IMPACT EVALUATION OF THE SANITATION AND HYGIENE PROGRAM IN ZAMBIA

FINAL REPORT
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ABBREVIATIONS
ARI  Acute respiratory infection
BU  Boston University
CATS  Community approaches to total sanitation
CC  Community champion
CGHD  Center for Global Health and Development
CHA  Community health assistant
CI  Confidence interval
CLTS  Community-led total sanitation
CSO  Central Statistics Office
DFID  Department for International Development
DHIS2  District Health Information Software 2
DHS  Demographic Health Survey
D-WASHE  District Water Sanitation Hygiene Education
EHT  Environmental health technician
GDP  Gross domestic product
HMIS  Health management information system
IPs  Implementing partners
IRB  Institutional Review Board
LE  Legal enforcement
M2W  Mobile-to-web
MDGs  Millennium Development Goals
MHM  Menstrual hygiene management
MoCTA  Ministry of Chiefs and Traditional Affairs
MoGE  Ministry of General Education
MoH  Ministry of Health
MoLGH  Ministry of Local Government and Housing
NGOs  Non-governmental organization
NWASCO  National Water Supply and Sanitation Council
ODF  Open defecation free
PR  Prevalence ratio
RTM  Real time monitoring
SAG  Sanitation action group
SDGs  Sustainable Development Goals
SE  Standard error
SEAs  Standard enumeration areas
SLTS  School led total sanitation
SMS  Short message service
TWG  Technical working group
UNICEF  United Nations Children’s Fund
WASH  Water, Sanitation and Hygiene
WHO  World Health Organization
ZAMCOM  Zambia Institute of Mass Communication Trust
ZCAHRD  Zambian Centre for Applied Health Research and Development Limited
ZMW  Zambian kwacha
ZSHP  Zambia Sanitation and Hygiene Program
EXECUTIVE SUMMARY

Introduction
In spite of the various measures taken, Zambia, with improved sanitation coverage of 44%, was not able to reach the Millennium Development Goal (MDG) 7c for water and sanitation which is halving the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015. The Sustainable Development Goals (SDGs), also known as the Global Goals, are now complementing and improving upon the goals initially outlined under the MDGs. The SDG 6, which builds upon MDG 7, has as one of the targets to achieve access to adequate and equitable sanitation and hygiene for all and end open defecation (ODF), paying special attention to the needs of women and girls and those in vulnerable situations by 2030.

To address the high burden of sanitation and hygiene related morbidity and mortality, especially in rural areas of the country, the Zambian government through the Ministry of Local Government and Housing (MoLGH), in partnership with UNICEF, the Department for International Development (DFID), and other cooperating partners, is implementing the Zambia Sanitation and Hygiene Program (ZSHP). The purpose of the ZSHP has been to contribute to the achievement of the MDG 7c (and SDG 6) targets in Zambia, with an additional 3 million people consistently using improved sanitation facilities and adopting related hygiene practices (such as hand washing with soap or ash). ZSHP features community led total sanitation (CLTS) as core activity, but it also comprises a package of activities including supporting enabling environments, sanitation marketing, school-led total sanitation (SLTS), and national behavior change communication. The program was intended to be implemented in 65 rural districts in eight of the ten provinces in Zambia. The two main targets of ZHSP were to increase the use of improved sanitation facilities from an estimated 46% to 75% and contribute to the reduction of diarrheal diseases amongst children from an estimated 15% to 12%.

The Boston University (BU) Center for Global Health and Development (CGHD) was tasked to conduct an impact evaluation of the program. The objective was to measure the key performance, impact, outcome and input indicators to track changes over time, and to examine and explain the extent the program has contributed to the observed impact, outcome and input indicators. This report presents the impact evaluation of ZSHP.

Methods
We employed a pre- and post-intervention design. We measured the study outcomes at baseline, allowed 36 months for implementation of the program and then conducted end-line measurement of the outcomes. The baseline survey was conducted in June – August 2013 and end-line survey in June – August 2016. The main data collection methods used to measure outcomes were household population-level and school surveys. The study was conducted in 47 of 50 randomly selected standard enumeration areas (SEAs) located in 26 of the 65 districts in the eight provinces where the ZSHP is being implemented. The end-line survey was conducted in the same SEAs as the baseline survey. The study team held discussions with UNICEF and two implementing partners and reviewed relevant program documents such as annual, semi-annual and annual reports, field progress and monitoring reports and reports of annual reviews by the funder.

1 Toilets in the home that separate the waste from human contact, exclusively used by members of household (not shared or public), which include flush toilets, ventilated improved pit latrines, pit latrines with slabs and composting toilets.
Results
We interviewed 1204 and 1170 female caregivers of children 0-59 months in the baseline and end-line household surveys respectively. The characteristics of women, households and children were similar in both surveys. Of the women interviewed, 69.8% were in the 20-35 year age group and 66.6% had at least primary education. About half of the households had a household size of 4-6, which is similar to the Zambian rural population. Less than half and a little over 10% of the households owned radio and television respectively.

Sanitation facilities and practices
At baseline, 64.1% of households reported using an improved toilet facility as compared to 80.0% in the end-line. The difference was significant, fewer households at baseline used improved toilet facility compared to end-line (Prevalence ratio (PR) = 0.80, 95% confidence intervals (CI): 0.76 – 0.84). A significantly higher proportion of households in the baseline survey (19.4%) reported not having a toilet facility than in the end-line (14.6%) (PR=1.32, 95% CI: 1.11 – 1.59). The most common sanitation facility reported as used by households in both the baseline and end-line was a pit latrine with a slab with coverage of 63.6% and 78.2%, respectively. A significantly lower proportion of households in the baseline survey (5.4%) had an improved unshared toilet facility with hand washing station with water and washing agent available than the proportion of 14.3% in the end-line survey (PR=0.37; 95% CI: 0.029 – 0.50). Program data indicated that by mid-September 2016, 291 people had been trained and promoting sanitation marketing and 3,287,922 people had access to improved toilet facilities.

ODF practice and status
At baseline, 16.8% of households as compared to 14.2% at end-line reported that a member of their households practiced open defecation on a daily basis. The difference was not significant (PR=1.18; 95% CI: 0.98-1.43). At baseline, 0.3% of households compared to 10.6% at end-line responded that they lived in an ODF-certified village. This difference was significant (PR=0.024; 95% CI: 0.008 – 0.074), fewer households at baseline lived in an ODF certified village. Program data indicated that 10,081 villages and four districts were certified as ODF by mid 2016.

Hand washing knowledge and reported practices
In both the baseline and end-line, caregivers had very high knowledge about washing hands after using the toilet (90.0% vs 90.8%; PR=0.99; 95% CI: 0.96-1.02) but poor knowledge about washing hands after disposing of child feces (24.9% vs 16.8%; PR=1.40; 95% CI: 1.20 – 1.63). At baseline, 55.2% of caregivers reported washing hands with water and washing agents compared to 61.4% in the end-line; this difference was significant (PR=0.90; 95% CI: 0.84 – 0.96). At baseline, 13.3% of households had water and washing agent available at the specific place of washing hands compared to 18.2% at end-line, the difference was significant (PR=0.72; 95% CI: 0.59 – 0.87).

Diarrhea, stunting and wasting prevalence in under-fives
The overall diarrhea prevalence among under-five children was 20.4% at baseline and 19.1% at end-line survey. The adjusted prevalence ratio (aPR) between the baseline and end-line did not show any significant difference (aPR=1.00; 95% CI: 0.85 – 1.17).The overall prevalence of stunting was 46.1% at baseline and 40.9% at end-line survey. The aPR was significantly higher at baseline than at end-line (aPR=1.18; 95% CI: 1.06 – 1.31). Similarly, the overall prevalence of severe stunting of 32.4% at baseline was significantly higher than the level of 18.2% at end-line.
The overall prevalence of wasting of 14.1% at baseline was also significantly higher than at end-line (7.4%) (aPR=2.07; 95% CI: 1.60 – 2.68).

Safe water access and water treatment
At baseline, 34.7% of households reported using improved (protected) water source for drinking compared to 51.9% at end-line, the difference was significant (PR=0.67; 95% CI: 0.60 – 0.73). For water treatment, 32.3% of households at baseline treated water appropriately (boil, add chlorine, filter, solar) while at end-line, 24.6% treated the appropriately. The difference was significant (PR=1.31; 95% CI: 1.15 – 1.49)

Knowledge on relationship of WASH and disease transmission and sources of information
Caregivers knowledge about the relationship between WASH and disease transmission was varied. More caregivers in both the baseline and end-line indicated that not treating water or storing water safely (72.7% vs 78.6%) could be harmful and cause diseases like diarrhea than not washing hands with soap after defecation (65.5% vs 65.5%), not using a clean latrine for defecation (52.5% vs 52.1%) or defecating in the open (48.6% vs 50.4%). There were no significant differences between baseline and end-line. The most common household source of information on WASH in both baseline and end-line was through health education by community health workers (CHWs) (74.6% vs 51.8%). Very few households in both the baseline (6.1%) and end-line (4.0%) received information on WASH from radio or television.

Impact outcome measures and WASH indicators
When we compared the impact outcome measures with various WASH indicators at end-line, the prevalence of diarrhea was significantly associated with improved sanitation facilities and hand washing practices. The two-week diarrhea prevalence was significantly lower in households with improved sanitation facilities (aPR= 0.78; 95% CI: 0.63-0.97) and improved sanitation facilities plus hand washing facilities with washing agent (aPR=0.66; 95% CI:0.47-0.95). The prevalence of stunting (aPR=0.75; 95% CI: 0.61-0.93) and severe stunting (aPR=0.65; 95% CI: 0.43-0.97) was significantly lower in households with improved sanitation facilities plus hand washing facilities with washing agent.

Triggering Status and WASH outcomes
We compared key WASH outcome indicators for households living in triggered villages to those living in non-triggered villages and they were similar. There appears to have been similar improvement in WASH outcomes in the non-triggered households, compared to those of the triggered households

Real-time monitoring (RTM) implementation
The RTM approach uses mobile-to-web platform combined with simple protocols for reporting, analysis and feedback. We compared the impact on key WASH indicators at end-line for households where RTM is being implemented to those where RTM is not being implemented. More households in areas where RTM was implemented had access to improved toilet facilities (82.9% vs 75.2%; aPR=1.10; 95% CI=1.03-1.18) and fewer households in RTM areas had no toilet facilities (10.7% vs 21.1%; aPR=0.51; 95% CI=0.38-0.67).

School survey results
We surveyed 44 and 47 schools during the baseline and end-line surveys of which 95.4% and 93.6% were government owned respectively. The average number of female pupils was 297 at baseline and 264 at end-line. The mean number of female pupils absent from school in the previous seven days was 35 (11.7%) at baseline and 27 (10.2%) in the end-line. The difference was not significant. At baseline, 68.2% of the schools used improved toilet facilities compared to 83.0% at end-line but this difference was not significant (PR=0.82; 95% CI: 0.65 – 1.04). All the schools with toilet facilities had separate facilities for boys and girls. Few schools in both the baseline (9/44) and end-line (13/47) had fifty or fewer children per improved toilet cabin.

At baseline, 65.9% of schools had a designated area for hand washing, 50% had hand washing facility that allowed for simultaneous use by pupils and 18.2% had water and washing agent available at place of washing hands compared to 53.2%, 42.5% and 23.4% respectively at end-line. These differences were not significant. There was no significant difference between baseline and end-line in the two major school outcome indicators: “hand washing standard” (25% vs 25.5%; PR=0.98; 95% CI 0.48-1.99) and “interim sanitation standard” (4.5% vs 12.8%; PR=0.36; 95% CI: 0.08-1.67).

Of the 47 schools surveyed at end-line, nine (19.1%) had received the package of the SLTS intervention. We compared these “interventions” with the “non-intervention” schools on key study indicators. In two of the indicators “specific place for washing hands” (88.9% vs 44.7%; PR=1.99; 95% CI:1.30-3.03) and “hand washing standard” (55.6% vs 18.4%; PR=3.02; 95% CI: 1.24-7.33), the proportions in the “intervention” schools were significantly higher than in the “non-intervention” schools.

**Discussion**

**Impact on sanitation and hygiene**

This impact evaluation has demonstrated improvements in sanitation and hygiene measures between the baseline survey conducted in 2013 and the end-line in 2016. Notable findings include a significant increase in the availability of improved sanitation facilities (from 64% to 80% between baseline and end-line) and increased proportions of households reporting living in an ODF certified village. The ZSHP target of reaching 3 million people with access to improved toilets was met. However, 36.4% of households at end-line used improved toilet facilities that were shared with other households. Going forward, the program should emphasize not sharing toilet facilities among households.

One approach that appears to have contributed to achieving these targets is the RTM, which provides important feedback to communities on their performance using mobile-to-web monitoring of CLTS interventions. Sanitation marketing was another strategy that is likely to have contributed to meeting the program’s targets. This strategy served to develop the capacity of private sector players such as artisans to provide sanitation services that fulfilled the need for stronger longer lasting toilets at affordable prices. Households living in villages that were not triggered had similar access to improved sanitation facilities with those in triggered villages. This is a positive trend because the program may not have to trigger all villages as those villages near triggered villages may be motivated to organize themselves to ensure that they use improved toilets; this may help with the sustainability of the program.
The program impact on ODF practice and status appears to have been lower than anticipated. A little over 80% of the program target was met, and four of the 65 districts were certified as ODF. The end-line survey showed only 10.6% of respondents reported that they lived in an ODF-certified village. This may have been underestimated since about a third of respondents did not know their village’s ODF status. However, the program impact on ODF must be of concern since close to 15% of respondents indicated that a member of their household practiced open defecation on daily basis.

There was a significant increase in access to handwashing facilities between the baseline and end-line surveys although this did not attain the program target. The program showed a significant increase in the proportion of caregivers who reported washing hands before preparing food or after defecation but about a third of those who reported washing hands did not wash hands with water and washing agent. Knowledge of critical times to wash hands; dangers of not washing hands with soap and washing agent, not using clean toilets and defecating in the open; and causes of diarrhea and ARI was generally not high. The program did not seem to have effect on levels of knowledge since there were not significant differences between the baseline and end-line surveys. The program reported heavy investment in behavior change messaging and hygiene promotion activities through media channels as radio, newspapers, television and social media. It appeared that these channels might not have been the appropriate channels to reach the target population since very few respondents indicated radio or television as their sources of information and few owned a radio or television.

*Impact on diarrhea and child nutrition*

Despite evidence of improved sanitation and access to improved drinking water (which was not a component of this program), there is no evidence of an impact on the reported two-week prevalence of diarrhea. It is known that multiple factors are responsible for the prevalence of diarrheal disease and not all are likely to be affected by improved sanitation. We found that only about one quarter of households appropriately treated their water. It is possible that penetration (i.e. degree of uptake of the sanitation and behavior change interventions) did not attain a higher level in order for the program to see an impact on childhood diarrhea. This is apparent when the stratified analysis is performed as households with improved, not shared sanitation facilities and handwashing station with water and soap, thus suggesting that the changes in sanitation and hygiene that resulted from ZSHP may have contributed to a reduction in stunting. There was also a significant reduction in the prevalence of wasting between baseline and end-line. These findings are similar to a cluster, randomized controlled trial of CLTS in Mali which demonstrated no impact on two-week prevalence of diarrhea but a significant reduction in stunting.

*SLTS impact*

The SLTS component of the program showed modest impact. The end-line survey showed an increase in the proportion of schools with improved sanitation facilities, that had 50 or fewer children per cabin, with handwashing facility with water and washing agent. There was also improvement in the proportion of schools who met the interim sanitation standard (have separate
facility for boys and girls; improved toilet, have hand washing facility close by; and fifty or less
students by toilet cabin) but the differences were not significant. This evaluation of SLTS did not
show an impact on school attendance, especially among female pupils.

It was reported that less than 20% of the schools surveyed had received the package of SLTS
interventions. A key WASH indicator for schools (improved sanitation facilities, gender
segregated toilets, fifty of fewer children per cabin, specific place for washing hands with multiple
water points) increased in the schools that received the SLTS package compared to those that did
not receive the package. The low coverage of the intervention may have accounted for the modest
impact on school indicators.

Sustainability and expansion
In implementing the program, there was a major focus on institutional strengthening and
accountability of the key line ministries to ensure the sustainability and expansion of the gains; the
strengthening of governance capacity in both the public and private sectors as well as in
community structures; and the MoLGH commitment to strengthening its central role are positive
to sustainability and expansion. The development of the “ODF Zambia by 2020 Strategy” and the
“National Rural Water Supply and Sanitation Program 2016-2030 Strategy” and a functional
Technical Working Group which convenes meetings to discuss issues pertinent to program
implementation and strategies will also help to sustain and expand the program. The creation of
the Ministry of Water Development, Sanitation and Environmental Protection (MWDSEP) is very
appropriate.

Conclusions and Recommendations
The ZHSP has demonstrated many improvements in sanitation and hygiene measures as well as
associated improvements in important child health outcomes such as the prevalence of stunting
and wasting. It has built a foundation for sustainability and expansion. Going forward, the
program:

- Should invest in scaling up the RTM strategy and provide adequate resources to make sure
  it is effectively used and monitored.
- Continue the sanitation marketing strategy.
- Must emphasize not sharing of toilet facilities among households.
- Needs to strengthen focus on safe water storage and treatment of water to prevent
  contamination.
- Should strengthen education regarding proper times to wash hands.
- Needs to focus on improving proportions of households with improved toilet facilities and
  nearby handwashing facilities.
- Program should invest in building the capacity of CHWs, CHAs, CLTS champions and
  volunteers to provide education on personal hygiene and sanitation.
- Attaining ODF status must be given high priority
- Greater involvement of women as community champions and SAG members must be
  encouraged and pursued.
- Need to prioritize SLTS component of the program so that schoolchildren can have
  access to improved sanitation and handwashing stations.
1.0 BACKGROUND

1.1 The Water, Sanitation, and Hygiene (WASH) challenges in Zambia

According to the World Health Organization (WHO) Global Health Observatory, improvements in drinking water, sanitation, hygiene, and water resource management could result in the reduction of almost 10% of the total burden of disease worldwide [1]. Among the many adverse health outcomes resulting from poor water, sanitation and hygiene, diarrhea is the most common. According to the United Nations Children Fund (UNICEF), globally there are about 4 billion cases of diarrhea per year [2]. The WHO and UNICEF’s Child Health Epidemiology Reference Group, estimated that in 2015, 526,000 children under the age of five years died of diarrhea; and diarrhea is the fourth-leading global cause of mortality of children 0-59 months and the second-leading global cause of mortality of children 1-59 months [3]. In sub-Saharan Africa, diarrhea is responsible for 19% of deaths in children under the age of five years. Diarrhea continues to be a major cause of childhood morbidity and mortality in Zambia [4]. The Demographic Health Survey (DHS) conducted in 2013-2014 in Zambia indicated that the two week-prevalence of diarrhea in children under age 5 was 16% with children aged 6-23 months having the highest prevalence of 28% [5].

While diarrheal episodes are often seen as individual events, they have a long-lasting impact on a child’s short-term health and overall development. More seriously, diarrhea triggers a cause and-effect chain with tragic results. It is closely linked to undernutrition including micronutrient deficits such as vitamin A deficiency, which contribute to an increased risk of severe diarrhea and mortality in children [6]. In turn, undernourished children have compromised immune systems and therefore, they often develop fatal or debilitating diseases, including pneumonia — which kills more children than any other infectious disease. Undernutrition also leads to stunted growth and impaired cognitive development.

In spite of the various measures taken, Zambia with improved sanitation coverage of 44%, was not able to reach Millennium Development Goal (MDG) 7c for water and sanitation (halving the proportion of people without sustainable access to safe drinking water and basic sanitation by 2015). The Sustainable Development Goals (SDGs), also known as the Global Goals, are now complementing and improving the goals initially outlined under the MDGs [7]. The SDGs place an increased emphasis on the importance of sanitation through SDG 6, which builds upon the MDG goal to halve the world’s population without access to clean water and sanitation by demanding universal access to sanitation and clean water by 2030. In addition, SDG 6 has specified that in order to achieve this by 2030, open defecation must end, and special attention must be paid to the needs of women and girls and those in vulnerable situations [7].

Zambia has one of the lowest access to sanitation and hygiene services on the continent. According to the last UNICEF/WHO Joint Monitoring Programme 2015, an estimated 8.4 million lack access to improved sanitation, of which around 2.1 million practice open defecation (8). Based on the economic impacts of poor sanitation in Africa, Zambia loses $194 million, equivalent to 1.3% of gross domestic product (GDP), every year due to poor sanitation. The loss is caused by deaths due to diarrhea ($167 million), loss of productivity while sick ($1 million), healthcare costs ($10.6 million), and access time for persons practicing open defecation to find a private location to defecate ($16 million) [8].
The National Water Supply and Sanitation Council (NWASCO) reports that one of the greatest challenges facing water and sanitation supply utilities in Zambia is poor infrastructure development and maintenance [9]. Inadequate water and sanitation infrastructure is mainly due to low financial investments in the sector, with an annual allocation of less than 3% of the national budget. According to NWASCO, the investments have been skewed towards water supply as opposed to sanitation and this situation has been compounded by lack of a clear policy on sanitation issues. Subsequently, Zambia has developed a comprehensive policy to guide the development and management of sanitation and water sectors. The specific policy measures for rural water supply and sanitation include a community-based approach; the promotion of appropriate technology; and capacity building at all levels. The Ministry of Local Government and Housing (MoLGH) is implementing a National Rural Water Supply and Sanitation Program (2006-2015). The sanitation and hygiene component of this program was developed in 2009 covering all aspects of sanitation including human excreta management, liquid and solid waste, bathing shelters, other elements of hygiene besides hand washing with soap/ash and school sanitation.

1.2 Evidence of impact of improved sanitation and hygiene on child health outcomes

Intervention studies have consistently demonstrated that hand washing with soap reduces diarrhea [10]. In addition, hand washing with soap reduces respiratory disease. Several studies in resource-limited countries have shown a reduction in respiratory disease following the introduction of interventions to promote hand hygiene [11] For example, a randomized, community-based study in Karachi, Pakistan among children under the age of 5 years living in households that received soap and regular visits to promote hand washing had a 50% lower incidence of pneumonia compared to children living in control households who were given school supplies and no hand washing promotion [12]. Most hand washing intervention studies have only included relatively small numbers of participants, ranging from several hundred to a few thousand households. In contrast, the impact on health outcomes of large scale implementation of hand washing promotion has not been rigorously evaluated. Thus, it is unclear whether the benefits of hand washing promotion that are effective on a small scale can be effectively implemented at a large scale with similar health benefits.

Some community-based studies including a study in Bangladesh which provided soap with hand washing promotion programs [13], and others that only included hand hygiene promotion without providing supplies, have been successful in reducing diarrheal disease [14]. In contrast to hygiene interventions, there is less evidence on the reduction of diarrheal disease by sanitation interventions. However, available data that are considered of high methodological quality suggest that sanitation interventions reduce diarrheal illness by approximately one third [15].

There is limited data available on the association between inadequate sanitation and growth of children. A recent analysis of DHS data suggested that open defecation is responsible for as much as 54% of international variation in child height [16]. This analysis also concluded that open defecation accounts for much of the excess stunting of children in India. A study in Mali which evaluated the impact of community-led total sanitation (CLTS) showed that CLTS reduced stunting and severe stunting and improved child height [17].

In summary, there is evidence from smaller, generally well controlled community-based trials that hand washing promotion reduces diarrhea and acute respiratory infections (ARI) and that
sanitation interventions reduce diarrhea. There is also limited evidence suggesting that interventions to address the problem of open defecation may result in reductions in stunting.

1.3 Zambia Sanitation and Hygiene Program (ZSHP)

Despite efforts by a broad range of stakeholders in recent years, the indicators for access to improved sanitation facilities are much lower than desirable, especially in rural areas of Zambia. This sad situation is reflected in the continued high burden of sanitation- and hygiene-related morbidity and mortality. To address this problem, especially in rural areas of the country, the Zambian government through the MoLGH, in partnership with UNICEF, the Department for International Development (DFID), and other cooperating partners, is implementing the ZSHP. ZSHP started in November 2012 and was to end in March 2016 with an initial funding of twenty million and five hundred thousand United Kingdom pound sterling (£20,500,000) with DFID contributing nineteen million United Kingdom pound sterling (£19,000,000) and UNICEF contributing the remaining one million and five hundred thousand United Kingdom pound sterling (£1, 500,000). In July 2015, the program end date was extended from March 2016 to March 2018 with an additional budget of four million and one hundred thousand United Kingdom pound sterling (£4,100,000) from DFID. The purpose of the ZSHP has been to contribute to the achievement of SDG 6 targets in Zambia, with an additional 3 million people consistently using improved sanitation facilities and adopting related hygiene practices (such as hand washing with soap or ash). ZSHP features a CLTS initiative, one of the community approaches to total sanitation (CATS) as a core activity, but it also comprises a package of activities including supporting enabling environments, sanitation marketing, school WASH, and national behavior change communication. The program was aimed at promoting the use of improved sanitation and hand washing with soap at critical times. The program was intended to be implemented in 65 rural districts in eight of the ten provinces in Zambia. The two main targets of ZHSP were to increase the use of improved sanitation facilities from an estimated 46% to 75% and contribute to the reduction of diarrheal diseases amongst children from an estimated 15% to 12% (Figure 1).

Community approaches to total sanitation including CLTS

CLTS, an innovative methodology for mobilizing communities to completely eliminate open defecation, is one of the approaches to community total sanitation. The shared goal of CATS is to help communities become open defecation free (ODF). This is done by generating demand and leadership for improved sanitation and behavior change within a community; producing sustainable facilities and services through engagement with local markets and artisans; and promoting adaptation and replication at scale through local capacity building [18]. CATS limits the use of subsidies, supporting their use only when they help catalyze communal action for total sanitation. The CLTS approach was piloted in Choma in Southern Province with considerable success [19,20]. At the ward level, community champions (CCs) are trained to facilitate a process known as triggering in communities. Triggering is a 2 to 3-hour process aimed at using interactive exercises to cause the communities to realize that ‘they eat their own shit’ because of lack of hygiene and sanitation in their community. Following the triggering, communities will usually decide to formalize a sanitation committee, to build their own latrines, set up hand washing stations, and to improve their management of wastes. The champion with support from the Chief
(depending on the district), councilors, and environmental health technicians (EHTs) will follow up on triggered villages until the village attains ODF status. Following the claims of ODF by sub district staff, champions or the village headman, district authorities will verify the village’s status. Twice a year, provincial authorities will assess district verification procedures during a certification process. Depending on the results of the desk study and field visit, the district’s results will be certified or not and the ODF status will officially be awarded to certified villages during a celebration. At the central level, the MoLGH coordinates the program with UNICEF support.

