and 86 households had soap, representing 57%, while 12 households had ash (8%). The study further revealed that 141 households had toilets, representing 94% therefore the toilet coverage is very high, followed by hand washing facilities at 67.3% and hand washing facilities with soap at 57%. In conclusion, the study revealed that indeed the number of Hand washing facilities are inadequate at 67.33% but better than the findings in Tanzania that indicated 1.2% coverage with 57% availability of soap again better than the results in Tanzania at 8%. hence attributing to factors inadequate commitments to construct HWFs with soap.

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Keywords

Assessing Factors, Adequate Toilet, ODF Parameters, Hygienic Handwashing, Type of Handwashing Facilities, Abrasion, Father of Hand Hygiene, Shimano Ward, Zambia

1. Introduction

There are inadequate handwashing facilities and practices of handwashing at all critical times in Shimano ward and health catchment area of Nkeyema District of western province in the Republic of Zambia even when Government of the Republic of Zambia working with NGOs such as World Vision Zambia and Water aid invested a lot of money to implement the Community Led Total Sanitation programme which is a national vehicle towards achieving the Zambia 2030 ODF strategy.

Hand washing facility construction and use is a big component of the Community Led Total Sanitation (CLTS) as it is one of the 4 (four) parameters of Open Defecation Free (ODF) together with other three (3) which is smooth cleanable floors, Lid or cover on the toilet and superstructure providing privacy.

Therefore the Chiefdoms, wards, catchments and villages cannot become, claim, verify and certify open defecation free as it is a general observation that the toilet coverage in any community is always high or good but the ODF coverage is correspondingly low or poor mainly because of lack of Handwashing facilities with soap.

The availability of handwashing facilities with soap and practices are not only critical to attain and sustain open defecation free (ODF) but also critical for the general public health of the populations as the studies have showed that handwashing facilities with running water and soap can prevent diarrheal diseases including cholera and typhoid by 47-50% including other respiratory diseases or infections such as SARS e.g. COVID 19 and in this regard handwashing remains the number one tip during current pandemic for preventing the spread of Coronavirus (COVID-19).

Therefore, hand hygiene is really important to prevent the spread of the COVID- 19 virus because it also interrupts transmission of other viruses and bacteria causing common colds, flu and pneumonia, thus reducing the general burden of disease. [1] Lucyna Gozdzielewska stated that the hand washing facilities and coverage has since skyrocketed since the occurrence of the COVID 19 that has led to a drastic increase in both hand washing facility construction and hand washing practices especially in trade premises and Public institutions mainly in the urban areas due intensified enforcement of the set regulations and guidelines by Local Authorities. However, wide gaps in coverage exist between toilet construction and use compared to hand-washing facility provision and practices in the same communities affecting the

declaration of most communities attaining the Open Defecation Free Status (ODF) as stated above on the ODF requirements.

Although awareness of the importance of hand hygiene in preventing infection with the COVID-19 virus is high, *access to hand hygiene facilities that include alcohol-based hand rubs* as well as soap and water is often suboptimal in the community and in health care facility settings, especially in low-and middle-income countries is low or poor.

According to the Centers for Disease Control and Prevention (CDC), hand hygiene is the single most important practice in the *reduction of the transmission of infection in the healthcare setting*. However, despite this evidence, studies have repeatedly shown that the importance of hygiene has *not been adequately recognized amongst healthcare professionals and compliance remains low*. Historically handwashing with soap or any abrasion was introduced by a Physician in Austria Hospitals called [2] Ignac Fulop Semmelweis (1818-1865).

In 2007 Zambia introduced an approach for improvement of sanitation called Community Led Total Sanitation which is the methodology that empowers the local people to analyse their won sanitation situation and understand they are actually practicing open defecation (OD) and upon realizing that they begin to construct toilets using the locally available materials and resources without external hardware subsidy.

These toilets constructed must have the following ODF parameters:

- 1) Superstructure providing privacy
- 2) Hand washing facility with running water and soap
- 3) Lid or cover for toilet hole
- 4) Smooth cleanable floors

Since 2007 a total of 53 Chiefdoms have been certified and declared Open Defecation Free (ODF) out of 288 Chiefs gazetted represented 17% and these ODF Chiefdoms are distributed in all the Province in Zambia except Lusaka and Western Provinces.

It has always been observed that in most areas the toilet coverage is very high but the settlements and Chiefdoms fails to attain ODF mainly due to lack of hand washing facilities hence the main purpose or aim of the study was to understand the handwashing facility coverage and how it was affecting the catchment area from becoming ODF as a result of lacking the hand washing facilities and the other aspect was on the effects of hand washing of the disease occurrence and

distribution in the Shimano catchment area.

In Zambia only 47% of people have access to adequate sanitation and inclusive hand-washing facilities and use as official estimates in 2005, stated that only 13% of the rural households in Zambia had access to proper household sanitation facilities and but there is limited data available on hand-washing practices indicates that around half of rural women and men wash hands after using the toilet, with hardly any of them using soap or another hand-washing medium.

The Community led total sanitation (CLTS) sanitation action group (SAG) reports at National Rural Water Supply and Sanitation Unit at Nkeyema Town Council shows that Shimano ward and Health facility catchment area has a total of 30 villages with 1,222 households and 999 toilets with 285 hand-washing facilities providing the coverage as follows: no. of villages = 28, no. of households 1,222, no. of households with toilets 999 (82%), no. of toilets with HHs 285. (29%) and in the year 2022 recorded a total of 6,244 diarrheal-related cases were recorded in Nkeyema District in 2022 and reduced to 4,617 cases in 2023 and the reduction of 1,627 cases representing a case reduction of 26% is clear evidence that the Community Led Total Sanitation intervention is yielding results although diarrheal diseases is ranked number 3 on the top 10 cause of morbidity.

2. Literature Review

Handwashing has been recognized as important in medicine for almost seven centuries, but during the early history of medicine, this practice was not widely acknowledged, and it was first connected with religious and magical practices. It later became a communal activity, but only lately has handwashing been linked to antisepsis and cleanliness. Since the introduction and validation of the historical idea, great progress has been made in the application of recommendations for the improvement of hand hygiene. For instance, it has been demonstrated that effective hand hygiene reduced fatalities from respiratory and diarrheal infections in children under five by 21 and 30%, respectively. Yet, by 2021, an estimated 2.3 billion people worldwide were unable to wash their hands at home with soap and water, and one-third of the world's health institutions would lack hand hygiene tools at the point of service and to demonstrate this the Hand Hygiene for All program and the World Hand Hygiene Day or global handwashing day was established by UNICEF, WHO, and other partners in an effort to channel enthusiasm surrounding hand hygiene into long-term, sustainable change. Unfortunately, early forerunners of antisepsis were overlooked and they did not see the results of their work. Semmelweis, like Holmes, was left to make the same painstaking discovery on his own. However, Holmes quoted Gordon to support his claims and while repeating his views in 1855 also referred to Semmelweis. We can only speculate as to whether Semmelweis knew about the work undertaken overseas. A ban on international literature did no

good for scientific work in Central Europe between 1820 and 1848. At least he might have read some of them around 1860 since he responded to criticism in great detail. Semmelweis might have been aware of the book by Zsoldos, which was part of the medical curriculum. What we know for certain is that Semmelweis was eventually redeemed but only after he had been driven to insanity. Similar to Semmelweis, Gordon was also persecuted. Several factors combined could have led to the rejection of the hypothesis of the early pioneers that stressed a link between hygiene and infections, but the major reason was the primal human behavior dominant in the medical community of the time, which favored sticking to existing beliefs and rejecting new ideas that contradicted them. This tendency is now often referred to as the Semmelweis reflex, which is still dominant in the current pandemic in the refusal to wash our hands.

