SAFE WATER SYSTEMS: An Evaluation of the Zambia CLORIN Program

FINAL REPORT
26 September 2004

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Funding Provided by:
U.S. Agency for International Development (USAID) through the Environmental Health Project (EHP)

ORGANIZATION

This report is organized into three parts. This first part contains the narrative. The second part contains the data tables, and the third part contains the questionnaire.

ABSTRACT AND KEY FINDINGS

This is a report of the evaluation of the Zambia Safe Water Systems program conducted by The Mwengu Social and Health Research Centre and the Johns Hopkins Bloomberg School of Public Health. The intent of this study was to assess how the Safe Water System was being used in areas where marketing and distribution had focused. Sites were selected on a nationwide basis using distribution information from Society for Family Health (SFH), Population Services International's (PSI) local affiliate, who ran the social marketing program for CLORIN. A sample size of 1319 households was used, stratifying for type of marketing and household characteristics. For each of these households interviews were carried out among heads of households, primary water caretakers, primary child caretakers and information gathered on children in the household under age five. The fieldwork took place during February and March 2004, which is the end of the rainy season in Zambia.

In the study areas, 42% reported current CLORIN use, and 22% said they were past users. The use of CLORIN was increased if the primary water caretaker had a secondary education, and in households of better construction. Households where promotion was carried out by the SFH were more frequent users of CLORIN. Promotion through health centers also had a positive effect on CLORIN use. Of the various marketing strategies, door-to-door promotion was most strongly associated with CLORIN use. Use was also related to the proximity to retail outlets. Although a large number of households were aware of CLORIN through radio and television, this was not associated with increased use. Perception that water was unsafe to drink was a significant reason for starting CLORIN and awareness building of water contamination may be an important message for both CLORIN use and improved hygiene behavior. Chlorine was found in the water of 36% of households who said they had been using CLORIN for a year or more. Rates for households saying they had been using CLORIN for a shorter period of time were less. Overall, 13% of all household water samples tested positive for residual chlorine.

Households that obtained water from surface sources had a higher utilization of CLORIN. Use of CLORIN was not related to the price paid for water or the distance traveled to obtain water. Households that used CLORIN did not generally follow other Safe Water Systems practices for the handling of water. Houses using CLORIN did not differ from non-users in the household hygiene practices. Price was cited as a barrier by many former users, particularly those living in lower housing status. As CLORIN use was more common among educated water caretakers, those living in lower index housing should be a particular focus for marketing. In the marketing process a concerted effort to identify and market to high-risk populations would be a sound public health approach.

The use of CLORIN did not affect the prevalence of diarrhea among children under the age of 5. There was less diarrhea in households which had received visits from the SFH. Also, diarrhea was significantly less in households where there was visible soap at washing points.

This study showed that the use of CLORIN did not automatically translate into other safe water handling practices or improved hygiene behaviors such as handwashing.

One of the most important reasons for starting the use of CLORIN was its use by a neighbor. Reasons for stopping CLORIN included price, smell and taste.

Compared with the findings of the 2001 DHS survey, we found CLORIN to be much more widely used, especially in areas with active social marketing. Community and neighborhood influences are important in starting CLORIN use. We found a substantial turnover in CLORIN users, and recommend that strategies be investigated to encourage retention of users, perhaps through stronger social marketing methods. There is a clear role of increased community marketing of CLORIN by the SFH and parallel marketing through Neighborhood Health Committees and other community-based activities.

The lower rates of CLORIN use and residual chlorine in household water observed in this study compared to previous trials combined with the limitations of a cross-sectional study design explain why no effect against diarrhea was found. It also points out once again the challenges with taking a small efficacious activity to scale while retaining effectiveness. Taking a small effort to scale involves many changes in communication methods, "compliance-assurance" approaches, and perceived incentives.

INTRODUCTION

Diseases associated with unsafe drinking water are a major cause of morbidity and mortality in many developing countries. Perhaps 19% of the world's burden of disease is water related. [1] Diarrhea is particularly a problem for children in developing countries. An estimated 1.9 million persons die every year from diarrheal diseases, the vast majority of whom are children under five years old.[2] Current estimates are that about 1.1 billion people do not have access to improved drinking water. In developing countries rapid population growth, urbanization and weak economies make access to safe water even more difficult. Because of the capital investment required for expanded water system in developing countries, point-of-use disinfection of water has become an attractive cost-effective intervention capable of meeting immediate needs.[3]

In Zambia the access to safe is water is similar to many other developing countries. Only 64% of Zambia's population has access to improved drinking water sources (88% urban and 48% rural)[4]. In Lusaka itself, 77% of water from shallow wells, which are common in the urban and peri-urban areas, were found to be contaminated with coliform bacteria.[5] Children bear much of the consequences of unsafe water. Zambia's Infant Mortality Ratio is 108, and Childhood Mortality is 192. Among children under five, 21% have had diarrhea in the past two weeks.[6] This figure was essentially the same for both rural and urban areas.

SAFE WATER SYSTEMS

The Safe Water Systems (SWS) initiative was developed by the Centers for Disease Control (CDC) and the Pan American Health Organization (PAHO) in 1992.[7] This initiative consisted of three major components: point of use water chlorination, improved household water storage, and

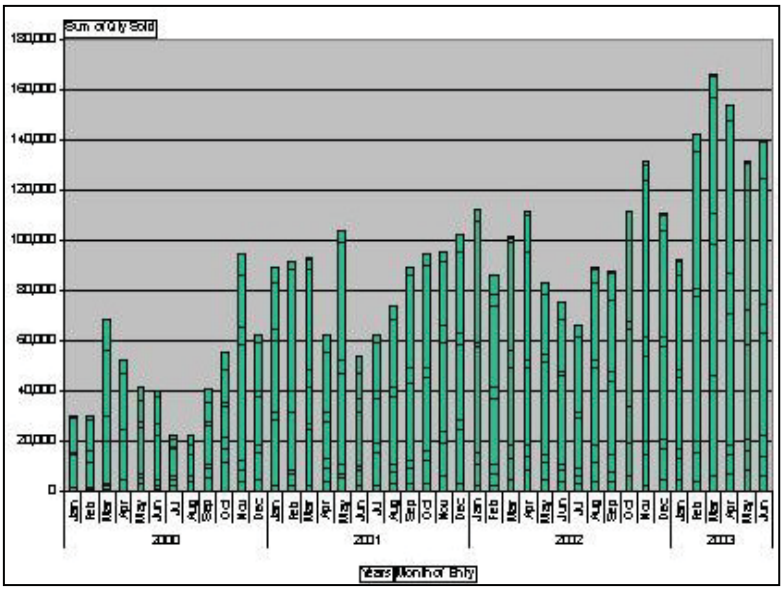
[1] UNESCO. Water for People, Water for Life. www.unesco.org/water/wwap Accessed 4/16/2004
[2] World Health Organization. World Health Report 2003:Shaping the Future
[3] UNESCO. World Water Development Report. Paris, 2003
[4] UNICEF 2004. State of the World's Children. New York.
[5] Zambia Central Statistical Office. Demographic and Health Survey 1996. MACRO, Calverton MD, 1997.
[6] Zambia Central Statistical Office. Demographic and Health Survey 2001-2002. MACRO, Calverton MD, 2003.
[7] http://www.cdc.gov/safewater/ accessed 10 August 2004

behavior change related to water handling. Worldwide, SWS has been implemented in 19 counties on five continents and has a reported efficacy of reducing diarrheal rates from 40-80%.[8,9,10]

In Zambia the SWS was implemented on a national scale beginning in 1998 by Society for Family Health (SFH), a local affiliate of Population Services International (PSI), in conjunction with the Ministry of Health and the Central Board of Health. Implementation used a social marketing approach, targeting low-income households with the product at a subsidized price. The project began as a field trial in low income urban areas, and was expanded to become a national program after a severe cholera epidemic in 1999.

The components of the Safe Water Systems intervention include a locally produced 0.5% solution of sodium hypochlorite (CLORIN) and a specialized storage container, the Budiza. The Budizas have narrow necks and spigots, designed to reduce recontamination by insertion of hands, dipping of dirty containers and entrance of other pollutants from the external environment into water storage vessels. In Zambia, the promotional campaign also encouraged the use of traditional storage containers that had similar features to these Budizas.

Figure A. Sales of CLORIN in Zambia 2000-2003



In many parts of Zambia SFH actively markets CLORIN through its training program for health center staff, neighborhood health volunteers (affiliated with neighborhood health committees) and pharmacists as well as by its own staff. In addition to the SFH agents, the active marketing includes community campaigns with mobile media units and drama teams. This is supported by promotional messages on radio, television, newspapers, and through posters and leaflets. In other distribution areas marketing is passive, with media messages, and promotional activities from health units, but without the active social marketing component of the SFH. Sales of CLORIN have steadily increased with the 1 million mark in annual sales of bottles being reached in 2001, and more than 1.7 million bottles sold in 2003 (Figure A).[11]

[8] CDC. Safe Water Systems Homepage. *CDC*. Available at: http://www.cdc.gov/safewater/where/zambia.htm. Accessed 4/16, 2003.

[9] Quick RE, Venczel LV, Mintz ED, Soleto L, Aparicio L, Gironaz M. Diarrea prevention in Bolivia through point-of-use water treatment and safe storage: a promising new strategy. *Epidemiology & Infection*, 199;122:83-90.

[10] Quick R, Kimura A, Thevos A, Tembo M, Shamputa I, Hutwagner L and Mintz E. Diarrhea Prevention Through Household-Level Water Disinfection and Safe Storage in Zambia. *American Journal of Tropical Medicine and Hygiene*. 2002; 66(5):584-589

[11] CDC. Cholera Epidemic Associated with Raw Vegetables—Lusaka, Zambia, 2003—2004. *MMWR* 2004;53:783-786.

To date there has been no external evaluation of the intervention, although an internal evaluation conducted by SFH found that the reported daily use of CLORIN was at 41%[12] while the latest Demographic Health Study (DHS) placed this figure at 13.5%.[5] The differences were due to sampling methods. DHS used a national sample unrelated to CLORIN use, whereas our sample was specifically taken from areas of high CLORIN distribution.

This overall objective of this study was to evaluate the household practices related to the Safe Water System initiative, the effectiveness of the intervention, and factors related to diarrhea in the household. The study was a joint effort of Johns Hopkins Bloomberg School of Public Health, the Mwengu Social and Health Research Centre, and the Environmental Health Project (EHP). Funding was provided by the Office of Health, Infectious Diseases and Nutrition in the Bureau for Global Health of the U.S. Agency for International Development (USAID). Planning for the study began in August 2003, with development and testing of the questionnaire. Actual field work was carried out in February and March 2004, toward the end of Zambia's rainy season. Data were entered and cleaned in Zambia, and became available for analysis in later June 2004.

STUDY OBJECTIVES

The goal of this study was to assess how CLORIN is being used in the community rather than to assess efficacy of the intervention itself. From this goal the following scope of work and objectives were developed for the studies, and indicators selected:

1. Describe behaviors related to point-of-use water chlorination and hygiene. *Indicators* were the proportions of people having knowledge or displaying behavior of good hygiene practices.
2. Assess the effectiveness of social marketing and communication channels. *Indicators* determined from the survey included proportion of people who recognized the CLORIN brand name, and the proportion of households that were utilizing correct dosages.
3. Analyze associations between point-of-use water treatment and hygiene behaviors. *Indicators* were common household hygiene practices
4. Investigate perceived variations in risk from water sources. *Indicators* were proportions of people who identified a particular season, or who identified no season, as the time of highest risk of contamination of water supplies.
5. Analyze associations between point-of-use water treatment, and household diarrhea, while controlling for access to improved water and sanitation and socio-economic characteristics of households. *Indicators* were proportions of households with diarrhea among the under 5.
6. Determine if households which were at the highest risk of diarrhea (and which were the target of the SWS project), were utilizing Safe Water Systems methods. In this study, households identified as having high risk of acquiring diarrheal diseases were those that had children under 5 years of age residing within the home, and were of low socio-economic status. *Indicators* proportion of people in various circumstances using the intervention.

[12] Kusanthan. *Attitudes Towards Water Quality And Water Use Practices In Zambia.* Lusaka: Society for Family Health; 2001.

7. Assess factors which would encourage the use of CLORIN among current non-users. *Indicators:* features liked and disliked.