The emphasis of CLTS implementation is on rural areas and it is aiming for the total (100%) elimination of open defecation to achieve health and social impacts by changing behavior at the community rather than individual level. The target of ZSHP was for 12,000 villages to achieve ODF status.

**School-led total sanitation (SLTS)**

This component of the program implements improvements in sanitation and sanitation hardware (including adequate numbers of physically, child friendly toilet blocks for girls and boys, separate hand washing facilities for boys and girls and other forms of hardware), complemented by a hygiene promotion component and creation of a school-based management of the infrastructure. By the end of 2015, the program’s target was to have 1000 schools reach the WASH in School Standard [21] through the improvement of sanitation and hygiene hardware as well as hygiene promotion activities.

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2 Open defecation free = All households have a latrine (with smooth surface platform plus a system preventing flies and providing privacy) and use it, and each latrine has a hand washing station.
Legal enforcement (LE)
Following LE training, district staff members enforce the public health act, food and drugs act, and sanitation standards to ensure compliance. The main targets of the LE team are business premises and landlords in urban and peri-urban areas of the rural district.

Sanitation marketing
This is intended to build the capacity of the private sector to respond to increasing demand for sanitation, and help households to improve their latrines. This is potentially important, as DFID support is based on “improved” rather than “basic” toilets; improved toilets include a cleanable slab, a closely fitting lid over the drop hole, and a hand washing facility. The aim of this component is to build the capacity of the private sector, such as artisans, to provide sanitation services that fulfill a need for stronger, longer lasting toilets at affordable prices, particularly in areas with difficult soil conditions, such as sandy, waterlogged and rocky soils.

Communication for development campaigns
A communication for behavior change strategy has been developed and rolled out in implementing districts. The strategy consists of mass media campaigns, interpersonal communication, and celebration of national and global events. This involves both inter-personal communication and mass media focusing on hand washing with soap or ash after visiting the toilet, before handling or consuming food, and after cleaning an infant.

ZSHP implementation
The government of Zambia is implementing ZSHP by using decentralized structures at the district level. ZSHP is being implemented under the leadership of the MoLGH supported by UNICEF. Other line ministries including Ministry of Health (MoH), Ministry of Chiefs and Traditional Affairs (MoCTA), and Ministry of General Education (MoGE) are collaborating to implement the sanitation program. Where possible, specialized non-governmental organizations (NGOs) serving as implementing partners (IPs) have been mobilized by UNICEF to provide appropriate support, coordinate or monitor the program. In addition to the above components of the program, UNICEF is supporting the government to coordinate the program at the national level through a technical working group (TWG), technical support for strategy design, and advocacy to raise the profile of the sanitation and hygiene sector.

The ZSHP monitoring system has been reinforced with national verification procedures of ODF achievement at the village level and certification of the district processes. Several district authorities (3 persons from line ministries) conduct the verification visits (funded by monitoring funds sent by UNICEF). The results of each visit are accessible at the district level; the compilation of the verification results is sent to the provincial office on a monthly basis by the council and to UNICEF which is supporting the government by helping to maintain a sanitation database.

The certification, done on a bi-annual basis at the provincial level (team of 2 professionals from provincial authorities), audits the verification process done at the district level. Reports for each verification visit are accounted for and the minutes of the District Water Sanitation Hygiene Education (D-WASHE) committee meeting (funded by UNICEF) are reviewed. The results of the certification of the district are sent to the national level. In addition to the national monitoring
system, UNICEF has taken advantage of the coaching structures available at national level as well as their own field visits to regularly monitor district achievements.

To reinforce monitoring of the sanitation program, the use of mobile technology has been piloted and scaled up. This real-time monitoring (RTM) system is an innovative approach developed by AKROS and uses a mobile-to-web (M2W) platform using a low-cost mobile phone combined with simple protocols for reporting and analysis. The system utilizes the short message service (SMS) text delivery system found on most basic mobile phones and is coded using the open source District Health Information Software 2 (DHIS2). The system uses a standard reporting and reviewing mechanism at the district level, which includes carefully defined key performance indicators together with clear reporting protocols together with tools and templates. At the village level, sanitation action group (SAG) members record information on key sanitation and hygiene indicators using paper forms which they hand over to CCs who in turn enter the data into the mobile phone. As soon as the data are entered, the real-time updating feature displays the information on the online DHIS2 platform. EHTs then receive automated SMS with summary of the data from the community champions in their wards with request to follow up on poor performances. The village-level data is then compiled across districts and provinces, for which management meetings are held to discuss and feedback sent to community champions and SAG members. Meetings are held regularly between EHTs and community champions to review data submitted and provide support and between community champions and SAG members to review the feedback. Feedback are also sent to Chiefs to help them mobilize their communities to improve on their performance. Chiefs are given tablets to view reports, charts and maps generated from the data collected in their Chiefdom. The data is customized so that Chiefs can see ODF status per village in their Chiefdom, an ODF summary for their whole Chiefdom and how their Chiefdom compares across districts.
2.0 EVALUATION RATIONALE

The Boston University (BU) Center for Global Health and Development (CGHD) in close collaboration with the Zambia Centre for Applied Health Research and Development (ZCAHRD) was tasked to conduct an impact evaluation of the program. The impact evaluation was comprised of two components:

Component 1: Formative research on hygiene practices
The formative research provided an in-depth understanding of determinants of sanitation and hygiene behavior, including issues such as perceptions, cultural norms, community level factors or institutional environment [22].

Component 2: Impact evaluation
This consisted of a baseline survey, an end-line survey and impact assessment. The baseline survey measured relevant baseline impact, outcome and input indicators. The end-line survey measured the key performance, impact, outcome and input indicators to track changes over time. The impact assessment used the baseline and end-line data to examine and explain the extent the program has contributed to the observed impact, outcome and input indicators.

The MoLGH and the new created Ministry of Water Development, Sanitation and Environmental Protection will use the findings of the impact evaluation as it continues to develop and strengthen WASH policies and systems beyond the timeframe of the ZSHP. The findings will also enhance the global evidence base on how CATS can contribute to a reduction in the prevalence of WASH-related diseases and child morbidity and mortality.

This report focuses on the impact assessment detailing the changes seen in the impact, outcome and input indicators; and examination and explanation of how the program contributed to the observed changes.
3.0 STUDY PURPOSE, OBJECTIVES AND OUTCOMES

3.1 Purpose
The purpose of this evaluation is to generate evidence and lessons learned about the ways in which program strategies and interventions have contributed to sustainable changes in sanitation and hygiene behavior, in disease prevalence, and in economic opportunities for and empowerment of households and communities.

3.2 Objectives:
The specific objectives of the evaluation are as follows:
1. Assess the extent of change, over the course of program implementation, in sanitation and hygiene behavior, including the consistent use of improved sanitation facilities, hand-washing practices, and the prevalence of diarrheal disease amongst children under five;
2. Analyze the extent to which and how the program strategies, in combination with external factors and in different contexts, have contributed to the observed changes in sanitation use, hygiene practice and the prevalence of diarrheal disease;
3. Analyze the extent to which observed changes are likely to be sustained and further expanded, in particular through adequate governance capacity in the public and private sectors, and in community structures;
4. Identify strengths and weaknesses in program implementation, with a focus on the main programmatic strategies used, partnerships, the use of evidence to improve Program performance and inform policy, and the cross-cutting issues of gender and the environment;
5. Formulate lessons learned and recommendations around scale-up and replication of the program approach, to inform policy and plans to further reduce morbidity associated with diarrheal disease amongst children, in Zambia and globally.

3.3 Main evaluation outcome indicators
The main evaluation outcome indicators measured reflected the impact, outcome and output indicators as indicated in the evaluation framework based on the Sanitation & Hygiene logic model presented in the term of reference (Figure 1.1).

Impact indicator:
- Prevalence of diarrheal disease among under 5 children (% of children with diarrhea in the previous 2 weeks)

Outcome Indicator 1
- Proportion of households using improved sanitation facilities with functional hand washing facility at the site (improved sanitation facility is defined as toilet in the home that separates the waste from human contact, and exclusive use by members of household; these include toilets such as flush toilet, ventilated improved pit latrine, traditional pit latrine with a slab and composting toilet; functional hand washing facility is defined as hand hashing facility with water and washing agent near the toilet)[23]

Outcome Indicator 2
- Proportion of caregivers that recall washing hands with water and washing agents at critical times
After using toilet
- Before eating
- Before preparing meals
- After cleaning or changing diaper/napkins of a baby that has recently defecated
- Before feeding a child
- After disposing of child’s feces

**Output Indicator 1**
- Proportion of households that have designated areas for washing hands with water and washing agent onsite

**Output Indicator 2**
- Proportion of caregivers with adequate knowledge and awareness of improved sanitation and hygiene
  - State importance of good hygiene practices
  - Link diarrhea to poor hygiene and sanitation
  - State critical times to wash hands

**3.4 Other evaluation outcome indicators**

**Impact Indicators**
- Prevalence of ARI among under 5 children (% of children with ARI in the previous 2 weeks)

- Proportion of children under 5 with stunting, severe stunting and wasting
  Stunting was defined as less than or equal to a -2 height/length for age WHO z-score; severe stunting was defined as less than or equal to a -3 height/length for age WHO z-score; and wasting was defined as less than or equal to -2 weight for height/length WHO z-score

- Proportion of schools (pupils) with improved sanitation facilities meeting needs of children (as described in the proposal for an Interim WASH in School Package for Zambia [20])
  - Appropriate (child-friendly)
  - Separate for girls and boys
  - Adequate (sufficient quantity—target ratio of 50 children per cabin assuming a double VIP pit latrine)
  - Well-maintained (cleanliness)

**Input indicator**
- Proportion of schools (pupils) with designated area for washing hands with water and soap on site

**Other related indicators**
- Proportion of households that have access to improved (protected) sources of drinking water
- Proportion of households that treat water for drinking
4.0 METHODS

4.1 Design
We employed a pre- and post-intervention design. We measured the study outcomes at baseline, waited for 36 months for implementation of the program and then conducted end-line measurement of the outcomes. The baseline survey was conducted in June – August 2013 and end-line survey in June – August 2016. The main data collection tools used to measure outcomes were a household population-level survey and a school survey. The household survey questionnaire was adapted from the standard relevant modules of the multiple indicator cluster survey and DHS. The end-line tools were slightly modified from the tools used in the baseline survey by adding the features of pit latrines with slabs as requested by the UNICEF WASH team. Key stakeholders, especially UNICEF and the Steering Committee members provided input in the design and development of the data collection tools.

4.2 Study Site
The study was conducted from selected standard enumeration areas (SEAs) from the 65 districts in eight of the ten provinces of Zambia where CLTS project is being implemented. In order to have a more precise estimate of change in our study outcomes, data were collected from the same SEAs used for the baseline study.

4.3 Study Population
Household survey: Female caregivers with children under five years old (0-59 months) who were permanent residents (living in the area for at least six months) in the study area (selected clusters) were interviewed for the household survey.

School survey: The school survey forms were administered to teachers responsible for school sanitation or head-teachers from primary schools in the selected clusters.

4.4 Sample Size and Sampling
Household survey
The sample was designed to provide “nationally” representative estimates of WASH indicators for rural Zambia. The sample design did not have power to allow for any outcome to be studied in subgroup analyses. Our primary sampling unit was the SEA. We chose to use SEAs for the following reasons:

1. They are approximately the same size so each household will have a similar probability of being selected;
2. They are geographically defined which allows us to identify all the households within the borders of the sampling frame; and,
3. They are a manageable size to survey, with only 130 households on average.

In calculating the sample size required to meet our study goals, we wanted to have sufficient power to show an impact of the intervention on the reduction in the prevalence of diarrheal disease in children under the age of five from baseline to end-line, and to generate precise estimates of the secondary outcomes. We selected a representative sample of 1250 households in 50 clusters based upon the following assumptions:

- For estimating proportions, we chose the most conservative proportion (50%).
- We estimated a margin of error of ±4% with a 95% confidence interval (CI).
Based upon a review of design effects from household surveys conducted in Zambia, we chose a design effect of 1.7.

From our previous work, we estimated a minimum of 88% participation rate of households and eligible individuals.

We used a conservative proportion of 50% because apart from the impact indicator 1 and outcome indicator 1, we did not know the baseline proportion of the other main evaluation indicators and therefore using 50% would give us the largest sample size. This would give us adequate sample size for known proportions such as diarrhea in the last fortnight which was less than 50%.

With 80% power and a two-sided alpha of 5%, the sample had sufficient power to show the effectiveness of the intervention between 3.4% and 9.3% for most of the study outcomes. In the case of our impact indicator outcome, “two-week reported prevalence of diarrheal diseases among children under 5 years”, we had sufficient power to demonstrate a five-percentage point (absolute) reduction from a baseline of 16%.

We selected the representative sample of 1250 households using a two-stage design. We received a list of SEAs for districts in the eight provinces where the program is being implemented from the Central Statistics Office (CSO). The SEA listed included the number of households in each SEA. In the first stage sampling, 50 SEAs were selected using systematic stratified sampling with probability proportion to size with the SEAs stratified by province and district to ensure complete geographical coverage. In the second stage of sampling at the SEA, due to the variable number of households in each SEA, we selected an average of 25 households (range 11 to 49) from each SEA proportionate to the number of households for each SEA. In order to minimize variation, we sampled households in the same SEAs for both the baseline and end-line surveys. Household was defined as consisting of one or more people who live in the same dwelling and also share at meals or living accommodation, consistent with the CSO definition. The 50 SEAs selected were located in 26 of the 65 districts in the eight provinces.

School survey
Basic schools serving the selected SEAs (clusters) were enrolled in the school survey. There was an average of one or fewer schools per cluster.

4.5 Recruitment and Informed Consent

Household survey
When interviewers entered selected households, they briefly introduced themselves and the purpose of the visit and asked for mothers/caregivers with children aged 0-59 months. In situations where the household had more than one mother/caregiver with a child of this age, the older mother/caregiver was interviewed. We selected the older caregiver/mother for interview because she was likely to be the partner of the head of household or head of household herself and thus would be in a better position to respond to all the questions.

The interviewers obtained informed consent in the participants’ local language. They explained the purpose and rationale of the study, and informed the participants that they would not be paid for participating, they were not obliged to participate, and they could refuse to answer any question. They were assured of confidentiality regarding any information they provided. They were asked
to sign, mark, or thumbprint the consent form, and offered the opportunity to receive a copy of the consent form. Participants were interviewed only after written informed consent was provided.

School survey
The study team contacted head-teachers of basic schools through introduction letters from the District Directors of Education. At the schools, the team asked to be introduced to the teacher(s) responsible for sanitation in the schools. The study team met with the teachers and explained the study to them after which they signed written consent forms prior to the administration of the survey. If there was no teacher in the school responsible for sanitation, the survey was administered to the head teacher.

4.6 Data Collection
Household survey
The caregivers were interviewed in their homes by trained interviewers. Information collected included knowledge and good hygiene practices, household water treatment practices, understanding of the link between diarrhea and poor hygiene and sanitation, access to and use of improved sanitation, hand washing practices, source and storage of drinking water and any barriers encountered in accessing these services. They were also asked about recent illnesses of their children, particularly diarrhea\(^3\) and ARI, actions taken during the illness including type and source of treatment, out of pocket expenditure during the illness and on health in general, and barriers to the treatment. Socio-demographic characteristics of respondents and family were also collected. We asked about expenditure on the construction and maintenance of latrines and hand washing materials. Dates when the latrines were constructed were also collected. We also asked about sources of information on sanitation and hygiene, any contact with the program and participation in program activities. In addition, toilet facilities for the household, water storage containers, and sites for washing hands were inspected. We checked whether there was soap or ash available for hand washing. Weight, height, and mid upper arm circumference of children under five years of age in the household were measured.

Data collectors worked in pairs to take the anthropometric measures. Weight was measured using Seca electronic scale (Seca 882 digital floor), with a precision of ±10g. Children aged one month and older were weighed by their caregivers holding them or sitting/standing alone in the middle of the scale. Children aged less than one month were weighed first with their caregiver and then the caregiver, and subtracting the weight of the caregiver from the weight of the combined. Two readings were taken and the average recorded.

Height/length was measured using measuring boards with sliding head pieces that had a precision of 0.1cm. An assistant made sure that the child’s knees were pushed against the board. Two readings to the nearest 0.1 cm were taken and the average recorded.

School survey:
The school survey collected information about the availability and number of improved sanitation facilities for both male and female pupils, their status including privacy, cleanliness and school specific programs to maintain hygienic standards for the school environment and pupils. We also collected information on SLTS support to the school including provision of sanitation and hygiene

\(^3\) Diarrhea defined as three or more loose or watery bowel movements per 24 hours
hardware and hygiene promotion. Toilet facilities, sites for washing hands and refuse disposal sites were inspected.

4.7 Approach to quality control
The field team was recruited from a pool of experienced field staff that ZCAHRD has used over the years to conduct similar field activities. They received a five-day training to ensure that they had the appropriate training and skills necessary to the overall conduct of the study, safety of research subjects, and quality of the resulting data. They were trained on how to use the study instruments (survey forms). They were taken through the forms question by question, explaining each thoroughly and detailing the information required. They received specific instructions in classifying sanitation facilities with assistance in this aspect of training from UNICEF. The training also covered ethical issues including the protection of human participants, confidentiality and the process of obtaining informed consent. Out of the 12 data collectors and supervisors engaged in the end-line survey, nine had been involved in the baseline data collection.

The instruments and procedures were similar to those used in both the baseline and end-line surveys. The interviews were conducted in the interviewee’s own language. Even though we recruited interviewers who spoke many of the relevant languages, in a few cases, the interviewers engaged local interpreters to enable them to administer the survey forms.

We maintained several levels of supervision of data collection and checking of study forms to ensure the quality of data. Three teams (A, B and C) were involved in data collection. Each team was made up of three data collectors and a supervisor. Each team was allocated a vehicle and worked together in the same area to ensure that the supervisor had daily contact with data collectors. The supervisor collected and checked forms to ensure that they were completed properly and there were no blank cells. The supervisors also made both scheduled and unscheduled visits to data collectors during interviews. During the end-line survey, we recruited a study coordinator and a data quality manager who were responsible for the field work. They were allocated a vehicle to visit the teams during the field work.

Team A collected data in 17 SEAs in eight districts from two provinces, Team B collected data from 18 SEAs in nine districts from three provinces and Team C collected data from 15 SEAs in nine districts from 3 provinces. Data collection lasted for seven weeks.

4.8 Implementation and Other Data Sources
To understand how the program was implemented and to meet some of the specific objectives, the study team held discussions with UNICEF and two IPs (AKROs and SNV Netherlands Development Organization) and reviewed relevant program documents such as annual, semi-annual and annual reports, field progress and monitoring reports, reports of annual reviews by the funder, publications and related documents. We also reviewed diarrhea and ARI data from the implementing districts submitted to the MoH through the national health management information system (HMIS) over the period of 2009 to 2015.

4.9 Data Management:
The data collection tools were designed in TeleForms®. The Teleforms® enabled hand-written text to be translated to computer readable files and the data was entered into a Microsoft® Access
database. As Teleforms® included a data verification system, there was no need for double data entry. The paper forms were scanned and imported as faxed forms into the computer and all fields were verified through the TeleForms® system. Data checking took place with verification of the Access database with the paper forms by the office-based data manager. Additionally, data cleaning involved logic checks, range, missing data, and missing form checks.

4.10 Analysis and impact assessment
Using data from the baseline and end-line surveys, supplemented with data from the implementation and other sources, we ascertained whether there have been significant changes which can be attributed to the project.

We used a complex sample design that needed to be taken into account in the survey analysis. We calculated base weights and then adjusted them for non-response and frame coverage. For descriptive statistics, we took the weights into account. We took these weights and variances (along with clustering) into account when tested the impact of the intervention.

The primary outcome of interest was the two-week prevalence of diarrheal diseases in children under the age 5 years. To report on baseline measures of our primary outcomes and other outcomes, we used SAS version 9.4 software (SAS Institute, Cary, NC). We used frequency counts for dichotomous outcomes and means and medians for continuous outcomes.

We used a generalized linear model to test the differences in outcome variables between pre- and post-intervention surveys to detect the impact and effect of the intervention. We calculated prevalence ratios (PR) and 95% CI adjusting for clustering. Since we sampled from matched SEAs in the baseline and end-line surveys at the same proportion, we treated the survey as a self-weighting sample. The prevalence ratio was calculated as below (Box 1):

**Box 1: Prevalence ratio calculation**

<table>
<thead>
<tr>
<th>E.g. Prevalence ratio calculation for households with improved sanitation:</th>
</tr>
</thead>
<tbody>
<tr>
<td>( p_1 ) = prevalence estimator in the end-line group</td>
</tr>
<tr>
<td>( A_1 ) = number of households with improved sanitation in end-line group</td>
</tr>
<tr>
<td>( N_1 ) = total number of households in end-line group</td>
</tr>
<tr>
<td>( p_0 ) = prevalence estimator in the baseline group</td>
</tr>
<tr>
<td>( A_0 ) = number of households with improved sanitation in baseline group</td>
</tr>
<tr>
<td>( N_0 ) = total number of households in baseline group</td>
</tr>
</tbody>
</table>

Prevalence ratio = \( \frac{p_1}{p_0} \)

95% CI for the log of the prevalence ratio is

\[
\ln\left(\frac{p_1}{p_0}\right) \pm 1.96 \sqrt{\frac{1 - p_1}{N_1 p_1} + \frac{1 - p_0}{N_0 p_0}}
\]

The antilogs are the 95% CI.
The prevalence ratio for other outcome measures was calculated by substituting the number of households with the other outcome characteristics in place of improved sanitation.

We calculated stunting and wasting for children under the age of five using the WHO Child Growth Standards SAS igrowup package. Stunting was defined as less than or equal to a -2 height/length for age WHO z-score; severe stunting was defined as less than or equal to a -3 height/length for age WHO z-score; and wasting was defined as less than or equal to -2 weight for height/length WHO z-score. For wasting, observations with WHO z-scores less than -5 or greater than 5 were flagged as being outliers and set to missing for the analysis. For stunting, observations with WHO z-scores less than -6 or greater than 6 were flagged and set to missing for the analysis.

For the end-line survey, we compared households that received RTM with households that did not receive RTM, households in triggered to non-triggered villages, and households in ODF to non-ODF villages by calculating prevalence ratios (PR) and 95% CI using log binary regression taking clustering by SEA into account. The model was used to calculate an adjusted PR (aPR) and 95% CI taking the clustering of households within SEA into account. No further adjustment variables were included in the model. We calculated survey weights for the sampled households based upon the proportion of households expected to be surveyed for each SEA. This satisfied us that the sample weights were approximately equal and we treated the sample as a self-weighted sample.