Handwashing is a socially influenced behavioral phenomenon. It is comparable to other preventative habits in that there are no immediate positive or negative repercussions to participating or avoiding the activity. As a result, it lacks intrinsic reinforcing qualities. Despite its ancient historical origins in magic and religion, the behavior has yet to become regular in many circumstances. The forerunners of handwashing were met with nothing but ignorance and mockery.

Hand washing with running water and soap removes germs from hands and prevents illnesses and spread of infections to others because:

People frequently touch their eyes, nose, and mouth without even realizing it and in this regard germs can get into the body through the eyes, nose and mouth and make us sick.

The pathogens from unwashed hands can contaminate foods and fluids while people prepare or consume them this is because germs can multiply in some types of foods or drinks, under certain conditions, and make people contract diseases.

The pathogens from unwashed hands can be transferred to other objects, like handrails, tabletops, door handles, taps and then transferred to another person's hands henceforth exchanging germs.

Therefore handwashing practices in the community can help them to stay healthy and achieve the following public health benefits:

Reduces the number of people who get sick with diarrhea by 23-40%

Reduces diarrheal illness in people with weakened immune systems by 58%

Reduces respiratory illnesses, like colds, in the general population by 16-21%

Reduces absenteeism due to gastrointestinal illness in schoolchildren by 29-57%

Further other literature states that globally about 1.8 million children under the age of 5 die each year from diarrheal diseases and pneumonia, the top two killers of young children however handwashing with soap could protect about 1 out of every 3 young children who get sick with diarrhea, and almost

1 out of 5 young children with respiratory infections like pneumonia and diarrhea accounts for 1.8 million deaths in children in low- and middle-income countries (LMICs) as stated above one of the identified strategies to prevent diarrhea is hand washing. It is globally estimated that the rates of handwashing after using the toilet are only 19% which is a very low coverage and a worrisome state of affairs even when the benefits of handwashing are clearly indicated that it can prevent about 30% of diarrhea-related sicknesses and about 20% of respiratory infections (e.g., colds), nonetheless, evidence suggests that washing hands for about 15-30 seconds removes more germs from hands than washing for shorter periods. Accordingly, many countries and global organizations have adopted recommendations to wash hands for about 20 seconds (some recommend an additional 20-30 seconds for drying). Hand washing at all critical times with running water and soap is key aspect or effective intervention for disease prevention and control of outbreaks such as diarrheal related and respiratory infections.

A study of the World Health Organization indicated that for every \$1 spent on improving sanitation, \$9.1 is saved in health, education, social development and other areas and that it is estimated worldwide 5.5 billion productive days per year are lost due to diarrhea alone [3] (Haller L. et al. 2007, from NGO WASH Forums. The state of sanitation in Zambia, 2008).

Consistent use of latrines can thus reduce the incidence of diarrhea by up to 40% and hand washing with soap at critical times by up to 50% (AMCOW, DfiD, the World Bank and WSP: A review of the sanitation and hygiene status in 32 countries:

It is in this vein that the study wants to find out the factors that lead to the low hand washing facility construction or provision and practice with soap at all critical times, especially before touching, eating foods and after use of the toilets.

Studies shows that using adequate safe water supply alone will prevent diarrheal diseases by 16%, while toilet use alone will prevent diarrhea by 36% and hand washing practice or use at all critical times with soap will prevent diarrheal diseases by 47% henceforth hand washing practice at all critical times with soap is the most effective intervention on prevention of diarrheas.

Yet studies show that only 67% of people practice any sort of hand hygiene. Researchers believe that this number is low because while most people have a vague idea that hand washing is important, many don't have a grasp of the facts. We've put together a list of some of the most interesting (and shocking!) facts about hand washing so you can see why practicing proper hand hygiene is so vitally important.

Although people around the world clean their hands with water, very few use soap to wash their hands. Washing hands with soap removes germs much more effectively. Millions of children under the age of 5 years die from diarrheal diseases and pneumonia, the top two killers of young children around the world. Hand washing is not only simple and inexpensive,

but remarkably, hand washing with soap can dramatically cut the number of young children who get sick. Hand washing with soap could prevent about 1 out of every 3 episodes of diarrheal illnesses and almost 1 out of 6 episodes of respiratory infections like pneumonia [4] (globalhandwashingday.org).

Findings of a study on effect of hand washing on child health in the United States of America revealed that: children younger than 5 years in households that received plain soap and hand washing promotion had a 50% lower incidence of pneumonia than controls (95% ci (-65% to -34%). Also, compared with controls, children younger than 15 years in households with plain soap had a 53% lower incidence of diarrheal (-65% to -41%) and a 34% lower incidence of impetigo (-52% to -16%).

The interpretation is that hand washing with soap prevents the two clinical syndromes that cause the largest number of childhood deaths globally- namely, diarrhea and acute lower respiratory infections. Hand washing with daily bathing also prevents impetigo.

Keeping hands clean through improved hand hygiene is one of the most important steps we can take to avoid getting sick and spreading germs to others. Many diseases and conditions are spread by not washing hands with soap and clean, running water, and if soap and water are unavailable, use an alcohol-based hand sanitizer that contains at least 60% alcohol to clean hands.

Hands should be cleaned before, during and after preparing food, before eating food, before and after caring for someone who is sick, before and after treating a cut or wound, after using the toilet, after changing diapers or cleaning up a child who has used the toilet, after blowing your nose, coughing, or sneezing, after touching an animal, animal feed, or animal waste, after handling pet food or pet treats and after touching garbage.

According to the report of the Zambia Demographic and Health Survey (DHS) [5] found that:

64% of the population uses basic drinking water services (87% in urban areas, 49% in rural areas),

33% of the population uses a basic sanitation service (41% in urban areas, 28% in rural areas),

10% of the population practices open defecation (1% in urban areas, 16% in rural areas),

24% of the population has access to basic hygiene services, i.e. a handwashing facility with soap and water (36% urban, 15% rural).

SDG global indicator 6.2.1. [6] states that population with a basic handwashing facility with soap and water available on premises as 70 countries had comparable data available on handwashing in 2015.

In 2015, 1. 70 countries had comparable data available on handwashing with soap and water, representing 30 per cent of the global population. 2. Coverage of basic handwashing facilities with soap and water varied from 15 per cent in sub-Saharan Africa to 76 per cent in Western Asia and

Northern Africa, but data are currently insufficient to produce a global estimate or estimates for other SDG regions.

In the least developed countries, 27 per cent of the population had basic handwashing facilities with soap and water, while 26 per cent had handwashing facilities lacking soap or water [7]. The remaining 47 per cent had no facility.

In sub-Saharan Africa, three out of five people with basic handwashing facilities (89 million people) lived in urban areas. Many high-income countries lacked sufficient data to estimate the population with basic handwashing facilities.