METHODS

The study method was based on a cross-sectional population survey that was conducted in 1319 households sampled nationwide in Zambia using the cluster sampling methodology. The sample size was selected to give a 95% precision and an 80% power with a design effect of 2. The following considerations, using information from the DHS survey, were used in determining sample size.[5]

1. The ratio of those who have not been exposed to CLORIN to those who have: 1:5
2. Expected frequency of CLORIN use among those who have not been exposed: 1%
3. Frequency of CLORIN use among those who have been exposed: 5%

As this study was designed to measure how CLORIN was being used at the household level it was decided to focus the survey on districts where the sales of CLORIN were at least 2 bottles per capita during the six months period from January to June, 2003. There were 37 of the country's 68 districts which met this criterion. Of the 37, 8 were dropped because it was difficult or impossible to reach these areas during the study time because of road and weather conditions. The remaining 29 districts were stratified according to the type of CLORIN marketing which had been conducted in the past year. Those where there was active social marketing taking place in their district were classified as *active* marketing. Those districts where there was television and radio promotion, but no focused social marketing activities sponsored by the SFH were classified as *passive* marketing. There were 11 districts meeting the criteria for *passive* marketing, and 18 districts meeting the criteria for *active* marketing.

The large majority of sales of CLORIN in Zambia are in the urban and peri-urban areas. Zambia is one of the most urbanized countries in Africa, with nearly a half of all persons living in cities and towns.[13] Within urban areas, neighborhoods or "compounds" are classified as low density, medium density and high density housing areas. This classification correlates roughly with socioeconomic levels with families of lower socioeconomic strata living in higher density housing areas. The study concentrated on sampling in the medium and high density compounds, as these were likely to be the populations at higher risk of unsafe water, and would be less likely to have access to other methods of water treatment.

A sampling frame of 29 districts with their respective populations was created. Using a a population-proportionate to size approach, 22 of the 29 districts were selected. A complete listing of all compounds within the district was obtained from the District Health Management Board. Only compounds within 6 km of the town center were for sampling, as these were the principal distribution and utilization areas for CLORIN.

Using a 30 cluster approach and the stratification for compound density and marketing methods, 120 clusters were selected. The clusters were selected using the probability proportionate to size (PPS) approach rather than random selection of compounds. In each compound selected, 11 interviews were conducted for that cluster. The selection of households within the compound was done in a systematic manner following a basic mapping exercise of the compound and the

[13] Family Health International. http://www.fhi.org/en/HIVAIDS/pub/guide/corrhope/corrsoc.htm accessed on 16 August 2004

use of a random method to identify the first house. Household eligibility was determined by the presence of children under 5, while eligible caretakers for an interview comprised of both men and women directly responsible for caring for the under-5 child, and managing the household drinking water. Those interviewed included parents, grandparents, aunts and uncles, cousins and older siblings (15 years and above). If households did not have a child under age five or refused to participate, an adjacent house was chosen as a replacement.

Both qualitative and quantitative chlorine tests were conducted at the time of the interview using standard testing kits.[14]

Consent was obtained for each person interviewed. In each household data were collected from or about four groups of people: household head, primary drinking water caretaker, primary child caretaker, and children under five. Unique identifiers were only temporarily recorded and are not part of the final database.

Data were collected about household characteristics and assets. Data were double entered in Zambia using EPIINFO v6.04, and analyzed in Baltimore using Stata version 8. Chi square analysis was done on the various responses as an initial step. The results were then adjusted using a model that included various variables such as housing, location, education, access to water and economic components.

The Johns Hopkins School of Public Health contributed to the study design, the technical supervision, and conducted the analysis. The implementation, interviews and data entry was completed by the Mwengu Social and Health Research Center in Zambia. The study was reviewed by the ethical review process at Mwengu and by the Committee on Human Research at the Johns Hopkins Bloomberg School of Public Health.

RESULTS

1. Demographic characteristics

The survey form concerned four groups of people in the household and their behaviors relating to water. The characteristics of the 1319 households are given on the right. Households had been stratified into active and passive marketing groups. On analysis, 50.3%

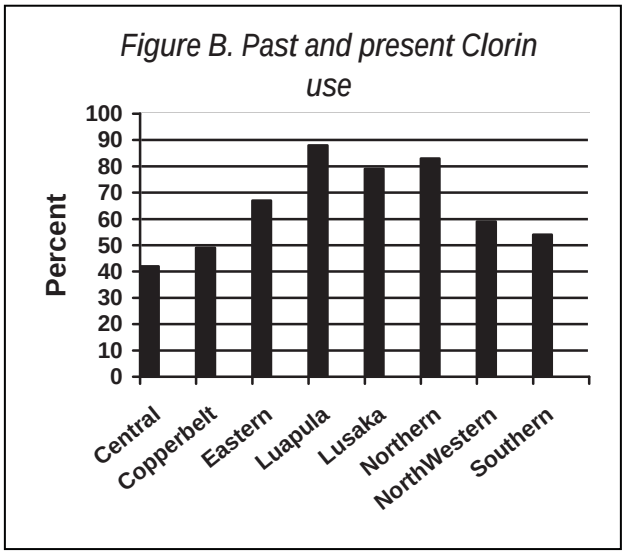
Table A. Household demographic characteristics

FAMILY MEMBER	AGE (Mean)	GENDER	NUMBER
Household Head	37 years	25% (F) 75% (M)	1317
Primary Drinking Water Caretaker	29 years	98% (F) 2% (M)	1283
Primary Child Caretaker	30 years	83% (F) 17% (M)	1263
Child under 5 years	29 months	52% (F) 48% (M)	1571

[14] HF Scientific, INC (Fort. Myers, FL).

of households were in the active local social marketing category, and 49.7% were in the passive marketing category (Ax C table 1).

Self-reported literacy rates were 79.1% for men and 72.8% for women, close to the national figure of 85% and 72% respectively.[3] Sanitation facilities were present in 91.1% of households, and 69.8% had access to piped water. Among the 1571 children under five in the survey households, 10.9% had experienced diarrhea in the past two weeks. Of the 1326 households, 13% had at least one child under five with diarrhea in the past two weeks.



Of the 354 households that responded to questions about most recent time of CLORIN use, 288 indicated use in the past week. However, chlorine was found in the drinking water in only 166 households or 12.6% at the time the survey team visited the household. Most of these (30,0%) were in the group who said that they had used CLORIN the previous day; and 92.5% reported current CLORIN use.

2. CLORIN use

a. CLORIN use across the households sampled. Among all households sampled there were 527 (42%) which said there were current CLORIN users; 299 (23%) who said they were past users but not current users; and 390 (31%) who stated they had never used CLORIN.

Table B. CLORIN use by distribution methods and household types.

CLORIN Use	Total Household Responses*	All Households	Households in active distribution areas	Households in passive distribution areas	Households in high density areas	Households in medium density areas
Reported current CLORIN use	1245	527 (42%)	304 (58%)	223 (42%)	258 (49%)	269 (51%)
Reported past use	1304	299 (23%)	160 (54%)	139 (46%)	153 (51%)	146 (49%)
Never used	1254	390 (31%)	164 (42%)	226 (58%)	191 (49%)	199 (51%)

** n for each category is variable due to missing data*

Households in areas where there was active promotion of CLORIN had a higher use than those in areas with passive promotion. Current and past use were similar among high density and medium density housing areas. However, as noted below, there was a difference in use according to housing characteristics. This information is set out in **Table B**. The past and current use of CLORIN by province is shown in **Figure B.** Full figures are shown in the Annex B, table 4.

b. Characteristics of the primary drinking water caretaker (Ax B, table 1-3. CLORIN was equally likely to be used in households whether the water caretaker was male or female.

Among the 535 water caretakers with a secondary education the chance of CLORIN use was twice (OR 2.0) that if the caretaker had primary or no formal education (693 persons). The chances of using CLORIN was 4.2 times greater among those with post-secondary education when compared with the primary education or no schooling group. However, the post secondary education group was small (14 persons). Where the primary water handler had a secondary education, CLORIN was used in 51% of households compared with under 35% where the water handler had primary school or no education.

Table C. Duration of use by education of water caretaker

Duration of use (months)	Education levels				Chi square (p value)
	No formal	Primary	Secondary	Post Secondary	
Less than 6 N=240	13 5.42%	137 57.08%	89 37.08%	1 0.42%	50.33 (0.000)‡
6-12 N= 155	11 7.10%	56 36.13%	83 53.55%	5 3.23%	
Greater than 12 N= 177	10 5.65%	44 24.86%	118 66.67%	5 2.82%	

Table E. Duration of use by housing characteristics

Duration of use (months)	Housing construction index		Chi square (p value)
	Low (4-8)	High (9-14)	
Less than 6 N=240	32 13.3%	208 86.7%	15.54 (0.000)‡
6-12 N= 157	15 9.6%	142 90.5%	
More than 12 N= 177	4 2.3%	173 97.7%	

Table D. Duration of use by age of water caretakers

Duration of use (months)	Age (years)			Chi square (p value)
	< 20	20-40	> 40	
Less than 6 N=223	34 15.3%	169 75.8%	20 9.0%	11.20 (0.024)‡
6-12 N= 155	19 12.3%	126 81.3%	10 6.5%	
Over 12 N= 172	10 5.8%	141 82.0%	21 12.2%	

Chi square analyses show that there are significant associations between the duration of use and the age, education level, household socio-economic status (as defined by the construction indices) and social marketing strategy. Households that report using CLORIN for 6 months and longer also have more water caretakers that are over the age of 20 years as compared with more recent users. Similarly, most of these longer term users have had secondary and tertiary schooling, and scored higher in the construction index. In addition, a higher proportion of these households received active social marketing. Once these factors were adjusted for, there was still a significantly greater proportion of CLORIN users that reported use for more than a year (these results are shown in the Tables C-F, while adjusted odds ratios are included in Annexes B & C).

b. Housing characteristics (Ax B table 4).

Many things about household constructions/characteristics were measured, and from this an index from 0-14 was constructed. Into this index went wall, roof and flooring construction, information on household sanitation facilities, as well as the classification of the neighborhood (medium or high density). Houses with better characteristics (scale 9-14) were more likely to use CLORIN than were households living in houses with an index number from 4-8 (OR 1.59, CI 1.09, 2.34). CLORIN use was adjusted for drinking water sources, time taken to obtain water and perceptions of risk from unsafe water. The odds of use among households with the better indices was 73% greater when the water source was adjusted for; it was 90% higher when the time to obtain water was adjusted for; and 74% higher when the perceptions of health risk from unsafe water was adjusted. Although information on household assets was collected, these data did not contribute to the analysis and where in the end were dropped.

3. Social Marketing characteristics.

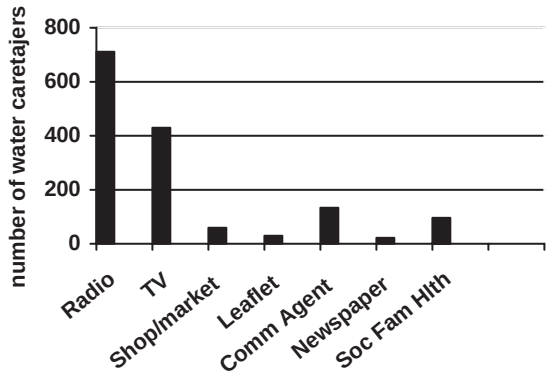
a. Marketing strategies (Ax C). Households located in areas where there was active local marketing of CLORIN were 1.4 times more likely to use CLORIN than those households located in areas where the marketing was passive (47.4% vs 37%). Exposure of the primary water caretakers to messages about CLORIN was greatest from radio (57.2%) and TV (34.8%), and lowest for newspapers (1.6%). The two principal information sources were identified by water caretakers in CLORIN-using households for information about CLORIN were television and the Society for Family Health. Information coming directly from SFH programs had a stronger association with CLORIN use (OR 1.69, CI 1.05 2.71) than did information through television (Ax C table 2). Exposure to information via radio, information in the shop or market, leaflets or booklets, community based agents (not identified with SFH) and newspapers were not associated with increased CLORIN use. Figure C shows the number of water caretakers exposed to the different information sources, while Table 2 (Annex C) shows the association between exposure to these information sources and CLORIN use.