4.11 Ethical Approval
Ethical approval was obtained from the BU Institutional Review Board (IRB) and a local Zambian ethical review committee (ERES CONVERGE), a private subsidiary of the Zambia National Health Research Ethics Committee authorized to review and approve studies of this nature. We also received approval from the MoH. All consent forms were developed in accordance with the BU IRB and ERES CONVERGE ethical committee guidelines. Consent forms were translated into the major local languages spoken in the study districts (Bemba, Nyanja and Tonga). These translations were validated and attested for their accuracy. Validation was done through re-translating the consent forms in the local languages into English and certified by an expert who completed an attestation form.
50 RESULTS

5.1 Characteristics of respondents and households
We interviewed 1204 and 1170 female caregivers of children 0-59 months in the baseline and end-line household surveys respectively. The characteristics of women, households and children were similar in both surveys. Most women interviewed were in the age group of 20-35 years, had at least primary education, identified themselves as farmers and a little over two-fifths were from Bemba or Tonga ethnic groups (Table 1). The head of households were, in most cases, the husband or partner of the respondent and about half of the households had a household size of 4-6 (Table 2). A little over half of the children under the age of five years were in the age group of 24-59 months and there were slightly more females than males (Table 3). For children aged 7 – 12 years, most of the children were in the 5-7 year age group and there were slightly more females than males (Table 4). These characteristics were similar to the Zambian rural population [24]

Table 1: Socio-demographic characteristics of respondents at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households</td>
<td>1204</td>
<td>1170</td>
</tr>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;20 years</td>
<td>9.9% (116/1,173)</td>
<td>9.1% (103/1,134)</td>
</tr>
<tr>
<td>20-35 years</td>
<td>71.6% (840/1,173)</td>
<td>67.9% (770/1,134)</td>
</tr>
<tr>
<td>&gt;35 years</td>
<td>18.5% (217/1,173)</td>
<td>23.0% (261/1,134)</td>
</tr>
<tr>
<td><strong>Highest level of education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>10.2% (123/1,204)</td>
<td>10.8% (126/1,170)</td>
</tr>
<tr>
<td>Primary</td>
<td>67.4% (812/1,204)</td>
<td>65.8% (770/1,170)</td>
</tr>
<tr>
<td>Secondary</td>
<td>21.8% (263/1,204)</td>
<td>22.8% (267/1,170)</td>
</tr>
<tr>
<td>College and higher</td>
<td>0.5% (6/1,204)</td>
<td>0.6% (7/1,170)</td>
</tr>
<tr>
<td><strong>Main occupation</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Housewife</td>
<td>3.2% (38/1,201)</td>
<td>4.4% (52/1,169)</td>
</tr>
<tr>
<td>Farmer</td>
<td>87.1% (1,046/1,201)</td>
<td>80.6% (942/1,169)</td>
</tr>
<tr>
<td>Business/self-employed</td>
<td>4.9% (59/1,201)</td>
<td>10.2% (119/1,169)</td>
</tr>
<tr>
<td>Civil servant</td>
<td>0.6% (7/1,201)</td>
<td>0.3% (4/1,169)</td>
</tr>
<tr>
<td>Unemployed</td>
<td>1.9% (23/1,201)</td>
<td>1.6% (19/1,169)</td>
</tr>
<tr>
<td>Others*</td>
<td>2.3% (28/1,201)</td>
<td>2.8% (33/1,169)</td>
</tr>
</tbody>
</table>
### Marital status

<table>
<thead>
<tr>
<th>Marital status</th>
<th>Base Survey</th>
<th>End-line Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single/not married</td>
<td>9.1% (109/1,203)</td>
<td>7.8% (91/1,169)</td>
</tr>
<tr>
<td>Married</td>
<td>82.0% (986/1,203)</td>
<td>81.7% (955/1,169)</td>
</tr>
<tr>
<td>Separated/divorced</td>
<td>6.4% (77/1,203)</td>
<td>6.7% (78/1,169)</td>
</tr>
<tr>
<td>Widowed</td>
<td>2.6% (31/1,203)</td>
<td>3.8% (45/1,169)</td>
</tr>
</tbody>
</table>

### Ethnic group/tribe affiliation

<table>
<thead>
<tr>
<th>Ethnic group/tribe affiliation</th>
<th>Base Survey</th>
<th>End-line Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bemba</td>
<td>27.1% (323/1,192)</td>
<td>25.9% (302/1,167)</td>
</tr>
<tr>
<td>Tonga</td>
<td>17.4% (208/1,192)</td>
<td>16.7% (195/1,167)</td>
</tr>
<tr>
<td>Tumbuka</td>
<td>6.8% (81/1,192)</td>
<td>6.8% (79/1,167)</td>
</tr>
<tr>
<td>Lozi</td>
<td>4.2% (50/1,192)</td>
<td>6.0% (70/1,167)</td>
</tr>
<tr>
<td>Others*</td>
<td>44.5% (530/1,192)</td>
<td>44.6% (521/1,167)</td>
</tr>
</tbody>
</table>

Others* (farm laborer, casual laborer, cleaner, maid)
Others@ (Kaonde, Lenje, Nsenga, Lunda, Chewa, Mpunda, Ngoni, Luvale)

### Table 2: Household characteristics at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households</td>
<td>1204</td>
<td>1170</td>
</tr>
<tr>
<td><strong>Head of household</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Respondent</td>
<td>11.3% (136/1,203)</td>
<td>13.4% (156/1,168)</td>
</tr>
<tr>
<td>Husband/partner</td>
<td>81.1% (976/1,203)</td>
<td>77.3% (903/1,168)</td>
</tr>
<tr>
<td>Female relative</td>
<td>3.7% (45/1,203)</td>
<td>5.0% (58/1,168)</td>
</tr>
<tr>
<td>Male relative</td>
<td>3.8% (46/1,203)</td>
<td>4.4% (51/1,168)</td>
</tr>
<tr>
<td><strong>Level of education of head of household</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No education</td>
<td>5.9% (71/1,199)</td>
<td>5.5% (64/1,166)</td>
</tr>
<tr>
<td>Primary</td>
<td>50.0% (599/1,199)</td>
<td>48.6% (567/1,166)</td>
</tr>
<tr>
<td>Secondary</td>
<td>33.9% (407/1,199)</td>
<td>35.4% (413/1,166)</td>
</tr>
</tbody>
</table>
| College and higher | 1.8%  
|                   | (22/1,199) | 1.5%  
|                   | (17/1,166) |
| **Main occupation** |   |   |
| Housewife         | 0.3%  
|                   | (3/1,194) | 0.3%  
|                   | (4/1,158) |
| Farmer            | 80.7%  
|                   | (963/1,194) | 78.0%  
|                   | (903/1,158) |
| Business/self-employed | 6.7%  
|                      | (80/1,194) | 12.6%  
|                      | (146/1,158) |
| Civil servant     | 1.7%  
|                   | (20/1,194) | 1.4%  
|                   | (16/1,158) |
| Unemployed        | 6.7%  
|                   | (80/1,194) | 0.3%  
|                   | (3/1,158) |
| Other             | 1.1%  
|                   | (13/1,194) | 7.3%  
|                   | (84/1,158) |
| **Household size** |   |   |
| < 4 persons       | 17.8%  
|                   | (214/1,204) | 14.1%  
|                   | (165/1,168) |
| 4-6 persons       | 47.3%  
|                   | (569/1,204) | 48.8%  
|                   | (570/1,168) |
| > 6 persons       | 35.0%  
|                   | (421/1,204) | 37.1%  
|                   | (433/1,168) |
| **Household expenditure on health in the last three months** |   |   |
| Household expenditure on health, ZMW mean (SE) | 32.1 (3.0) | 37.2 (3.1) |
| Household expenditure on health, ZMW median (range) | 2.0 (0 - 1000) | 0.0 (0 - 1000) |
| No expenditure | 47.7%  
|                   | (550/1,153) | 61.2%  
|                   | (712/1,163) |
| 1-99 ZMW | 42.8%  
|                   | (494/1,153) | 26.8%  
|                   | (312/1,163) |
| 100-199 ZMW | 5.5%  
|                   | (63/1,153) | 5.3%  
|                   | (62/1,163) |
| 200 ZMW and over | 4.0%  
|                   | (46/1,153) | 6.6%  
|                   | (77/1,163) |
| Ownership of radio | 49.6%  
|                   | (597/1204) | 41.8%  
|                   | (489/1170) |
| Ownership of television | 12.1%  
|                   | (146/1204) | 12.9%  
|                   | (151/1170) |
Table 3: Characteristics of under-fives at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of U5 Children</td>
<td>1641</td>
<td>1671</td>
</tr>
<tr>
<td>Mean age (SE) in months</td>
<td>26.7 (0.4)</td>
<td>27.4 (0.4)</td>
</tr>
</tbody>
</table>

**Age group**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11 months</td>
<td>26.4% (381/1,443)</td>
<td>22.8% (379/1,664)</td>
</tr>
<tr>
<td>12-23 months</td>
<td>18.2% (263/1,443)</td>
<td>20.7% (345/1,664)</td>
</tr>
<tr>
<td>24-59 months</td>
<td>55.4% (799/1,443)</td>
<td>56.5% (940/1,664)</td>
</tr>
</tbody>
</table>

**Sex**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>51.2% (841/1,641)</td>
<td>51.2% (856/1,671)</td>
</tr>
<tr>
<td>Male</td>
<td>48.8% (800/1,641)</td>
<td>48.8% (815/1,671)</td>
</tr>
</tbody>
</table>

Table 4: Characteristics of 5-12 years old at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects 5-12 years of age</td>
<td>1042</td>
<td>1491</td>
</tr>
<tr>
<td>Mean age (SE) in years</td>
<td>7.6 (0.1)</td>
<td>7.9 (0.1)</td>
</tr>
</tbody>
</table>

**Age group**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>5-7 years</td>
<td>55.2% (575/1,042)</td>
<td>47.0% (701/1,491)</td>
</tr>
<tr>
<td>8-9 years</td>
<td>27.8% (290/1,042)</td>
<td>26.6% (396/1,491)</td>
</tr>
<tr>
<td>10-12 years</td>
<td>17.0% (177/1,042)</td>
<td>26.4% (394/1,491)</td>
</tr>
</tbody>
</table>

**Sex**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Female</td>
<td>54.4% (567/1,042)</td>
<td>52.1% (777/1,491)</td>
</tr>
<tr>
<td>Male</td>
<td>45.6% (475/1,042)</td>
<td>47.9% (714/1,491)</td>
</tr>
</tbody>
</table>

5.2 Diarrhea prevalence in under-fives

The overall diarrhea prevalence was 19.1% in the end-line survey, slightly lower than the 20.4% found in the baseline. The end-line survey prevalence was higher than the baseline prevalence in the age-group 12-23 months and lower in the age-group 24-59 months (Table 5). The end-line survey diarrhea prevalence was lower than the baseline prevalence in both females and males. The
adjusted overall prevalence ratio between the baseline and end-line did not show any significant difference (1.00; 95% CI: 0.85 – 1.17).

Table 5: Diarrhea prevalence in under-fives at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of U5 Children</td>
<td>1340</td>
<td>1664</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall prevalence</td>
<td>20.4% (273/1,340)</td>
<td>19.1% (318/1,664)</td>
<td>1.07 (0.92 -1.23)</td>
<td>1.00 (0.85-1.17)</td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-11 months</td>
<td>22.5% (84/373)</td>
<td>23.0% (87/379)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-23 months</td>
<td>20.2% (51/252)</td>
<td>32.6% (112/344)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-59 months</td>
<td>18.3% (100/547)</td>
<td>12.6% (118/934)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>21.1% (145/688)</td>
<td>18.9% (161/852)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>19.6% (128/652)</td>
<td>19.3% (157/812)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.3 ARI prevalence in under-fives

The overall prevalence of ARI of 27.8% in the end-line survey was slightly higher than the 25.7% found in the baseline. Similarly, the prevalence by age group and prevalence by sex were higher in the end-line than the baseline survey (Table 6). However, the adjusted overall prevalence ratio between the baseline and end-line did not show any significant difference (0.91; 95% CI: 0.79 – 1.05).

The ARI prevalence was higher than the diarrhea prevalence in both surveys (Figure 2).

Table 6: ARI prevalence in under-five children at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of U5 children</td>
<td>1341</td>
<td>1671</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall prevalence</td>
<td>25.7% (344/1,341)</td>
<td>27.8% (465/1,671)</td>
<td>0.91 (0.80 -1.03)</td>
<td>0.91 (0.79-1.05)</td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age Group</td>
<td>Baseline (n/N)</td>
<td>End-line (n/N)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-------------------</td>
<td>----------------</td>
<td>---------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-11 months</td>
<td>26.2% (98/374)</td>
<td>29.3% (111/379)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-23 months</td>
<td>27.6% (70/254)</td>
<td>31.6% (109/345)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-59 months</td>
<td>23.7% (129/544)</td>
<td>25.7% (242/940)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sex**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Baseline (n/N)</th>
<th>End-line (n/N)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>23.1% (159/687)</td>
<td>25.8% (221/856)</td>
</tr>
<tr>
<td>Males</td>
<td>28.3% (185/654)</td>
<td>29.9% (244/815)</td>
</tr>
</tbody>
</table>

**Figure 2: Diarrhea and ARI prevalence in under-fives at baseline and end-line**

![Diarrhea and ARI prevalence graph]

**5.4 Stunting prevalence in under-fives**

The overall prevalence of stunting was 40.9% in the end-line survey, lower than 46.1% observed in the baseline. The end-line survey prevalence was higher than the baseline prevalence in the age-
groups 0-11 months and 12-23 months but lower in the age-group 24-59 months (Table 7). The end-line survey stunting prevalence was lower than the baseline prevalence in both females and males. The adjusted overall prevalence ratio between the baseline and end-line was significant (1.18; 95% CI: 1.06 – 1.31); the baseline stunting prevalence was significantly higher than the end-line stunting prevalence.

Table 7: Stunting prevalence in under-five children at baseline and end-line (z-score -2)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of U5 children</td>
<td>670</td>
<td>1507</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall prevalence</td>
<td>46.1% (309/670)</td>
<td>40.9% (617/1,507)</td>
<td>1.13 (1.01 -1.25)</td>
<td>1.18 (1.06-1.31)</td>
</tr>
</tbody>
</table>

**Age group**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11 months</td>
<td>22.6% (38/168)</td>
<td>30.0% (83/277)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-23 months</td>
<td>44.7% (80/179)</td>
<td>49.8% (161/323)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-59 months</td>
<td>59.1% (191/323)</td>
<td>41.1% (373/907)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sex**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>44.6% (156/350)</td>
<td>37.0% (286/774)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>47.8% (153/320)</td>
<td>45.2% (331/733)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.5 Severe stunting prevalence in under-five

The overall prevalence of severe stunting was 18.2% in the end-line survey, lower than the 32.4% in the baseline. The end-line survey prevalence was higher than the baseline in the age group 0-11 months but lower in the age groups 12 – 23 months and 24-59 months. End-line survey severe stunting prevalence was lower than the baseline prevalence in both females and males (Table 8). The adjusted overall prevalence ratio between the baseline and end-line was significant (1.86; 95% CI: 1.59 – 2.18); the baseline severe stunting prevalence was significantly higher than the end-line stunting prevalence.

5.6 Wasting prevalence in under-fives

The overall prevalence of wasting was 7.4% in the end-line survey, lower than the 14.1% in the baseline. The end-line survey prevalence was lower than the baseline prevalence in all age-groups (Table 9). The end-line survey wasting prevalence was lower than the baseline prevalence in both females and males. The adjusted overall prevalence ratio between the baseline and end-line was significant (2.07; 95% CI: 1.60 – 2.68); the baseline wasting prevalence was significantly higher than the end-line wasting prevalence.
Table 8: Severe stunting prevalence in under-five children at baseline and end-line (z-score -3)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of U5 children</td>
<td>670</td>
<td>1507</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall prevalence</td>
<td>32.4% (217/670)</td>
<td>18.2% (275/1,507)</td>
<td>1.78 (1.52 -2.08)</td>
<td>1.86 (1.59-2.18)</td>
</tr>
</tbody>
</table>

**Age group**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11 months</td>
<td>13.7% (23/168)</td>
<td>15.9% (44/277)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-23 months</td>
<td>29.6% (53/179)</td>
<td>24.5% (79/323)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-59 months</td>
<td>43.7% (141/323)</td>
<td>16.8% (152/907)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sex**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>30.6% (107/350)</td>
<td>15.2% (118/774)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>34.4% (110/320)</td>
<td>21.4% (157/733)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The wasting prevalence was lower than the stunting prevalence in both surveys (Figure 3)

Table 9: Wasting prevalence in under-fives at baseline and end-line (z-score -2)

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of U5 children</td>
<td>1063</td>
<td>1507</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall prevalence</td>
<td>14.1% (150/1,063)</td>
<td>7.4% (111/1,507)</td>
<td>1.92 (1.51 -2.43)</td>
<td>2.07 (1.60-2.68)</td>
</tr>
</tbody>
</table>

**Age group**

<table>
<thead>
<tr>
<th>Age group</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-11 months</td>
<td>13.7% (43/315)</td>
<td>8.5% (23/272)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12-23 months</td>
<td>12.2% (26/213)</td>
<td>7.7% (25/326)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>24-59 months</td>
<td>16.6% (66/397)</td>
<td>7.0% (63/906)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sex**

<table>
<thead>
<tr>
<th>Sex</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>11.1%</td>
<td>8.0%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 3: Stunting, Severe stunting and Wasting prevalence in under-five children at baseline and end-line

<table>
<thead>
<tr>
<th></th>
<th>Baseline (60/540)</th>
<th>End-line (62/777)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Males</td>
<td>17.2% (90/523)</td>
<td>6.7% (49/730)</td>
</tr>
</tbody>
</table>

5.7 Diarrhea prevalence in 5 – 12 years
The overall prevalence of diarrhea in this age group was 4.4% in the end-line survey, slightly higher than the 3.9% in the baseline survey. In both the end-line and baseline, the prevalence in 5-12-year-old children was about a quarter of the prevalence among children under five years old. The end-line survey prevalence was higher than the baseline prevalence in the age-groups 5 – 7 years and 8-9 years but lower in the age-group 10-12 years (Table 10). The end-line survey diarrhea prevalence was lower than the baseline prevalence in males and higher in females. However, the adjusted overall prevalence ratio between the baseline and end-line did not show any significant difference (0.89; 95% CI: 0.58 – 1.36).
### Table 10: Diarrhea prevalence in 5 – 12 years at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subjects 5-12 years of age</td>
<td>1033</td>
<td>1471</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall prevalence</td>
<td>3.9% (40/1,033)</td>
<td>4.4% (64/1,471)</td>
<td>0.89 (1.60 -1.31)</td>
<td>0.89 (0.58-1.36)</td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-7 years</td>
<td>4.2% (24/573)</td>
<td>5.1% (35/692)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-9 years</td>
<td>2.1% (6/283)</td>
<td>3.8% (15/393)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-12 years</td>
<td>5.6% (10/177)</td>
<td>3.6% (14/386)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Sex</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Females</td>
<td>3.9% (22/564)</td>
<td>5.7% (44/770)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Males</td>
<td>3.8% (18/469)</td>
<td>2.9% (20/701)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 5.8 ARI prevalence in 5 -12 years

The overall prevalence of ARI, prevalence by age group and prevalence by sex were higher in the end-line survey than the baseline survey (Table 11). The adjusted overall prevalence ratio between the baseline and end-line was significant (0.64; 95% CI: 0.48 – 0.85); the baseline ARI prevalence was significantly lower than the end-line ARI prevalence.

Similar to the under-fives, the ARI prevalence was higher than the diarrhea prevalence in both surveys (Figure 4).

### Table 11: ARI prevalence in older children at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline</th>
<th>End-line</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Adjusted Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of subject 5-12 years of age</td>
<td>1035</td>
<td>1491</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall prevalence</td>
<td>8.0% (83/1,035)</td>
<td>12.4% (185/1,491)</td>
<td>0.64 (0.50 -0.83)</td>
<td>0.64 (0.48-0.85)</td>
</tr>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age Group</td>
<td>Diarrhea Prevalence</td>
<td>ARI Prevalence</td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------</td>
<td>---------------------</td>
<td>----------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-7 years</td>
<td>8.7% (50/573)</td>
<td>14.4% (101/701)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8-9 years</td>
<td>8.4% (24/286)</td>
<td>10.6% (42/396)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10-12 years</td>
<td>5.1% (9/176)</td>
<td>10.7% (42/394)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Sex**

<table>
<thead>
<tr>
<th>Gender</th>
<th>Diarrhea Prevalence</th>
<th>ARI Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Females</td>
<td>7.8% (44/566)</td>
<td>12.6% (98/777)</td>
</tr>
<tr>
<td>Males</td>
<td>8.3% (39/469)</td>
<td>12.2% (87/714)</td>
</tr>
</tbody>
</table>

Figure 4: Diarrhea and ARI prevalence in 5 – 12 years at baseline and end-line

5.9 Household use of sanitation facilities
The most common sanitation facility reported as used by households in both the baseline and end-line was a pit latrine with a slab with coverage of 63.5% and 78.2%, respectively (Table 12). More households in the baseline survey (19.4%) reported not having a toilet facility than in the end-line.
(14.6%) (PR=1.32, 95% CI: 1.11 – 1.59). At baseline, 64.1% of households reported using an improved toilet facility as compared to 80.0% in the end-line (Figure 5); this difference was significant (PR=0.80, 95% CI: 0.76 – 0.84). Only 35.9% of the households in the baseline survey reported using an improved unshared toilet facility as compared to 50.7% in the end-line survey; this difference was also significant (PR=0.70; 95% CI:0.64 – 0.78). Similarly, the proportion of households in the baseline survey (5.4%) who had an improved unshared toilet facility with hand washing station with water and washing agent available was significantly lower than the proportion of 14.3% in the end-line survey (PR=0.37; 95% CI: 0.029 – 0.50). The proportion of households in the end-line survey who had access to adequate sanitation (improved unshared toilet facility with smooth latrine floor, fly prevention (lid), privacy, and handwashing facility with water and washing agent) was 9.0%. Not all relevant data (e.g. fly prevention and privacy assessment) were collected in the baseline survey so this indicator could not be measured.

Table 12: Household sanitation facilities at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Prevalence Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Number of households</td>
<td>1204</td>
<td>1170</td>
</tr>
<tr>
<td></td>
<td>Pit latrine with slab</td>
<td>63.5% (765/1,204)</td>
<td>78.2% (915/1,170)</td>
</tr>
<tr>
<td></td>
<td>Ventilated improved pit latrine</td>
<td>0.6% (7/1,204)</td>
<td>1.6% (19/1,170)</td>
</tr>
<tr>
<td></td>
<td>Flush/pour toilet</td>
<td>0.0% (0/1,204)</td>
<td>0.2% (2/1,170)</td>
</tr>
<tr>
<td></td>
<td>Pit latrine without slab</td>
<td>16.4% (198/1,204)</td>
<td>5.2% (61/1,170)</td>
</tr>
<tr>
<td></td>
<td>No facility</td>
<td>19.4% (234/1,204)</td>
<td>14.6% (171/1170)</td>
</tr>
</tbody>
</table>

5.10 Household ODF practice and status
At baseline, 58.0% of households responded that no member of their households had ever practiced open defecation compared to 62.0% in the end-line. This difference was not significant (PR=0.94; 95% CI: 0.87 – 1.00) Similarly, 16.8% of households in the baseline survey as compared to 14.2% in end-line reported that a member of their households practiced open defecation on a daily basis (Figure 6). In the baseline survey, 0.3% responded that they lived in an ODF-certified village as compared to 10.6% in the end-line, a significant difference (PR=0.024; 95% CI: 0.008 – 0.074).
Figure 5: Household using improved sanitation facilities at baseline and end-line

Figure 6: Household member practicing open defecation at baseline and end-line
5.11 Hand washing knowledge and reported practices

In both the baseline and end-line, caregivers had very high knowledge about washing hands after using the toilet (90.0% vs 90.8%; PR=0.99; 95% CI: 0.96-1.08) and before eating (87.0% vs 83.5%; PR=1.04; 95% CI: 1.01-1.08) but poor knowledge about washing hands after disposing of child feces (24.9% vs 16.8%; PR=1.40; 95% CI: 1.20-1.63) and before feeding a child (31.7% vs 19.1%; PR=1.66; 95% CI: 1.44-1.92) (Table 13). Very few of the caregivers could name all the six critical times to wash hands; 7.9% in baseline and 5.4% in end-line but this difference was significant (PR=1.45; 95% CI: 1.07 - 1.98). The caregivers’ report of practicing washing hands before preparing food or after using the toilet was very high (87.3% vs 94.0%; PR=0.92; 95% CI: 0.84 – 0.96). However, only 55.2% in the baseline and 61.4% in the end-line reported washing hands with water and washing agents. The difference was significant, less people in the baseline washed hands with water and washing agent (PR=0.90; 95% CI: 0.84 – 0.96). Only 21.1% of caregivers in the baseline reported that the household had a specific place for washing hands and only 13.3% of households had water and washing agent available at the hand washing place. In contrast, 33.4% of caregivers in the end-line reported having a specific place for washing hands and 18.2% had water and washing agent available. These differences were significant; fewer households in the baseline had a specific place for washing hands (PR=0.63; 95% CI: 0.55 – 0.72) and had water and washing agent available onsite (PR=0.72; 95% CI: 0.59 – 0.87).

Table 13: Hand washing knowledge and practices at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline survey</th>
<th>End-line survey</th>
<th>Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households</td>
<td>1204</td>
<td>1170</td>
<td></td>
</tr>
<tr>
<td>Reported washing hands before preparing food or after defecation</td>
<td>87.3% (1038/1189)</td>
<td>94.0% (1092/1162)</td>
<td>0.92 (0.90 – 0.95)</td>
</tr>
<tr>
<td>Reported washing hands with water and washing agent</td>
<td>55.2% (665/1,204)</td>
<td>61.4% (718/1,170)</td>
<td>0.90 (0.84 – 0.96)</td>
</tr>
<tr>
<td>Specific place for washing hands</td>
<td>21.1% (254/1,204)</td>
<td>33.4% (391/1,170)</td>
<td>0.63 (0.55 – 0.72)</td>
</tr>
<tr>
<td>Have place for washing hands near or close to toilet area</td>
<td>13.6% (164/1,204)</td>
<td>20.7% (242/1,170)</td>
<td>0.66 (0.55-0.79)</td>
</tr>
<tr>
<td>Specific place has water and soap available</td>
<td>13.3% (160/1,204)</td>
<td>18.2% (213/1,170)</td>
<td>0.72 (0.59 – 0.87)</td>
</tr>
</tbody>
</table>

Knowledge of when to wash hands

<table>
<thead>
<tr>
<th>Action</th>
<th>Baseline survey</th>
<th>End-line survey</th>
<th>Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before preparing food</td>
<td>48.5% (584/1,204)</td>
<td>47.8% (559/1,170)</td>
<td>1.02 (0.93-1.10)</td>
</tr>
<tr>
<td>Before eating</td>
<td>87.0% (1,047/1,204)</td>
<td>83.5% (977/1,170)</td>
<td>1.04 (1.00-1.08)</td>
</tr>
</tbody>
</table>
Before feeding a child | 31.7% (382/1,204) | 19.1% (223/1,170) | 1.66 (1.44-1.92)
--- | --- | --- | ---
After defeaction or visiting toilet | 90.0% (1,083/1,204) | 90.8% (1,062/1,170) | 0.99 (0.96-1.02)
After washing child’s bottom or changing diapers | 29.2% (352/1,204) | 23.8% (279/1,170) | 1.22 (1.07-1.40)
After disposing of child’s feces | 24.9% (300/1,204) | 16.8% (196/1,170) | 1.40 (1.20-1.63)
Know all critical times | 7.9% (95/1,204) | 5.4% (63/1,170) | 1.45 (1.07 - 1.98)

5.12 Knowledge on relationship of WASH and disease transmission
In both the baseline and end-line, the majority of caregivers were aware that not treating water or storing water safely, not washing hands with soap after defeaction or disposing of child feces, not using a clean latrine for defeaction and defeacting in the open could be harmful and cause diseases like diarrhea (Table 14). Only about half of caregivers in both the baseline and end-line indicated that dirty water and food could cause diarrhea and fewer knew that flies can cause diarrhea (Table 15). On the causes of ARI, there were low levels of knowledge from both the baseline and end-line respondents, particularly about the role of indoor air pollution and overcrowding (Table 16).