Zambia remains one of the countries in Africa with the least access to water, sanitation and hygiene services. [8] According to the 2017 WHO/UNICEF Joint Monitoring Programme (JMP) for Water Supply and Sanitation, 61% of Zambia's population had access to basic drinking water services, and 31% had access to basic sanitation services in 2015. An estimated 15% of the population practiced open defecation, while only 14% of households had access to a handwashing facility with soap and water in 2015. 24% of the population has access to basic hygiene services, i.e. a handwashing facility with soap and water (36% urban, 15% rural).

Diarrhea is the third largest killer of children under the age of five in Zambia. This is especially prevalent in rural areas where less than half of all rural women and men (43%) use soap or another appropriate medium to wash their hands after relieving themselves and before cooking and eating.

Poor sanitation costs Zambia 946 billion Zambian Kwacha each year, equivalent to US\$194 million, * [9] according to a desk study carried out by The Water and Sanitation Program (WSP). This sum is the equivalent of US\$16.4 per person in Zambia per year or 1.3% of the national GDP. • 4 million Zambians use unsanitary or shared latrines. • 2.1 million have no latrine at all and defecate in the open. • The poorest 20% is 12 times more likely to practice open defecation than the richest 40%. Open defecation costs Zambia USD\$71 million – yet eliminating the practice would require less than 420,000 latrines to be built and used.

During recent years, Zambia has been losing 1.3% of its gross domestic product (GDP), approximately ZMW 946 million or US\$194 million annually, due to poor sanitation.

Poor sanitation costs Zambia 946 billion Zambian Kwacha each year, equivalent to US\$194 million,* according to a desk study carried out by [10] The Water and Sanitation Program (WSP). This sum is the equivalent of US\$16.4 per person in Zambia per year or 1.3% of the national GDP. • 4 million Zambians use unsanitary or shared latrines. • 2.1 million have no latrine at all and defecate in the open. • The poorest 20% is 12 times more likely to practice open defecation than the richest 40%.

Official statistics from CSO showed a clear trend in the reduction of open defecation in rural areas, from 36% of rural households practicing open defecation in 1996 to 19% in 2006. The household survey of 522 households showed similar results, with 22% of households practicing open defecation.

CSO estimated that in 2005, only 13% of the total rural population had access to proper sanitation facilities.

Washing hands with soap and water is the best way to reduce the number of microbes on the hands in most situations, and if soap is not available, use an alcohol-based hand sanitizer that contains at least 60% alcohol.

Other studies state that 80% of communicable diseases are transferred by touch [11]:

“Touch” refers primarily to the touching of food, or the touching of one's own mouth, eyes, and nose and anal area or bottom habitually, accidentally and during anal cleansing and it is not simply person-to-person contact.

Touching food with contaminated hands spreads foodborne illnesses like Salmonella, E. Coli, Staphylococcus, and diarrheal infection. Proper hand washing can reduce diarrhea rates by 47%.

Diarrhea remains the second most common cause of childhood morbidity and mortality (illnesses and deaths).

Touching the face with contaminated hands spreads illnesses like pneumonia, the cold, and the flu, and proper hand washing can reduce respiratory infections by close to 20%. Pneumonia remains the number one cause of childhood death.

The most critical times for hand washing are before preparing food and after going to the bathroom:

Only 20% of people wash their hands before preparing food.

Less than 75% of women and less than 50% of men wash their hands after going to the bathroom.

Every time a toilet is flushed with the lid up, a fine mist containing bacteria such as E. Coli and Staph is spread over an area of 6 square meters. The area around sinks in public bathrooms is 90% covered in such bacteria.

Hand washing and hand hygiene initiatives significantly reduce the number of absences, sick leaves, and lost productivity. [12] A study of Detroit school children showed that those who washed their hands had 24% fewer sick days due to respiratory illness and 51% fewer sick days due to upset stomach. In China, the distribution of soap in primary schools resulted in 54% fewer sick days. The use of hand sanitizer in the classroom resulted in 20% fewer sick days across 16 different elementary schools.

Numerous studies have shown that promoting the frequency of hand washing can prevent about 30% of diarrhea-related illnesses and about 20% of respiratory infections through efforts such as community hand washing education, diarrhea can be reduced by 23–40% as for people with poor compromised immunity, their proper hand washing can reduce certain infectious diseases by 58%, while respiratory diseases such as cold will be reduced by 16–21%. This simple prevention measure can also have lasting impacts. Some research has reported that rates of absenteeism among primary school students due to gastrointestinal diseases can be reduced by 29–57% with the implementation of hand washing. For this reason, The World Health Organization (WHO)

advises the public to wash their hands frequently as a part of basic protection against COVID-19.

A study by Alba et al. showed that for every unit of improvement in hand washing frequency, typhoid infection rates decreased by about 62%. The study found that hand washing more than 4 times per day was a protective factor in reducing disease risk.

Thus, research on the frequency of hand washing and its effect on prevention of disease is not consistent. Hence, the purpose of this study was to conduct a systematic review to explore the relationships between the frequency of hand washing and the effect of disease prevention, and develop more comprehensive suggestions on the frequency of hand washing (available at <http://dx.doi.org/10.21037/atm-20-6005>).

In the study above a total of eight studies were included in the systematic review, when carefully analyzed showed generally no statistically significant difference in the impact of frequency of hand washing on disease occurrence or symptoms, although hand washing more than 4 times per day may be better than hand washing less than 4 times per day. A few low-quality pieces of evidence showed that hand washing more than 10 times per day could reduce the risk of respiratory and gastrointestinal diseases better than hand washing less than 10 times per day.

According to the results of this meta-analysis [13], hand washing more than 10 times per day can effectively reduce the risk of respiratory disease infection compared to hand washing less than 10 times per day, as determined in another study. Similar results have been observed in a previous systematic review, which pooled reviews from six case-control studies on varying public health interventions. The results showed that hand washing more than 10 times per day could effectively reduce the risk of the transmission of SARS. Additionally, as seen in the findings of this study, hand washing more than 10 times per day was better than more than 4 times per day in the prevention of the transmission of respiratory diseases, and the difference was found to be statistically significant. In other words, to some extent, it may be because insufficient hand washing frequency every day can't ensure the reducing the risk of diseases at critical moments. These critical moments include eating, inserting or removing contact lenses, preparing food, using the toilet, changing diapers or cleaning up children who have used the toilet, blowing your nose, coughing or snoring, contacting animals and their feed or waste, disposing of garbage, handling pet food, treating wounds or caring for patients and obviously dirty hands.

Some studies have shown that hand hygiene is more effective in reducing gastrointestinal diseases than in preventing respiratory diseases. Huang et al., for example, showed that hand washing 7 times per day versus 4 times per day resulted in fewer episodes of diarrheal illness. However, the study only included one gastrointestinal disease. Three studies showed no difference between different hand washing frequencies and the reducing the risk of respiratory diseases.

Two possible reasons may account for this result. On one hand, hand hygiene may have different effects on the prevention of different diseases. Multiple transmission routes of respiratory infections, for example, may mean that frequent hand washing may be ineffective. On the other hand, participants were students or adults in these three studies. However, in five other studies, participants were patients and were matched to controls showed the opposite results. Therefore, hand washing frequency may have different effects on disease prevention for different groups.