Table F. Duration of use by social marketing strategy

Duration CLORIN use (months)	Social marketing strategy		Chi square (p value)
	Passive	Active	10.24 (0.006)‡
Less than 6 N=240	126 52.5%	114 47.5%	
6-12 N= 157	64 40.8%	93 59.2%	
More than 12 N= 177	67 37.9%	110 62.1%	

When active CLORIN promotional activities are considered (Ax C table 3), as distinct from just informational sources, there were several promotional activities which were associated with increased CLORIN use on the chi square analysis. The Society for Family Health activities, exposure to household visits ($p<0.001$), SFH promotional activities ($p=0.008$), and promotional activities by district health centers ($p<0.001$) were all associated with increased CLORIN use. However, when the results are adjusted for other factors, household visits had the strongest effect, with households exposed to this method being 2.5 times more likely to report that they regularly used CLORIN (OR 2.7, CI 1.29, 4.72). Promotion of messages through the health centers reached the largest number of people (464), followed by community agents (144), whereas house visit promotions reached 69.

Figure C. Information Sources



b. Knowledge among CLORIN users (Ax B, table 4). It is not surprising that CLORIN users were more likely than non users to know the correct amounts of CLORIN to add to water, and to identify its potential beneficial health effects. This was equally true for all three sizes of containers (OR 1,97, 1.54, 2.02).

c. Availability of CLORIN supplies (Ax B, table 6). The most commonly cited sources for the purchase of CLORIN were the shops or markets (824 households), the health center (261 house-

holds) and the chemist (143 households). However, availability at the chemist's shop (OR 2.24, CI 1.48-3.39) and from door-to-door agents (OR 2.25, CI 1.06, 4.79) showed the strongest association with increased CLORIN use, though only 36 persons reported getting CLORIN from door-to-door sales person. The most commonly paid price was between 500 and 1000 Kwacha ($US 0.10-0.20) for a container. Retail availability within 15 minutes of the household was associated with greater CLORIN use (p=0.014).

d. CLORIN use and residual chlorine (Ax C tables 9 and 13). There were 603 households which reported that they used CLORIN only to treat drinking water. The remaining 219 houses that had also used CLORIN at various times used the treated water for other purposes such as laundry and household cleaning.

Of the 546 households which responded to questions about duration of use, 230 had been using it for less than 6 months, 150 had been using it for 6-12 months, and 166 had been using CLORIN for one year or longer (Ax C table 13).

Chlorine was found in the water of 36.1% of the households (Ax C table 13) that reported CLORIN use for more than one year; in 27.3% of households that had used it for 6-12 months, and in 20.0% of households saying that CLORIN had been used for less than 6 months. On chi square analysis this was highly significant, but after adjusting for factors such as housing and social marketing of CLORIN in the household areas, the differences remained, though not statistically significant.

Households that boiled water (Ax D table 5) were statistically less likely to use CLORIN than households that did not (p<0.001).

4. Water Management

a. Water sources (Ax D, table 1). CLORIN use was significantly more common among households that identified their principal water source as surface water when compared with those obtaining water from wells, springs and piped water sources, though the number of surface water users was small (n=15). There was no difference in CLORIN use within the groups who identified their main water source as protected wells or springs, or among those who indicated unprotected wells or springs as main sources. Neither was there a difference in CLORIN use between those 476 households which had a water source within 15 minutes and the 553 who had to travel more than 15 minutes to obtain water. The amount paid for water, where it was bought, did not influence the use of CLORIN.

b. Storage containers (Ax D table 2). In addition to the use of CLORIN, the Safe Water Systems approach includes promotion of good water management practices. These include the use of only narrow neck water storage containers; the covering of storage containers; the positioning of containers off the floor; and the removal of water from the container by pouring rather than dipping. The odds of following any of these practices was not higher in the households of CLORIN users. However, the chi square analysis which did not adjust for other differences among households, noted that vessels which were covered and vessels elevated above the floor were more common in the households of CLORIN users.

c. Perception of water quality (Ax E table 1). Households were asked if they perceived turbid water or water at certain times of year as having less quality. Households that believed that tur-

bidity was a sign of contamination of water were much less likely to use CLORIN as households that did not mention turbidity as a sign of water contamination, though the numbers were small. Households who defined their water quality to be high throughout the year were less likely to use CLORIN (OR 0.71, CI 0.54 0.92) than were households who believed that water quality fluctuated during the year (Ax E table 3).

5. Hygiene behaviors

a**. Household hygiene behaviors (Ax F, tables 1 & 2)**. There were no differences in practices of waste disposal and disposal of child's faeces in CLORIN-using houses compared with those households which did not use CLORIN. There was no association between the use of CLORIN and reported hand washing behavior (Ax F tables 3). The majority (80.6%) of child caretakers stated they had used soap in the preceding 24 hours, although on inspection soap could only be found at the household hand-washing site in 47% of households.

6. Diarrhea in survey households

a. Diarrhea (Ax G table 1). There were 13.9% of child caretakers who reported that a child under 5 in the household had diarrhea in the past two weeks. The presence of diarrhea in children under five during the past two weeks was not associated with the reported use of CLORIN. Neither was diarrhea related to the length of time households had been using CLORIN (Ax H table 6). Diarrhea was not reported less frequently in households where chlorine was detected in stored household water (Ax H table 5). Households which boiled drinking water as a treatment process also did not have reduced prevalence of diarrhea (Ax I table 5). However, the prevalence of diarrhea was lower (OR 0.44, CI 0.20, 0.95) in households that reported that they received information about CLORIN from the Society for Family Health (Ax H table 2). At the same time the prevalence of diarrhea was more common (OR 1.16, CI 1.25 2.47) in households where active social marketing was present (Ax H table 1). The significance of this is unclear.

b. Diarrhea and age of child caretakers (Ax G table 2). Diarrhea is most common in children under five when the child caretaker was aged less than 20 years (Ax G table 2). When the child caretaker was aged 20-40 years the odds of diarrhea were 51% less in children than with the younger caretakers, and when the child caretaker was over age 40, the odds of diarrhea in children during the past two weeks was 33% of children attended by child caretakers under age 20. Among children in the care of child caretakers with a secondary school education, the odds of having diarrhea was 43% of that among children in the care of someone with no formal education (Ax G table 3). Among child caretakers, 58.1% had a primary schooling or no schooling. Diarrhea occurred in all age groups, but was least common (OR 0.20 CI 0.07-0.56) in the 48-60 month group (Ax G table 4)

c. Housing quality (AxG table 6). The types of housing, the source of water, the provision of sanitation and housing density had no effect on the prevalence of diarrhea during the past two weeks in children under five.

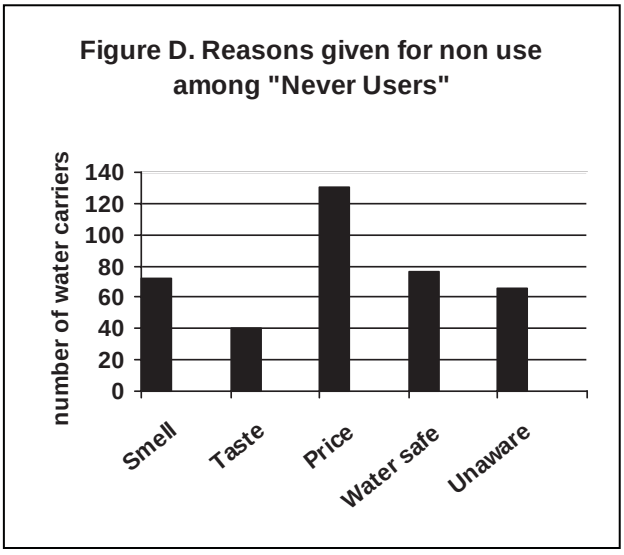
d. Water management (Ax I table 1). There was no association between water sources and the prevalence of diarrhea in children under five. Diarrhea was less common in households where

water was poured from storage containers than dipped from containers (this was statistically significant on the chi square but not on the adjusted odds ratio) But diarrhea was not associated with other water storage characteristics. Households that took 30 minutes or longer to routinely obtain water had an odds of diarrhea in children which was three times greater (OR 3.08 CI 1.31, 7.29) than those requiring less time to obtain water Ax I table 3). This is likely to be related to volume of use, which was not assessed in this study. There was no relation found between costs paid for water and the prevalence of diarrhea (Ax I table 4).

e. Diarrhea prevalence by household hygiene behaviors (Ax K table 1). The prevalence of diarrhea was unrelated to household garbage disposal, disposal of children's faeces or reported use of soap for hand washing by the child caretaker. However, where soap was found on inspection of the hand washing area (Ax K table 3), the odds of diarrhea among children was less in households than where soap was not found, a significant difference (OR 0.25 CI 0.10, 0.60).

7. Factors associated with CLORIN use.

a. Likes and dislikes about CLORIN presentation (Ax L tables 1A &B). Participants in the survey were asked what they most liked about the present presentation of CLORIN. Among the present features such as color, label, shape, size and lid, current CLORIN users liked the label best (OR 1.45 CI 1.02, 2.07). Among the features felt needing improvement by current CLORIN users were the size of the bottle, which many felt was too small, and the price, which was felt to be too high. Those who felt the size too small were still frequent users of CLORIN (OR2.59 CI 1.85, 3.61), whereas those who felt the price too high used CLORIN much less often than those who did not identify the price as a negative factor (OR 0.60 CI 0.44, 0.82). Among past CLORIN users, the form in which it was packaged, and the lid were the most liked features. The least liked features among previous users (Ax L table 2B) were most commonly the price, labeling, color and the concentration. The numbers for some of these responses were small.



b. Why households began using CLORIN (Ax L table 3). The strongest reason for starting CLORIN use given was because the neighbors were using it, though the numbers for this reason were very small. All of this group were using CLORIN at the time of the survey. Other reasons which were associated with CLORIN use at the time of the survey were having received CLORIN promotion at the Health Center (OR 3.77 CI 1.47, 9.57) and a perception that the household drinking water was unsafe (OR 2.81 CI 1.22, 6.46). Recent cases of diarrhea in the household did not seem to prompt households to begin CLORIN use. Among users, there was both a willingness to pay the current price of 500K or even above this for CLORIN (Ax L table 4).

c. Reasons given for stopping CLORIN use. The largest number of people (262) said they had stopped using CLORIN because they could no longer afford it. Other statistically significant reasons for stopping use of CLORIN given were because of the taste imparted to water and also the smell of CLORIN. Some 87 heads of household felt that CLORIN was not needed because the water was already safe but when other factors were controlled in the regression analysis these reasons were not statistically significant.

d. **Reasons given for never-use of CLORIN(Ax L table 6).** The most frequent reason given by households that reported they had never used CLORIN was because they could not afford it (30.8%), while 16.7% cited the smell, 9.4% mentioned the taste, 18.1% indicated that they believed their water was safe, and 15.5% said they were unaware of CLORIN.

DISCUSSION

In this study we assessed CLORIN use in 1319 households from across Zambia. In the areas assessed we found that 42% of all households said they were current CLORIN users and 22% said they had used CLORIN in the past. A third said they had never used CLORIN. There was considerable variation in use among provinces. These data fit well with the findings of a recent cholera investigation in Lusaka.[10] This survey was specifically an evaluation of practices in households that were likely to use CLORIN. As a result the survey was conducted in areas with substantial CLORIN distribution and included areas where considerable efforts in social marketing had taken place. This included mainly the urban and peri-urban areas. For this reason, results cannot be considered to be a cross-sectional picture of Zambia as a whole, where the use of CLORIN was found to be 13.5% in the 2001.[5] Among households using river or stream water there did seem to be an awareness of vulnerability, as they were much more likely to use CLORIN than households using other water sources. The numbers in this group are, however small. Households getting water from other unprotected sources were as likely as households using protected sources to use CLORIN.

When asked about how long the household had been using CLORIN, 31% indicated for a year or more, 27% for 6-12 months, and 42% for less than six months. When this information is compared with sales patterns, it suggests that new users continue to be recruited. However, it does also suggest that there may be a problem in retaining CLORIN users. One of the explanations for this may be common perceptions of water purity in Zambia. Water quality is thought by about 60% of persons to fluctuate during the seasons, which could explain why there may be seasonal users of CLORIN. However, current CLORIN users were more likely to believe that the quality of the water they used did not change with the seasons.

Among other perceptions, water that is clear is generally thought to be safe water, as is water that comes from a pipe. In this survey, the majority of households felt that water that contained dirt or was turbid was contaminated and unsafe. The perception that unsafe water contained bacteria was mentioned by 29% of persons interviewed. These differences did not vary between CLORIN and non-CLORIN users. Clearly this is an area which the program can address for the future.