Table 14: Knowledge of association between WASH practices and disease risk at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households</td>
<td>1204</td>
<td>1170</td>
<td></td>
</tr>
<tr>
<td>Not treating water or storing safely</td>
<td>72.7% (875/1,204)</td>
<td>78.6% (920/1,170)</td>
<td>0.92 (0.89-0.97)</td>
</tr>
<tr>
<td>Not washing hand with soap and water</td>
<td>65.5% (789/1,204)</td>
<td>65.5% (766/1,170)</td>
<td>1.00 (0.94-1.06)</td>
</tr>
<tr>
<td>Not using clean latrine</td>
<td>52.5% (632/1,204)</td>
<td>52.1% (610/1,170)</td>
<td>1.01 (0.93-1.09)</td>
</tr>
<tr>
<td>Defecating on the ground</td>
<td>48.6% (585/1,204)</td>
<td>50.4% (590/1,170)</td>
<td>0.96 (0.88-1.04)</td>
</tr>
</tbody>
</table>

Table 15: Knowledge of causes of diarrhea at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households</td>
<td>1204</td>
<td>1170</td>
<td></td>
</tr>
<tr>
<td>Dirty water</td>
<td>52.4% (631/1,204)</td>
<td>48.5% (567/1,170)</td>
<td>1.08 (0.99-1.17)</td>
</tr>
<tr>
<td>Characteristic</td>
<td>Baseline Survey</td>
<td>End-line Survey</td>
<td>Prevalence Ratio 95% CI</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>------------------</td>
<td>-----------------</td>
<td>-------------------------</td>
</tr>
<tr>
<td>Dirty food</td>
<td>59.1% (712/1,204)</td>
<td>59.7% (699/1,170)</td>
<td>0.99 (0.92-1.06)</td>
</tr>
<tr>
<td>Uncleanliness/bad hygiene</td>
<td>34.5% (415/1,204)</td>
<td>49.4% (578/1,170)</td>
<td>0.70 (0.63-0.77)</td>
</tr>
<tr>
<td>Dirty environment</td>
<td>11.6% (140/1,204)</td>
<td>18.4% (215/1,170)</td>
<td>0.63 (0.52-0.77)</td>
</tr>
<tr>
<td>Flies</td>
<td>31.0% (373/1,204)</td>
<td>31.9% (373/1,170)</td>
<td>0.97 (0.86-1.09)</td>
</tr>
</tbody>
</table>

Table 16: Knowledge of causes of ARI at baseline and end-line

5.13 Access to water
The reported main sources of water used by households for drinking in both the baseline and end-line were boreholes/tubewells, unprotected dug wells, and surface water. Very few households had access to piped water (Figure 7). A little over half of the households (51.9%) in the end-line survey reported using an improved (protected) water source for drinking as compared to only 34.7% in the baseline, a significant difference (PR=0.67; 95% CI:0.60 – 0.73). Most households in both surveys spent 30 minutes or less to walk to water sources and carry water back to their homes (90.8% vs 87.8%; PR=1.03; 95% CI:1.00 – 1.07).

Observation of water storage for drinking water revealed that most households in both surveys stored water in storage containers which were completely covered and not within the reach of animals (Table 17).
Figure 7: Household drinking water sources at baseline and end-line

Table 17: Household drinking water storage at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Prevalence Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Container completely covered</td>
<td>84.9% (1,020/1,201)</td>
<td>83.4% (973/1,166)</td>
<td>1.01 (0.98-1.05)</td>
</tr>
<tr>
<td>Container has narrow mouth</td>
<td>30.4% (364/1,197)</td>
<td>22.6% (264/1,166)</td>
<td>1.34 (1.17-1.54)</td>
</tr>
<tr>
<td>Container has spigot</td>
<td>0.4% (5/1,181)</td>
<td>0.8% (9/1,161)</td>
<td>0.55 (0.18-1.62)</td>
</tr>
<tr>
<td>Container within reach of children</td>
<td>48.5% (581/1,199)</td>
<td>66.1% (768/1,161)</td>
<td>0.73 (0.68-0.79)</td>
</tr>
<tr>
<td>Container within reach of animals</td>
<td>2.7% (32/1,198)</td>
<td>4.4% (51/1,166)</td>
<td>0.61 (0.40-0.94)</td>
</tr>
</tbody>
</table>
5.14 Water treatment practices

In the baseline survey, 34.1% of households reported that they treat their water to make it safe for drinking as compared to 25.0% in the end-line survey. In both surveys, the common methods for treating water were adding bleach/chlorine and boiling the water (Table 18). In the baseline survey 32.3% of the households treated water appropriately as compared to 24.6% in the end-line survey. The difference was significant (PR=1.31; 95% CI: 1.15 – 1.49); more households in the baseline treated their water before drinking than in the end-line.

Table 18: Water treatment practices at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households</td>
<td>1204</td>
<td>1170</td>
<td></td>
</tr>
<tr>
<td>Reported treating water for drinking</td>
<td>34.1% (411/1,204)</td>
<td>25.0% (292/1,166)</td>
<td>1.36 (1.20-1.55)</td>
</tr>
<tr>
<td>Boil</td>
<td>10.4% (125/1,204)</td>
<td>11.6% (136/1,170)</td>
<td>0.89 (0.71-1.12)</td>
</tr>
<tr>
<td>Add bleach/chlorine</td>
<td>25.7% (310/1,204)</td>
<td>14.3% (167/1,170)</td>
<td>1.80 (1.52-2.14)</td>
</tr>
<tr>
<td>Use water filter (ceramic/sand/composite)</td>
<td>0.1% (1/1,204)</td>
<td>0.2% (2/1,170)</td>
<td>0.05 (0.04-5.35)</td>
</tr>
<tr>
<td>Solar disinfection</td>
<td>0.2% (2/1,204)</td>
<td>0.5% (6/1,170)</td>
<td>0.32 (0.07-1.60)</td>
</tr>
<tr>
<td>Strain it through a cloth</td>
<td>0.4% (5/1,204)</td>
<td>0.7% (8/1,170)</td>
<td>0.61 (0.20-1.85)</td>
</tr>
<tr>
<td>Let it stand to settle</td>
<td>2.0% (24/1,204)</td>
<td>0.7% (8/1,170)</td>
<td>2.92 (1.32-6.46)</td>
</tr>
<tr>
<td>Other</td>
<td>0.0% (0/1,204)</td>
<td>0.8% (9/1,170)</td>
<td>-</td>
</tr>
<tr>
<td>Treat water appropriately</td>
<td>32.3% (389/1,204)</td>
<td>24.6% (288/1,170)</td>
<td>1.31 (1.15-1.49)</td>
</tr>
</tbody>
</table>

5.15 Sources of information on WASH

In both the baseline and end-line surveys the respondents reported that the most common household source of information on WASH was through health education by community health workers. Significantly less households in the baseline survey than the end-line survey received information on WASH from CLTS champions and volunteers (PR=0.33; 95%CI; 0.28 – 0.39). Very few households received information on WASH from radio and television (Table 19).

About three-quarters of households in both the baseline and end-line surveys had received information on handwashing with water and soap, use of safe water and the use of sanitary latrines and safe feces disposal in the previous six months. Significantly more households at baseline received WASH information (Table 20).
Table 19: Household report on sources of information on WASH at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households</td>
<td>1204</td>
<td>1170</td>
<td></td>
</tr>
<tr>
<td>Posters and handbills</td>
<td>0.2% (2/1,204)</td>
<td>0.6% (7/1,170)</td>
<td>0.28 (0.06-1.33)</td>
</tr>
<tr>
<td>Health education by CHWs</td>
<td>74.6% (898/1,204)</td>
<td>51.8% (606/1,170)</td>
<td>1.44 (1.35-1.54)</td>
</tr>
<tr>
<td>Health education by CHAs</td>
<td>12.3% (148/1,204)</td>
<td>11.5% (134/1,170)</td>
<td>1.07 (0.86-1.33)</td>
</tr>
<tr>
<td>Health education by CLTS community champions and/or sanitation action group</td>
<td>13.0% (156/1,204)</td>
<td>38.8% (454/1,170)</td>
<td>0.33 (0.28-0.39)</td>
</tr>
<tr>
<td>Health education by health personnel*</td>
<td>0.2% (2/1,204)</td>
<td>24.3% (284/1,170)</td>
<td>0.01 (0.00-0.03)</td>
</tr>
<tr>
<td>Radio</td>
<td>5.7% (69/1,204)</td>
<td>3.7% (43/1,170)</td>
<td>1.56 (1.07-2.26)</td>
</tr>
<tr>
<td>Television</td>
<td>0.4% (5/1,204)</td>
<td>0.3% (4/1,170)</td>
<td>1.21 (0.33-4.50)</td>
</tr>
<tr>
<td>Drama groups</td>
<td>0.2% (2/1,204)</td>
<td>0.9% (10/1,170)</td>
<td>0.19 (0.04-0.88)</td>
</tr>
</tbody>
</table>

*Health personnel include doctors, clinical officers, nurses, EHTs

Table 20: Household report on timing of receipt of information on WASH at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households</td>
<td>1204</td>
<td>1170</td>
<td></td>
</tr>
<tr>
<td>Received information on handwashing with water and soap within 1 month</td>
<td>50.4% (606/1,203)</td>
<td>35.3% (412/1,166)</td>
<td>1.43 (1.30-1.57)</td>
</tr>
<tr>
<td>Received information on handwashing with water and soap within 6 months</td>
<td>78.9% (949/1,203)</td>
<td>68.0% (793/1,166)</td>
<td>1.16 (1.10-1.22)</td>
</tr>
<tr>
<td>Received information on use of safe water within 1 month</td>
<td>50.9% (612/1,203)</td>
<td>34.2% (399/1,168)</td>
<td>1.49 (1.35-1.64)</td>
</tr>
<tr>
<td>Received information on use of safe water within 6 months</td>
<td>80.1% (964/1,203)</td>
<td>68.3% (798/1,168)</td>
<td>1.17 (1.12-1.23)</td>
</tr>
</tbody>
</table>
Received information on sanitary latrines and feces disposal within 1 month | 52.4% (626/1,194) | 32.2% (374/1,162) | 1.63 (1.47-1.80)

Received information on sanitary latrines and feces disposal within 6 months | 82.2% (981/1,194) | 68.2% (793/1,162) | 1.20 (1.15-1.26)

5.16 CLTS champion/volunteer visit to household and household participation in CLTS activities.

Generally, very few households, both in the baseline and end-line surveys, reported receiving a visit from a CLTS champion or volunteer to their household to discuss issues related to WASH. Similarly, fewer households reported participating in CLTS activities in their communities (Table 21).

Table 21: Household report on visit by CLTS volunteer/champion and participation in CLTS activities at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Prevalence ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of households</td>
<td>1204</td>
<td>1170</td>
<td></td>
</tr>
<tr>
<td>Visit by CLTS member/volunteer within 1 month</td>
<td>7.1% (85/1204)</td>
<td>13.4% (157/1,170)</td>
<td>0.53 (0.41-0.68)</td>
</tr>
<tr>
<td>Visit by CLTS member/volunteer within 6 months</td>
<td>14.0% (168/1,204)</td>
<td>30.0% (351/1,170)</td>
<td>0.47 (0.39-0.55)</td>
</tr>
<tr>
<td>Participated in CLTS activity within 1 month</td>
<td>8.0% (96/1,204)</td>
<td>8.1% (95/1,170)</td>
<td>0.98 (0.75-1.29)</td>
</tr>
<tr>
<td>Participated in CLTS activity within 6 months</td>
<td>13.4% (161/1,204)</td>
<td>22.8% (267/1,170)</td>
<td>0.59 (0.49-0.70)</td>
</tr>
</tbody>
</table>

5.17 Triggering Status and WASH outcomes

Program implementation data confirmed the triggering status of 777 households (of the 1170 households surveyed during the end-line survey), of which 93, representing 12.0%, lived in a village which had not been triggered. We compared key WASH outcome indicators for households living in triggered villages to those living in non-triggered villages. The differences were generally not significant except hand washing knowledge and practice (Table 22). There appeared to be improvement in WASH outcomes in the non-triggered households. These data should be interpreted with caution since the number of non-triggered households is small.
Table 22. WASH outcomes by triggering status

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Households in triggered villages (n=684)</th>
<th>Households in non-triggered villages (n=93)</th>
<th>Crude Prevalence ratio 95% CI</th>
<th>Adjusted prevalence ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved toilet facility</td>
<td>537 (78.5%)</td>
<td>76 (81.7%)</td>
<td>0.96 (0.87 -1.07)</td>
<td>0.96 (0.87 -1.07)</td>
</tr>
<tr>
<td>Improved toilet facility (not shared)</td>
<td>323 (47.2%)</td>
<td>59 (63.4%)</td>
<td>0.74 (0.63 – 0.89)</td>
<td>0.75 (0.64 – 0.89)</td>
</tr>
<tr>
<td>No facilities--use bush or field</td>
<td>113 (16.5%)</td>
<td>15 (16.1%)</td>
<td>1.02 (0.62 – 1.68)</td>
<td>1.03 (0.63 – 1.67)</td>
</tr>
<tr>
<td>Appropriate disposal of child feces**</td>
<td>563 (87.3%)</td>
<td>74 (87.1%)</td>
<td>1.00 (0.92– 1.09)</td>
<td>1.02 (0.93– 1.12)</td>
</tr>
<tr>
<td>Households has specific place for washing hands</td>
<td>245 (35.8%)</td>
<td>29 (31.2%)</td>
<td>1.15 (0.84 – 1.58)</td>
<td>1.11 (0.83 – 1.48)</td>
</tr>
<tr>
<td>Site for washing hands has water and soap/detergent or ash available</td>
<td>132 (19.3%)</td>
<td>11 (11.8%)</td>
<td>1.63 (0.92 – 2.90)</td>
<td>1.64 (0.92 – 2.91)</td>
</tr>
<tr>
<td>Knowledge of all six critical times to wash hands</td>
<td>43 (6.3%)</td>
<td>1 (1.1%)</td>
<td>5.87 (0.81 – 41.96)</td>
<td>5.91 (0.82 – 42.46)</td>
</tr>
<tr>
<td>Knowledge of at least 4 critical times to wash hands</td>
<td>192 (28.1%)</td>
<td>12 (12.9%)</td>
<td>2.18 (1.27 – 3.74)</td>
<td>2.20 (1.28 – 3.78)*</td>
</tr>
<tr>
<td>Recent hand washing with soap/detergent or ash</td>
<td>473 (69.2%)</td>
<td>44 (47.3%)</td>
<td>1.46 (1.17 – 1.82)</td>
<td>1.47 (1.18 – 1.83)*</td>
</tr>
<tr>
<td>Improved toilet facility and hand washing station with water and washing agent</td>
<td>105 (15.4%)</td>
<td>11 (11.8%)</td>
<td>1.30 (0.73 – 2.32)</td>
<td>1.31 (0.73 – 2.34)</td>
</tr>
<tr>
<td>Improved (protected) water source</td>
<td>372 (54.4%)</td>
<td>49 (52.7%)</td>
<td>1.03 (0.84 -1.27)</td>
<td>1.05 (0.85 -1.30)</td>
</tr>
<tr>
<td>Treat water effectively (use adequate water treatment method)</td>
<td>181 (26.5%)</td>
<td>18 (19.4%)</td>
<td>1.36 (0.89 – 2.11)</td>
<td>1.38 (0.88 – 2.15)</td>
</tr>
<tr>
<td>†Two-week diarrhea prevalence among children &lt;5 y</td>
<td>20.5% (198/965)</td>
<td>19.7 (27/137)</td>
<td>1.04 (0.73 – 1.49)</td>
<td>1.04 (0.74 – 1.48)</td>
</tr>
<tr>
<td>†Two week ARI prevalence among children &lt;5 y</td>
<td>32.0% (310/968)</td>
<td>21.2% (29/137)</td>
<td>1.51 (1.08 – 2.12)</td>
<td>1.57 (1.07 – 2.30)*</td>
</tr>
<tr>
<td>†Stunting (height/length for age z-score ≤-2) among children &lt;5 y</td>
<td>38.6% (339/879)</td>
<td>45.8% (54/118)</td>
<td>0.84 (0.68 – 1.04)</td>
<td>0.83 (0.66 – 1.03)</td>
</tr>
</tbody>
</table>
Wasting (weight for height/length z-score ≤ -2) among children <5 y

<table>
<thead>
<tr>
<th>Parameter</th>
<th>RTM (n=730)</th>
<th>No RTM (n=440)</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Crude Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Toilet facility and sanitation practices</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved toilet facility</td>
<td>605 (82.9%)</td>
<td>331 (75.2%)</td>
<td>1.10 (1.03 - 1.18)</td>
<td>1.10 (1.03 - 1.18)*</td>
</tr>
<tr>
<td>Improved toilet facility (not shared)</td>
<td>396 (54.2%)</td>
<td>199 (45.2%)</td>
<td>1.20 (1.06 – 1.36)</td>
<td>1.20 (1.06 – 1.35)*</td>
</tr>
<tr>
<td>No facilities--use bush or field</td>
<td>78 (10.7%)</td>
<td>93 (21.1%)</td>
<td>0.51 (0.38 – 0.67)</td>
<td>0.51 (0.38 – 0.67)*</td>
</tr>
<tr>
<td>Appropriate disposal of child** feces</td>
<td>603 (90.8%)</td>
<td>356 (87.0%)</td>
<td>1.04 (0.99 – 1.08)</td>
<td>1.04 (0.99 – 1.08)</td>
</tr>
<tr>
<td>Household has specific place for washing hands</td>
<td>252 (34.6%)</td>
<td>139 (31.6%)</td>
<td>1.09 (0.92 – 1.29)</td>
<td>1.09 (0.92 – 1.28)</td>
</tr>
<tr>
<td>Site for washing hands has water and soap/detergent or ash available</td>
<td>73 (10.0%)</td>
<td>51 (11.6%)</td>
<td>0.86 (0.62 – 1.21)</td>
<td>0.96 (0.75 – 1.24)</td>
</tr>
</tbody>
</table>

*difference is significant

** n for triggering is 645 and n for non-triggering is 85

† n for children indicators is different

5.18: Real-time monitoring (RTM) implementation
RTM of rural sanitation has been one of several innovative approaches being implemented in the ZSHP. The approach uses mobile-to-web platform combined with simple protocols for reporting and analysis. The system has resulted in greater accountability, better data quality, and higher cost efficiency per village targeted. Good quality and timely information is now being used to inform the targeting of interventions and to facilitate better follow-up services. We compared the impact on key WASH indicators at end-line for households where RTM is being implemented to those where RTM is not being implemented. The differences were significant for the use of improved toilet facilities (Table 23). Households in areas where RTM was implemented were more likely to use improved toilet facilities, less likely to have no toilet facilities, and to have and consequently lead to reduction in severe stunting.

Table 23. Summary of household WASH outcomes stratified by RTM intervention
<table>
<thead>
<tr>
<th>Parameter</th>
<th>RTM (n=730)</th>
<th>No RTM (n=440)</th>
<th>Crude Prevalence Ratio 95% CI</th>
<th>Crude Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of all six critical times to wash hands</td>
<td>43 (5.9%)</td>
<td>20 (4.5%)</td>
<td>1.29 (0.77–2.17)</td>
<td>1.29 (0.77–2.17)</td>
</tr>
<tr>
<td>Knowledge of at least 4 critical times to wash hands</td>
<td>177 (24.2%)</td>
<td>95 (21.6%)</td>
<td>1.12 (0.90 – 1.40)</td>
<td>1.12 (0.90 – 1.40)</td>
</tr>
<tr>
<td>Recent hand washing with soap/detergent or ash</td>
<td>438 (60.0%)</td>
<td>280 (63.6%)</td>
<td>0.94 (0.86 – 1.04)</td>
<td>0.94 (0.86 – 1.04)</td>
</tr>
<tr>
<td>Improved toilet facility and hand washing station with water and washing agent</td>
<td>105 (14.4%)</td>
<td>62 (14.1%)</td>
<td>1.02 (0.76 – 1.37)</td>
<td>1.02 (0.76 – 1.37)</td>
</tr>
<tr>
<td>Improved (protected) water source</td>
<td>394 (54.0%)</td>
<td>213 (48.4%)</td>
<td>1.13 (1.00 – 1.27)</td>
<td>1.13 (1.00 – 1.27)</td>
</tr>
<tr>
<td>Treat water effectively (use adequate water treatment method)</td>
<td>182 (24.9%)</td>
<td>106 (24.1%)</td>
<td>1.04 (0.84 – 1.28)</td>
<td>1.03 (0.83 – 1.27)</td>
</tr>
<tr>
<td>†Two-week diarrhea prevalence among children &lt;5 y</td>
<td>18.4% (191/1036)</td>
<td>20.2% (127/628)</td>
<td>0.91 (0.74 – 1.12)</td>
<td>0.91 (0.74 – 1.12)</td>
</tr>
<tr>
<td>†Two week ARI prevalence among children &lt;5 y</td>
<td>26.0% (271/1042)</td>
<td>30.8% (194/629)</td>
<td>0.85 (0.72 – 1.00)</td>
<td>0.85 (0.72 – 1.00)</td>
</tr>
<tr>
<td>†Stunting (height/length for age z-score ≤-2) among children &lt;5 y</td>
<td>43.1% (403/934)</td>
<td>37.3% (214/573)</td>
<td>1.11 (0.94 – 1.30)</td>
<td>1.11 (0.94 – 1.30)</td>
</tr>
<tr>
<td>†Severe stunting (height/length for age z-score ≤-3) among children &lt;5 y</td>
<td>20.6% (192/934)</td>
<td>14.5% (83/573)</td>
<td>1.42 (1.12 – 1.80)*</td>
<td>1.35 (1.02 – 1.78)*</td>
</tr>
<tr>
<td>†Wasting (weight for height/length z-score ≤-2) among children &lt;5 y</td>
<td>7.5% (70/933)</td>
<td>7.1% (41/574)</td>
<td>1.10 (0.74 – 1.64)</td>
<td>1.10 (0.74 – 1.64)</td>
</tr>
</tbody>
</table>

*difference is significant  
** n for RTM is 664 and n for no RTM is 409  
† n for children indicators is different
5.19: ODF status and WASH outcomes

Program implementation data confirmed the ODF status of 832 households (of the 1170 households surveyed during the end-line survey), of which 83 representing 10.0% lived in an ODF certified village, similar to the response from the survey respondents. We compared the households living in ODF certified villages to those living in non-ODF certified villages on key WASH outcome indicators. The differences were significant for the use of improved toilet facilities (Table 24).

### Table 24. WASH outcomes by ODF status

<table>
<thead>
<tr>
<th>Indicator</th>
<th>Households living in ODF certified villages (n=83)</th>
<th>Households living in non-ODF certified villages (n=749)</th>
<th>Crude Prevalence ratio 95% CI</th>
<th>Adjusted prevalence ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Improved toilet facility</td>
<td>70 (84.3%)</td>
<td>582 (77.7%)</td>
<td>1.09 (0.98–1.20)</td>
<td>1.09 (0.98–1.20)</td>
</tr>
<tr>
<td>Improved toilet facility (not shared)</td>
<td>55 (66.3%)</td>
<td>360 (48.1%)</td>
<td>1.38 (1.16–1.64)</td>
<td>1.38 (1.17–1.64)*</td>
</tr>
<tr>
<td>No facilities--use bush or field</td>
<td>1 (1.2%)</td>
<td>145 (19.4%)</td>
<td>0.06 (0.01–0.44)</td>
<td>0.06 (0.01–0.44)*</td>
</tr>
<tr>
<td>Appropriate disposal of child feces**</td>
<td>82 (100%)</td>
<td>579 (85.1%)</td>
<td>1.17 (1.14–1.21)</td>
<td>1.29 (1.24–1.35)*</td>
</tr>
<tr>
<td>Household has specific place for washing hands</td>
<td>43 (51.8%)</td>
<td>247 (33.0%)</td>
<td>1.57 (1.25–1.98)</td>
<td>1.57 (1.25–1.98)*</td>
</tr>
<tr>
<td>Site for washing hands has water and soap/detergent or ash available</td>
<td>19 (22.9%)</td>
<td>130 (17.4%)</td>
<td>1.32 (0.86–2.02)</td>
<td>1.32 (0.86–2.02)</td>
</tr>
<tr>
<td>Knowledge of all six critical times to wash hands</td>
<td>4 (4.8%)</td>
<td>38 (5.1%)</td>
<td>0.95 (0.35–2.60)</td>
<td>0.95 (0.35–2.59)</td>
</tr>
<tr>
<td>Knowledge of at least 4 critical times to wash hands</td>
<td>17 (20.5%)</td>
<td>185 (24.7%)</td>
<td>0.82 (0.53–1.29)</td>
<td>0.83 (0.53–1.29)</td>
</tr>
<tr>
<td>Recent hand washing with soap/detergent or ash</td>
<td>46 (55.4%)</td>
<td>486 (64.9%)</td>
<td>0.85 (0.70–1.04)</td>
<td>0.85 (0.70–1.04)</td>
</tr>
<tr>
<td>Improved toilet facility and hand washing station with water and washing agent</td>
<td>16 (19.3%)</td>
<td>106 (14.2%)</td>
<td>1.36 (0.85–2.19)</td>
<td>1.36 (0.85–2.19)</td>
</tr>
<tr>
<td>Improved (protected) water source</td>
<td>33 (39.8%)</td>
<td>415 (55.4%)</td>
<td>0.72 (0.55–0.94)</td>
<td>0.72 (0.55–0.94)*</td>
</tr>
<tr>
<td>Treat water effectively (use adequate water treatment method)</td>
<td>17 (20.5%)</td>
<td>177 (23.6%)</td>
<td>0.87 (0.56–1.35)</td>
<td>0.87 (0.56–1.35)</td>
</tr>
</tbody>
</table>

39
†Two-week diarrhea prevalence among children <5 y
26.1% (31/119)

†Two-week ARI prevalence among children <5 y
14.9% (18/121)

†Stunting (height/length for age z-score ≤-2) among children <5 y
59.3% (64/108)

†Wasting (weight for height/length z-score ≤-2) among children <5 y
10.0% (11/110)

*difference is significant
** n for ODF is 82 and n for Non-ODF is 680
† n for children indicators is different

**5.20 Impact outcome measures and WASH indicators**
We compared the impact outcome measures with various WASH indicators at end-line and found that the prevalence of diarrhea was significantly associated with improved sanitation facilities and hand washing practices. The prevalence of diarrhea was significantly lower in households with improved sanitation facilities, adequate sanitation facilities and hand washing facilities. Similarly, the prevalence of stunting was significantly lower in households with adequate sanitation facilities and hand washing facilities and severe stunting was significantly lower in households with adequate water storage container (Table 25). By contrast, the prevalence of wasting was higher in households with improved not shared sanitation facilities and households with adequate sanitation facilities. This counterintuitive relationship was the same when there were handwashing facilities in association with unshared sanitation facilities.