The hand washing frequency may be affected by many factors, such as gender, age, economic condition, education level, handwashing compliance and religious culture etc. The data shows that after exposure to pollutants, handwashing frequency in high-income countries is higher (48–72%), while that in low-income countries is only 5–25%. The low compliance of medical staff and the general public (22–59.6%) can explain low handwashing frequency to some degree.

A systematic review showed that setting long-term hand washing reminders or regular repeated feedback can improve the enthusiasm of medical staff to wash their hands. The implementation of health education to promote hand hygiene can effectively support children, medical staff, and patients to improve their hand washing frequency and technique. At the same time, improvements in hand washing facilities can also increase the frequency of hand washing, such as the availability of soap or hand sanitizer, as well as a clean napkin to dry hands. Based on these differences, health workers need to develop a detailed education plan to improve people's enthusiasm for handwashing, so as to increase the handwashing frequency. These can refer to the WHO and the CDC in their hand hygiene guidelines and website materials and the need for the user (e.g., hospital) to adapt it to their culture and think of hand hygiene as a whole system.

It is recommended that future large-scale, high-quality hand washing frequency studies be conducted among different populations and different diseases. Besides, for the same population, the same disease prevention test should verify whether there is a certain frequency range relationship between the effect of handwashing frequency and disease occurrence.

The studies were conducted in New York in 2006–08 amongst 509, mainly Latino households in Hong Kong during 2008 amongst 259 households of patients, who presented with symptoms of acute respiratory illness and in rural area in Bangladesh in 2009–10 amongst 384 household compounds of index case-patients. In all studies, households or compounds were randomized into study arms. In both Larson et al. and Cowling et al., there were three study arms, including education only, education and ABHR and education with ABHR and mask wearing by caretaker and person showing symptoms of influenza. In Ram et al. the intervention consisting of education, set up of hand washing stations, provision of soap and water, and HH cue cards, was compared against the control arm in which no intervention was applied.

The outcome measure in all three studies were laboratory-confirmed influenza incidence and/or influenza transmission (i.e. secondary attack rate) within the household.

Larson et al. found the group, which received ABHR and education regarding ABHR use and the prevention of respiratory infections, included significantly more household members without any symptoms (57.6%) as compared with the education group (49.4%) and the education, ABHR and face mask group (38.7%) ($p < 0.01$). However, no significant difference in influenza acquisition rates was found between the education group and education and ABHR ($p = 0.2$) or education, ABHR and face mask group ($p = 0.9$). Likewise, Ram et al. observed no significant difference in secondary attack ratio amongst the susceptible members of the households of laboratory-confirmed index patients in the intervention compounds (9.6%) and the control compounds (4.0%) (2.40, 95% CI: 0.68, 8.47; $p = 0.17$). However, as noted it is not clear from the studies when HH was performed.

Cowling et al. demonstrated some effect of an HH intervention, consisting of soap and ABHR provision, demonstration of correct HH technique and education about the importance of HH for preventing influenza transmission. Household-level secondary attack ratios were 14% in the HH group in comparison with 24% in the education-only group, and 18% in the HH and face masks group. However, this difference was not significant ($p = 0.37$). Yet, a significant difference in the secondary attack ratios was found between the groups if the intervention was implemented within 36 hours of symptom onset in the index patient (4% in face masks & HH group, 5% in an HH group and 12% in education only group; $p = 0.04$), suggesting a benefit in early implementation of a combination of HH and face masks. But the relative contributions of the interventions were not shown; thus, the individual effect of each of these two interventions is not known and it remains uncertain how these two interventions effected the outcomes.

School children

Three cRCTs focusing on elementary school children, including 44,451 pupils from 60 schools in Cairo in 2008, 3360 pupils from 10 schools in Pittsburgh during the 2007–2008 influenza season and 10,855 pupils from 24 schools in Dhaka in 2015 influenza season.

In each study, participating schools were randomised to an educational intervention or control group which received no intervention. Interventions consisted of HH education through entertainment activities, booklets and posters and washing hands at least twice a day, HH and respiratory hygiene training, presentation of correct HH and teaching children to use it at least four times a day, or provision of ABHR in classrooms and outside the toilets, provision of training to teachers, and incorporating HH and respiratory hygiene education into curriculum.

Furthermore, in Stebbins et al. and Biswas et al., children were taught to use ABHR at specific times, i.e., upon arrival to school or entering the classroom, when leaving school,

before and/or after lunch, after sneezing, coughing, or blowing their nose and after using the toilet.

Talaat et al. found the rate of laboratory-confirmed influenza was higher among pupils who reported their illness in the control schools (35%) than in the intervention schools (18%; $p < 0.01$). A significant effect of the intervention was also observed by Biswas et al. with the incidence of laboratory-confirmed influenza per 1000 student-weeks among children in the intervention schools found to be 53% lower than in the control schools (incidence rate ratio [IRR]: 0.5; 95% CI: 0.3, 0.8; $p = 0.01$). [14] Stebbins et al. reported significantly fewer influenza A infections in the intervention schools, in comparison with control schools (IRR: 0.48; 95% CI: 0.26, 0.87; $p < 0.02$); however, observed no significant effect of the intervention when the total number of laboratory-confirmed influenza cases was considered (IRR: 0.81; 95% CI: 0.54, 1.23; $p = 0.33$).

In Tanzania a study was conducted to measure the effects of the sanitation and handwashing interventions on the health of children under five years old. These children represent the age group most susceptible to diarrheal disease, growth faltering and acute lower respiratory infections, which are major causes of childhood morbidity and mortality in developing countries.

Approximately 70% of Tanzania's population lives in rural areas characterized by subsistence livelihoods, poor access to health and education services, and high morbidity and mortality rates. [15] The 2010 Demographic and Health Survey estimated that 13.6% experienced diarrhea within a 2 week period, and 57.8% could be classified as anemic. Stunting and wasting, as measured by height-for-age and weight for-age z-scores, is also commonplace, with 44.5% of children under 5 falling below two standard deviations of the reference population mean in height-for-age measures and 4.9% for weight-for-age measures. Less than half of the rural population has access to an improved water source, and more than half spends over 30 minutes collecting water.

The country experienced a rapid acceleration of sanitation coverage following a cholera outbreak in the late 1970s, with widespread adoption of basic latrines in rural areas. Coverage in rural areas was estimated at 50 percent by 1980 and the 93/94 HRDS16 survey found that 92.3% of rural Tanzanian households had a traditional or improved pit latrine. Over time, these (mostly shared) facilities gradually fell into disrepair and, currently, do not meet the JMP standards for "improved" sanitation World Bank, 1996. As such, while most [16] Tanzanian households have access to some form of latrine, the majority of these latrines can be more accurately described as 'fixed-point open defecation'. While approximately 80% of households have access to a pit latrine, only 8% have a slab to ensure that fecal matter is safely separated from human contact. Open defecation continues to be the most common form of toileting among 18% of households and child feces are disposed of in an unsafe manner 40% of the time.

While 80% of households have a pit latrine with slab or VIP

latrine, more than 40% of these slabs are in disrepair and a third of the facilities are shared with other households. Furthermore, only 17% of these latrines have a cover for the squat hole to contain the feces and reduce potential transmission by flies, and more than two-thirds of the households with squat hole covers did not have them in place when visited. It was observed that 82% of caregivers knew that handwashing with soap and water is the best method for cleaning hands, while only 8% of households have any soap visible near the place where hands are washed and only 1.2% have a fixed handwashing device.