Of concern was the fact that although households said they were presently using CLORIN, only a third or less of these households actually had chlorine in the water when it was tested. Chlorine was present in 36% of household that reported they were using CLORIN for a year or more. This dropped to 27% for those who stated they had used CLORIN for 6-12 months and 20%

for those stating they had used CLORIN for six months or less. Although the coverage of CLORIN may be relatively high in a number of areas in urban Zambia, the proportion of these households that are actually protected is probably much lower.

This level of chlorine contrasts with the 72-90% measurable levels found during a field trial of water disinfection and safe storage in Kitwe.[15] The Kitwe study was of a research study rather than a mass marketing approach, and provided CLORIN free to participants. This difference can easily explain why the Kitwe study was able to demonstrate an effect against diarrhea, whereas in the present survey this did not. It also points out once again the problems with taking a small efficacious activity to scale while retaining effectiveness. Taking a small effort to scale involves many changes in communication methods, "compliance-assurance" approaches, and perceived incentives so that it is not surprising that efficacy demonstrated in small studies is often hard to replicate on a large scale.

This study sought to assess the role of social marketing in CLORIN use. The study found an increased use of CLORIN in areas where the SFH was active. Many respondents specifically cited this social marketing organization as a method of exposure to information about CLORIN and statistically, the presence of the Society was a major factor in promoting its use. Although mass media was cited much more frequently as a source of information, the Society showed the strongest statistical association between being a source of information and the use of CLORIN. The sources of information about CLORIN cited by participants in the 2001 DHS survey were similar.

The role of various organizations in the social marketing process is difficult to disentangle. Although many persons cited the district health centers and chemists as information sources and also as active in marketing, these groups, in turn receive training and support from the Society for Family Health. The same may be said for the house-to-house promotion that showed a strong association with household CLORIN use. Some of this promotion came through personnel directly connected with the SFH, and others from community agents responsible to the Neighborhood Health Committees. Organizations such as CARE have used these committees to promote distribution of CLORIN. Neighborhood Health Committees are now a common finding in Zambia, with the 2001 DHS survey finding 40% of people saying they existed in their community.[5] In this DHS survey, 10.5% of women stated that a health worker had visited them in the preceding 12 months. Half of these women reported receiving services related to CLORIN from the visiting worker. Our survey found 6.0% of primary water caretakers reporting household visits to promote CLORIN. It is a bit surprising that this was not higher given that our survey was carried out in areas with particularly active social marketing. Nevertheless, the existence of household visits was strongly associated with increased CLORIN use in the household. The use of these Neighborhood Health Committees and other community-based structures would seem an important strategy for extending CLORIN awareness and use. Although radio and television have contributed greatly to awareness, they are not now positively associated with CLORIN use. Newspapers did not seem to be an effective way of building CLORIN awareness. These media channels may have had an important role in building awareness in the beginning of the campaign.

Water management is a key component of the Safe Water Systems. In this study we found that the use of CLORIN did not automatically translate into other safe water handling practices. There was no difference in CLORIN-using households in use of narrow necked storage vessels,

[15] Quick R, *et al.* Diarrhea Prevention Through Household-Level Water Disinfection and Safe Storage in Zambia. *Am Journal Trop Med Hyg*, 2002;66:584-589.

covering containers, elevating containers from the floor, or pouring water rather than dipping from the storage vessels. This might have been anticipated, as the use of "medicine", in this case CLORIN, is often much easier to "prescribe" than is the changing of behaviors. This is not just a question of clients not paying attention to messages, as they had learned the correct volume CLORIN for three sizes of containers, and could repeat these accurately. It is clear that strengthening the water hygiene message component of the CLORIN marketing should receive extra attention from the SFH. Our findings in this respect do not differ greatly from those cited during the 2003/4 cholera investigation by the CDC.[10]

This probably explains why there was also no noticeable "spill over" of hygiene message into such areas as management of household garbage, disposal of a child's feces, and the use of soap. The hand washing and soap use practices we found did not seem to fit any clear pattern that could be associated with behavior change promotion as part of the Safe Water Systems messages.

A particular area of interest was the promulgation of Safe Water Systems messages and the frequency of diarrhea. Some of the findings were predictable such as a lower prevalence of diarrhea when the child caretakers were older or better educated. Of interest was that diarrhea was reported less often only if soap was actually seen at the hand washing site. This is an important finding for future surveys assessing hygiene, and is consistent with other surveys. The CDC investigation of cholera in 2003/04 found that households which had visible soap present were more likely to be using CLORIN.[10]

An important series of questions were related to what prompted users to start CLORIN and what users (and former users) liked and disliked about CLORIN. The information on what prompted a person to begin using CLORIN seems a bit conflicting. The use by neighbors is very important, although this group is very small. In this section, the role of the district health center is very important in the start of CLORIN use, although in the questions related to marketing, the importance was not seen. The perception of water being unsafe, which also an important reason for starting CLORIN, perhaps is consistent with the finding that CLORIN users understood surface water to be unsafe.

Although taste and smell were seen as reasons to stop CLORIN by past users, a study now ongoing in Liberia by the authors found that the users see the smell and taste of chlorine as "quality assurance" evidence of purity. Cost does not seem to be a major factor for not using CLORIN, as there is a strong willingness to pay for CLORIN. Yet, inability to pay was a reason commonly given by previous users for having stopped CLORIN. In real terms the cost of CLORIN has dropped with inflation, and the per capita GDP for Zambia has risen recently for the first time in several years, so costs may not present a barrier for some urban populations.[16] As CLORIN use is less among those in lower status housing, it can be assumed with some safety that price is an important barrier for this population group.

Household that were already using CLORIN liked the label. These households also felt the size of the container could be changed as well as the price. The latter finding does not match with the perception of a general willingness to pay current costs of K500-K1000, suggesting that the willingness to pay outweighs the concern about price.

This study has several limitations, as the findings cannot be extrapolated to other populations in Zambia which differ from those studied. It was intended to specifically to look at CLORIN use

[16] The World Bank Group. Zambia: Quick facts. http://web.worldbank.org/ accessed on 10 August 2004.

where use was relatively high, both in areas where there was active social marketing, and in areas where there were substantial sales but without the organized social marketing component. This was to determine what has been achieved to date in locations in Zambia where circumstances are propitious. The study focus was on urban and peri-urban areas where the bulk of CLORIN sales occurs, and provides no information on use in rural areas. The sample size for this study was calculated on the expected prevalence of CLORIN users in the community. Many of the questions about household practices and perceptions may have occurred in the communities with a frequency such that significance could not be assessed using our sample size. We had not anticipated such poor performance from the water management indicators. Had we expected this there would have been more emphasis on intra-household determinants of water and hygiene practices.

CONCLUSIONS

The use of CLORIN is common in the areas purposefully chosen for this survey. It is clear that active marketing through community-level personnel is a very important component in this success. Targeting more efforts at community level and particularly house-to-house marketing would seem a very wise use of resources. Whether personnel are from the SFH or from Neighborhood Health Committees, these persons could do periodic chlorine checks using swimming pool type testing kits to advise their clients on the adequacy of water treatment. The role of the mass media messages in CLORIN use is not clear. Typically, mass media is effective in building brand awareness during the launch of a project, but other methods of marketing are more effective once awareness has been established. Certainly this was identified as the most important information exposure source, yet it was not possible to link their impact at the household level to increased CLORIN use.

As CLORIN seems to be more readily taken up by households with more educated primary water caretaker, special attention should be paid to marketing to those with lower educational achievements. This also applies to those living in houses with a lower housing quality index, as they may be less likely to respond to CLORIN marketing.

The finding that the use of CLORIN influenced adaptation of this practice by neighbors perhaps adds an additional marketing approach. By concentrating in certain towns or compounds within these towns there may be a multiplier effect from the early adopters. It may also be that continued use by households could influence the continued use by neighbors as well, although this study did not investigate this aspect. An important factor that lead to adaptation in a number of households was the perception that drinking water was unsafe. This may be an area for marketing which can be further pursued. Further, the District Health Clinic was frequently cited as a reason for starting Clorin, and important message not to neglect the formal health sector in promotion. In this study we did not attempt to separate out private providers from among the chemists and district health facilities. In some areas this might be an important channel to investigate further.

CLORIN use is associated with proximity of a retail source. This may be a further reason to increase community agents or better penetrate the market of kiosks and small shops that pervade housing compounds.

Boiling water is a competitive strategy to CLORIN, and this could be a promotional angle.

In another finding, it appears that there is a need to look at more effective ways to retain CLORIN users, once recruited. In most programs, retaining users requires considerably fewer resources than does recruiting new users. It might be possible to find ways to build stronger links with retailers and community agents not directly supported by the Society for Family Health. Although the smell and taste of chlorine was mentioned as a negative feature, the association with stopping CLORIN use was not statistically significant. However, it might be possible to use these sometimes negatively perceived traits as a positive message—evidence that your family is being protected against serious disease. These features are not always negatively perceived in African societies, but this would need more investigation before undertaking.

Perception of risks seems an important reason to some households to use CLORIN particularly from those using surface water. However, the lack of perceived risk in using unprotected wells and other sources, and incorrect beliefs about the "safe season" for water sources are still widely held, and should be addressed.

The Water Management side of the program clearly needs further strengthening. Even in the absence of Budizas, the promotion of pouring rather than dipping water from a storage container has shown its ability to reduce diarrhea. With these and other data, it is possible to build a profile of vulnerability to diarrhea. With this profile it would be possible to identify households at increased risks, and target them in marketing.

Household hygiene practices could be more actively included in Safe Water messages and could make a natural fit with the water management messages.

The failure to fully protect households through erratic dosing of CLORIN, as shown by the low levels of chlorine, is as big a challenge as increasing program coverage. Unless this is addressed, there is a potential in undermining the entire program through lack of perceived effectiveness among clients. A program of monitoring use, perhaps using some of the questions developed for this survey along with testing, would help inform program management of developing problems. An on-going "Quality Control" component would be important for the program. The differences in chlorine results between the Kitwe efficacy trial and findings in this national program again illustrate the problems in scaling up.

The instructions for mixing CLORIN seem to be extraordinarily clear, as there was no difficulty with these at all.

Acknowledgements

The authors would like to extend their appreciation to members of staff at the Central Statistical Office, Lusaka for their extensive support and efficiency in providing vital demographic information. We would also like to acknowledge the help we received from the staff at Society for Family Health in Lusaka and across the nation in accessing their CLORIN sales data. We are also indebted to Central Board of Health for their assistance in acquiring health and demographic data at the district levels, and providing the authorization to conduct this phase of the study. Finally, we are deeply grateful to the communities at Nameseche and Kawama respectively for their eager participation in our forum and Focus Group Discussion.