**Table 25. Summary of impact outcome measures and WASH indicators (n = 1170)**

<table>
<thead>
<tr>
<th></th>
<th>Household (HH) with improved not shared sanitation facilities</th>
<th>HH without improved not shared sanitation facilities</th>
<th>Crude Prevalence Ratio (95% CI)</th>
<th>Adjusted Prevalence Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stunting</td>
<td>325/787 (41.3%)</td>
<td>292/720 (40.6%)</td>
<td>1.02 (0.90 - 1.15)</td>
<td>0.99 (0.87, 1.14)</td>
</tr>
<tr>
<td>Severe stunting</td>
<td>146/787 (18.6%)</td>
<td>129/720 (17.9%)</td>
<td>1.04 (0.84 - 1.28)</td>
<td>0.99 (0.75, 1.30)</td>
</tr>
<tr>
<td>Wasting</td>
<td>66/786 (8.4%)</td>
<td>45/721 (6.2%)</td>
<td>1.35 (0.93 - 1.94)</td>
<td>1.24 (0.81, 1.91)</td>
</tr>
<tr>
<td>ARI</td>
<td>204/864 (23.6%)</td>
<td>261/809 (32.3%)</td>
<td>0.73 (0.63 - 0.86)</td>
<td>0.83 (0.67, 1.02)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>145/860 (16.9%)</td>
<td>173/804 (21.5%)</td>
<td>0.78 (0.64 - 0.96)</td>
<td>0.78 (0.63, 0.97)*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>HH with adequate</th>
<th>HH without adequate</th>
<th>Crude Prevalence Ratio (95% CI)</th>
<th>Adjusted Prevalence Ratio (95% CI)</th>
</tr>
</thead>
</table>

40
<table>
<thead>
<tr>
<th>Condition</th>
<th>Sanitation Facilities</th>
<th>Sanitation Facilities</th>
<th>Crude Prevalence Ratio (95% CI)</th>
<th>Adjusted Prevalence Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stunting</td>
<td>48/150 (32.0%)</td>
<td>493/1137 (43.4%)</td>
<td>0.74 (0.58 - 0.94)</td>
<td>0.72 (0.55, 0.93)*</td>
</tr>
<tr>
<td>Severe stunting</td>
<td>22/150 (14.7%)</td>
<td>224/1137 (19.7%)</td>
<td>0.74 (0.50 - 1.11)</td>
<td>0.74 (0.44, 1.24)</td>
</tr>
<tr>
<td>Wasting</td>
<td>18/148 (12.2%)</td>
<td>79/1141 (6.9%)</td>
<td>1.76 (1.08 - 2.85)</td>
<td>1.74 (1.13, 2.68)</td>
</tr>
<tr>
<td>ARI</td>
<td>32/159 (20.1%)</td>
<td>347/1275 (27.2%)</td>
<td>0.74 (0.54 - 1.02)</td>
<td>0.74 (0.53, 1.05)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>21/158 (13.3%)</td>
<td>245/1268 (19.3%)</td>
<td>0.69 (0.45 - 1.04)</td>
<td>0.65 (0.45, 0.94)*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition</th>
<th>HH with improved not shared facilities and handwashing station with water and soap</th>
<th>HH without improved not shared facilities and handwashing station with water and soap</th>
<th>Crude Prevalence Ratio (95% CI)</th>
<th>Adjusted Prevalence Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stunting</td>
<td>78/228 (34.2%)</td>
<td>539/1279 (42.1%)</td>
<td>0.81 (0.67 - 0.98)</td>
<td>0.75 (0.61, 0.93)*</td>
</tr>
<tr>
<td>Severe stunting</td>
<td>31/228 (13.6%)</td>
<td>244/1279 (19.1%)</td>
<td>0.71 (0.50 - 1.01)</td>
<td>0.65 (0.43, 0.97)*</td>
</tr>
<tr>
<td>Wasting</td>
<td>26/226 (9.2%)</td>
<td>85/1281 (6.6%)</td>
<td>1.73 (1.14 - 2.63)</td>
<td>1.71 (1.13, 2.58)*</td>
</tr>
<tr>
<td>ARI</td>
<td>56/249 (22.5%)</td>
<td>409/1424 (28.7%)</td>
<td>0.78 (0.61 - 1.00)</td>
<td>0.84 (0.65, 1.08)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>35/248 (14.1%)</td>
<td>283/1416 (20.0%)</td>
<td>0.71 (0.51 - 0.98)</td>
<td>0.66 (0.47, 0.95)*</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition</th>
<th>HH with hand washing facility with water and soap</th>
<th>HH without hand washing facility with water and soap</th>
<th>Crude Prevalence Ratio (95% CI)</th>
<th>Adjusted Prevalence Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stunting</td>
<td>89/280 (31.8%)</td>
<td>528/1227 (43.0%)</td>
<td>0.74 (0.61 - 0.89)</td>
<td>0.68 (0.55, 0.83)*</td>
</tr>
<tr>
<td>Severe stunting</td>
<td>38/280 (13.6%)</td>
<td>237/1227 (19.3%)</td>
<td>0.70 (0.51 - 0.96)</td>
<td>0.65 (0.46, 0.92)*</td>
</tr>
<tr>
<td>Wasting</td>
<td>30/278 (10.8%)</td>
<td>81/1229 (6.6%)</td>
<td>1.64 (1.10 - 2.44)</td>
<td>1.68 (1.14, 2.47)*</td>
</tr>
<tr>
<td>ARI</td>
<td>78/314 (24.8%)</td>
<td>387/1359 (28.5%)</td>
<td>0.87 (0.71 - 1.08)</td>
<td>0.89 (0.71, 1.11)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>50/313 (16.0%)</td>
<td>268/1351 (19.8%)</td>
<td>0.81 (0.61 - 1.06)</td>
<td>0.78 (0.59, 1.02)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Condition</th>
<th>HH reported washing hands with water and soap</th>
<th>HH not reported washing hands with water and soap</th>
<th>Crude Prevalence Ratio (95% CI)</th>
<th>Adjusted Prevalence Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stunting</td>
<td>366/928 (39.4%)</td>
<td>251/579 (43.4%)</td>
<td>0.91 (0.80 - 1.03)</td>
<td>0.95 (0.84, 1.08)</td>
</tr>
<tr>
<td>Severe stunting</td>
<td>148/928 (15.9%)</td>
<td>127/579 (21.9%)</td>
<td>0.73 (0.59 - 0.90)</td>
<td>0.78 (0.63, 0.97)*</td>
</tr>
<tr>
<td>Wasting</td>
<td>56/927 (6.0%)</td>
<td>55/580 (9.5%)</td>
<td>0.64 (0.45 - 0.91)</td>
<td>0.67 (0.46, 0.98)</td>
</tr>
<tr>
<td>ARI</td>
<td>337/1030 (32.7%)</td>
<td>128/643 (19.9%)</td>
<td>1.64 (1.38 - 1.96)</td>
<td>1.36 (1.11, 1.65)*</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>197/1026 (19.2%)</td>
<td>121/638 (19.0%)</td>
<td>1.01 (0.83 - 1.24)</td>
<td>0.99 (0.80, 1.22)</td>
</tr>
<tr>
<td>Characteristic</td>
<td>HH with improved (protected) water source</td>
<td>HH without improved (protected) water source</td>
<td>Crude Prevalence Ratio (95% CI)</td>
<td>Adjusted Prevalence Ratio (95% CI)</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>------------------------------------------</td>
<td>---------------------------------------------</td>
<td>---------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Stunting</td>
<td>295/795 (37.1%)</td>
<td>322/712 (45.2%)</td>
<td>0.82 (0.73 - 0.93)</td>
<td>0.88 (0.75, 1.03)</td>
</tr>
<tr>
<td>Severe stunting</td>
<td>127/795 (16.0%)</td>
<td>148/712 (20.8%)</td>
<td>0.77 (0.62 - 0.95)</td>
<td>0.83 (0.62, 1.10)</td>
</tr>
<tr>
<td>Wasting</td>
<td>53/792 (6.7%)</td>
<td>58/715 (8.1%)</td>
<td>0.82 (0.58 - 1.18)</td>
<td>0.79 (0.50, 1.27)</td>
</tr>
<tr>
<td>ARI</td>
<td>253/880 (28.8%)</td>
<td>212/793 (26.7%)</td>
<td>1.08 (0.92 - 1.26)</td>
<td>1.05 (0.89, 1.24)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>166/878 (18.9%)</td>
<td>152/786 (19.3%)</td>
<td>0.98 (0.80 - 1.19)</td>
<td>1.01 (0.84, 1.23)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>HH with adequate water storage container</th>
<th>HH without adequate water storage container</th>
<th>Crude Prevalence Ratio (95% CI)</th>
<th>Adjusted Prevalence Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stunting</td>
<td>34/103 (33.0%)</td>
<td>583/1404 (41.5%)</td>
<td>0.79 (0.60 - 1.05)</td>
<td>0.93 (0.73, 1.19)</td>
</tr>
<tr>
<td>Severe stunting</td>
<td>10/103 (9.7%)</td>
<td>265/1404 (18.9%)</td>
<td>0.51 (0.28 - 0.94)</td>
<td>0.67 (0.45, 0.98)*</td>
</tr>
<tr>
<td>Wasting</td>
<td>5/101 (5.0%)</td>
<td>106/1406 (7.5%)</td>
<td>0.66 (0.27 - 1.57)</td>
<td>0.65 (0.24, 1.81)</td>
</tr>
<tr>
<td>ARI</td>
<td>15/106 (14.2%)</td>
<td>450/1567 (28.7%)</td>
<td>0.49 (0.31 - 0.79)</td>
<td>0.64 (0.39, 1.04)</td>
</tr>
<tr>
<td>Diarrhea</td>
<td>19/106 (17.9%)</td>
<td>299/1558 (19.2%)</td>
<td>0.93 (0.61 - 1.42)</td>
<td>1.03 (0.73, 1.46)</td>
</tr>
</tbody>
</table>

5.21 Characteristics of schools surveyed
We surveyed 44 and 47 schools during the baseline and end-line surveys respectively. Most of the schools were government owned. The average number of male pupils was 331 and that of females was 297 in the baseline while the average number of male and female pupils was 281 and 264 respectively in the end-line. The mean number of female pupils absent from school in the previous seven days was 35 in the baseline and 27 in the end-line (Table 26).

Table 26: School characteristics at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey (N=44)</th>
<th>End-line Survey (N =47)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Government owned schools</td>
<td>42</td>
<td>44</td>
</tr>
<tr>
<td>Mean number of male pupils</td>
<td>331</td>
<td>281</td>
</tr>
<tr>
<td>Range</td>
<td>64 – 933</td>
<td>35 – 803</td>
</tr>
<tr>
<td>Mean number of female pupils</td>
<td>297</td>
<td>264</td>
</tr>
<tr>
<td>Range</td>
<td>56 – 790</td>
<td>27 – 827</td>
</tr>
<tr>
<td>Mean number of male pupils absent from school in the previous seven days</td>
<td>42</td>
<td>29</td>
</tr>
<tr>
<td>Range</td>
<td>4 – 143</td>
<td>5 – 84</td>
</tr>
<tr>
<td>Mean number of female pupils absent from school in the previous seven days</td>
<td>35</td>
<td>27</td>
</tr>
<tr>
<td>Range</td>
<td>3 – 145</td>
<td>4 – 92</td>
</tr>
</tbody>
</table>
5.22 Sanitation facilities for schools
The most common sanitation facilities used by schools were ventilated improved pit latrines (Table 27). One school in the end-line survey did not have a toilet facility. In the baseline, 68.2% of the schools used improved toilet while 83.0% of the schools in the end-line survey used improved toilet facility (Figure 8). This difference was not significant (R=0.82; 95%CI: 0.65 – 1.04). All the schools with toilet facilities had separate facilities for boys and girls. Only a few schools in both the baseline and end-line (nine in baseline and thirteen in end-line) had fifty or fewer children per improved toilet cabin.

Table 27: School sanitation facilities at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Prevalence ratio</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of schools</td>
<td>44</td>
<td>47</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pit latrine with slab</td>
<td>15.9% (7/44)</td>
<td>55.3% (26/47)</td>
<td>0.28</td>
<td>(0.13-0.59)</td>
</tr>
<tr>
<td>Ventilated improved pit latrine</td>
<td>52.3% (23/44)</td>
<td>72.3% (34/47)</td>
<td>0.76</td>
<td>(0.51-1.00)</td>
</tr>
<tr>
<td>Pit latrine without slab</td>
<td>31.8% (14/44)</td>
<td>10.6% (5/47)</td>
<td>3.00</td>
<td>(1.17-7.62)</td>
</tr>
<tr>
<td>No facility</td>
<td>0.0% (0/44)</td>
<td>2.1% (1/47)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5.23 Hand washing practices in schools
Twenty-nine schools (representing 65.9%) reported having a designated area for hand washing in the baseline survey as compared to 25 schools representing 53.2% in the end-line survey (Figure 9). This difference was not significant (PR=1.24; 95%CI: 0.88 – 1.75). Similarly, 22 schools (representing 50%) in the baseline survey had hand washing facility that allowed for simultaneous use by children as compared to 20 schools (representing 42.6%) in the end-and survey. This difference was also not significant (PR=1.18; 95%CI: 0.75 – 1.83). During observation, it was observed that in eight schools (representing 18.2%) in the baseline survey, the hand washing facilities had water and washing agent available as compared to eleven schools (representing 23.4%) in the end-line survey. This difference was also not significant (PR=0.78; 95%CI: 0.35 – 1.75).
Figure 8: School sanitation indicators at baseline and end-line

![Bar chart showing school sanitation indicators at baseline and end-line.]

Figure 9: School hand washing facilities at baseline and end-line

![Bar chart showing school hand washing facilities at baseline and end-line.]

44
5.24 Drinking water sources for schools

The main source of drinking water for the schools in both the baseline and end-line surveys was a borehole/tubewell. Five schools in the baseline survey used surface water as their drinking water source but no school in the end-line survey used surface water as a drinking water source. One school in each survey did not have any source of drinking water (Figure 10). In all, 38 schools representing 86.4% in the baseline and 39 schools representing 83.0% in the end-line survey used an improved (protected) water source for drinking. The difference was not significant (PR=1.07; 95%CI: 0.90 – 1.26).

Figure 10: School drinking water sources at baseline and end-line

![Bar chart showing school drinking water sources at baseline and end-line](image)

5.25 School major WASH outcome indicators

There were no significant differences between the baseline and end-line surveys in terms of major outcome indicators including school hand washing standard and interim school sanitation standards (Table 28). There were more schools meeting the interim sanitation standard (having a separate facility for boys and girls, improved toilet, hand washing facility close by, and fifty or less students by toilet cabin) but this difference was not significant.
Table 28: School major WASH outcome indicators at baseline and end-line

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Baseline Survey</th>
<th>End-line Survey</th>
<th>Prevalence Ratio (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sanitation facilities</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>All facilities improved</td>
<td>68.2% (30/44)</td>
<td>83.0% (39/47)</td>
<td>0.82 (0.65- 1.04)</td>
</tr>
<tr>
<td>Gender segregated toilets</td>
<td>100% (44/44)</td>
<td>97.9% (46/47)</td>
<td>0.98 (0.93-1.02)</td>
</tr>
<tr>
<td>50 or fewer children per cabin</td>
<td>20.5% (9/44)</td>
<td>27.7% (13/47)</td>
<td>0.74 (0.35-1.56)</td>
</tr>
<tr>
<td><strong>Hand washing</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific place for washing hands</td>
<td>65.9% (29/44)</td>
<td>53.2% (25/47)</td>
<td>1.24 (0.88-1.75)</td>
</tr>
<tr>
<td>Multiple water points</td>
<td>50.0% (22/44)</td>
<td>42.6% (20/47)</td>
<td>1.18 (0.75-1.83)</td>
</tr>
<tr>
<td>Located outside toilet</td>
<td>38.6% (17/44)</td>
<td>31.9% (15/47)</td>
<td>1.21 (0.69-2.12)</td>
</tr>
<tr>
<td>Soap or other washing agent is available</td>
<td>18.2% (8/44)</td>
<td>23.4% (11/47)</td>
<td>0.78 (0.35-1.75)</td>
</tr>
<tr>
<td>Meets hand wash standard (hand washing facility close to a toilet that allows more than one person to wash their hands at a time)</td>
<td>25.0% (11/44)</td>
<td>25.5% (12/47)</td>
<td>0.98 (0.48-1.99)</td>
</tr>
<tr>
<td>Meets interim sanitation standard: Have separate facility for boys and girls; improved toilet, have hand washing facility close by; and fifty or less students by toilet cabin)</td>
<td>4.5% (2/44)</td>
<td>12.8% (6/47)</td>
<td>0.36 (0.08-1.67)</td>
</tr>
<tr>
<td>Improved (protected)water source</td>
<td>88.4% (38/43)</td>
<td>83.0% (39/47)</td>
<td>1.07 (0.90-1.26)</td>
</tr>
</tbody>
</table>
5.26: Active SLTS intervention

We were informed that, of the 47 schools surveyed in the end-line survey, only 9 (representing 19.1%) had received the package of SLTS interventions. We compared these “intervention” schools with the “non-intervention” schools on key study indicators and only two (specific place for washing hands and “meets hand hygiene standards”) showed significant differences (Table 29).

Table 29. Comparison of key WASH indicators between SLTS “intervention” schools and “non-intervention” schools

<table>
<thead>
<tr>
<th>Parameter</th>
<th>SLTS “Intervention” Schools</th>
<th>SLTS “Non-Intervention” Schools</th>
<th>Prevalence Ratio 95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Sanitation facility</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved toilet/sanitation facility</td>
<td>88.9% (8/9)</td>
<td>81.6% (31/38)</td>
<td>1.09 (0.83 -1.44)</td>
</tr>
<tr>
<td>Gender segregated toilets</td>
<td>100.0% (9/9)</td>
<td>97.3% (37/38)</td>
<td>1.03 (0.97-1.08)</td>
</tr>
<tr>
<td>50 or fewer children per cabin</td>
<td>33.3% (3/9)</td>
<td>26.3% (10/38)</td>
<td>1.27 (0.44-3.68)</td>
</tr>
<tr>
<td><strong>Hand hygiene facility</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Specific place for washing hands</td>
<td>88.9% (8/9)</td>
<td>17 (44.7%) (17/38)</td>
<td>1.99 (1.30-3.03)*</td>
</tr>
<tr>
<td>Multiple water points</td>
<td>66.7% (6/9)</td>
<td>36.8% (14/38)</td>
<td>1.81 (0.97-3.37)</td>
</tr>
<tr>
<td>Located outside toilet</td>
<td>55.6% (5/9)</td>
<td>26.3% (10/38)</td>
<td>2.11 (0.96-4.65)</td>
</tr>
<tr>
<td>Soap or other washing agent available</td>
<td>22.2% (2/9)</td>
<td>23.7% (9/38)</td>
<td>0.94 (0.24-3.62)</td>
</tr>
<tr>
<td><strong>Meets hand washing standard:</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(hand washing facility close to a toilet that allows more than one person to wash their hands at a time)</td>
<td>55.6% (5/9)</td>
<td>18.4% (7/38)</td>
<td>3.02 (1.24-7.33)*</td>
</tr>
<tr>
<td>Parameter</td>
<td>SLTS “Intervention” Schools</td>
<td>SLTS “Non-Intervention” Schools</td>
<td>Prevalence Ratio 95% CI</td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>-----------------------------</td>
<td>---------------------------------</td>
<td>------------------------</td>
</tr>
<tr>
<td><strong>Meets interim sanitation standard:</strong> Have separate facility for boys and girls; improved toilet, have hand washing facility close by; and fifty or less students by toilet cabin</td>
<td>22.2% (2/9)</td>
<td>10.5% (4/38)</td>
<td>2.11 (0.46- 9.79)</td>
</tr>
<tr>
<td><strong>Water source</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improved (protected)water source</td>
<td>88.9% (8/9)</td>
<td>81.6% (31/38)</td>
<td>1.09 (0.83- 1.44)</td>
</tr>
<tr>
<td><strong>Sanitation facility features observed</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toilet clean</td>
<td>83.3% (5/6)</td>
<td>69.0% (20/29)</td>
<td>1.21 (0.78–1.86)</td>
</tr>
<tr>
<td>Fecal smell</td>
<td>83.3% (5/6)</td>
<td>62.1% (18/29)</td>
<td>1.34 (0.85-2.12)</td>
</tr>
<tr>
<td>Door on latrine</td>
<td>50.0% (3/6)</td>
<td>13.8% (4/29)</td>
<td>3.63 (1.08-12.17)</td>
</tr>
<tr>
<td>Door closed/locked from inside</td>
<td>16.7% (1/6)</td>
<td>13.8% (4/29)</td>
<td>1.21 (0.16-9.00)</td>
</tr>
<tr>
<td>Anal cleaning material available</td>
<td>16.7% (1/6)</td>
<td>0 (0/29)</td>
<td>-</td>
</tr>
</tbody>
</table>

**5.27 Other Data 1: Annual diarrhea cases 2009-2015**
The total number of annual diarrhea cases reported from districts where the SEAs were selected from in each province did not show any particular trend (Figure 11).
5.28 Other data 2: Annual ARI cases 2009-2015

Annual ARI cases from districts where the SEAs were selected from in each province did not show any particular trend (Figure 12).

Figure 11. Annual diarrhea cases by province 2009-2015

Figure 12. Annual ARI cases by province 2009-2015
5.29. Other data 3: Implementation data: triggering and ODF status

**a) Strengthening program implementation and accountability of results**

In implementing ZSHP, UNICEF has focused on institutional strengthening and accountability to ensure that key areas for hygiene and sanitation are prioritized in the daily and annual work streams of all the involved key ministries and implementing counterparts. UNICEF has supported the hiring of a senior WASH expert to support policy/advocacy within line ministries and key cooperating partner and a communication expert for MoLGH to boost and strengthen the hygiene promotion components of the program.

**MoLGH:** As the lead ministry, the MoLGH is committed to strengthening its central role and scaling-up to all rural districts. With external support, it is building local level WASH capacity in monitoring and MIS management, planning and budgeting through provincial level trainings. It is leading the development of ODF Zambia by 2020 Strategy and a new NRWSSP 2016-2030 strategy. It has convened several TWG meetings to discuss issues pertinent to program implementation and strategies.

**MoCTA:** This ministry has actively been involved in the program with its provincial and district staff supporting the various aspects of the program including mass ODF verification activities for Chiefdoms, data validation, ODF Chiefdom celebrations and Chiefdom orientation and triggering. MoCTA has also included sanitation promotion in two key documents currently under development: Chiefdom Development Strategy and Guidelines for Traditional Ceremonies and has managed to obtain a permanent spot on the agenda of House of Chiefs’ regular meetings.

**MoH:** The EHTs and community health assistants (CHAs) of the MoH have continued to play a pivotal role in the implementation of ZSHP through their coordination with CCs) and monitoring activities. The MoH has included the CLTS approach and sanitation marketing components of the program in the national CHA training curriculum and a hand washing indicator in the household register monitoring form.

**MoGE:** This ministry leads the implementation of the school WASH package, which combines the SLTS approach with latrine construction using both the interim latrine design for government schools and the low cost latrine design for community schools. With support from donors, MoGE led the development of a national menstrual hygiene management (MHM) guidelines and toolkit. There is a proposition under consideration to house a school health and nutrition unit within the MoGE.

**b) Access to sanitation and hygiene and behavior change communication**

Based on data collected through WASH district reports, the number of people with access to an improved toilet by mid-September 2016 was 3,287,922. The percentage of the triggered population with access to improved sanitation and hand washing facilities in the 68 districts is estimated to be 66% while access to improved sanitation alone is 79%. The number of ODF villages is 10,081 and there are 35 ODF chiefdoms and four ODF districts.

Behavior change messaging disseminated through hygiene promotion activities and various media outlets have reached 6,670,914 people in the 68 districts as well as Lusaka. UNICEF has entered
into new partnership agreement with Zambia Institute of Mass Communication Trust (ZAMCOM) covering the period 2016 – 2018. During this period, ZAMCOM will carry out ODF messaging through media channels such as radio, newspapers, TV and social media, as well as capacity building support to community radios to improve coverage quality of ODF, sanitation and hygiene issues. ZAMCOM will also support messaging on platforms that are youth-friendly in order to target the messaging at a demographic most likely to take up new behaviors.

c) School WASH Program Progress
Provision of appropriate sanitation facilities including hand-washing facilities together with hygiene promotion and management system is on course. Following the official revision of the low-cost school latrine design by the MoGE Infrastructure Section, 408 government supported schools have received the interim package and 360 community schools have received the low-cost package. A toolkit and guidelines have been developed for the WASH in School for Girls package consisting of menstrual hygiene management. 32 national SLTS/MHM coaches, from eight provinces, have received a training of trainers to assist with the implementation of the MHM toolkit and guidelines in schools with existing school WASH packages and to reinforce the messaging around STLS and its complementary components.

d) Sanitation Marketing
The aim of the sanitation marketing component is to build the capacity of the private sector, such as artisans, to provide sanitation services that fulfil a need of stronger, longer lasting toilets at affordable prices, particularly in areas with sandy/waterlogged soils. The innovation has centered on developing substructure designs that use locally available materials keeping the costs as low as possible in order to reach a larger market segment.

The program has identified 49 chiefdoms in 26 districts which need skilled service providers to support household to build solid and sustainable pit latrines. A total of 291 people with technical and business skills for sanitation marketing from 51 Chiefdoms in five provinces have been trained. Out of the 291 people formally trained 116 have been confirmed as active and there are now 41 Chiefdoms with at least two active entrepreneurs. The sanitation marketing component has introduced an accreditation system whereby “Master builders” are recognized when they have sold at least five toilets with at least two different designs while “Grand Master builders” have sold at least 20 toilets with all design options included and have trained others. Currently, there are 53 Master builders and five Grand Master builders. An exhibition center of sanitation marketing options has been completed at the CHA training center in Mwachisompola.

e) Program Monitoring
More attention has been focused on systematic program monitoring. During field visits, UNICEF staff are monitoring IPs (by checking their results against field observation) and quality of results (to ensure intended beneficiaries are utilizing services as intended). Where required, independent consultants have been recruited for quality assurance of specific outputs, such as school sanitation.

f) Evaluation, knowledge management, advocacy
The Post-ODF Sustainability Assessment has focused on the underlying conditions of the sustainability of latrine usage and hand washing. The Evaluability Assessment on this study has been completed and the terms of reference finalized. Proposals were selected from a number of
suitable organization with Long Term Agreement. Akros, UNICEF and the MoLGH drafted a joint publication submitted in the Water, Sanitation and Hygiene for Development Journal named “Mobility up the sanitation ladder following community-led total sanitation in rural Zambia”.

g) Gender and Environment
Women and young children are the main beneficiaries of the program as toilets bring privacy, convenience and reduce the walking distance, as well as health benefits - with less time and effort in caring for sick children. Field visits suggest that women are typically well engaged in the program particularly at community level (SAGs) but more needs to be done to ensure opportunities are available at other levels. There are attempts to increase the percentage of women who are CCs which currently stands at 19%.