In-depth structured observations revealed that any form of handwashing at critical junctures, such as post-toileting or before eating, is low (27%), and washing hands with soap is substantially lower (4%).

The program conducted extensive formative research on barriers to handwashing with soap, and the following barriers were identified included a lack of both time and cues (e.g. handwashing stations) that are helpful in reinforcing habits. In light of these barriers, HWWS promoted an enabling technology called the “tippy tap” that provides an external cue to handwashing with soap. It comprises a simple handwashing station equipped with water and soap (made cheaply using local materials) (Coombes & Paynter, 2010).^[17]

Furthermore, while the presence of soap by a handwashing station is 8% in the control group, this proportion is unchanged in the handwashing and combined wards and actually declines slightly (significant at the 10% level) in TSSM wards. Households in the TSSM and combined group report higher expenditures on soap in the last month. The intervention does not have an impact on the probability of having any form of handwashing station, including mobile stations, regardless of whether soap is present (48% of households do), While only 1.2% of control households have a fixed handwashing station, this proportion increases by 1.7 and 2.8 percentage points respectively in HWWS and combination groups. Most of this change is driven by the presence of “tippy taps”, which were included as fixed handwashing stations. While statistically significant, these numbers remain small – a total of 22 tippy taps were observed in the entire sample, which questioned the sustainability of this intervention. Only 3.7% of control households have a handwashing facility within 6 meters of their latrine, and this proportion increases by 6.3 percentage points in combination wards (but not the stand alone groups). Though in absolute terms the presence of latrines with handwashing facilities in combination wards is still relatively small (about 10% of households), this result may reflect an interaction of the TSSM and HWWS interventions whereby households exposed to both types of messages are more likely to install new latrines with a handwashing station nearby.

Moreover, while 47% of respondents report washing hands

after fecal contact in the last 24 hours, only 12% of individuals washed hands after fecal contact in the direct observation sub-sample. There is a 7.7 percentage point increase in self-reported handwashing before food preparation in the HWWS group over the 15% reported in the control group (and no significant impacts in the TSSM or combination groups). In the direct observation sample, there is a 1.6 percentage point increase in the likelihood of observing handwashing when handling food or feeding among members of the HWWS and combination groups, over a mere 1.3% of handwashing observed at this junction in the control group.

National Level handwashing facility and practice Coverage

In Zambia the Ministry of Local Government and Housing has set the minimum target of 60% for hand washing facilities and practice as provided for in the and below are some statistical data on access to water and sanitation. The majority of women and men in the households’ survey and FGDs indicated they always washed hands before eating, while far less did the same after defecation, even less women washed hands after cleaning the bottoms of their children after the children defecated, indicating that children’s feces were considered less dangerous than those of adults.

Key Statistics

4.8 million people (36%) are without access to clean water.

6.6 million people (50%) are without access to sanitation facilities.

More than 25% of basic schools do not have access to safe water supply and sanitation.

Zambia has set the year 2030 as a target for the attainment of Open Defecation Free (ODF), and that all the 288 chiefdoms and 106 districts must all be declared Open Defecation Free where every household shall have an adequate toilet that includes a hand washing facility with running water and soap or ash available and utilized including other 3 parameters of smooth cleanable floors, superstructure providing privacy and lid or toilet covers on the orifice.

According to the data from the CLTS database at Nkeyema Town Council it showed that community members have responded very well on toilet construction and use as compared to the construction of hand-washing facilities and practices in Shimano ward and health catchment area.

Shimano Ward: CLTS data

Shimano ward has a total of 28 villages with 1,222 households and 999 toilets with 285 hand-washing facilities providing the coverage as follows: no. of villages = 28, no. of households 1,222, no. of households with toilets 999 (82%), no. of toilets with HHs 285. (29%).

Shimano Ward in Nkeyema District: Disease Patterns

According to the 2022 and 2023 disease aggregated data on the top 10 causes of morbidity for Nkeyema District as captured on the DHIS 1, the following were the top 10 diseases causing morbidity:

Table 1. Top 10 Cause of Morbidity 2022-2023 in Nkeyema District.

No	Name of disease	2022	2023	Variance
1	Malaria confirmed cases	40,851	39,050	-1,801
2	Respiratory non-pneumonia	25,927	20,642	-5,285
3	Diarrhea (non-bloody)	6,244	4,617	-1,627
4	Lower back pain disease (new)	2,145	2,669	+524
5	Dental caries	2,088	2,380	+292
6	Gastritis disease	2,078	1,531	-547
7	Headache tension disease (new)	1,610	2,096	+486
8	Dermatitis disease (new)	1,164	705	-459
9	New	799	498	-301
10	Injuries/wounds disease (new)	785	699	-86

Source: Nkeyema DHIS 2.

Feacal oral route transmits diseases and other hygiene-related diseases: a total of 6,244 diarrheal-related cases were recorded in Nkeyema District in 2022 and 4,617 cases in 2023.

Diarrheal cases are highly ranked on the morbidity table above on no. 3, with dental caries ranked no. 5 and dermatitis diseases no. 8, and all these are due to poor environmental and personal.

There is only one health facility in the Shimano ward called Kahare Rural Health Centre that recorded a total number of diarrheal diseases non bloody of 454 in 2022 and 611 cases in 2023. In both 2022 and 2023, the diarrheal diseases non bloody was ranked no. 4 on the cause of morbidity in Shimano ward captured at Kahare RHC.

Other factors are not understanding and appreciating the benefits or importance of hand washing as key to disease prevention. It contributes 47% effectiveness of diarrhea prevention and control more than latrine use and availability of adequate clean water supply and other hygienic parameters. Currently, the target for hand washing in rural Zambia is 80%,

Table 2. Top 10 Cause of Morbidity 2022 -2023 in Kahare RHC Shimano Ward.

No	Name of disease	2022	2023	Variance
1	Malaria confirmed cases	4,189	4,442	+253
2	Respiratory infection (non-pneumonia)	2,593	2,233	-360
3	Lower back pain disease (new)	518	295	-223
4	Diarrhea (non-bloody)	454	611	+159
5	Gastritis disease	155	75	-80
6	Dental caries	154	376	+222
7	Headache tension disease (new)	125	287	+162
8	Ear pain diseases (new)	88	20	-68
9	New	53	57	+4
10	Injuries/wounds disease (new)	52	30	-22

Source: Nkeyema DHIS 2.

The ward also recorded an increase in diarrheal cases from 2022 to 2023 by 159 cases. Further, other Dental caries due to lack of Oral hygiene were ranked no. 5 with Water washed diseases such as ear pains were ranked no. 8.

These increases in the number of waterborne diseases are due to many factors, such as low literacy levels leading to lack of adequate knowledge on hygiene to make available latrines and hand-washing facilities.

but we are around 28% in the Shimano ward.

The data from various studies indicated that the toilet coverage was high, while hand washing coverage was low and availability of soap was even lower and this was similar to the data reviewed at Nkeyema Town Council water supply and sanitation unit database pointing the impressive why the study

Table 3. Shimano Ward: Sanitation Profile Data.