Annex A

Sampling methodology, sales data, demographic data

HIGH (>2)	LOW (1-1.99)	SPORADIC (<1)	TOTAL DISTRICTS
Central Chibombo 3.0 Kabwe 30.0 Kapiri Mponshi 3.0	Mkishi 1.0 Mumbwa 1.0 Serenje 1.0		6
Copper belt Chililabombwe 7.0 Chingola 36.0 Kitwe 18.0 Luanshya 14.0 Mufulira 3.0 Mpongwe 4.0 Ndola 18.0	Kalulushi 1.0 Lufwanyama 1.0		9
Eastern Chipata 5.0 Katete 2.0 Lundazi 2.0 Mambwe 3.0	Chama 1.0 Petauke 1.0	Nyimba 0.3	7
Luapula Chiengi 9.0 Kawambwa 2.0 Mansa 13.0 Nchelenge 5.0 Samfya 2.0		Mwense 0.4	6
Lusaka Kafue 4.0 Luangwa 8.0 Lusaka 23.0		Chongwe 0.03	4
Northern Kasama 11.0 Mpika 2.0 Mpulungu 2.0	Mbala 1.0 Nakonde 1.0 Kaputa 1.0	Chinsali 0.10 Isioka 0.16 Luwingu 0.05 Mporokoso 0.38	10
Northwestern Solwezi 4.0		Mwinilunga 0.4	2
Southern Choma 3.0 Gwembe 22.0 Itezhi-Tezhi 5.0 Kazungula 10.0 Livingstone 10.0 Mazabuka 3.0 Namwala 5.0 Siavonga 2.0 Sinazongwe 2.0 Monze 4.0		Kalomo 0.14	11
Western Mongu 2.0	Sesheke 1.0		2
37	**11**	**9**	**57**

Table 2. Sample Sizes

						SAMPLE SIZE		
CONF (%)	POWER (%)	UNEX:EXP	DISEASE IN EXP (%)	RISK RATIO	ODDS RATIO	UNEXP	EXPOSED	TOTAL
95	80	1:5	5.0	5.0	5.21	221	1,105	1,326
90	80	1:5	5.0	5.0	5.21	175	876	1,051
95	80	1:5	5.0	5.0	5.21	221	1105	1326
99	80	1:5	5.0	5.0	5.21	328	1642	1970
99.9	80	1:5	5.0	5.0	5.21	482	2412	2894
95	80	1:5	5.0	5.0	5.21	221	1105	1326
95	90	1:5	5.0	5.0	5.21	266	1330	1596
95	95	1:5	5.0	5.0	5.21	307	1533	1840
95	99	1:5	5.0	5.0	5.21	392	1958	2350
95	80	1:1	5.0	5.0	5.21	332	332	664
95	80	1:2	5.0	5.0	5.21	266	531	797
95	80	1:3	5.0	5.0	5.21	241	724	965
95	80	1:4	5.0	5.0	5.21	229	915	1144
95	80	1:5	5.0	5.0	5.21	221	1105	1326
95	80	1:6	5.0	5.0	5.21	216	1295	1511

Table 3. Population of < 5 and sales of CLORIN per district (cumulative 2000-2003)

PROVINCE (DISTRICT)	**POPULATION <5**	**SALES OF CLORIN (cumulative 2000-2003)**
Zambia	**2,705,985**	**3,569,325**
Central Province	**276,837**	**351,411**
Chibombo	66,346	27,204
Kabwe	47,164	212,487
Kapiri Mposhi	52,578	72,300
Mkushi	30,745	23,544
Mumbwa	43,022	13,428
Serenje	36,982	2,628
Copperbelt Province	**420,479**	**1,129,110**
Chllibombwe	18,649	10,848
Chingola	46,103	162,624
Kalulushi	19,109	4,980
Kitwe	100,250	437,334
Luanshya	37,600	103,080
Lufwanyama	16,875	6,612
Mufulira	36,781	2,9280
Masaiti	25,714	9,684
Mpongwe	17,708	6,444
Ndola	101,690	337,152
Eastern Province	**359,344**	**153,576**
Chadiza	23,227	1,320
Chama	22,088	2,784
Chipata	99,889	77,220
Katete	53,074	16,500
Lundazi	66,322	27,792
Nyimba	18,594	5,508
Petauke	63,253	15,432
Mambwe	12,897	6,864
Luapula Province	**219,200**	**246,912**
Chiengi	23,966	33,792
Kawambwa	28,197	16,392
Mansa	51,922	120,456
Milenge	8,242	660
Mwense	29,646	12,972
Nchelenge	32,345	38,028
Samfya	44,882	17,856
Lusaka Province	**381,780**	**1260816**
Chongwe	34,190	8,952
Kafue	39,513	45,936

Luangwa	5,176	6,012
Lusaka	302,901	1,198,896

Northern Province	**351,591**	**157,872**
Chilubi	18,498	2,916
Chinsali	35,332	3,180
Isoka	27,431	2,448
Kaputa	25,417	5,184
Kasama	47,952	97,488
Luwingu	21,422	1,320
Mbala	42,452	5,976
Mpika	40,766	17,544
Mporokoso	21,176	456
Mpulungu	19,094	15,036
Mungwi	31,087	816
Nakaonde	20,964	6,912
North Western Province	**161,090**	**39912**
Chavuma	8,147	No Data
Kabompo	19,481	240
Kasempa	12,257	1,452
Mwinilunga	34,054	4,704
Mufumbwe	14,897	No data
Solwezi	54558	33,000
Zambezi	17,696	516
Southern Province	**336,180**	**204936**
Choma	56865	40,128
Gwembe	9,520	8,957
Itezhi-Tezhi	11,697	3,216
Kalomo	48,713	6,252
Kazungula	18,487	9,552
Livingstone	25,573	73,356
Mazabuka	56,849	21,492
Monze	46,622	22,284
Namwala	23,990	9,480
Siavonga	15,560	5,544
Sinazongwe	22,304	4,500
Western Province	**199,484**	**24,780**
Kalabo	29,738	1,044
Kaoma	41,801	No data
Lukulu	18,060	240
Mongu	42,326	20,124
Senanga	29,573	1,200
Sesheke	19,477	3,348
Shang'ombo	18,509	No Data

Note: Sales in shippers were converted to bottles. 1 shipper =24 bottles

Table 4. Per capita uptake of CLORIN per district (Jan-Jun 2003)

PROVINCE (DISTRICT)	POPULATION <5	SALES OF CLORIN (Cumulative 2000-2003)	SALES OF CLORIN (In Shippers Jan-Jun 2003)	SALES OF CLORIN (In bottles Jan-June 2003)	PER CAPITA SALES
Zambia	**2,705,985**	**3,569,325**			
Central Province	**276,837**	**351,411**			
Chibombo	66,346	27,204	7,524	180576	3.0
Kabwe	47,164	212,487	58,500	1,404,000	30
Kapiri Mposhi	52,578	72,300	6,732	161,568	3.0
Mkushi	30,745	23,544	1,068	25632	1.0
Mumbwa	43,022	13,428	2,448	58752	1.0
Serenje	36,982	2,628	1,200	28800	1.0
Copperbelt Province	**420,479**	**1,129,110**			
Chllibombwe	18,649	10,848	5,580	133920	7.0
Chingola	46,103	162,624	69,612	1670688	36.0
Kalulushi	19,109	4,980	840	20160	1.0
Kitwe	100,250	437,334	75,234	1805616	18.0
Luanshya	37,600	103,080	21,900	525600	14.0
Lufwanyama	16,875	6,612	852	20448	1.0
Mufulira	36,781	2,9280	4,740	113760	3.0
Masaiti	25,714	9,684	*0 No data	No data	No data
Mpongwe	17,708	6,444	2,904	69696	4.0
Ndola	101,690	337,152	75,888	1821312	18.0
Eastern Province	**359,344**	**153,576**			
Chadiza	23,227	1,320	* 0 No data	No data	No data
Chama	22,088	2,784	504	12096	1.0
Chipata	99,889	77,220	19,728	473472	5.0
Katete	53,074	16,500	3,696	88704	2.0
Lundazi	66,322	27,792	4,416	105984	2.0
Nyimba	18,594	5,508	264	6336	0.3
Petauke	63,253	15,432	3,444	82656	1.0
Mambwe	12,897	6,864	1,644	39456	3.0
Luapula Province	**219,200**	**246,912**			
Chiengi	23,966	33,792	9,012	216288	9.0
Kawambwa	28,197	16,392	2,592	62208	2.0
Mansa	51,922	120,456	27,900	669600	13.0
Milenge	8,242	660	*0 No data	No data	No data
Mwense	29,646	12,972	456	10944	0.4
Nchelenge	32,345	38,028	7,368	176832	5.0
Samfya	44,882	17,856	4,488	1077712	2.0
Lusaka Province	**381,780**	**1260816**			
Chongwe	34,190	8,952	48	1152	0.03
Kafue	39,513	45,936	7,368	176832	4.0
Luangwa	5,176	6,012	1,752	42048	8.0
Lusaka	302,901	1,198,896	285,780	6858720	23.0
Northern Province	**351,591**	**157,872**			
Chilubi	18,498	2,916	*0 No data	No data	No data
Chinsali	35,332	3,180	144	3456	0.10
Isoka	27,431	2,448	180	4320	0.2
Kaputa	25,417	5,184	588	14112	1.0
Kasama	47,952	97,488	22,740	545760	11.0
Luwingu	21,422	1,320	48	1152	0.05
Mbala	42,452	5,976	1,320	31680	1.0

Mpika	40,766	17,544	3,900	93600	2.0
Mporokoso	21,176	456	336	8064	0.4
Mpulungu	19,094	15,036	1,836	44064	2.0
Mungwi	31,087	816	*0 No data	No data	No data
Nakonde	20,964	6,912	864	20736	1.0
North Western Province	**161,090**	**39912**			
Chavuuma	8,147	No Data	No data	No data	No data
Kabompo	19,481	240	*0 No data	No data	No data
Kasempa	12,257	1,452	*0 No data	No data	No data
Mwinilunga	34,054	4,704	528	12672	0.4
Mufumbwe	14897	No data	No data	No data	No data
Solwezi	54558	33,000	9,636	231264	4.0
Zambezi	17696	516	* 0 No data	No data	No data
Southern Province		**204936**			
Choma	56865	40,128	8,220	197280	3.0
Gwembe	9520	8,957	8,580	205920	22.0
Itezhi-Tezhi	11697	3,216	2,640	63360	5.0
Kalomo	48713	6,252	276	6624	0.1
Kazungula	18,487	9,552	7,440	178560	10.0
Livingstone	25,573	73,356	10,692	256608	10.0
Mazabuka	56,849	21,492	8,052	193248	3.0
Monze	46,622	22,284	7,944	190656	4.0
Namwala	23,990	9,480	5,280	126720	5.0
Siavonga	15,560	5,544	1,320	31680	2.0
Sinazongwe	22,304	4,500	1,980	47520	2.0
Western Province	**199,484**	**24,780**			
Kalabo	29,738	1,044	*0 No data	No data	No data
Kaoma	41,801	No data	No data	No data	No data
Lukulu	18,060	240	*0 No data	No data	No data
Mongu	42,326	20,124	3,120	74880	2.0
Senanga	29,573	1,200	* 0 No data	No data	No data
Sesheke	19,477	3,348	840	20160	1.0
Shang'ombo	18,509	No Data	No data	No data	No data

Table 5. Type of social marketing per district

PROVINCE (DISTRICT)	**DISTRIBUTION OF CLORIN**	**ACTIVE PROMOTION OF CLORIN**
Zambia		
Central Province		
Chibombo	YES	
Kabwe	YES	YES
Kapiri Mposhi	YES	
Mkushi	YES	
Mumbwa	YES	
Serenje	YES	
Copperbelt Province		
Chllibombwe	YES	YES
Chingola	YES	YES
Kalulushi	YES	YES
Kitwe	YES	YES
Luanshya	YES	
Lufwanyama	YES	
Mufulira	YES	
Masaiti	YES	
Mpongwe	YES	
Ndola	YES	YES
Eastern Province		
Chadiza	YES	YES
Chama	YES	
Chipata	YES	YES
Katete	YES	

Lundazi	YES	YES
Nyimba	YES	
Petauke	YES	
Mambwe	YES	YES
Luapula Province		
Chiengi	YES	
Kawambwa	YES	
Mansa	YES	YES
Milenge	YES	
Mwense	YES	
Nchelenge	YES	YES
Samfya	YES	YES
Lusaka Province		
Chongwe	YES	
Kafue	YES	
Luangwa	YES	
Lusaka	YES	YES
Northern Province		
Chilubi	YES	
Chinsali	YES	YES
Isoka	YES	
Kaputa	YES	
Kasama	YES	YES
Luwingu	YES	
Mbala	YES	YES
Mpika	YES	YES
Mporokoso	YES	
Mpulungu	YES	
Mungwi	YES	
Nakaonde	YES	YES
North Western Province		
Chavuma	NO DATA	
Kabompo	YES	
Kasempa	YES	
Mwinilunga	YES	
Mufumbwe	YES	
Solwezi	YES	YES
Zambezi	YES	
Southern Province		
Choma	YES	YES
Gwembe	YES	
Itezhi-Tezhi	YES	
Kalomo	YES	YES
Kazungula	YES	
Livingstone	YES	YES
Mazabuka	YES	YES
Monze	YES	YES
Namwala	YES	
Siavonga	YES	
Sinazongwe	YES	
Western Province		
Kalabo	YES	
Kaoma	NO DATA	
Lukulu	YES	
Mongu	YES	
Senanga	YES	
Sesheke	YES	
Shang'ombo	NO DATA	