The ZSHP is responding to issues of environmental degradation and climate change by: (i) contributing to build community resilience and capacity to adapt to changes; (ii) reducing the impact of WASH interventions on the carbon footprint (i.e. number of cement bags required for school latrine construction/reduced logs through the sanitation marketing options); and (iii) reducing the amount of fecal material released in the environment.
6.0 DISCUSSION

6.1 Impact on sanitation and hygiene
This impact evaluation has demonstrated many improvements in sanitation and hygiene measures between the baseline survey conducted in 2013 and the end-line in 2016 as well as associated improvements in important child health outcomes such as the prevalence of stunting and wasting. Notable findings include a significant increase in the availability of improved sanitation (from 64% to 80% between baseline and end-line), decreased proportions of households reporting open defecation, and improvements in hand washing with soap or ash and hand washing at critical times. However, knowledge of appropriate times to wash hands has not improved between the baseline and end-line time periods, potentially because this was not a major emphasis of the ZSHP.

The ZSHP had a target of reaching 3 million people with access to improved toilets and at least 73% of households in program areas using improved sanitation. The results from this evaluation and the review of program data indicated that these targets were met. The end-line survey showed a significant increase from baseline in the proportion of households with improved toilet facilities which were not shared. However, 36.4% of households at end-line used improved toilet facilities that were shared with other households. Going forward, the program should emphasize the need for each household to have its own toilet facilities.

One approach that appears to have contributed to achieving these targets is the RTM, which provides important feedback to communities on their performance using mobile-to-web monitoring of CLTS interventions [25]. Households in communities where RTM was implemented showed a significant increase in both access to improved sanitation facilities and improved “not shared” facilities and a decrease in the proportion of households that did not have toilet facilities and therefore continued to practice open defecation. The RTM strategy appears to have contributed to the successful attainment of ODF status for Chiengi District in Luapula Province [26]. While this is a small district relative to many others in Zambia, these results are highly encouraging and suggest that the RTM strategy should be more widely implemented.

Sanitation marketing was another strategy that is likely to have contributed to meeting the program’s targets. This strategy served to develop the capacity of private sector players such as artisans to provide sanitation services that fulfilled the need for stronger longer lasting toilets at affordable prices. Close to three hundred artisans from 51 chiefdoms in 26 of the districts in five provinces were trained and more than a third are confirmed as “active”.

There appeared to be knowledge sharing in the implementation of the project. Households living in villages that were not triggered had similar access to improved sanitation facilities with those in triggered villages. This is a positive trend because the program may not have to trigger all villages as those villages near triggered villages may be motivated to organize themselves to ensure that they use improved toilets; this may help with the sustainability of the program.

The program impact on ODF practice and status appears to have been lower than anticipated. Our review of program reports indicated that, by mid 2016, 10,080 villages were certified as ODF compared to the target of 12,000. This is a little over 80% of the program target, however, only four of the 68 districts were certified as ODF. This meant that the ODF campaign might have been
concentrated in only a few districts. It was reported that some more villages had attained ODF status but yet to be certified. The impact evaluation survey results showed that 10.6% of respondents in the end-line survey reported that they lived in an ODF-certified village. This may have been underestimated since about a third of respondents did not know their village’s ODF status. Even though this proportion is far higher than the 0.3% reported during the baseline, it can be considered as demonstrating very little impact. The proportion of households that indicated that members of their households practice open defecation did not change significantly between baseline and end-line and close to 15% in both cases indicated that a member of their household practiced open defecation on daily basis.

There was a significant increase in access to handwashing facilities between the baseline and end-line surveys although this did not attain the program target. At end-line, 33.4% (compared to 21.1% at baseline) indicated that they had a place for washing hands. In 20.7% compared to 13.6% the place for washing hands was located near the toilet and in 18.2% compared to 13.3% the washing facility had water and washing agent available. The impact was slightly smaller when the combination of access to improved toilet facility and handwashing facility located near the toilet with water and washing agent was assessed. The end-line survey showed almost three-fold increase over the baseline survey for this indicator (14.3% vs. 5.4%). While this is clear improvement, it suggests that the majority of households in rural areas of Zambia do not have both improved toilet facilities and nearby handwashing facilities.

The program showed significant increase in the proportion of caregivers who reported washing hands before preparing food or after defecation and washing hands with water and washing agent but about a third of those reported washing hands did not wash hands with water and washing agent. Considering that less than 20% of households had a washing hand facility with water and washing agent near the toilet area, this finding must be interpreted with caution. It must be recognized however that there are a number of different contextual and psychosocial factors that can have an influence on handwashing practices. A study in Burundi found that household wealth, amount of water per person, and having a designated place for handwashing all significantly predicted the frequency of handwashing [27]. Psychosocial factors including remembering to wash one’s hands, self-efficacy, and action planning were all important contributors to the variance in self-reported handwashing frequency.

Knowledge of critical times to wash hands; dangers of not washing hands with soap and washing agent, not using clean toilets and defecating on the open; and causes of diarrhea and ARI was generally not high. The program did not seem to have effect on levels of knowledge since there were not significant differences between the baseline and end-line surveys. The program reported heavy investment in behavior change messaging and hygiene promotion activities through media channels as radio, newspapers, TV and social media. It appeared that these channels might not have been the appropriate channels to reach the target population since the people surveyed indicated health education by CHWs, CHAs, CLTS community champions and SAGs were their sources of information on WASH related activities. Less than 5% of the people surveyed indicated radio, TV, drama groups, posters and handbills as sources of information few households owned radio and television. Going forward the program should invest in building the capacity of CHAs, CHAs, CLTS champions and SAG members to provide education on personal hygiene and sanitation.
6.2 Impact on diarrhea and ARI prevalence
Despite evidence of improved sanitation and access to improved drinking water (which was not a component of this program), there is no evidence of an impact on the reported two-week prevalence of diarrhea (the impact evaluation’s primary outcome measure). The end-line diarrhea prevalence we observed among the age groups in our study is similar to that observed in the Zambia 2014 DHS [5]. First, there is evidence that cross-sectional surveys that use recall of two-week prevalence of diarrhea may yield data that vary substantially from one point in time to another. An analysis of several studies conducted in squatter settlements in Karachi, Pakistan found that the daily reported prevalence of diarrhea varied greatly from one week to the next and even more from one month to the next [28]. Similarly, an analysis of data from the Control of Diarrhoeal Diseases program and DHS found moderate variability of reported prevalence of diarrhea [29]. Second, there are multiple factors that are responsible for the prevalence of diarrheal disease and not all are likely to be affected by improved sanitation. For example, contamination of weaning foods, consumption of contaminated water (both from collection of contaminated water and inadequate household storage), soil ingestion, and exposure to animal feces all have been associated with diarrhea in children in resource-limited areas [30–33]. Third, we found that only about one quarter of households at end-line appropriately treated their water. While this proportion is lower than that reported recently by Rosa and colleagues who found that 50% of rural households in Zambia reported that they treated their drinking water [34]. They also found that drinking water was significantly more contaminated than source water for both rural and urban households. Finally, the penetration (i.e. degree of uptake of the sanitation interventions) may need to attain a higher level in order for the program to see an impact on childhood diarrhea. This is apparent when the stratified analysis is performed as households with improved, not shared sanitation facilities had significantly less reported diarrhea than those without improved facilities. Similarly, those with adequate sanitation facilities had significantly less diarrhea and stunting. In order to effectively control diarrheal disease, multi-faceted programs need to be implemented that include improved sanitation, access to safe water, rotavirus vaccine, and improved access to treatment with oral rehydration therapy and zinc (which has a post-treatment prophylactic effect on future episodes of diarrheal disease in children) [35].

As was the case with diarrhea, we did not observe any difference in ARI prevalence between the baseline and end-line. Although there is some evidence that hand washing may have some effect on prevalence of ARI [12, 36], hand washing was not a major focus of this study and there were only slight improvements in hand washing with soap or ash (10% improvement). The lack of impact on ARI may be due to low coverage of hand washing with water and washing agent (61.4%).

6.3 Impact on measures of child nutrition: stunting and wasting
There was a significant decrease in the overall prevalence of stunting from 46% in the baseline to 41% in the end-line survey (adjusted prevalence ratio 1.18; 95% CI: 1.06 – 1.31). While end-line survey prevalence was higher than baseline prevalence in the age-groups 0-11 months and 12-23 months, it was lower in the 24-59-month age group. The beneficial effect on stunting was associated with households that had improved, not shared facilities and handwashing station with water and soap, thus suggesting that the changes in sanitation and hygiene that resulted from ZSHP may have contributed to a reduction in stunting. It is interesting to note that a cluster, randomized controlled trial of CLTS in Mali demonstrated no impact on two week prevalence of diarrhea but
a significant reduction in stunting [17], findings similar to those of this impact evaluation in Zambia. However, the end-line stunting prevalence we observed among the age groups in our study is similar to that observed in the Zambia 2014 DHS [5] so this change might also have been due to secular trends. Alternatively, the DHS data were collected at a different time of year so this difference may be a result of seasonal factors that relate to household food security.

There was a significant reduction in the prevalence of wasting between baseline and end-line (14% vs. 7.4%, adjusted prevalence ratio 2.07; 95% CI: 1.60 – 2.68). In addition, the end-line wasting prevalence we observed among the age groups in our study was lower than observed in the Zambia 2014 DHS [5]. For example, the prevalence of wasting was higher in households with improved not shared sanitation facilities and households with adequate sanitation facilities. This counterintuitive relationship remained the same when there were handwashing facilities in association with unshared sanitation facilities.

6.4 SLTS impact
The SLTS component of the program showed modest impact. The end-line survey showed an increase in the proportion of schools with improved sanitation facilities, proportion of schools that had 50 or fewer children per cabin, proportion with handwashing facility with water and washing agent. Of the schools surveyed, less than 20% had received the package of SLTS interventions. The key WASH indicators for schools (improved sanitation facilities, gender segregated toilets, fifty of fewer children per cabin, specific place for washing hands with multiple water points) increased in the schools that received the SLTS package compared to those that did not receive the package. There was also improvement in the proportion of schools who met the interim sanitation standard (have separate facility for boys and girls; improved toilet, have hand washing facility close by; and fifty or less students by toilet cabin). However, the differences were not significant. There was no significant difference between the schools that received the SLTS package and those that did not in meeting the specific needs of children in, especially girls, in terms of privacy, cleanliness, security or comfort. The program however made some attempts to improve menstrual hygiene management.

SLTS did not show an impact on school attendance, especially among female pupils. The proportion of female pupils absent from school in the seven days prior to the survey was similar between end-line (10.2%) and baseline (11.7%); and at end-line, it was similar between female pupils and male pupils (10.3%). It is important to note however that the total number of schools studied was relatively small so this impact evaluation may have been underpowered to show differences in certain measures of SLTS.

Program implementation data reviewed showed that the target for schools was not met, and this low coverage may have accounted for the modest impact in the school indicators. The low coverage might have been partially due to the longer time it took for the MoGE Infrastructure Section to review the low-cost school latrine design. A school-based WASH intervention in Mali has demonstrated evidence of reduced student absence due to diarrhea and having had diarrhea or ARI symptoms in the last week although this intervention did not reduce overall absenteeism [37]. These data demonstrate nevertheless the potential benefits that may arise from an effective school-based WASH program.
6.5 Sustainability and expansion

In implementing the program, there was a major focus on institutional strengthening and accountability of the key line ministries. This was to ensure the sustainability and expansion of the gains. Governance capacity was strengthened in both the public and private sectors as well as in community structures. As part of the funding arrangement, two important positions were created and filled. The first was a senior WASH expert whose scope of work was to support policy and advocacy within the line ministries and key cooperating partners. The second was a communication expert for the lead ministry (MoLGH) who was supposed to boost and strengthen the hygiene promotion components of the program.

The MoLGH has committed itself to strengthening its central role and scaling up to all districts. It has conducted provincial level trainings and provided the support necessary to enable the provinces to build local level WASH capacity in monitoring and management of information systems, planning and budgeting. The MoLGH has facilitated and led the development of two important strategies, the ODF Zambia by 2020 Strategy and the National Rural Water Supply and Sanitation Program 2016-2030 Strategy. There is a functional TWG which convenes meetings to discuss issues pertinent to program implementation and strategies.

The MoCTA has included sanitation promotion in two key documents it has recently developed: Chiefdom Development Strategy and Guidelines for Traditional Ceremonies. In addition, sanitation issues have since obtained a permanent spot on the agenda of House of Chiefs’ regular meetings. Provincial and district staff of MoCTA have been trained and given mandates; they are supporting various aspect of the program including Chiefdom orientation and triggering, data validation, ODF verification celebrations.

The MoH has included the CLTS approach and sanitation marketing components of the program in the national CHA training curriculum. This provides CHA trainees the needed knowledge and skills in sanitation activities before they graduate and are posted to the communities. An exhibition center of sanitation marketing options has been completed at the CHA training center in Mwachisompola. EHTs and CHAs are playing a pivotal role in the implementation of the program at the community level and coordinating the activities of the community champions.

The MoGE has developed and supported the construction of latrines using the interim latrine design for government schools and the low-cost latrine design for community schools. It has developed national menstrual hygiene management (MHM) guidelines and a toolkit, and has subsequently trained 32 national SLTS/MHM coaches as trainers of trainees to support the nationwide implementation.

Sanitation marketing, an approach to build sustainable capacity of the private sector to support the building of low-cost latrines has become an integral part of the program. The introduction of an accreditation system where artisans are recognized as “Master builders” and “Grand Master builders” depending on number of latrines built and sold has added incentives and motivation to access to improved toilet facilities. However, there is not enough information to assess its effectiveness and how it has moved people up the sanitation ladder.
6.6 Female involvement
It is understood that women and young children are the main beneficiaries of sanitation program as toilets bring privacy, convenience and reduce the walking distance, as well as health benefits - with less time and effort in caring for sick children. Review of documentation of this program showed limited involvement and engagement of women and girls in the program. Relatively few women were engaged in the program particularly at the community level as SAGs members and only 19% of champions were women. In addition, very few women were engaged in the social marketing of the program.

6.7 Impact on wellbeing of beneficiaries
There was very little information from the program review documentation and the surveys to ascertain any significant differences the program might have made in terms of wellbeing of beneficiaries, especially women and girls, in particular in terms of life skills, dignity, self-confidence and economic opportunity.

6.8 Environmental factors and the program
A little over a third of the households (37.0%) during the endline survey reported having had a toilet that had collapsed (Endline Survey Report 2017). The most common reasons for collapse of toilets were reported as rainfall, sandy soil, water-logged soil and poor construction. The social marketing component of the project aimed to provide longer lasting toilets at affordable prices, particularly in areas with sandy/waterlogged soils is therefore an appropriate strategy to address environmental factors which may impact on the performance of the program. There is little information to ascertain how the project has impacted on the local environment. Theoretically, the program is supposed to respond to issues of environmental degradation and climate change by: (i) contributing to build community resilience and capacity to adapt to changes; (ii) reducing the impact of WASH interventions on the carbon footprint (i.e. number of cement bags required for school latrine construction/reduced logs through the sanitation marketing options); and (iii) reducing the amount of fecal material released in the environment. So far there is no evidence to support these assertions.

6.9 Study limitations
This impact evaluation has a number of limitations as follows. First, in some SEAs, the program had started before the baseline survey, hence their data were not truly pre-intervention data. Second, we relied on respondents’ self-reporting to measure many of the outcome indicators, other than the data that were collected by direct observation. Consequently, these results are subject to potential reporting biases which may have resulted in either over or under estimation of indicators. Third, there may have been misclassification of improved sanitation at baseline during observations of toilet facilities by the data collectors. We addressed this challenge by carefully reviewing all types of improved latrines during the end-line data collector training and by providing each data collector with a laminated pictorial atlas demonstrating examples of unimproved and improved latrines that were used during end-line data collection. Fourth, at baseline, anthropometric measurements were done on fewer children because their caregivers refused. The situation was addressed during the end-line survey so anthropometric measurements were performed on many more children. We have assumed that the children whose anthropometric measurements were done were representative of those which were not done, and therefore have concluded that our prevalence estimates are unbiased. Fifth, we did not measure water quality so
the possibility of poor water quality could not be ruled out as a reason for not detecting a reduction in diarrhea prevalence. Sixth, we did not collect identifiable information so we could not link the data from the two surveys to determine which households participated in both surveys to allow us to assess changes among households prior to and after the intervention. Finally, we did not assess school children’s behavioral practices to ascertain how much the school intervention has changed their sanitation and hygiene behaviors.
7.0 LESSONS LEARNED, CONCLUSIONS AND RECOMMENDATIONS

7.1 Lessons Learned
Based on our observations and discussions with members of the WASH team, there is a critical need to engage government agencies and traditional rulers in community based programs of this nature. Active involvement of government agencies at different levels of the political and health system as well as Chiefs, their Royal Council, and the village headmen in their traditional leadership catchment areas leads to a higher chance of success in achieving the goals of the sanitation and hygiene program. The critically important role of the Chiefs and other traditional leaders is apparent in two areas that attained widespread ODF status including the Macha chiefdom in Choma District, Southern Province and Chiengi District in Luapula Province [26]. The latter success was facilitated by collaborations between the District WASH Committee and other stakeholders who met with the Chiefs on a regular basis to review monthly ODF progress. In addition, the chiefs conducted monthly inspections of villages to identify areas that were lagging in attaining ODF status. The Chiefs also instituted penalties for households that did not construct latrines and continued open defecation. As a result of the active engagement of Chiefs, District WASH Committees and other key stakeholders, Chiengi District was the first district to be declared ODF.

Notably the successful elimination of open defecation in Chiengi District was facilitated by the use of RTM data, using a mobile-to-web platform, on the status and progress of program implementation. We feel that the use of RTM data by implementers and beneficiaries can serve as motivation to improve performance. Based on our analysis, this strategy was associated with a significantly greater construction of improved toilet facilities by households in areas where RTM was implemented.

Another important lesson learned is that the presentation of information does not always lead to internalization of that knowledge and subsequent behavior change. Conscious efforts need to be made to translate newly acquired knowledge into behavior change by identifying barriers to adoption of new behaviors. In regards to hand washing, there appears to be a need for improved communications and a greater emphasis on education about appropriate times for hand washing. In the future, innovative communication strategies such as community-level plays or text messages to village headmen and other community leaders to remind them of the importance of hygiene and other forms of behavior change might serve to improve knowledge and strengthen positive hand hygiene practices.

This impact evaluation has also taught us that improved sanitation and access to improved drinking water may not necessarily lead to reductions in diarrhea prevalence. Our study did not measure water quality, so the possibility of poor water quality could not be ruled out as one of the reasons for not detecting a positive change in diarrhea prevalence. It also calls for a review of the definition of “improved drinking water” which currently does not take into account water quality.

Given the time required for the development and piloting of new approaches during program implementation, it may take much longer to see widespread impact than originally anticipated. The ZSHP program began implementation gradually in 2012 and then progressively scaled up during the next few years. While this impact evaluation has demonstrated some evidence of impact
between the early time frame of program implementation in 2013 and the end line survey in 2016, further time and resources are necessary to have widespread impact including reaching more district-wide ODF zones. Program implementers must therefore plan accordingly—either by allowing more time for gradual scaling up of interventions or putting more resources into the program so that there is intensification of efforts to allow widespread concurrent implementation of the programmatic activities.

7.2 Conclusions
This impact evaluation has demonstrated many improvements in sanitation and hygiene measures between the baseline and the end-line survey as well as associated improvements in child anthropometric measures. Notable findings include a significant increase in the availability of improved sanitation (from 64% to 80% between baseline and end-line), decreased proportions of households reporting open defecation, and improvements in households having designated place for washing hands and washing hands with water and washing agents at critical times.

The ZSHP target of reaching 3 million people with access to improved toilets and at least 73% of households in program areas using improved sanitation was met. The end-line survey showed a significant increase from baseline in the proportion of households with improved toilet facilities which were not shared. However, 29.1% of households at end-line used improved toilet facilities that were shared with other households. The program impact on ODF practice and status was lower than anticipated.

The RTM and sanitation marketing strategies both appeared to have contributed to substantial improvements in sanitation and hygiene measures. In contrast, the program’s investment in behavior change messaging and hygiene promotion activities through media channels such as radio, newspapers, TV, and social media may not have been the best approaches to reach the target population since these were the least commonly cited sources of information.

Despite evidence of improved sanitation and access to improved drinking water (which was not a component of this program), there was no evidence of an impact on the reported two-week prevalence of diarrhea. However, the program showed impact on measures of child nutrition. There were significant reductions in stunting, severe stunting and wasting. Given the importance of child growth for future academic and work productivity, these are extremely important benefits of this program.

The SLTS component of the program showed only modest impact. The end-line survey demonstrated an increase in the proportion of schools with improved sanitation facilities, the proportion of schools that had 50 or fewer children per cabin, and the proportion with handwashing facility with water and washing agent, although these differences were not significant.

In implementing the program, there was a major focus on institutional strengthening and accountability of key line ministries to ensure the sustainability and expansion of the gains. Governance capacity was strengthened in both the public and private sectors as well as in community structures. The program has therefore built a foundation for sustainability and expansion of the package of sanitation and hygiene interventions.
We have identified some program gaps which we feel must be addressed for the program to achieve the required impact. These include lack of focus on water quality, limited interventions to educate rural populations on proper water storage, limited reinforcement of behavior change messages through repeated education and innovative strategies such as community theater and limited focus and coverage of interventions in SLTS especially in the area of behavior change.

7.3 Recommendations
Based on the lessons learned and conclusions, we make the following recommendations:

A. Program changes
- Need to strengthen focus on safe water storage and treatment of water to prevent contamination
- Strengthen education regarding proper times to wash hands
- Program needs to emphasize not sharing of toilet facilities between households
- Need to focus on improving proportions of households with improved toilet facilities and nearby handwashing facilities.
- Greater involvement of women as community champions and SAG members must be encouraged and pursued.

B. Priority setting
- Program implementers should invest in scaling up the RTM strategy and provide adequate resources to make sure it is effectively used
- Continue sanitation marketing strategy
- Attaining ODF status must be given high priority
- Need to prioritize SLTS component of the program so that schoolchildren can have access to improved sanitation and handwashing stations
- Invest in building the capacity of CHAs, CHAs, CLTS champions, and SAG members to provide education on personal hygiene and sanitation

C. Future research
- Evaluation of home water storage systems and strategies to reduce contamination of stored water
- Use of RTM mobile-to-web data for increasing the availability and use of hand washing stations
8.0 REFERENCES

1. World Health Organization (WHO). Mortality and burden of disease from water and sanitation. Global Health Observatory (GHO) data.

2. UNICEF. Common water and sanitation-related diseases. Water, Sanitation and Hygiene.


15. Fewtrell L, Kaufmann RB, Kay D, Enanoria W, Haller L, Colford JM. Water, sanitation, and hygiene interventions to reduce diarrhoea in less developed countries: a systematic review and


### 9.0 Annexes

#### 9.1 Annex 1: Data Collectors and Supervisors Training Program

**Day 1 – Monday May 31, 2016**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Facilitator</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00-8:30</td>
<td>Introductions, logistics, team roles, responsibilities and expectations</td>
<td>Godfrey</td>
</tr>
<tr>
<td>8:30-9:15</td>
<td>SHPZ Program Overview</td>
<td>UNICEF</td>
</tr>
<tr>
<td>9:15-10:00</td>
<td>Protocol overview presentation</td>
<td>Kojo/David</td>
</tr>
<tr>
<td>10:00-10:15</td>
<td>Discussion on study protocol</td>
<td>Kojo/David</td>
</tr>
<tr>
<td>10:15-10:30</td>
<td><strong>Tea Break</strong></td>
<td></td>
</tr>
<tr>
<td>10:30-11:30</td>
<td>Data collection/survey techniques</td>
<td>Godfrey</td>
</tr>
<tr>
<td>11:30-12:30</td>
<td>Field procedures including sampling</td>
<td>Kojo</td>
</tr>
<tr>
<td>12:30-13:30</td>
<td><strong>Lunch</strong></td>
<td></td>
</tr>
<tr>
<td>13:30-14:15</td>
<td>Introduction to Teleforms</td>
<td>James</td>
</tr>
<tr>
<td>14:15-15:00</td>
<td>Research ethics</td>
<td>Kojo</td>
</tr>
<tr>
<td>15:00-16:30</td>
<td>Informed consent (theory and practice)</td>
<td>David/Kojo</td>
</tr>
<tr>
<td>16:30-17:00</td>
<td>Day 1 Wrap up session</td>
<td>Godfrey</td>
</tr>
</tbody>
</table>

**Day 2 – Tuesday May 31, 2016**

<table>
<thead>
<tr>
<th>Time</th>
<th>Topic</th>
<th>Facilitator</th>
</tr>
</thead>
<tbody>
<tr>
<td>08:30-10:15</td>
<td>Review of the survey forms (data collection instruments)</td>
<td>Kojo/David/UNICEF</td>
</tr>
<tr>
<td>10:15-10:30</td>
<td><strong>Tea Break</strong></td>
<td></td>
</tr>
<tr>
<td>10:30-12:30</td>
<td>Continue review of survey forms</td>
<td>Kojo/David/UNICEF</td>
</tr>
<tr>
<td>12:30 – 13:30</td>
<td><strong>Lunch</strong></td>
<td></td>
</tr>
<tr>
<td>13:30 – 16:30</td>
<td>Practice use of survey form and anthropometry</td>
<td>All</td>
</tr>
<tr>
<td>16:30-17:00</td>
<td>Day 2 Wrap up session</td>
<td>Godfrey</td>
</tr>
<tr>
<td>Time</td>
<td>Topic</td>
<td>Facilitator</td>
</tr>
<tr>
<td>--------------</td>
<td>-------------------------------</td>
<td>-------------</td>
</tr>
<tr>
<td>8:30-10:15</td>
<td>Finalizing survey forms</td>
<td>All</td>
</tr>
<tr>
<td><strong>10:15-10:30</strong></td>
<td><strong>Tea Break</strong></td>
<td></td>
</tr>
<tr>
<td>10:30-12:30</td>
<td>Discussion of field issues</td>
<td>All</td>
</tr>
<tr>
<td><strong>12:30 – 13:30</strong></td>
<td><strong>Lunch</strong></td>
<td></td>
</tr>
<tr>
<td>13:30-15:00</td>
<td>Preparation towards field work</td>
<td>All</td>
</tr>
<tr>
<td>15:30-16:30</td>
<td>Meeting with Supervisors</td>
<td></td>
</tr>
</tbody>
</table>
9.2 Annex 2: Household Survey Form

**ZSHP HOUSEHOLD SURVEY FORM**

Study ID number __ __/__ __/__ __/__ __
(Province 2 digits; District 2 digits; SEA 2 digits; household number 2 digits)

Is this household living in an ODF certified village?
1. Yes
2. No
99. Do not know

Date (__ __/__ __/__ __) (dd/mo/yr)

**1.0 HOUSEHOLD SOCIO-DEMOGRAPHIC DATA**

1.1 How old are you?__-__(years) (99 IF UNKNOWN)

1.2. What is the highest level of education that you attained?
1. No education
2. Primary (grades 1-7)
3. Secondary (grades 8-12)
4. College
5. University

1.3. What ethnic group or tribe do you belong to?
1. Bemba
2. Tumbuka
3. Chewa
4. Ngoni
5. Kaonde
6. Lozi
7. Luvale
8. Lunda
9. Tonga
10. Other (specify)______________________________

1.4. What is your main occupation?
1. Housewife
2. Farmer
3. Business/self employed
4. Civil servant
5. Unemployed
6. Other (specify)______________________________

1.5. What is your marital status?
1. Single/not married
2. Married
3. Separated/divorced
4. Widowed

1.6. Who is the head of this household?
   1. Respondent
   2. Husband/partner
   3. Female relative
   4. Male relative

IF RESPONSE TO Q1.6 IS “RESPONDENT”, SKIP TO Q1.11.