No	No. Villages	No. HHs	POP	No. Latrines	No. HWFs	ODF HHs
1	30	1,551	8,427	1,278	437	95
Percentage Coverage				82%	28%	6%

Source: RWSSU Nkeyema Town Council CLTS Excel sheet (2024).

was undertaken.

3. Material and Methods

A section intended to contain a detailed description of all the methods, materials, collaborators and participants in the study. The protocols used for data acquisition, techniques and procedures, investigated parameters, methods of measurements, and apparatus has been described in sufficient detail to allow other scientists to understand, analyse and compare the results. The study subjects and participants has been described in terms of number, age and sex. The statistical methods have been described in detail to enable verification of the reported results. This section could contain a separate sub-section that comprises the explanation of the abbreviated terms used in the study.

3.1. Overview

This chapter presents the components of the research methodology which was adopted for this study. It provides an outline of the study approach used to collect the relevant data needed to answer the research questions outlined in Chapter 1. The chapter describes the research design, the study population, the data collection methods employed, the sample selection methods, and the data analysis techniques applied. It also includes a brief discussion pertaining to the limitations of the study and ethical implications considered.

3.2. Study Design

The study design used was a descriptive cross-section study. The research will be a combined method, mainly a quantitative method or approach that will collect data using a survey questionnaire through interviews and observations of sanitary and handwashing facilities. Further, the research will employ the quantitative approach by reviewing the existing secondary data from the community champion reports and Nkeyema Town Council. This will enable triangulation, authenticity, and credibility of data to enhance generalization. The research design embodies the blueprint for the collection, measurement and analysis of data related to the research questions. The procedural description adopted in carrying out this research was outlined mainly based on a quantitative approach. In conclusion, the study design was descriptive and cross-sectional.

3.3. Study Area

The study area is Shimano ward, comprised of 30 villages that will all be enumerated and its 5 kilometers away from Nkeyema Civic Centre, situated at Munkuye area. This research will target households in selected villages in the 30 villages of the Shimano ward.

3.4. Study Population

The study population involves 300 household heads situated or located in 30 villages, targeting Head of households as key informants for enumeration or administration of the questionnaire, including the 1 environmental health technologist and 6 community champions operating in the wards.

3.5. Type of Study

The research will take a combined study of qualitative and quantitative research where the questionnaire will capture raw or primary data from the key informants that will be based on their perceptions; hence for the purposes of authenticity and generalization the data will be triangulated with national, district and health and local authority statistics hence combined study.

3.6. Sampling Methods

A non-probability sampling method called convenient sampling of the community champions was used, which were purposively enumerated in the study.

This was done due to the fact that the topic needed the people who are familiar with the subject matter to ascertain sustainability; hence, the community champions are regarded as experts in ODF and CLTS implementation were targeted.

The convenient method was applied due to limitations in mobilizing sufficient research logistics and public health limiting factors to reach out to many respondents due to the COVID-19 pandemic and the restricted movements and gatherings.

Further movements were hampered by rain and the farming season.

3.7. Sample Size

The sample size was estimated using the formula:

Confidence level of 95%

Confidence interval of ± 5

Standard deviation of 5% or 0.5

Z – Score of 95% = 1.96

$$N = (z\text{-score})^2 \times \text{std Dev} \times (1 - \text{std Dev}) / (\text{Confidence interval})^2$$

$$n = ((1.96)^2 \times 0.5 (0.5)) / (0.05)^2$$

$$n = (3.8416 \times 0.25) / 0.0025$$

$$n = (0.964 / 0.0025)$$

$$n = 384.16$$

$$= 385$$

However, a total of 150 respondents of the sample size 385 enrolled were enumerated.

The informants were selected as follows:

11 SAG chairpersons were interviewed in each chiefdom per chiefdom.

10 community champions were enumerated in each selected chiefdom.

1 D-WASH member from 5 districts.

Table 4. Actual number sampled and enumerated.

No.	Category of respondents	Number of respondents	Number of districts/chiefdoms	Total number of respondents
1	D-WASH Members	2	5	10
3	CC	20	7	140
				150

A total of 150 out of 385 were purposively and conveniently enumerated.

3.8. Data Collection

Four research assistants were trained to collect data (D-WASHE committee). Data was collected through the using semi structured questionnaires administered to head of households for in-depth interviews and through observations by checking on the availability of hand-washing facilities and soap at toilets and the respective evidence for use.

The questionnaires were written in English, and schedules for household heads were translated into the local language (Lozi) during the interview period or sessions.

3.8.1. Data Analysis

Data was analyzed using Excel and SSPS packages, and the results were presented using descriptive statistics of tables and percentages.

3.8.2. Pilot Study

A pilot study was conducted in 5 villages to assess the practicability of the tools in Shimano ward of Nkeyema District in the Western Province of the Republic of Zambia.

3.9. Ethical and Cultural Considerations

Permission was sought to carry out the research from the Ministry of Water Development Sanitation Environmental Protection or the Ministry of Local Government.

The research assistants will be able to explain to the respondents

and assure them that they are required to answer the questionnaire and schedules without force or pressure. Consent was obtained from each respondent without coercion at the beginning of every interview session. Confidentiality was assured to all the respondents involved in answering the questions or tool.

4. Results and Discussion (Findings)

A comparative or descriptive analysis of the study based on results, previous studies, etc. The results should be presented in a logical sequence, giving the most important findings first and addressing the stated objectives. The number of tables and figures should be limited to those absolutely needed to confirm or contest the premise of the study. The authors should deal only with new or important aspects of the results obtained. Material from the results section should not be repeated, nor should new material be introduced. The relevance of the findings in the context of existing literature or contemporary practice should be addressed.

This chapter presents the findings from a comprehensive study conducted in Nkeyema District among 150 households, aimed at evaluating various aspects of hand facilities and hygiene practices.

The objectives of this study were multifaceted, focusing on the identification of households equipped with adequate sanitation facilities, assessing community knowledge regarding hand washing at critical times, examining the types of hand washing facilities used, determining the community's understanding of the linkage between hand hygiene and diarrheal disease prevention, and evaluating the effectiveness of various triggers for promoting hand washing behaviors.

Table 5. Households with Toilets.

Status	Number of Households	Percentage (%)
Toilets available	141	94.00%
Lack of toilets	09	6.00%
Total	150	100.00%

The data in Table 5 revealed that 94% of the households have toilets, which is a very important milestone in achieving total sanitation and protection of the general public from faecal-oral-transmitted diseases.

However, 6% of the respondents indicated that they lacked

toilets, hence practicing open defecation and such practice endangers also those who have toilets as the environmental media such as water sources can be contaminated and affect even those with toilets, hence the need to address the situation.

Table 6. Households with Adequate or ODF Toilets.

Status	Number of Households	Percentage (%)
Adequate/ODF toilet facilities	90	60.00%
Inadequate toilet facilities	60	40.00%
Total	150	100.00%

The data in the table 6 above revealed that 60% of the 150 households interviewed had toilets that are adequate meaning these toilets were complete with smooth cleanable floors, lids on top, with superstructures providing privacy and finally, with hand-washing facilities filled with water and soap.

Conversely, 40% (60 households) lacked ODF parameters such as hand-washing facilities, lids, superstructures

providing privacy and smooth cleanable floors.