***Data obtained from Society for Family Health**

TABLE 6 . SUMMARY OF CLUSTERS IN INTERVENTION LOW SES COMPOUNDS

PROVINCE	COMPOUNDS	# OF CLUSTERS	# OF INTERVIEWS
LUAPULA	NCHELENGE		

	Kafimbwa	1	11
	Total	1	11
COPPERBELT	CHINGOLA		
	Kalilo	1	11
	CHILILABOMBWE		
	Lubengele	1	11
	KITWE		
	Ipusukilo	1	11
	Race Cource	1	11
	NDOLA		
	Chipulukusu	1	11
	Makenzi	1	11
	Nkwazi	1	11
	Total	7	77
NORTHWEST	SOLWEZI		
	Zambia	1	11
	Total	1	11
SOUTHERN	LIVINGSTONE		
	Nakatiyu	1	11
	MAZABUKA		
	Kabobola	1	11
	Total	2	22
NORTHERN	KASAMA		
	Lwimbo	1	11
	Grouped Compound 2	2	22
	Total	3	33
CENTRAL	KABWE		
	Chikwata	1	11
	Total	1	11
LUSAKA	LUSAKA		
	Mtendere	1	11
	Kaingalinga	1	11
	Kamanga	1	11
	Kanyama	1	11
	Jack Compound	1	11
	Chibolya	1	11
	Chawama	1	11
	George	1	11
	Ng'ombe	1	11
	Chipata	1	11
	Matero East	1	11
	Kaunda Square	1	11
	Chaisa	1	11
	Chunga	1	11
	Chainda	1	11
	Total	15	165
	Grand total	30	330

TABLE 7. SUMMARY OF CLUSTERS IN INTERVENTION MEDIUM SES COMPOUNDS

PROVINCE	COMPOUNDS	# OF CLUSTERS	# OF INTERVIEWS
LUAPULA	MANSA		
	Musenga	1	11
	Total	1	11
COPPERBELT	CHINGOLA		
	Chawama	1	11
	Kabundi East	1	11
	KITWE		
	Buchi	1	11
	Chimwemwe	1	11
	Kwacha	1	11
	Mindolo 1	1	11
	Ndeke	1	11
	NDOLA		
	Chifubu	1	11
	Lubuto	1	11
	Masala	1	11
	Twapia	1	11
	Total	11	121
EASTERN	CHIPATA		
	Mthlansembe B	1	11
	Total	1	11
SOUTHERN	LIVINGSTONE		
	Libuyu	1	11
	Maramba	1	11
	MAZABUKA		
	Stage II	1	11
	Total	3	33
NORTHERN	KASAMA		
	New Town	1	11
	Total	1	11
CENTRAL	KABWE		
	Bwacha	1	11
	Total	1	11
LUSAKA	LUSAKA		
	Hellen Kaunda	1	11
	Chelstone	1	11
	Kabwata	1	11
	Libala	1	11
	Emmasdale	1	11
	Kamwala	2	22

	Mandevu	1	11
	Matero	1	11
	Chilenje South	1	11
	Lilanda Site & Service	2	22
	Total	12	132
	Grand total	30	330

TABLE 8. SUMMARY OF CLUSTERS IN CONTROL LOW SES COMPOUNDS

PROVINCE	COMPOUNDS	# OF CLUSTERS	# OF INTERVIEWS
LUAPULA	KAWAMBWA		
	Messengers	1	11
	Total	1	11
COPPERBELT	MUFULIRA		
	Kansunswa	1	11
	Murundu	1	11
	Tangup	1	11
	MPONGWE		
	Mwisuku	1	11
	Musangashi A	1	11
	Ntanda	1	11
	LUANSHYA		
	Maposa	1	11
	Chisokone	1	11
	Kambilombilo	1	11
	Ng'ombe	1	11
	Old Buntungwa	1	11
	Total	11	121
CENTRAL	KAPIRI MPONSHI		
	Material	1	11
	Ndeke	1	11
	Kawama	1	11
	CHIBOMBO		
	Kashaya	1	11
	Total	4	44
LUSAKA	KAFUE		
	Mungu Village	1	11
	Kashelela	1	11
	Mutendere	1	11
	Lumumba	2	22
	Chawama	1	11
	Total	6	66
EASTERN	KATETE		
	Soweto	1	11
	Luangwa	1	11
	Total	2	22
SOUTHERN	KAZUNGULA		
	Mambova	1	11
	Total	1	11

NORTHERN	MPULUNGU		
	Muzabwela	1	11
	Posa	1	11
	Mupata	1	11
	Kapato	1	11
	Simoche	1	11
	Total	5	55
	Grand total	30	330

TABLE 9. SUMMARY OF CLUSTERS IN CONTROL MEDIUM SES COMPOUNDS

PROVINCE	COMPOUNDS	# OF CLUSTERS	# OF INTERVIEWS
COPPERBELT	MUFULIRA		
	Butondo	2	22
	Chibolya	1	11
	Kamuchanga	3	33
	Suburbs	1	11
	Mokambo	1	11
	Kantanshi 1	2	22
	Kantanshi 5	3	33
	LUANSHYA		
	Mikomfwa Suburb	2	22
	Mikomfwa	2	22
	Second Class	1	11
	ZAMEFA	1	11
	Police Camp	1	11
	Total	20	220
CENTRAL	KAPIRI MPONSHI		
	Zambia	1	11
	Total	1	11
LUSAKA	KAFUE		
	Estates	4	44
	Shikoswe	1	11
	Town/Cottege	1	11
	Total	6	66
EASTERN	KATETE		
	Chibolya B	1	11
	ECU	1	11
	Total	2	22
NORTHERN	MPULUNGU		
	Old Location	1	11
	Total	1	11
	Grand total	30	330

TABLE 10. SUMMARY OF CLUSTERS BY PROVINCE AND DISTRICT

PROVINCE	INTERVENTION		CONTROL		TOTAL
NORTHERN	LOW	MEDIUM	LOW	MEDIUM	
	Kasama	Kasama	Mpulungu	Mpulungu	

	33	11	55	11	110
LUAPULA	Nchelenge	Mansa	Kawambwa		
	11	11	11	0	33
NORTHWESTERN	Solwezi				
	11	0	0	0	11
EASTERN		Chipata	Katete	Katete	
	0	11	22	22	55
CENTRAL	Kabwe	Kabwe	Kapiri Mponshi	Kapiri Mponshi	
	11	11	33	11	66
			Chibombo		
	0	0	11	0	11
SOUTHERN	Livingstone	Livinstone	Kazungula		
	11	22	11	0	44
	Mazabuka	Mazabuka			
	11	11	0	0	22
COPPERBELT	Chingola	Chingola	Mufulira	Mufulira	
	11	22	33	143	209
	Chililabombwe		Mpongwe		
	11	0	33	0	44
	Kitwe	Kitwe	Luanshya	Luanshya	
	22	55	55	77	209
	Ndola	Ndola			
	33	44	0	0	77
LUSAKA	Lusaka	Lusaka	Kafue	Kafue	
	165	132	66	66	429
TOTALS	330	330	330	330	1320

TABLE 11. CLORIN USE (PAST AND CURRENT) BY PROVINCE AND DISTRICT

PROVINCE	TOTAL NUMBER OF HOUSEHOLDS	RATE OF CLORIN USE	DISTRICT	TOTAL NUMBER OF HOUSEHOLDS	RATE OF CLORIN USE
Central Province	78	33 (42%)	Chibombo	12	6 (50%)
			Kabwe	22	10 (45%)
			Kapiri Mposhi	44	17 (37%)
Copperbelt Province	540	262 (49%)	Chllibombwe	11	4 (36%)
			Chingola	33	13 (39%)
			Kitwe	77	43 (56%)

			Luanshya	132	57 (43%)
			Mufulira	176	72 (41%)
			Mpongwe	33	9 (27%)
			Ndola	78	64 (82.%)
Eastern Province	55	37 (67%)	Chipata	11	7 (64%)
			Katete	44	30 (68%)
Luapula Province	33	29 (88%)	Kawambwa	11	9 (82%)
			Mansa	11	9 (82%)
			Nchelenge	11	11 (100%)
Lusaka Province	430	339 (79%)	Kafue	132	98 (74%)
			Lusaka	298	241 (81%)
Northern Province	107	89 (83%)	Kasama	46	31 (67%)
			Mpulungu	61	58 (95%)
North Western Province	11	6 (59%)	Solwezi	298	241 (81%)
Southern Province	65	35 (54%)	Kazungula	11	8 (73%)
			Livingstone + Mazabuka	54	27(50%)

Annex B

Factors Affecting CLORIN Use

1. Demographic characteristics of the water handlers

Table 1. Gender

Gender	Rate of Clorin Use (%)	Chi-square† (p-values)	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
Male N=22	59.09	2.56 (0.110)	1.99 (0.117) {.84, 4.68}	1.68 (0.250) {.69, 4.05}
Female N=1195	42.09			

†comparing current Clorin use in exposed to non exposed in each category
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted
***OR adjusted for age, education level, ses (housing conditions index•), social marketing group

Table 2. Age

Age-Groups (years)	Rate of Clorin Use (%)	Chi-square (p-value)†	Odds ratios Unadjusted* (p values)‡{confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
1. Less than 20 N=133	45.11	1.25 (0.536)	1	1
2. 20-40 N=978	41.62		.87 (0.444) {.60, 1.25}	.81 (0.266) {.55, 1.18}
3. 40-80 N=104	46.15		1.04 (0.873) {.62, 1.75}	1.0 (0.988) {.59, 1.69}

†comparing current Clorin use across age groups
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is age group 1
***OR adjusted for gender, education level, ses (housing conditions index), social marketing group

• see section on socio-economic characteristics of the household

Table 3. Education

Education Level	Rate of Clorin Use (%)	Chi-square† (p-value)	Odds ratios Unadjusted* (p values)‡{confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
1.No formal schooling N=83	33.73	37.09 (0.000)‡	1	1
2.Primary N=610	35.08		1.06 (0.809) {.65, 1.72}	1.09 (0.716) {.67, 1.79}
3.Secondary N=535	51.03		2.05 (0.004)‡ {1.26, 3.33}	2.00 (0.006)‡ {1.22, 3.30}
4.Post-secondary N=14	71.43		4.91 (0.012)‡ {1.41, 17.07}	4.17 (0.028)‡ {1.12, 14.86}

†comparing current Clorin use across education categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
***OR adjusted for gender, age, ses (housing conditions index), social marketing group

Table 4 Rate of CLORIN use across risk groups (as defined by the housing construction index)

Housing Conditions Index (housing characteristics)	Rate of Clorin Use (%)	Chi square† (p-value)	Odds ratios Unadjusted* (p-values)‡ {confidence intervals}◦
Low (4-8) N=132	32.58	5.75	1.59 (0.017)‡ {1.09, 2.34}
High (9-14) N=1113	43.49	(0.016)‡	

†comparing current Clorin use between households with high versus low housing conditions scores
‡ significant p-values (α=0.05)
◦95% CI
* OR for households with high housing conditions scores compared to those with low scores

Table 5 Clorin use in households with varying risks controlling for key aspects of social marketing

Social Marketing Factors	Adjusted Odds Ratios (p-values) {confidence intervals}
Social marketing group	[1] 1.56 (0.036)‡ {1.03, 2.35}
Information sources	[2] 1.61 (0.028)‡ {1.05, 2.46}
Modes of promotion	[3] 1.80 (0.007)‡ {1.18, 2.78}
Product knowledge	[4] 1.16 (0.606) {0.66, 2.06}
Product accessibility	[5] 1.05 (0.853) {0.63, 1.75}
Household Clorin use	[6] 0.78 (0.719) {0.20, 3.0}

[1] Odds ratio comparing current Clorin use in households with high housing conditions scores (low risk) versus those with low scores (high risk), adjusting for social marketing group and sdf of water manager

[2] Odds ratio comparing current Clorin use in low risk versus high risk households adjusting for sources of information, social marketing group, sdf of water manager

[3] Odds ratio comparing Clorin use in low risk versus high risk households adjusting for primary modes of Clorin promotion, social marketing group, and sdf of water manager

[4] Odds ratio comparing Clorin use in low risk versus high risk households adjusting for product knowledge (knowledge of correct dosage instructions, Clorin efficacy and impact on family health), social marketing group, and sdf of water manager

[5] Odds ratio comparing Clorin use in low risk versus high risk households adjusting for product accessibility (source of supply, proximity of supply source and price of purchase), social marketing group, and sdf of water manager

[6] Odds ratio comparing Clorin use in low risk versus high risk households adjusting for function and length of use, social marketing group, and sdf of water manager