1.7 How old is the head of household? __ __(years) (99 IF UNKNOWN)

1.8. What is the highest level of education that the head of household attained?
   1. No education
   2. Primary (grades 1-7)
   3. Secondary (grades 8-12)
   4. College
   5. University
   99. Do not know

1.9. What ethnic group/tribe does the head of household belong to?
   1. Bemba
   2. Tumbuka
   3. Chewa
   4. Ngoni
   5. Kaonde
   6. Lozi
   7. Luvale
   8. Lunda
   9. Tonga
   10. Other (specify)__________________________
   99. Do not know

1.10. What is the main occupation of the head of household?
   1. Housewife
   2. Farmer
   3. Business/self employed
   4. Civil servant
   5. Unemployed
   6. Other (specify)__________________________
   99. Do not know

1.11. How many people live in this household? __ __
1.12. How many children under five years old live in this household? __ __

1.13. How many children aged 5-12 years live in this household? __ __

1.14. Who owns the house you live in?
   1. Household
   2. Rented
   3. Relative - no rent is paid
   4. Supplied by employer
   5. Other (specify) ________________________________

1.15. What type of floor does the house have?
   1. Sand/earth
   2. Dung
   3. Cement
   4. Bamboo/palm
   5. Parquet or polished wood
   6. Vinyl or asphalt
   7. Ceramic tiles
   8. Carpet
   9. Other (specify) ________________________________

1.16. What is the main type of material that the house walls are composed of?
   1. No walls
   2. Cane/palm/trunk
   3. Mud
   4. Bamboo pole with mud
   5. Stone with mud
   6. Plywood
   7. Cardboard
   8. Cement
   9. Stone with lime/cement
   10. Bricks
   11. Cement blocks
   12. Wood planks/shingles
   13. Other (specify) __________________________________

1.17. What material is the roof of the house made of?
   1. No roof
   2. Thatch/palm leaf
   3. Rustic mat
   4. Palm/bamboo
   5. Metal/iron sheets
   6. Wood
   7. Calamine/cement fiber (asbestos)
   8. Concrete
9. Ceramic/Harvey tiles
10. Roofing shingles
11. Mud tiles
12. Other (specify)_____________________________

1.18. What is the main type of cooking fuel that you use in this house?
1. Electricity
2. Solar
3. Gas
4. Kerosene
5. Charcoal
6. Wood
7. Straw/shrubs/grass
8. No food cooked in household
9. Other (specify)_____________________________

1.19. Does your household own any of these? (SHADE ALL THAT APPLY)
1. Radio
2. Cassette player
3. VCR/DVD player
4. Mobile telephone
5. Non-mobile telephone
6. Watch
7. Refrigerator
8. Television
9. Bed
10. Chair
11. Table
12. Cupboard
13. Sofa
14. Clock
15. Fan
16. Sewing machine
17. Plow
18. Tractor
19. Hammer mill
20. Grain grinder

1.20. Does your household own any of the types of transport? (SHADE ALL THAT APPLY)
1. Bicycle
2. Animal drawn cart
3. Motorcycle/scooter
4. Car/truck
5. Boat with a motor
6. Banana boat
7. Canoe
1.21. Does your household own or have any of the following? (SHADE ALL THAT APPLY)
   1. Cattle
      1.0 A If yes, number of cattle __ __
   2. Agricultural land
      2.0 A If yes, how many hectares of land? __ __
   3. Bank/savings account (at least one household member has an account)

1.22 How much did your family spend on health (treatment and prevention of illness) in the last 3 months? ___________________________ ZMW

2.0 HAND WASHING PRACTICES AND KNOWLEDGE OF DISEASE CAUSATION

2.1 When do you consider important for washing hands?
FIRST ASK QUESTION AND ALLOW RESPONDENT TO PROVIDE RESPONSES WITHOUT PROMPTING AND ENTER RESPONSES IN COLUMN 2. SECOND, REVIEW EACH OPTION AND DOCUMENT RESPONSE

<table>
<thead>
<tr>
<th>Category</th>
<th>Response without prompt (yes/no)</th>
<th>Response with prompt (yes/no)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Before preparing food</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before eating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Before feeding a child</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After defecation or visiting a</td>
<td></td>
<td></td>
</tr>
<tr>
<td>toilet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After washing child’s bottom</td>
<td></td>
<td></td>
</tr>
<tr>
<td>or changing diapers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>After disposing of child feces</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

2.2 Which of the following activities did you perform most recently today?
   1. Prepared food
   2. Fed a child
   3. Defecation
   4. Washed child’s bottom or changed diapers
   5. Disposed of child feces

IF RESPONSE WAS “1. PREPARED FOOD” OR “2. FED A CHILD”, THEN ASK Q2.3a.

2.3a. Did you wash your hands before this activity?
   1. Yes
2. No


2.3b. Did you wash your hands after this activity?
   1. Yes
   2. No

IF RESPONSE TO Q2.3a or Q2.3b IS “2. NO”, THEN SKIP Q2.4.

2.4. Please describe how you washed your hands during this activity?
   1. With water only?
   2. With water and soap or detergent
   3. With water and ash
   4. Mud/sand
   5. Other (specify)____________________________________

2.5. Do you have a specific place where you usually wash your hands?
   1. Yes
   2. No

IF THE RESPONSE IS ‘2. NO’, SKIP TO Q2.7.

2.6. Where do you usually wash your hands? (SHADE ALL THAT APPLY)
   1. Inside or at a location near the toilet
   2. Inside or near the kitchen or cooking place
   3. Elsewhere in yard
   4. Outside yard

2.7 How much do you usually spend per week on supplies (e.g. soap, detergent) to wash your hands?
   __________________________ ZMW

2.8. What do you think is the harm or danger of not treating water to drink or not storing drinking water safely? (SHADE ALL THAT APPLY; DO NOT PROMPT)
   1. Diarrhea
   2. Cholera
   3. Typhoid
   4. Acute respiratory infection
   5. Water will be contaminated
   6. Sickness (unspecified)
   7. Other (specify)____________________________________

2.9. What do you think is the harm or danger of not washing hands with soap after defecation or disposing of child feces? (SHADE ALL THAT APPLY; DO NOT PROMPT)
1. Diarrhea
2. Cholera
3. Typhoid
4. Acute respiratory infection
5. Will contaminate water or food
6. Sickness (unspecified)
7. Other (specify)

2.10. What do you think is the harm/danger of not using a clean latrine for defecation? (SHADE ALL THAT APPLY; DO NOT PROMPT)
   1. Diarrhea
   2. Cholera
   3. Typhoid
   4. Acute respiratory infection
   5. Will contaminate water or food
   6. Sickness (unspecified)
   7. Other (specify)

2.11. What do you think is the harm/danger of defecating in the open (bush, ground)? (SHADE ALL THAT APPLY; DO NOT PROMPT)
   1. Diarrhea
   2. Cholera
   3. Typhoid
   4. Acute respiratory infection
   5. Will contaminate water or food
   6. Sickness (unspecified)
   7. Other (specify)

2.12. What do you think are important causes of diarrhea? (SHADE ALL THAT APPLY; DO NOT PROMPT)
   1. Dirty water
   2. Dirty food
   3. Uncleanliness/bad hygiene
   4. Dirty environment
   5. Flies
   6. Other 1 (specify)
   7. Other 2 (specify)

2.13. What do you think are important causes of acute respiratory infections? (SHADE ALL THAT APPLY; DO NOT PROMPT)
   1. Dirty water
   2. Dirty food
   3. Uncleanliness/bad hygiene
   4. Dirty environment
   5. Overcrowding
   6. Cold
7. Indoor air pollution
8. Sick family members or friends
8. Other 1 (specify)___________________________________
9. Other 2 (specify)__________________________________

3.0 WATER SOURCES
3.1. What is the main source of drinking water for members of your household?
   1. Piped water into dwelling
   2. Piped water to yard/plot
   3. Public well or standpipe
   4. Borehole/tubewell
   5. Protected dug well
   6. Protected spring
   7. Rainwater
   8. Unprotected spring
   9. Unprotected dug well
   10. Cart with small tank/drum (water trucked into community and sold from water truck)
   11. Tanker truck
   12. Surface water (rivers, dams, lakes, ponds, streams, canals, irrigation channels)
   13. Other (specify) ____________________________________

3.2. How long does it take to go to the source of drinking water and come back?
DO NOT ASK THIS QUESTION IF RESPONSE TO Q3.1 IS “PIPED WATER INTO DWELLING” OR “PIPED WATER TO YARD/LOT”.
No of minutes__ __ __ (999 IF DO NOT KNOW)

3.3. Who is responsible for fetching the water for the household? CHECK ALL THAT APPLY.
   THIS QUESTION IS FOR THOSE WHO RESPONDED TO Q 3.2 ABOVE.
   1. Adult woman
   2. Adult man
   3. Female child (under 15 years)
   4. Male child (under 15 years)
   5. Do not know

3.4. How many times a day does the household fetch water each day?
   __ __ (number of times)

3.5. Do you treat your water in any way to make it safer to drink?

---

*4 Water delivered through a pump powered by human, wind, electric, diesel or solar means
*5 Protected from runoff water by a well lining or casing raised above ground level and a platform that directs spilled water away from the well. It is covered so that bird/animal droppings cannot fall into the well
*6 Protected from bird/animal droppings by “spring box” constructed of brick/concrete and built around the spring so that water flows directly out of the box into a pipe or cistern without being exposed to outside pollution.
1. Yes
2. No

IF RESPONSE TO Q3.5 IS “NO”, SKIP Q 3.6 TO 3.9, AND PROCEED TO SECTION 4.0.

3.6. What do you usually do to the water to make it safer to drink? CHECK ALL THAT APPLY.
   1. Boil
   2. Add bleach/chlorine
   3. Use water filter (ceramic, sand, composite)
   4. Solar disinfection
   5. Strain it through a cloth
   6. Let it stand to settle
   7. Other (specify)__________________________

3.7 When was the last time you treated water to make it safe to drink?
   1. Today
   2. Within the last week
   3. Within the last month
   4. Within the last 2 months
   5. Over 2 months ago

3.8 Which method did you use the last time you treated water to make it safe?
   1. Boil
   2. Add bleach/chlorine
   3. Use water filter (ceramic, sand, composite)
   4. Solar disinfection
   5. Strain it through a cloth
   6. Let it stand to settle
   7. Other (specify)__________________________
   8. Do not remember

3.9 How much do you spend per week to treat water to make it safer to drink?
   ______________________ (ZMW)

4.0 SANITATION

4.1 What kind of toilet facility do members of your household usually use?
   1. Flush/pour flush to (piped sewer system, septic tank, pit latrine)
   2. Ventilated improved pit latrine (VIP)
   3. Pit latrine with slab/platform (made of mud, concrete, or wood)
   4. Composting toilet
   5. Pit latrine/ open pit without slab/platform to cover the pit and/or no walls and/or roof
   6. No facilities; use bush or field
   7. Other (specify)___________________________________
IF THE RESPONSE TO Q4.1 IS “3. PIT LATRINE WITH SLAB/PLATFORM”, ANSWER Q4.1.1.
IF THE RESPONSE TO Q4.1 IS “6. NO FACILITIES”, SKIP “Q4.2 TO Q4.9” AND PROCEED TO Q4.10
IF ANY OTHER ANSWER PROCEED TO Q4.2

4.1.1 Does the pit latrine with slap/platform have the following items? (SHADE ALL THAT APPLY AND SEE PICTURES IN EVALUATION FIELD GUIDE)
1. Roof
2. Privacy (walls, door, cloths, other sight protection)
3. Lid
4. Slab/platform is smooth and easy to clean
5. Slab/platform is raised

4.2. Do you share this facility with other households?
1. Yes
2. No

IF RESPONSE TO 4.2 IS “NO”, THEN SKIP Q4.3.

4.3. How many households use this toilet facility? __ __ (No. households)

4.4. Can any member of the public use this toilet?
1. Yes
2. No

4.5. Who provided the funding/resources/materials for the construction of this toilet? (SHADE ALL THAT APPLY)
1. Household
2. NGO not related to CLTS (Specify______________)
3. Family member
4. Government
5. Church/mission
6. Other, specify ________________
9. Do not know

4.6. When was this toilet constructed?
1. Within the last 6 months
2. Within 6 months to one year
3. Within the last one to two years
4. More than 2 years ago
99. Do not know
4.7. How much did it cost to construct this toilet facility? _______________ ZMW (99999 IF DO NOT KNOW)

4.8. When was this toilet rehabilitated?
   1. Within the last 6 months
   2. Within 6 months to one year
   3. Within the last one to two years
   4. More than 2 years ago
   88. Not applicable (Has not been rehabilitated)

4.9. How much did it cost to rehabilitate this toilet facility? _______________ ZMW (99999 IF DO NOT KNOW)

4.10. How much does it cost per month to maintain this toilet facility? _______________ ZMW (99999 IF DO NOT KNOW)

4.11. Has any of your latrines in this household ever collapsed?
   1. Yes
   2. No

4.12. Why did the latrine collapse?
   1. Sandy soil
   2. Water logged soil
   3. Poor construction
   4. Rain
   5. Other, specify ______________________

4.13. The last time the youngest child (0-3 years) in this household passed stools, what was done to dispose of the feces?
   1. Child used toilet/latrine
   2. Put/rinsed into toilet or latrine
   3. Buried
   4. Put/rinsed into drain or ditch
   5. Thrown into garbage
   6. Left in the open
   7. Other (specify) ______________________
   88. Not applicable (all children aged >3 years)
   99. Do not know

4.14. How often does any member of this household (apart from children under five years old) defecate outside on the ground?
   1. Daily
   2. At least once a week
   3. Occasionally
   88. Never
   99. Do not know
4.15. Where do you dispose of your household waste (garbage)? CHECK ALL THAT APPLY.
   1. Throw in the backyard
   2. Throw in open spaces
   3. Deposit in the dumping space
   4. Collected by agency free of charge
   5. Collected by agency but we pay for it
   6. Burning
   7. Burying

5.0 SOURCES OF INFORMATION ON WATER, SANITATION, AND HYGIENE
5.1. Where do you normally receive information on water, sanitation and hygiene? (SHADE ALL THAT APPLY)
   1. Posters and handbills
   2. Health education by community health workers
   3. Health education by community health assistants (CHAs)
   4. Health education by CLTS community champions
   5. Health education by Sanitation Action Group (SAG)
   6. Radio
   7. Television
   8. Newspapers
   9. Drama groups
   10. Chief
   11. Headmen
   12. Other (specify) ________________________________

5.2. When was the last time you received a message on hand-washing with soap?
   1. Within the last week
   2. Within 1 month
   3. Within 2 months
   4. Within 6 months
   5. More than 6 months ago
   88. Never
   99. Cannot remember

5.3. What was the source of this message?
   1. Posters and handbills
   2. Health education by community health workers
   3. Health education by community health assistants (CHAs)
   4. Health education by CLTS community champion
   5. Health education by Sanitation Action Group (SAG)
   6. Radio
   7. Television
   8. Newspapers
   9. Drama groups
10. Chief
11. Headmen
12. Other (specify) ________________________________________
99. Cannot remember

5.4. When was the last time you received a message on use of safe water?
   1. Within the last week
   2. Within 1 month
   3. Within 2 months
   4. Within 6 months
   5. More than 6 months ago
   88. Never
   99. Cannot remember

5.5. What was the source of this message?
   1. Posters and handbills
   2. Health education by community health workers
   3. Health education by community health assistants (CHAs)
   4. Health education by CLTS community champion
   5. Health education by Sanitation Action Group (SAG)
   6. Radio
   7. Television
   8. Newspapers
   9. Drama groups
   10. Chief
   11. Headmen
   12. Other (specify) ________________________________________
99. Cannot remember

5.6. When was the last time you received a message on sanitary latrine use and feces disposal?
   1. Within the last week
   2. Within 1 month
   3. Within 2 months
   4. Within 6 months
   5. More than 6 months ago
   88. Never
   99. Cannot remember

5.7. What was the source of this message? (SHADE ALL THAT APPLY)
   1. Posters and handbills
   2. Health education by community health workers
   3. Health education by community health assistants (CHAs)
   4. Health education by CLTS community champion
   5. Health education by Sanitation Action Group (SAG)
   6. Radio
   7. Television
8. Newspapers
9. Drama groups
10. Chief
11. Headmen
12. Other (specify) ________________________________
99. Cannot remember

5.8. When was the CTLS project initiated in your village?
   1. Not yet
   2. within the last 3 months
   3. Within the last 4-6 months
   4. Within 6-12 months
   5. More than 12 months ago
   99. Do not know

5.9. Has any member/volunteer of this project visited your home to talk about/discuss sanitation and hygiene issues (i.e. sanitary feces disposal, safe water use and hand washing practices)?
   1. Yes
   2. No

5.10. When was the last time he/she visited?
   1. Within the last week
   2. Within 1 month
   3. Within 2 months
   4. Within 6 months
   5. More than 6 months ago
   88. Not applicable (No visit)
   99. Cannot remember

5.11 Have you participated in a group event organized by the CLTS champion, SAG group or traditional leader, where you discussed about water, toilets, defecation in the bush, sanitation and hygiene?
   1. Yes
   2. No

5.12. When was the last time you participated in such an event?
   1. Within the last week
   2. Within 1 month
   3. Within 2 months
   4. Within 6 months
   5. More than 6 months ago
   88. Not applicable (No participation)
   99. Cannot remember
## 6.0 DIARRHEA AND ARI PREVALENCE AND TREATMENT

6.1.a Characteristics of children under the age of 5 years, diarrhea and ARI prevalence, their immunization status and anthropometry.

<table>
<thead>
<tr>
<th></th>
<th>Child 1</th>
<th>Child 2</th>
<th>Child 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Breastfeeding (Y/N)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diarrhea in the last two weeks**</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many days did the diarrhea last</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cough in the last two weeks (Y/N)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Runny nose in the last two weeks (Y/N)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difficult or fast breathing in the last two weeks (Y/N)***</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Vitamin A supplementation in last 12 months (Y/N)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Immunizations (review under 5 card)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BCG</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>OPV 0</td>
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<td></td>
<td></td>
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<tr>
<td>OPV 1</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>OPV 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>OPV 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPT-hepB-Hib 1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPT-hepB-Hib 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DPT-hepB-Hib 3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rotavirus</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Weight of child</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Height/length of child</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mid upper arm circumference of child</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*For babies less than one month enter zero (0) months  
**Diarrhea defined as ≥3 loose or watery bowel movements per 24 hours  
***ARI defined as cough plus runny nose or cough with fast or difficulty breathing

6.1.b Was the under five card seen?  
1. Yes  
2. No
6.2. Diarrhea treatment in children under the age of 5 years who have had an episode of diarrhea during the past two weeks.

<table>
<thead>
<tr>
<th>Was child given any of these?</th>
<th>Child 1</th>
<th>Child 2</th>
<th>Child 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluids from ORS sachet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORS fluid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homemade fluid</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was child taken to health facility during the diarrhea?</td>
<td>a) less</td>
<td>a) less</td>
<td>a) less</td>
</tr>
<tr>
<td></td>
<td>b) same</td>
<td>b) same</td>
<td>b) same</td>
</tr>
<tr>
<td></td>
<td>c) more</td>
<td>c) more</td>
<td>c) more</td>
</tr>
<tr>
<td>How was child breastfed/fed during the diarrhea?</td>
<td>a) less</td>
<td>a) less</td>
<td>a) less</td>
</tr>
<tr>
<td></td>
<td>b) same</td>
<td>b) same</td>
<td>b) same</td>
</tr>
<tr>
<td></td>
<td>c) more</td>
<td>c) more</td>
<td>c) more</td>
</tr>
<tr>
<td>Was child given any of these during the diarrhea?</td>
<td>Zinc</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Amoxicillin pill/syrup</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Cotrimoxazole (septrin)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Antimotility pill/syrup</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Unknown pill/syrup</td>
<td>Injection</td>
<td></td>
</tr>
<tr>
<td></td>
<td>IV Fluids</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Home remedies/herbal</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Other (specify)</td>
<td></td>
<td>Cost of treatment</td>
</tr>
</tbody>
</table>

6.3. ARI treatment in children under the age of 5 years who have had an episode of ARI during the past two weeks

<table>
<thead>
<tr>
<th>Was child taken to health facility during the ARI?</th>
<th>Child 1</th>
<th>Child 2</th>
<th>Child 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was child given any of these during the ARI?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin pill/syrup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotrimoxazole (septrin)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cough mixture (syrup)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panadol/aspirin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other antibiotic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home remedies/herbal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### 6.4. Household roster of children 5 to 12 years of age and diarrhea and ARI prevalence

<table>
<thead>
<tr>
<th>Child 1</th>
<th>Child 2</th>
<th>Child 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex (M/F)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diarrhea in the last two weeks*</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How many days did the diarrhea last?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cough in the last two weeks**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Runny nose in the last two weeks**</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fast or difficult breathing in the last two weeks*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Diarrhea defined as ≥3 loose or watery bowel movements per 24 hours  
**ARI defined as cough plus runny nose or cough with fast or difficulty breathing

### 6.5. Diarrhea treatment in children 5-12 years of age who have had an episode of diarrhea during the past two weeks

<table>
<thead>
<tr>
<th>Child 1</th>
<th>Child 2</th>
<th>Child 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was child given any of these?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fluids from ORS sachet</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ORS fluid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Homemade fluid</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was child taken to health facility during the diarrhea?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>How was child fed during the diarrhea?</td>
<td>d) less</td>
<td>d) less</td>
</tr>
<tr>
<td></td>
<td>e) same</td>
<td>e) same</td>
</tr>
<tr>
<td></td>
<td>f) more</td>
<td>f) more</td>
</tr>
<tr>
<td>Was child given any of these during the diarrhea?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Zinc</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin pill/syrup</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotrimoxazole (septrin)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Antimotility pill/syrup</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unknown pill/syrup</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Injection</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV Fluids</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home remedies/herbal</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
6.6. ARI treatment in children 5 – 12 years of age who have had an episode of ARI during the past two weeks

<table>
<thead>
<tr>
<th></th>
<th>Child 1</th>
<th>Child 2</th>
<th>Child 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was child taken to health facility during the ARI?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was child given any of these during the ARI?</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Amoxicillin pill/syrup</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cotrimoxazole (septrin)</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Cough mixture (syrup)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Panadol/aspirin</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other antibiotic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home remedies/herbal</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other (specify)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cost of treatment</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7.0 OBSERVATION OF WATER STORAGE

7.1 How is water stored for drinking?
   1. Bottles
   2. Jerry cans
   3. Earthen pots
   4. Buckets
   5. Jugs
   6. Plastic container
   7. Other (specify)___________________

7.2 Is the container covered?
   1. Completely covered
   2. Partially covered
   3. Uncovered

7.3 Does it have a narrow or wide mouth?
   1. Narrow
   2. Wide

7.4 Does it have a spigot?
   1. Yes
   2. No

7.5. Is it within the reach of children?
   1. Yes
   2. No
7.6. Is it within the reach of animals?
   1. Yes
   2. No

8.0 OBSERVATION OF TOILET FACILITY
8.1 Type of toilet facility?
   1. Flush/pour flush to (piped sewer system, septic tank, pit latrine)
   2. Ventilated improved pit latrine (VIP)
   3. Pit latrine with raised floor (made of mud, concrete, or wood)
   4. Composting toilet
   5. Pit latrine/open pit without raised floor to cover the pit
   8. No facilities; use bush or field
   9. Other (specify)________________________________________

IF THE RESPONSE TO Q8.1 IS “3. PIT LATRINE WITH SLAB / PLATFORM”, ANSWER Q8.1.1

8.1.1 Does the pit latrine with slap / platform have the following items?
(Shade all that apply and see pictures in evaluation field guide)
   1. Roof
   2. Privacy (walls, door, cloths, other sight protection)
   3. Lid
   4. Slab / platform is smooth and easy to clean
   5. Slab / platform is raised

8.2. Is there evidence of recent use of the pathway to the latrine?
   1. Yes
   2. No
   99. Not sure

8.3 Is there evidence of recent use of the latrine?
   1. Yes
   2. No
   99. Not sure

8.4 Is the toilet area clean?
   1. Yes
   2. No

8.5 Is stool visible on the slab or floor?
   1. Yes
   2. No

8.6. Is there any fecal smell in the toilet area?
1. Yes
2. No

8.7. Are there flies or insects in the toilet area?
   1. Yes, many flies or insects
   2. Yes, a few flies or insects
   2. No