This indicates a positive trend towards having adequate or ODF toilets with handwashing facilities, and essential materials such as soap within single household units. However, the remaining 40% lacking comprehensive facilities underscore a significant gap in public health infrastructure.

Table 7. Hand Washing Facilities.

Status	Number of Households	Percentage (%)
Hand washing facilities available	101	67.33%
Lack of hand-washing facilities	49	35.34%
Total	150	100.00%

The data in the table above indicates that the majority of the people have hand washing facilities at their respective

premises with 67.33% while 35.34 do not, hence risking the general health of the population.

Table 8. Type of Abrasion.

Status	Number of Households	Percentage (%)
Soap	86	57.00%
Ash	12	8.00%
Lack of abrasion	52	34.67%
Total	150	100.00%

The data above revealed that the majority of the people in

Shimano ward are using soap at 57% and 8% are still using

ash when the Government had passed a policy of soap only and banning the use of ash and further a significant number of

people do not use either soap nor ash posing a very big danger to disease transmission.

Table 9. Type of Soap Used.

Status	Number of Households	Percentage (%)
Bar soap	58	38.67%
Liquid soap	20	13.33%
Powdered soap	17	11.33%
No soap available/use	55	36.67
Total	150	100.00%

The data above shows that 64% of the households are using a type of abrasion with 38.67% using bar soap, 13.33% are using liquid soap, while 11.33% are using powdered soap and

36.67% do not have and are not using any type of soap rendering the majority of population vulnerable to diseases.

Table 10. Knowledge Levels on Handwashing at All Critical Times among Community Members.

Knowledge Level	Number of Households	Percentage (%)
Knowledgeable	118	78.67%
Not knowledgeable	32	21.33%
Total	150	100.00%

A significant majority of households (78.67%) were categorized as knowledgeable about hand-washing practices at critical times. These households confirmed having access to toilets and either washing hands with soap during meal times or consistently using hand-washing facilities.

Meanwhile, 21.33% of households did not meet the criteria for being considered knowledgeable, indicating a gap in either the availability of facilities or in behavioral practices concerning hand hygiene. While a majority of the community

(78.67%) demonstrated knowledge of handwashing practices at critical times, there remains a 21.33% segment that is not adequately informed.

This suggests that knowledge alone is insufficient without the physical availability of handwashing facilities. Continuous education and practical demonstrations on hand hygiene could bridge this gap, emphasizing not just the 'how' but also the 'why' behind handwashing at critical times.

Table 11. Types of Hand-washing Facilities Available.

Facility Type	Number of Households	Percentage (%)
Tippy tap	40	42.55%
Jugs or jars	26	27.66%
Pressure bottles	22	23.40%
Kalingalinga bucket	06	6.38%
Total	94	100.00 (%)

The assessment identified a diverse range of hand washing solutions, with the tippy tap being the most common, used by approximately 42.55% of the households. This was followed by jugs or jars (27.66%), pressure bottles (23.40%), and the Kalingalinga bucket (6.38%), illustrating a trend towards cost-effective and accessible solutions. The prevalence of simple and cost-effective hand-washing setups like tippy taps

is encouraging, as it reflects community-driven solutions to hand hygiene that are both sustainable and accessible. However, the diversity in hand-washing facilities also points to affordability and choice factors by the people based on the trigger messages by environmental health technologists and the community champions.

Table 12. Link between Knowledge Levels and Contracting Feecal-oral Diseases.

Outcome	Number of Respondents	Percentage (%)
Experienced Diarrhea	97	65.10%
No Diarrhea	52	34.90%
Chi-squared Test	Statistic: 1.7578	P-value: 0.185

Diarrhea was reported by 65.10% of respondents, indicating a high prevalence. The Pearson Chi-squared test showed no statistically significant association between knowledge of hand-washing practices and the occurrence of diarrheal diseases ($p = 0.185$), suggesting that knowledge alone may not significantly impact the prevention of such diseases. The absence of a statistically significant association between handwashing knowledge and the prevalence of

diarrheal diseases highlights the complex interplay between knowledge, behaviour and health outcomes. This finding suggests that while knowledge is crucial, it must be coupled with consistent behavioural change and access to necessary facilities to impact health outcomes significantly. Public health interventions should thus focus on both education and the provision of resources to ensure that knowledge leads to action.

Table 13. Cadres Identified to Be Doing More Triggering in the Community.

Trigger Source	Number of Respondents	Percentage (%)
Community Champions	92	61.33%
Health Facilitators	24	16.00%
Council Members	14	9.33%
Others	9	6.00%
Unspecified	11	7.33%

Community champions were identified as the primary influencers (61.33%), highlighting their significant role in promoting health practices. Other notable sources included health facilitators (16%) and council members (9.33%). The results emphasize the importance of community-led initiatives in enhancing effective health behavior changes. Community champions are pivotal in triggering effective handwashing behaviors, with over 61% of respondents acknowledging their influence. This underlines the importance of leveraging local leaders and influencers in health promotion activities. However, the varied triggers and

the notable percentage of respondents without a specific trigger suggest that there are still opportunities to enhance community engagement strategies. Integrating more structured and frequent interactions between health workers, community champions, and the community could enhance the effectiveness of these triggers.

5. Discussion and Conclusion

The research study had a set of objectives, and the findings have revealed the following results:

5.1. Toilets

The study has clearly identified that a total of 141 households out of 150 households enumerated had toilets, representing 94% which is good coverage as only 6% had no toilets. The results resonates very well with the findings in the study in Tanzania which was standing at 92.3%.

It therefore prove that the toilet coverage is good in Africa and the failure to attain ODF is due to other factors rather than the toilet factor which has been ruled out by the study.

5.2. Hand Washing Facilities with Soap

The study has revealed that a total of 86 households with toilets had hand-washing facilities out of 101 households with toilets, representing 57.33%. This finding was incredibly higher compared to the results in the 2017 WHO/UINCEP findings that reported 14%, 24% was reported by Zambia demographic health survey report as access to hand washing facilities which was even lower in rural area equivalent to Nkeyema at 15%. The Shimano results in Nkeyema District in the Republic of Zambia of 67.3% is better than the WHO (JMP) findings the reported global hand washing facilities with soap at 30%, more than the 15% in Sub Sahara and moving towards the category of Western and Northern Asia placed at 76%

The study results were good compared to the findings is study conducted in Tanzania that showed that were standing at 8%-10% meaning the Shimano community is doing fine compared to other areas both internally and in surrounding neighboring Countries.

5.3. Hand Washing Facilities

The study revealed that a total of 101 households from 141 households with toilets had hand washing facilities representing 67.3%. In the same vain 57% of the hand washing facilities had running water and soap giving a total of 10% hand washing facilities without soap.

The study revealed that there were 40 tippy taps representing 42% as compared to 22 tippy taps discovered in the Tanzanian study.

5.4. Availability of Soap

The study further revealed that 57.3% of the hand washing facilities had soap and the following were the different type of abrasion is used in the majority of households using bar soap, with 58 households representing 38.67%, followed by liquid soap with 20 households representing 13.33%, then powdered soap with 17 households representing 11.33% and finally, 12 households are still using ash representing 8% which is better than any global statistics especially in the Sub Sahara region except West and North Asia.