Table 6 Clorin use in households with varying risks controlling for key aspects of social marketing

Water Storage Practices	Adjusted Odds Ratios (p-values) {confidence intervals}
Storage Containers	[1] 1.43 (0.10) {0.77, 1.28}
Drinking water source	[2] 1.73 (0.015)‡ {1.11, 2.69}
Time to taken to obtain drinking water	[3] 1.90 (0.007)‡ {1.19, 3.04}
Water payment	[4] 1.09 (0.798) {0.56, 2.15}
Perception of water quality	[5] 0.63 (0.353) {0.24, 1.67}
Perception of health risk	[6] 1.74 (0.014)‡ {1.12, 2.70}

[1] Odds ratio comparing current Clorin use in households with high housing conditions scores (low risk) versus those with low scores (high risk), adjusting for aspects of storage containers (if they are covered, neck size, location, method of water retrieval) social marketing group and sdf of water manager

[2] Odds ratio comparing current Clorin use in low risk versus high risk households adjusting for water source, social marketing group, and sdf of water manager

[3] Odds ratio comparing Clorin use in low risk versus high risk households adjusting for time taken to obtain drinking water, social marketing group, and sdf of water manager

[4] Odds ratio comparing Clorin use in low risk versus high risk households adjusting for water payment, social marketing group, and sdf of water manager

[5] Odds ratio comparing Clorin use in low risk versus high risk households adjusting for perception of water quality (household knowledge of causes of water contamination and perception of seasons of high and low quality), social marketing group, and sdf of water manager

[6] Odds ratio comparing Clorin use in low risk versus high risk households adjusting for perception of health risk (household knowledge of causes of diarrhea and perception of seasons of high and low diarrhea prevalence), social marketing group, and sdf of water manager

Annex C
Social marketing variables

Social marketing group	Rate of Clorin Use (%)	Chi-square † (p-values)	Odds ratios Unadjusted* (p values)‡{confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Intervention (active marketing) N=603	47.35	13.70 (0.000)‡	1.53 (0.000) ‡ { 1.22, 1.92}	1.39 (0.006) ‡ {1.10, 1.76}
Control (passive marketing) N=642	36.98			

†comparing current Clorin use in intervention versus control
‡ significant p-values (α=0.05)
◦95% CI
* OR comparing current Clorin use in intervention compared to control
***OR adjusted for sdf (water manger) and ses indicator (housing conditions index)

Information source	Rate of Clorin Use (%)	Chi square† (p-values)	Odds ratios Unadjusted* (p values) ‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
Exposed to radio N=710	41.83	0.21 (0.648)	.95 (0.648) {.76, 1.19}	.86 (0.286) {0.66, 1.13}
Not exposed to radio N=531	43.13			
Exposed to tele-vision N=432	47.45	6.97 (0.008)‡	1.37 (0.008)‡ {1.08, 1.74}	1.18 (0.252) {.89, 1.56}
Not exposed to Television N=809	39.68			
Exposed to shop/market N=57	43.86	0.05 (0.818)	1.07 (0.818) {.62, 1.82}	1.16 (0.619) {0.65, 2.07}
Not exposed to shop/market N=1184	42.31			
Exposed to leaflet/booklet N=27	51.85	1.01 (0.314)	1.48 (0.317) {.69, 3.17}	1.39 (0.426) {0.62, 3.14}

Not exposed to leaflets/booklet N=1214	42.17			
Exposed to community based agent N=135	40.00	0.35 (0.552)	.90 (0.553) {.622 , 1.29}	0.94 (0.743) {0.63, 1.40}
Not exposed to community based agent N=1106	42.68			
Exposed to newspaper N=20	40.00	0.05 (0.828)	.90 (0.828) {.37, 2.23}	0.64 (0.338) {0.25, 1.61}
Not exposed to Newspaper N=1221	42.42			
Society for Family Health N=100	55.00	7.09 (0.008)‡	1.74 (0.008)‡ {1.15, 2.62}	1.69 (0.031)‡ {1.05, 2.71}
Not exposed to SFH N=1141	41.28			

†comparing current Clorin use among households exposed to each information source versus those who are unexposed to that source
‡ significant p-values (α=0.05)
◦95% CI
* OR comparing current Clorin use among households exposed to each information source as opposed to those who are unexposed to that source
*** OR adjusted for sdf (water manager) ses indicator (housing conditions index), social marketing group

Modes of Promotion	Rate of Clorin Use (%)	Chi square† (p-values)	Odds ratios Undjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
Posters N=46	54.35	1.99 (0.158)	1.53 (0.161) {.85, 2.76}	0.80 (0.50) {.41, 1.56}
Exposure to modes of promotion other than posters N= 1,112	43.79			
house visits N=69	68.12	16.99 (0.000)‡	2.87 (0.000)‡ {1.70, 4.82}	2.47 (0.006)‡ {1.29, 4.72}
Exposure to modes of promotion other than house visits N= 1,089	42.70			
SFH N=33	66.67	6.94 (0.008)‡	2.59 (0.011)‡ {1.24, 5.40}	2.12 (0.086) {0.90, 4.99}
Exposure to modes of promotion other than SFH campaigns N= 1,125	43.56			
Community based agents N=144	43.75	0.01 (0.91)	0.98 (0.905) {.69, 1.40}	0.87 (0.628) {0.48, 1.55}
Exposure to modes of promotion other than community based agents N= 1,014	44.28			
health center campaign N=464	53.23	25.53 (0.000)‡	1.84 (0.000)‡ {1.45, 2.34}	1.43 (0.194) {0.83, 2.45}
Exposure to modes of promotion other than health center campaigns N= 694	38.18			

†comparing Current Clorin use for households exposed to each mode versus those who are unexposed
‡ significant p-values (α=0.05)
◦95% CI
* OR comparing current clorin use for households exposed to each mode versus those who are unexposed
*** OR adjusted for sdf (water manager), ses indicator(housing conditions index), and social marketing group

Table 4 Product knowledge

Container Volumes	Rate of Clorin Use (%)	Chi square† (p-values)	Odds ratios Unadjusted** (p values)‡ {confidence inter-vals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
Households with correct dosage information for 2.5L N=470	72.55	70.174 (0.000)‡	3.27 (0.000)‡ {2.47, 4.34}	1.97 (0.000)‡ {1.37, 2.84}
Incorrect dosage information N= 405	44.69			
Correct dosage informa-tion for 5.0L N=517	70.21	58.54 (0.000)‡	2.95 (0.000)‡ {2.23, 3.90}	1.54 (0.024)‡ {1.06, 2.25}
Incorrect dosage information N= 360	44.44			
Correct dosage information 20L N=501	71.06	63.34 (0.000)‡	3.07 (0.000)‡ {2.32, 4.07}	2.02 (0.000)‡ {1.44, 2.84}
Incorrect dosage information N= 376	44.41			

†comparing current Clorin use in households having correct knowledge of dosage instructions for each container volume versus those which do not

‡ significant p-values (α=0.05)

◦95% CI

* OR comparing current Clorin use for households with correct knowledge of dosage instructions as opposed to those that are unaware

*** OR adjusted for sdf (water manager), ses indicators, and social marketing group

Table 5 Knowledge of CLORIN germicidal efficacy and impact on family health

Household knowledge of Clorin efficacy	Rate of Clorin Use (%)	Chi square† (p values)	Odds ratios Unadjusted* (p values)‡{confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Households with knowledge of germicidal efficacy N=933	54.13	22.91 (0.000)‡	3.76 (0.000)‡ {2.11, 6.69}	3.41 (0.000)‡ {1.90, 6.14}
Households unaware of this activity N=67	23.88			
Households with perception of positive health impact on family N=703	72.12	49.64 (0.000)‡	7.07 (0.000)‡ {3.83, 13.06}	7.28 (0.000)‡ {3.87, 13.72}
Households without this perception N= 703	6.79			

†comparing current Clorin use among households that have correct knowledge of Clorin's germicidal activity and health impact in relation to those that are unaware

‡ significant p-values (α=0.05)

◦95% CI

* OR comparing current Clorin use among households that have correct knowledge of Clorin efficacy versus those that are unaware

*** OR adjusted for sdf (water manager), ses indicators, social marketing group

Table 6 Source of supply

Supply source	Rate of Clorin Use (%)	Chi square† (p-values)	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
Health center N=261	50.19	1.05 (0.305)	1.16 (0.305) {.88, 1.53}	1.02 (0.887) {.74, 1.41}
Other sources N=844	46.56			
Chemist N=143	68.53	29.36 (0.000)‡	2.74 (0.000)‡ {1.88, 3.99}	2.24 (0.000)‡ {1.48, 3.39}
Other sources N= 962	44.28			
Shop/market N=824	45.51	4.75 (0.029)‡	.74 (0.030)‡ {.56, .97}	0.70 (0.060) {.48, 1.01}
Other sources N=281	53.02			
Door to door sales agent N=36	69.44	7.24 (0.007)‡	2.60 (0.009)‡ {1.26, 5.33}	2.25 (0.036)‡ {1.06, 4.79}
Other sources N= 1,069	46.68			
Community based agent N=20	60.00	1.29 (0.256)	1.68 (0.261) {.68, 4.14}	1.67 (0.287) {0.65, 4.30}
Other sources N=1,085	47.19			

†comparing current Clorin use among households that are exposed to each supply source compared with those that are unexposed
‡ significant p-values (α=0.05)
◦95% CI
* OR comparing current Clorin use among households exposed to each supply source compared with unexposed
*** OR adjusted for sdf (water manager), ses indicator (housing conditions index), and social marketing group

Table 7. Proximity of supply source

Proximity of source	Rate of Clorin Use (%)	Chi-square†	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted**** (p values) {confidence intervals}
Less than 15 minutes N=476	59.24	27.48 (0.000)‡	.57 (0.000)‡ .45, .73}	.73(0.014)‡ {0.57, 0.94}
More than 15 minutes N=553	42.86			

†comparing current Clorin use across the time categories
‡ significant p-values (α=0.05)

◦95% CI
* OR unadjusted comparing rates for supply sources more than 15 minutes away compared to those less than 15 minutes away
*** OR adjusted for sdf (water manager), ses indicator (housing conditions index), and social marketing group

Table 8. CLORIN pricing

Clorin retail price (kwacha)	Rate of Clorin Use (%)	Chi-square† (p-values)	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
0 N=4	75.00	10.80 (0.013)‡	1.0	1.0
0-500 N=406	50.74		.34 (0.356) {.04, 3.33}	.25 (0.234) {.02, 2.49}
500-1000 N=603	50.25		.34 (0.347) {.03, 3.25}	.24 (0.230) {.02, 2.45}
1000-7000 N=37	24.32		.11 (0.066) {.010, 1.16}	.07 (0.032)‡ {.01, .80}

†comparing current Clorin use across the price categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf (water manager), ses indicator (housing conditions index), and social marketing group

Table 9 Household CLORIN use

Household Clorin use	Rate of Clorin Use (%)	Chi square (p-value)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values) {confidence intervals}
Treat drinking water only N=603	66.67	9.77 (0.002)‡	1.65 (0.002)‡ {1.20, 2.26}	1.69 (0.002)‡ {1.21, 2.34}
Other uses[1] N=219	54.79			

[1] Other uses refer to laundry, cleaning of kitchenware, general household cleaning, treatment of all water
†comparing current Clorin use in households utilizing Clorin for exclusive drinking water treatment as opposed to those which do not
‡ significant p-values (α=0.05)
◦95% CI
* OR comparing current Clorin use for households utilizing Clorin for exclusive drinking water treatment compared to those that do not
*** OR adjusted for sdf (water manager) and ses indicator (housing conditions index), social marketing group

Table 11. Proportion of households with positive chlorine tests among current CLORIN users, versus non-users.

current CLORIN use Total house-holds N=1,187	Proportion with chlorine in drinking water	Chi-square† (p-values)	Odds ratio Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Yes N=501 No N=686	29.34 1.75	190.02 (0.000)‡	23.32 (0.000)‡ {12.77, 42.60}	22.50 (0.000)‡ {12.00, 42.35}

†comparing presence of chlorine among current Clorin users versus non users
‡ significant p-values (α=0.05)
◦95% CI
* OR comparing presence of chlorine among users versus non-users
*** OR adjusted for sdf , ses indicator (housing conditions index), social marketing group

Table 13 Presence of chlorine by length of CLORIN use *(this question was missing many responses)*