8.8. Is water and soap for washing hands in or close by?
   1. Yes
   2. No

9.0 OBSERVATION OF HAND WASHING AREAS
Only complete this section if there is a hand washing area.

Location 1: ________________

9.1 What type of Hand Washing Facility?
   1. Tippy Tap
   2. Water in a bucket with tab
   3. Water in a bowl/bucket with mug
   4. Water in a bowl/bucket without mug
   5. Pressure bottle
   6. Dip and drip
   7. Running water (pipe stand, sink, etc.)
   8. Other, specify_________________

9.2 Is water available?
   1. Yes
   2. No

9.3. Is washing agent available?
   1. Yes
   2. No

9.4 What type of washing agent?
   1. Soap
   2. Detergent
   3. Ash/mud
   4 Liquid soap
   5. Sand/ mud
   6. Other (specify other _________________________)
   88. Not applicable

9.5 Are there any traces of recent use?
(such as water in the sink / wet floor; partially used soap; clear path to facility)
1. Yes
2. No

9.6 When was this hand washing facility constructed? (Ask if hand washing facility is tippy tap, pressure bottle, dip and drip, or running water)
   1. Within the last 6 months
   2. Within 6 months to one year
   3. within the last one year to two years
   4. More than 2 years ago
   Do not know

9.7. How much did it cost to construct this hand washing facility?
   ________ ZMW

Location 2: ________________

9.8 What type of Hand Washing Facility?
   1. Tippy Tap
   2. Water in a bucket with tab
   3. Water in a bowl/bucket with mug
   4. Water in a bowl/bucket without mug
   5. Pressure bottle
   6. Dip and Drip
   7. Running water (pipe stand, sink, etc)
   8. Other, specify_________________

9.9 Is water available?
   1. Yes
   2. No

9.10. Is washing agent available?
   1. Yes
   2. No

9.11 What type of washing agent?
   1. Soap
   2. Detergent
   3 Liquid soap
   4. Ash
   5. Sand/ mud
   6. Other (specify other _________________________)
   9. Not applicable

9.12 Are there traces of recent use? (such as water in the sink / wet floor; partially used soap; clear path to facility)
   1. Yes
2. No

9.13 When was this hand washing facility constructed? (Ask if hand washing facility is tippy tap, pressure bottle, dip and drip, or running water)
   1. Within the last 6 months
   2. Within 6 months to one year
   3. within the last one year to two years
   4. More than 2 years ago
      Do not know

9.14 How much did it cost to construct this hand washing facility?
       ________ZMW
9.3 Annex 3: School Survey Form

ZSHP SCHOOL SURVEY FORM

School ID Number: __ __/__ __/__ __/__ __
(Province 2 digits; District 2 digits; SEA 2 digits; school 2 digits)

Date __ __/__ __/__ __ (dd-mo-yyyy)

1.0 SCHOOL CHARACTERISTICS
1.2 Type of School
   1. Government basic
   2. Church/mission
   3. Private

1.2. Number of male pupils? __ __ __ __

1.2a. Number of male pupils absent from school in the last completed week preceding the survey __ __ __ (REFER TO THE SCHOOL REGISTER)

1.3. Number of female pupils? __ __ __ __

1.3a. Number of female pupils absent from school in the last completed week preceding the survey __ __ __ (REFER TO THE SCHOOL REGISTER)

1.4. Number of male teachers? __ __

1.5. Number of female teachers? __ __

1.6. Number of male non-teaching staff? __ __

1.7. Number of female non-teaching staff? __ __

1.8. How many classes (different classrooms) does the school have? __ __

2.0 WATER SUPPLY
2.1. What is the main source of drinking water for the pupils and staff of this school?
   14. Piped water into the school
   15. Public water or standpipe
   16. Borehole/tubewell
   17. Protected dug well
   18. Protected spring
   19. Rainwater
   20. Unprotected spring
   21. Unprotected dug well
22. Cart with small tank/drum (water trucked into community and sold from water truck)
23. Tanker-truck
24. Surface water (rivers, dams, lakes, ponds, streams, canals, irrigation channels)
25. Other (specify)___________________________________________

2.2. Is the distance to the water source more than 200 meters?
   1. Yes
   2. No

2.3. Who provided this water source for the school?
   1. Government
   2. ZSHP (SLTS) project
   3. Community
   4. NGO not related to ZSHP/SLTS (specify)______________
   5. Other (specify)______________
   8. Not applicable

2.4. Is the water available all year round?
   1. Yes, all year round
   2. No, wet/rainy season only
   3. No, dry season only
   4. Other (specify)______________
   8. Not applicable

2.5 Do you store drinking water for school pupils?
   1. Yes
   2. No

IF THE RESPONSE TO Q2.5 IS “1. YES”, CONTINUE AND INSPECT STORAGE CONTAINERS LATER. BUT IF THE RESPONSE IS “2. NO”, SKIP Q2.6 AND Q2.7 AND GO TO SECTION 3.

2.6. How many separate storage containers of water do you have in the school?
   1. One for each class
   2. One for two or more classes
   3. One for the whole school

2.7. Who collects the water for drinking?
   1. Any pupil
   2. Special pupils (specify)______________
   3. Non-teaching school staff
   4. Other (specify)____________________________________
3.0 SANITATION
3.1. What kind of toilet facility(ies) do you use in this school? (multiple responses are possible)

1. Flush/pour flush toilet (piped sewer system, septic tank, pit latrine)
2. Ventilated improved pit latrine (VIP)
3. Pit latrine with raised floor (made of mud, concrete, or wood)
4. Composting toilet
5. Pit latrine/open pit without slab to cover the pit
6. No facilities; use bush or field
7. Other (specify)________________________________________

IF THE RESPONSE TO Q3.1 IS PIT LATRINE WITH SLAB/PLATFORM, ANSWER Q3.1.1
IF THE RESPONSE TO Q3.1 IS “8. NO FACILITIES”, SKIP “Q3.2 TO Q3.6” AND PROCEED TO Q3.7

3.1.1 Does the pit latrine with slab/platform have the following items? (SHADE ALL THAT APPLY)

1. Roof
2. Privacy (walls, doors, cloths, other sight protection)
3. Lid
4. Slab/platform is smooth and easy to clean
5. Slab/platform is raised.

3.2. How many of each of the following do you have in this school?

1. Flush/pour flush toilet (piped sewer system, septic tank, pit latrine) ____________
2. Ventilated improved pit latrine (VIP) ____________
3. Pit latrine with raised floor (made of mud, concrete, or wood) with walls and roof ____________
4. Composting toilet ____________
5. Pit latrine/open pit without raised floor to cover the pit and/or no walls and/or roof ____________

3.3. Can any member of the public use this/these toilet(s)?

1. Yes
2. No

3.4. Who funded the construction of this/these toilet facility(ies)?

1. Government
2. ZSHP (SLTS) project
3. Community
4. NGO not related to ZSHP/SLTS (specify)_____________________
5. Other (specify)_____________________

3.5. Is/are the toilet facility(ies) usable during school time throughout the year?

1. All year round
2. Dry season only
3. Wet season only
4. Other (specify) ______________________________

3.6. Who cares for or maintains (washing surrounding area and cleaning) the toilet facility(ies)?

1. Only boys
2. Only girls
3. Both boys and girls
4. School staff
5. Hired person
6. Other (specify): ______________________________

3.7. Where do you dispose of garbage from this school?
1. Throw in the backyard
2. Throw in open spaces
3. Deposit in the dumping space
4. Burning
5. Burying

4.0 WASH KNOWLEDGE AND PRACTICES
4.1 Do you have a specific place where pupils wash their hands after defecation/toilet use?
1. Yes
2. No

IF THE RESPONSE TO Q4.1 IS “1. YES”, CONTINUE AND INSPECT SITE LATER.
IF THE RESPONSE IS “2. NO”, SKIP Q4.2 TO Q4.7 AND GO TO Q4.8.

4.2 Where is this specific place located?
1. Inside toilet facility
2. Just outside of the toilet
3. Corridor of the school block
4. Elsewhere in the school yard

4.3 Does the washing station allow simultaneous use by several children?
1. Yes
2. No
4.4 What type of hand cleansing agents do you have for pupils to clean their hands after defecation?
   1. Soap or detergent
   2. Ash
   3. Other (specify____________________)

4.5 Do students use this/these hand washing facility(ies)
   1. Almost always
   2. Sometimes
   3. Rarely

4.6 Is supervised group hand washing practiced at least once a day by the majority of pupils
   1. Yes
   2. No

4.7 How much does the school spend per month to provide hand washing supplies (e.g. soap, detergent, etc.) for the school?
   ________________________________ZMW

4.8 Who pays for this cost?
   1. School
   2. Contribution by pupils
   3. ZSHP (SLTS) project
   4. Government/local council
   5. NGO not related to ZSHP/SLTS, Specify____________________________
   6. Private companies/individuals
   7. Other (Specify)_____________________

4.9 Does the school have emergency sanitary material (pads) in stock
   1. Yes
   2. No

4.10 Do members/volunteers of SLTS come to this school to talk to the pupils about sanitation and hygiene?
   1. Yes
   2. No

4.11. When was the last time any member/volunteer of SLTS came to this school for a talk?
   1. Within the last week
   2. Within 1 month
   3. Within 2 months
   4. Within 6 months
   5. More than 6 months ago
   6. Cannot remember
   7. Not applicable
4.12 Has any member/volunteer of STLS come to this school to orientate or train pupils/teachers on sanitation and hygiene?
   3. Yes
   4. No

4.13. When was the last time the orientation or training took place?
   1. Within the last week
   2. Within 1 month
   3. Within 2 months
   4. Within 6 months
   5. More than 6 months ago
   6. Cannot remember
   7. Not applicable

4.14 Do any other group of people come to this school to talk to the pupils about sanitation and hygiene?
   1. Yes
   2. No

4.15 Who are they? (Shade all that apply)
   1. Health staff from the local health facility
   2. Some NGO not related to ZSHP/SLTS (specify)____________________
   3. Members of the Community/Health Committee members
   3. Other (specify): ___________________

4.16. When was the last time any of these groups came to the school for the talk?
   1. Within the last week
   2. Within 1 month
   3. Within 2 months
   4. Within 6 months
   5. More than 6 months ago
   99. Cannot remember

4.17 Does the school have a designated sanitation manager or champion or group responsible for sanitation and hygiene including hygiene promotion and education?
   1. Yes
   2. No

IF THE RESPONSE TO Q4.17 IS “2. NO”, SKIP Q4.18 AND GO TO SECTION 5.

4.18 Who is he/she? (Shade all that apply)
   1. Health staff from the local health facility
   2. CLTS volunteer
   3. DWASH member
4. Other (specify): ___________________

5.0 OBSERVATION OF WATER STORAGE
5.1 How is water stored for drinking? (multiple responses are possible)
   1. Bottles
   2. Jerry cans
   3. Earthen pots
   4. Buckets
   5. Jugs
   6. Plastic containers
   7. Other (specify)___________________

5.2 Are the containers covered?
   1. Completely covered
   2. Partially covered
   3. Uncovered

5.3 Is there a drinking cup on site?
   1. Yes
   2. No

5.4. Is there a provision for washing the drinking cup before or after using it?
   1. Yes
   2. No

6.0 OBSERVATION OF TOILET FACILITY (IES)

IF THERE ARE SEPARATE TOILET FACILITIES FOR BOYS AND GIRLS,
COMPLETE SECTIONS 6.1 AND 6.2. IF THERE IS ONLY ONE FACILITY FOR
BOTH GENDERS, THEN COMPLETE ONLY SECTION 6.1.

Please shade one of the following boxes:

1. Facility for girls only
2. Facility for both boys and girls
3. Facility for use of girls and female teachers

6.1 Main type of toilet facility for use of girls

   1. Flush/pour flush toilet (piped sewer system, septic tank, pit latrine)
   2. Ventilated improved pit latrine (VIP)
   3. Pit latrine with raised floor (made of mud, concrete, or wood) with walls and roof;
   4. Composting toilet
   5. Pit latrine/open pit without raised floor to cover the pit and/or no walls and/or roof
   6. No facilities; use bush or field
7. Other (specify)________________________________________

IF THE RESPONSE TO Q6.1 IS PIT LATRINE WITH SLAB/PLATFORM, ANS Q6.1.1

6.1.1 Does the pit latrine with slab/platform have the following items? (SHADE ALL THAT APPLY)
   1. Roof
   2. Privacy (walls, doors, cloths, other sight protection)
   3. Lid
   4. Slab/platform is smooth and easy to clean
   5. Slab/platform is raised.

6.1.2 Is the toilet area clean?
   1. Yes
   2. No

6.1.3 Is there any fecal smell in the toilet area?
   1. Yes
   2. No

6.1.4 Are there flies or insects in the toilet area?
   1. Yes, many flies or insects
   2. Yes, a few flies or insects
   3. No

6.1.5 Is there a door on the latrine?
   1. Yes
   2. No

6.1.6 Can the door be closed/locked from inside?
   1. Yes
   2. No
   88. NA (No door)

6.1.7 Is stool visible on the slab or floor?
   1. Yes
   2. No

6.1.8 Is there any anal cleaning material available for use?
   1. Toilet paper
   2. Ordinary paper
   3. Piece of cloth
   4. Water
   5. Nothing
   6. Other (Specify__________________)
6.1.9 Is water for washing hands in the toilet area or close by?
   1. Yes
   2. No

6.2 Toilet Facility for use of Boys

6.2.1 What is the main type of toilet facility for use of boys?
   1. Flush/pour flush toilet (piped sewer system, septic tank, pit latrine, elsewhere, or unknown place)
   2. Ventilated improved pit latrine (VIP)
   3. Pit latrine with the pit well covered by a slab
   4. Composting toilet
   5. Pit latrine without a slab to cover the pit well/open pit
   6. Bucket
   7. Hanging toilet/hanging latrine
   8. Other (specify)________________________________________

IF THE RESPONSE TO Q6.2.1 IS PIT LATRINE WITH SLAB/PLATFORM, ANS Q6.2.2

6.2.2 Does the pit latrine with slab/platform have the following items? (SHADE ALL THAT APPLY)
   1. Roof
   2. Privacy (walls, doors, cloths, other sight protection)
   3. Lid
   4. Slab/platform is smooth and easy to clean
   5. Slab/platform is raised.

6.2.3 Is the toilet area clean?
   1. Yes
   2. No

6.2.4 Is there any fecal smell in the toilet area?
   1. Yes
   2. No

6.2.5 Are there flies or insects in the toilet area?
   1. Yes, many flies or insects
   2. Yes, a few flies or insects
   2. No

6.2.6 Is there a door on the latrine?
   1. Yes
   2. No
6.2.7 Can the door be closed/locked from inside?
   1. Yes
   2. No
   88. NA (No door)

6.2.8 Is stool visible on the slab or floor?
   1. Yes
   2. No

6.2.9 Is there any anal cleaning material available for use?
   1. Toilet paper
   2. Ordinary paper
   3. Piece of cloth
   4. Water
   5. Nothing

6.2.10 Is water for washing hands in the toilet area or close by?
   1. Yes
   2. No

7.0 HAND WASHING AREA
7.1 Is water available for hand washing?
   1. Yes
   2. No

IF THE ANSWER IS NO, SKIP TO QUESTION 8.

7.2 What type of Hand Washing Facility
   1. Group Hand Washing Facility
   2. Tippy Taps (water in a bucket with tap)
   3. Concrete tank with tap
   4. Running water (pipe stand, sink, etc)
   5. Water in a bowl/bucket with mug
   6. Water in a bowl/bucket without mug
   7. Water in bucket with tap

7.3 No of facilities
   1. Group Hand Washing Facility
   2. Tippy Taps (water in a bucket with tap)
   3. Concrete tank with tap
   4. Running water (pipe stand, sink, etc)
   5. Water in a bowl/bucket with mug
   6. Water in a bowl/bucket without mug
   7. Water in bucket with tap
7.4. Is the water for hand washing clean?
   1. Yes
   2. No

7.5 Is washing agent available?
   1. Yes
   2. No

7.6 What type of washing agent is available?
   1. Soap
   2. Detergent
   3. Liquid soap
   4. Ash
   88. NA (No washing agent)

8.0 SCHOOL ENVIRONMENT
8.1 Are the classrooms clean?
   (CONSIDER THE PRESENCE OF WASTE PAPER, SOOT, FOOD, DUST, LEAVES, ETC)
   1. Waste is not visible
   2. Some waste is visible
   3. Not clean

8.2 Is school compound clean?
   (CONSIDER THE PRESENCE OF COW/ANIMAL DUNG, SOLID WASTE, HUMAN FECES, ETC)
   1. Waste is not visible
   2. Some waste is visible
   3. Not clean

8.3 Are posters on water, sanitation and hygiene displaced on the school premises?
   1. Posters displayed in all classrooms
   2. Posters displayed not in all classrooms but more than 1 place
   3. Poster displayed in 1 place
   4. Poster not displayed
9.4 Annex 4: Evaluation Team

EVALUATION TEAM

The impact evaluation team consisted of Dr. Kojo Yeboah-Antwi, Dr. Godfrey Biemba, Dr. William MacLeod and Prof. David Hamer. They were supported by a program manager from CGHD as well as the data management team at ZCAHRD. The team recruited experienced quantitative research assistants as data collectors.

Kojo Yeboah-Antwi, MB ChB, MPH, a Research Associate Professor of Global Health at BU was the Principal Investigator and the team leader. He is a public health specialist and a researcher with over 25 years’ experience in managing health systems, program and project implementation, monitoring and evaluation, policy and strategy development and implementation research. Before joining BU in 2004, he was involved in a broad range of public health programs including serving as the District Medical Officer and District Director of Health Services in Wenchi, Ghana, Director of the Kintampo Health Research Centre, and West Africa Regional Officer for the Malaria Consortium. In his role as the Wenchi District Director of Health Services, Dr. Yeboah-Antwi was actively engaged in water, sanitation, and hygiene program development, implementation, and monitoring and evaluation (M&E). In recent years, he has been involved in large program evaluations including Netmark’s insecticide-treated bednet program, the global evaluation of the Presidential Malaria Initiative, external evaluation of the Bill and Melinda Gates Foundation Malaria Control and Evaluation Partnership project and the external evaluation of the Roll Back Malaria Partnership. He has also been engaged in applied health research and M&E in Zambia including projects in the Copperbelt and Southern Provinces, one of which involved a detailed baseline evaluation of water access and sanitation in Lufwanyama District. His extensive experience with public health program M&E, qualitative and quantitative data collection was invaluable to the design, implementation, and analysis of the evaluation. Dr. Yeboah-Antwi was responsible for overall implementation and coordination of the evaluation and reporting to the Chief of Social Policy, Planning, and M&E at UNICEF. He was responsible for the development of the detailed evaluation framework and methodology and oversight of data collection and data management, and interpretation of analyses and report writing.

Godfrey Biemba, MB ChB, MSc, the ZCAHRD Country Director and a Research Assistant Professor of Global Health at BU was a co-investigator. He is a clinical and public health research scientist by training and practice who has been involved in M&E, clinical research study design, implementation, analysis and reporting for the past 20 years. Dr. Biemba has extensive experience conducting program evaluations and applied health research in Zambia, especially on malaria, HIV, and orphans and vulnerable children. Some of his past positions include working as the Deputy Director for Epidemiology and Disease Control at the MOH Headquarters in Zambia from 2007 to 2008. During this time he was responsible for coordinating all health related research activities in Zambia, as well the development of health research policies and guidelines. Before joining the Zambian MOH, he was the Chairperson of the National Health Research Advisory Committee, responsible for providing technical support and advice on all health related research in the Country. While serving as Chairman of this important committee, he worked full time as the Executive Director of the Churches Health Association of Zambia, which is responsible for the provision of over 50% of health service delivery in rural
Zambia. In the last couple of years some of his work has focused on M&E of OVC programs in Zambia and Mozambique. In addition, in collaboration with Dr. Hamer, Dr. Biemba helped to develop and write the recently completed Diarrhea Global Action Plan Project -Zambia Childhood Diarrhea Case Study. This case study of childhood diarrhea in Zambia, which included a two day meeting of key stakeholders working in diarrhea control, water and sanitation, was part of an 8-country global landscape analysis of policies and programs against diarrhea, intended to help countries identify policy gaps and implementation bottle-necks in programs and strategies for diarrhea prevention, control and treatment. Dr. Biemba’s extensive familiarity with national guidelines and the Zambian context as well as his past background conducting program M&E was invaluable to the evaluation.

He assisted the development of the detailed evaluation framework and methodology and was responsible for coordinating with relevant stakeholders including the various Ministries involved in the Sanitation and Hygiene Project; development of training materials, hiring and training data collectors. He had oversight of data collection and assisted in data management, interpretation of analyses and report writing.

David Hamer, MD, a Professor of Global Health and Medicine at BU and former ZCAHRD Director of Research and Evaluation resident in Zambia, was a co-Principal Investigator. He has extensive experience with diarrhea treatment and programs through his past work with the Applied Diarrheal Disease Research and the Applied Research on Child Health Projects. During the last several years, as a result of participation in research and evaluation projects in many parts of Zambia in close collaboration with the MOH, he has gained extensive knowledge of the Zambian healthcare context. He also has extensive experience with the design and collection of qualitative and quantitative data. Dr. Hamer also has substantial experience in the design, implementation, and analysis of program evaluations, cross-sectional epidemiological studies, and randomized, controlled trials. His long-term work in Zambia, familiarity with diarrheal disease, water and sanitation, undernutrition, and M&E experience provided additional important assets to the evaluation team.

Dr. Hamer assisted the provision of technical input including the development of the detailed evaluation framework and methodology, coordinating with relevant stakeholders, development of training materials and training of data collectors. He also assisted in the impact analysis, interpretation of analyses and report writing.

William MacLeod, ScM, ScD, an Assistant Professor of Global Health at BU and based at the Health Economics Research Outcomes Center in Johannesburg, South Africa was a co-investigator. He has an 18-year history of working in sub-Saharan Africa including more than a decade of research capacity strengthening and applied research in Zambia. He is trained demographer an experienced biostatistician. Dr. MacLeod was responsible for the database development, analysis of the survey data and the impact evaluation, and the interpretation of the impact evaluation. He assisted with the report writing.

Mccallum, Caitryn Megan, a project administrator at CGHD was the Program Manager. Miss Mccallum has served as a project administrator for several studies in Zambia, including a study on the impact of infection control interventions on infants at a Zambian care center, a project to support the Government of the Republic of Zambia in improving the quality of services for orphans and vulnerable children, and a study to integrate early child development support in
routine health and community-level care. Prior to joining CGHD, Miss McCallum worked at Accion International, a nonprofit organization delivering microfinance services worldwide and Grace Institute, a nonprofit organization providing tuition-free job training to underserved women in New York City. Miss McCallum was responsible for the management of all administrative details of the contract including financial tracking of the project.

The ZCAHRD data management office has more than a decade of skilled experience in the use of Cardiff Teleforms data scanning technology, enabling the ZCAHRD data core to handle large quantities of data entry and cleaning with superb efficiency. The team was responsible for the data management.
### 9.5 Annex 5: List of people met

#### List of people met

<table>
<thead>
<tr>
<th>Name</th>
<th>Designation/Title</th>
<th>Organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nicolas Osbert</td>
<td>Chief of Water, Sanitation, Hygiene</td>
<td>UNICEF Zambia</td>
</tr>
<tr>
<td>Patrick Sijenyi</td>
<td>WASH Specialist</td>
<td>UNICEF Zambia</td>
</tr>
<tr>
<td>Alexandra Hoehne</td>
<td>Monitoring and Evaluation Consultant - WASH</td>
<td>UNICEF Zambia</td>
</tr>
<tr>
<td>Lavuun Verstraete</td>
<td>WASH Specialist</td>
<td>UNICEF Zambia</td>
</tr>
<tr>
<td>Gaelle Fohr</td>
<td>Sanitation and Hygiene Specialist</td>
<td>UNICEF Zambia</td>
</tr>
<tr>
<td>Paul Quarles van Ufford</td>
<td>Chief Social Policy and Economic Analysis</td>
<td>UNICEF Zambia</td>
</tr>
<tr>
<td>John Pinfold</td>
<td>Chief Toilets</td>
<td>UNICEF Zambia</td>
</tr>
<tr>
<td>Swathi Manchikanti</td>
<td>Communications Specialist</td>
<td>UNICEF Zambia</td>
</tr>
<tr>
<td>Chola Mbilima</td>
<td>Commercial and Financial Inspector</td>
<td>National Water Supply and Sanitation Council (Zambia)</td>
</tr>
<tr>
<td>Ennie Muchelemba</td>
<td>Technical Advisor - School Water, Sanitation and Hygiene</td>
<td>Ministry of General Education, Zambia</td>
</tr>
<tr>
<td>Geoffrey Soloka</td>
<td>M&amp;E Technical Advisor</td>
<td>Ministry of Chiefs and Traditional Affairs</td>
</tr>
<tr>
<td>Luke J. Banda</td>
<td>Lecturer</td>
<td>University of Zambia</td>
</tr>
<tr>
<td>Rabson Zimba</td>
<td>M&amp;E Technical Advisor</td>
<td>Ministry of Local Government and Housing</td>
</tr>
<tr>
<td>Tito Hampako</td>
<td>Technical Advisor</td>
<td>Lusaka City Council</td>
</tr>
<tr>
<td>Benjamin Winters</td>
<td>Regional Director for Africa (Formerly Zambia Country Director)</td>
<td>AKROS</td>
</tr>
<tr>
<td>Sharon Mazimba</td>
<td>Surveillance Manager</td>
<td>AKROS, Zambia</td>
</tr>
<tr>
<td>Tamara Simavwa</td>
<td>Technical Advisor</td>
<td>AKROS, Zambia</td>
</tr>
<tr>
<td>Solomon Tesfamamiam</td>
<td>Country Director</td>
<td>AKROS, Zambia</td>
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<tr>
<td>Iven M Sikanyiti</td>
<td>Ag Deputy Director (Social Statistics)</td>
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<td>Sheila Mudenda</td>
<td>Ag Deputy Director Information, Research and Dissemination</td>
<td>Central Statistics Office, Lusaka, Zambia</td>
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<tr>
<td>Muchemani Zulu</td>
<td>Chief Biogas Engineer</td>
<td>SNV Netherlands Development Organization</td>
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</tbody>
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