5.5. Community Hand Hygiene Knowledge Levels

The study has also revealed that the majority of the respondents numbering 118 respondents representing 78.67% had adequate knowledge on the critical times of washing hands that responded well and addressed the second objective that wanted to assess the level of knowledge on hand washing practice in the community at all critical times in Nkeyema District and this is in agreement with the findings in the study in Tanzania where 82% of the Caregivers had knowledge of hand washing at all critical times. In this regard the research objective 4, to establish the community knowledge to link prevention of diarrheal diseases with hand hygiene, was also established as 97 respondents, representing 65.10%, showed to have adequate knowledge and linked to disease transmission, especially diarrheal diseases, hence objective addressed.

5.6. Open Defecation Free (ODF)

The data in the table above revealed that 60% of the 150 households interviewed had toilets that are adequate meaning these toilets were complete with smooth cleanable floors, lids on top, with superstructures providing privacy and finally, with hand-washing facilities filled with water and soap.

Conversely, 40% (60 households) lacked ODF parameters such as hand-washing facilities, lids, superstructures providing privacy and smooth cleanable floors.

This indicates a positive results compared to other Countries like Tanzania where the ODF coverage was 10% and the 60% moving towards having adequate or ODF toilets with handwashing facilities, and essential materials such as soap within single household units.

5.7. Other Findings

Lastly the study revealed or established that hand washing was effectively triggered by the community champions, EHTs as follows: community champions 61.33%, health facilitators 16%, council members 9.33% and others 13.33%

Therefore, the study was a success as it addressed all the set study objectives. The study revealed that 40% of the households do not have adequate toilets that is total agreement with the findings of the Zambia Demographic and Health Survey (DHS) report that found that 10 per cent of the population practices open defecation (1 per cent in urban areas, 16 per cent in rural areas) while it also indicated that 67.33% of the households have handwashing facilities and respondents are practicing handwashing showing a high coverage contrary to the findings of the Zambia Demographic and Health Survey (DHS) report of 2018 that indicated that 24 per cent of the population has access to basic hygiene services, i.e. a handwashing facility with soap and water (36 per cent urban, 15 per cent rural).

This section contains theoretical and practical recommendations, further research ideas, new approaches, suggestions and concerns regarding potential social and cultural impacts, etc.

This chapter will present the general overview of the answers for conclusions and recommend possible solutions.

5.8. Recommendations

The following recommendations are suggested:

12 households out of 150 households representing 8% revealed that these households are still using ash in Shimano ward and health catchment area which has been banned by UN through WHO as ineffective against pathogens, therefore a detailed study to understand the extent of utilization of ash as abrasion at National level is highly recommended.

The tippy tap coverage is still low standing at 42% hence need to intensify the triggering campaign and also to ensure tippy taps are sustainable not to cause a slippage for lack of replacements.

Shimano catchment with 94% toilet coverage and 67% hand washing facilities with 57% availability of soap is a potential ODF catchment and require a surge approach on the principles of Reach every house and fix every missing parameter, with probability of 80% success.

Trigger more households to have 100% toilet and tippy taps coverage that has a pull factor on handwashing practices that will exert impacts on disease reduction unlike the current where there are no notable significant movements towards disease reduction, Intensify demonstrations on pressure bottles as materials are readily available for quick results.

Train more Community Champions to ensure an increase in knowledge levels and mindset change or behavior change towards hand hygiene and support innovations or creativity on local materials for handwashing facilities.

Trigger more Traditional Leaders to ensure the use of soap at all critical times and trickle down effects to their subjects.

Train all the Sanitation Action Group (SAG) members in hand washing trigger tools and construction and use of various types of handwashing facilities.

5.9. Gaps Identified

The following are the gaps identified:

6% of the households had no toilets

23% of the toilets had no hand washing facilities

43% of the hand washing facilities had no soap

8% of the households are still using ash

Diarrheal and Respiratory diseases are among the top 3 cause of morbidity.

The triggering intensity is low.

Contributions to knowledge

This study has brought out key findings that will contribute immensely to the existing knowledge in the following ways:

It study has discovered that some community members are

still using ash instead of soap putting the entire communities at risk of disease outbreaks and a large scale research undertaking is recommended or called.

The study findings have collaborated with other findings by WHO/UNICEF, ZDHS, TDHS reports and also other studies e.g. Tanzanian study hence it is credible.

The study has reinforced the understanding that the major facility problems leading to failure towards ODF attainment is lack of hand washing facilities and soap.

The study has revealed a lot of progress and declared Shimano ward as a potential ODF area with proper ODF plan using the surge approach Western province has a high probability of recording an ODF ward and Health catchment.

The study has further revealed a weak link between hand hygiene and sanitation in general with disease reduction henceforth more studies are recommended in this area.

6. Conclusion

In conclusion, the study addressed all the research questions and general objectives and has revealed that 93% of the households had toilets, this result is similar to the good toilet coverage seen in the study in Tanzania that reported having traditional or improved pit latrines at 92.3%. while 18% were of the residents are reported practicing open defecation (OD).

This study revealed that the majority of the people had hand washing facilities at their respective premises with 67.33% while the findings in the study in Tanzania showed a very low coverage of only 1.2% having fixed handwashing devices and this clearly indicated that the communities in Shimano ward of Nkeyema District in the Republic of Zambia is doing exceptionally well in comparison with the situation in Tanzania.

The assessment identified that 42.55% of the hand washing devices were Tippy taps while in similar study conducted in Tanzania revealed that a total of 22 tippy taps were observed in the entire sample indicating that there is a very poor or low number of Tippy taps available as compared to the Shimano community in Zambia.

The study further revealed that 57% of the households enumerated at handwashing facilities with soap while 8% had ash and the remaining 35 households had nothing this again showed a good coverage in comparison the Tanzania study that found that only 8% of the households had any soap visible near the place where hands are washed.

The study has also revealed that the majority of the respondents numbering 118 respondents representing 78.67% had adequate knowledge on the critical times of washing hands that responded well in Shimano ward and this is in agreement with the findings in the study in Tanzania where 82% of the Caregivers had knowledge of hand washing at all critical times.

Further study established that 97 respondents, representing 65.10%, proved to have adequate knowledge and linked to disease transmission, especially diarrheal diseases, hence knowledge on benefits of handwashing is not a factor contributing to inadequate number of hand washing facilities

with soap and use in Shimano ward and health catchment area but knowledge on hand washing facilities especially on Tippy taps and pressure bottles including the exclusive use of soap are real issues because 8% are still using ash which has been banned by World Health Organization indicating failure to change to soap only.

Abbreviations

ODF	Open Defecation Free
EHT	Environmental Health Technologist
CBV	Community Based Volunteer
CC	Community Champion
HWF	Hand Washing Facility
WHO	World Health Organization.
UNICEF	United Nations Children Fund
ZDHS	Zambia Demographic Health Survey
TDHS	Tanzania Demographic Health Survey
UN	United Nations
D-WASH	District Water and Sanitation Hygiene
SAG	Sanitation Action Group
JMP	Joint Program Monitoring
NGO	Non-Governmental Organization
CLTS	Community Led Total Sanitation
COVID 19	Corona Viral Disease
OD	Open Defecation
HH	Household
CDC	Centre for Disease Control

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Conflicts of Interest

The author declares no conflicts of interest.

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Biography

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