Length of use (months)	Proportion of House-holds with chlorine(%) N=546	Chi-square †	Odds ratios Unadjusted* (p values)‡{confidence in-tervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Less than 6 N=230	20.00	12.79 (0.002)‡	1	1
6-12 N=150	27.33		1. 50 (0.097) {0.93, 2.44}	1.23 (0.427) {0.74, 2.04}
Greater than 12 (1 year) N=166	33.14		2.26 (0.000)‡ {1.44, 3. 56}	1.49 (0.107) {0.92, 2.43}

†comparing chlorine among households with varying periods of Clorin use
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf (water manager), ses indicator (housing conditions index), and social marketing group

Annex D
Water Management

Table 1 Water source

Water source	Rate of Clorin Use (%)	Chi-square† (p-values)	Odds ratios Unadjusted* (p values)‡{confidence inter-vals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
1.River/stream N=15	60.00	7.53 (0.057)	1	1
2.Unprotected sources (un-protected dugwell/spring) N=112	35.71		0.37 (0.078) {0.12, 1.12}	0.16 (0.005)‡ {0.04, 0.57}
3. Protected sources (tubewell/borehole /protected dugwell) N=228	37.28		0.40 (0.089) {0.14, 1.15}	0.14 (0.002)‡ {0.04, 0.49}
4.Piped water N=890	44.16		0.53 (0.228) {0.19, 1.50}	0.15 (0.003)‡ {0.04, 0.53}

†comparing current Clorin use across the water source categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: comparison of OR of current Clorin use compared to water source 1
*** OR adjusted for sdf (water manager), ses indicators, and social marketing group

Table 2 Storage containers

Characteristics of Storage containers	Rate of Clorin Use (%)	Chi square† (p-values)	Odds ratios Unadjusted* (p values)‡{confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
1. Neck-sizes				
Only Narrow N=987	42.76	0.14 (0.705)	.94 (0.705) {.68, 1.29}	0.86 (0.389) {.62, 1.21}
Only Wide N=183	44.26			
2. Lid use	47.45	5.57 (0.018)‡	1.70 (0.019)‡ {1.09, 2.64}	1.39 (0.165) {0.87, 2.22}
All covered N=881				
None covered N=95	34.74			
3. Location	40.60	3.88 (0.05)‡	.79 (0.05)‡ {.62, 1.00}	0.97 (0.804) {.75, 1.25}
On the floor N=761				
Elevated N=437	46.45		.	
4. Method of retrieval				
Only Pouring N=1031	42.77	0.58 (0.447)	88 (0.448) {.63, 1.23}	0.78 (0.174) {.55, 1.11}
Only Dipping N=161	45.96			

†comparing current Clorin use for households who exclusively: use containers that are narrow necked compared to those who do not, cover their containers versus those who do not, store all containers on the floor versus those that do not, retrieve water by pouring versus those that do not

‡ significant p-values (α=0.05)

◦95% CI

* OR comparing current Clorin use among exclusive users of narrow necked containers, covered containers, containers stored on ground, water retrieved by pouring versus users of containers that do not have these characteristics

*** OR adjusted for sdf (water manager), ses indicator (housing conditions index), and social marketing group

Table 3 Time to getting drinking water

Time (in minutes)	Rate of Clorin Use (%)	Chi-square† (p-values)	Odds ratios Undjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Less than 15 N=417	41.25	0.08 (0.962)	1	1
15-30 N=95	41.05		.99 (0.972) {.63, 1.56}	.98 (0.945) {.61, 1.59}
Greater than 30 N=25	44.00		1.12 (0.786) {.50, 2.52}	1.17 (0.721) {.50, 2.73}

†comparing current Clorin use across the time categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: comparison of current Clorin use to category 1
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 4 Water payment

Payment (in kwacha)	Rate of Clorin Use (%)	Chi square† (p-vaues)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Less than 20000 N=520	44.42	0.12 (0.725)	0.93 (0.725) {0.64, 1.36}	0.72 (0.122) {0.48, 1.09}
Greater than 20000 N=138	42.75			

†comparing current Clorin use across water price categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted comparing current Clorin use for those paying more than 20000 to those paying less than 20000
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 5 Water treatment

Reported Treatment Method	Rate of Clorin Use (%)	Chi-square† (p-values)	Odds ratio Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
Households practicing boiling N=298	21.48	246.07 (0.000)‡	.08 (0.000) ‡ {.06, .12}	.50 (0.000)‡ {.44, .56}
No boiling N=585	76.58			
Households adding Chlorine/bleach (other than Clorin) N=19	100.00	14.07 (0.000)‡	predicts success perfectly	predicts success perfectly
Not using bleach N=864	57.06			

†comparing current Clorin use among households reporting treatment compared to those not using the treatment method
‡ significant p-values (α=0.05)
◦95% CI
* OR comparing current Clorin use for households using each treatment method versus those that do not
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Annex E

Perception of water quality and health risk

Table 1. Household knowledge of causes of contamination of drinking water

Cause of contamination	Rate of Clorin Use (%)	Chi square (p-values)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values) {confidence intervals}
1.Households citing dirt/waste N=273	55.31	0.08 (0.774)	1.08 (0.774) {.64, 1.81}	.96 (0.912) {.51, 1.82}
Households citing other causes N=73	53.42			
2.Households citing Bacteria N=126	57.14	0.4 (0.528)	1.15 (0.528) {.74, 1.79}	1.02 (0.929) {.61, 1.73}
Households citing other causes N= 220	53.64			
3.Households citing turbid appearance N=33	21.21	16.73 (0.000)‡	0.19 (0.000)‡ {.08, .45}	0.17 (0.000)‡ {0.07, .43}
Households citing other causes N= 313	58.47			

†comparing current Clorin use for households having each perception of contamination causes versus those that do not have that perception

‡ significant p-values (α=0.05)

◦95% CI

* OR unadjusted comparing Clorin use for each perception of contamination causes as opposed to those that do not have that perception

*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 2. Seasonal variation in perception of water quality: High water quality

Season	Rate of Clorin Use (%)	Chi square† (p-values)	Odds ratios Undjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Cold-dry season N=493	44.83	5.26 (0.154)	1	1
Hot-dry season N=133	44.36		.98 (0.923) { .67, 1.44}	.92 (0.671) {.61, 1.38)
Warm-wet season N=105	41.90		.87 (0.584) {.58, 1.34}	.80 (0.343) {.51, 1.26}
All year the same N=483	37.89		.75 (0.028)‡ {.58, .97}	.71 (0.011)‡ {.54, .92}

†comparing current Clorin use across seasons
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 3. Seasonal variation in perception of water quality :Low water quality

Season	Rate of Clorin Use (%)	Chi-square† (p-values)	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Cold-dry season N= 23	56.52	7.80 (0.050)‡	1	1
Hot-dry season N=181	37.02		.85 (0.481) {.55, 1.32}	.79 (0.320) { .50, 1.25}
Warm-wet season N=535	45.98		1.24 (0.248) {.86, 1.77}	1.19 (0.357) { .82, 1.74}
All year the same N=362	39.78		.96 (0.833) {.66, 1.41}	.88 (0.521) { .59, 1.31}

†comparing current Clorin use across seasons
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 4. Household knowledge of causes of diarrhea

Causes of diarrhea	Rate of Clorin Use (%)	Chi square †	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
1.Dirty water N=874	42.09	0.09 (0.763)	.96 (0.763) {.75, 1.23}	.77 (0.120) {.55, 1.07}
Other causes N= 372	43.01			
2.Dirty food N=921	41.37	1.44 (0.230)	.85 (0.231) {.66, 1.10}	.74 (0.068) {.53, 1.02}
Other causes N= 323	45.20			
3.Poor hygiene N=449	36.97	8.37 (0.004)‡	.71 (0.004)‡ { .56, .89}	.63 (0.003)‡ { .46, .86}
Other causes N= 795	45.41			
4.Feces N=20	45.00	0.06 (0.810)	1.12 (0.810) {.46, 2.72}	.68 (0.523) {.20, 2.26}
Other causes N= 1,224	42.32			
5.Dirty hands N=42	54.76	2.74 (0.098)	1.67 (0.101) {.90, 3.11}	1.91 (0.152) {.79, 4.61}
Other causes N= 1,202	41.93			
6. Germs N=82	26.83	8.67 (0.003)‡	.48 (0.004)‡ {.28, .79}	.34 (0.012)‡ {.15, .79}
Other causes N= 1,162	43.46			
7. Flies N=94	24.47	13.33 (0.000)‡	.42 (0.000)‡ {.26, .67}	.58 (0.109) {.30, 1.13}
Other causes N= 1,150	43.83			

†comparing current Clorin use for households having each perception of diarrhea causes versus those that do not have that perception

‡ significant p-values (α=0.05)

◦95% CI

* OR unadjusted comparing Clorin use for each perception of diarrhea causes as opposed to those that do not have that perception

*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 5. Current CLORIN use by the seasonal variation in perception of risk: Low risk

Season	Rate of Clorin Use (%)	Chi square†	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Cold-dry N=813	40.22	6.46 (0.091)	1	1
Hot dry N=124	50.00		1.49 (0.040)‡ { 1.01, 2.17}	1.29 (0.334) { .77, 2.17}
Warm wet N=114	48.25		1.39 (0.104) { .93, 2.05}	1.38 (0.248) {0.80, 2.40}
Constant all year N=147	44.90		1.21 (0.289) { .85, 1.72}	1.23 (0.320) { .82, 1.85}

† comparing rates of current Clorin use across seasons
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 6. Current CLORIN use by the seasonal variation in perception of risk: High risk

Season	Rate of Clorin Use (%)	Chi square†	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values) {confidence intervals}
Cold-dry N=41	48.78	9.87 (0.020)‡	1	1
Hot dry N=610	38.03		.64 (0.174) { .34, 1.21}	.51 (0.137) { .21, 1.24}
Warm wet N=406	47.29		.94 (0.856) {0.50, 1.79}	.80 (0.635) { .33, 1.98}
Constant all year N=153	45.10		.86 (0.674) { .43, 1.72}	.69 (0.438) { .27, 1.77}

† comparing current Clorin use across seasons
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 7. Current CLORIN use by prevalence of diarrhea

Diarrhea prevalence	Rate of Clorin Use (%)	Chi-square† (p-vaues)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Diarrhea present N=159	40.25	0.32 (0.570)	0.91 (0.570) {0.65, 1.27}	0.89 (0.518) {.63, 1.27}
Diarrhea absent N=1086	42.63			

†comparing current Clorin use among households with cases of diarrhea compared to those with no diarrhea
‡ significant p-values (α=0.05)
◦95% CI
* OR comparing current Clorin use for households with diarrhea compared with those with no diarrhea
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Annex F

Household Hygiene Behaviors

Table 1. Garbage disposal

Garbage Disposal Site	Rate of Clorin Use (%)	Chi square† (p-vaues)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values) {confidence intervals}
Collected from home N=24	37.50	0.88 (0.830)	1	1
Collected at neighborhood box N=24	50.00		1.67 (0.384) { .53, 5.26}	1.73 (0.356) { .54, 5.57}
Openly discarded within premises/just outside premises N=1186	42.41		1.23 (0.630) { .53, 2.83}	1.52 (0.340) { .65, 3.56}
Burned/buried/composted N=8	37.50		1.00 (1.000) { .19, 5.22}	1.11 (0.901) { .20, 6.05}

†comparing current Clorin use across the garbage disposal site categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf (household head), ses indicator (housing conditions index), and social marketing group

Table 2. Child fecal disposal

Means of Child Fecal Disposal	Rate of Clorin Use (%)	Chi-square† (p-vaues)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Directly into Sanitation Facility N=402	42.79	0.09 (0.955)	1	1
Washed/rinsed away N=128	41.41		0.94 (0.783) { .63, 1.41}	1.00 (0.988) { .63, 1.59}
Discarded into/outside premises N=60	43.33		1.02 (0.936) { .59, 1.77}	2.40 (0.068) { .94, 6.14}

†comparing current Clorin use across the fecal disposal site categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf (primary child caretaker), ses indicator (housing conditions index), and social marketing group

Table 3. Soap use behaviors

Soap use behaviors	Rate of Clorin Use (%)	Chi-square† (p-vaues)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Soap use in past 24 hrs Yes N=1003 No N= 242	 43.67 36.78	 3.79 (0.051)‡	 1.33 (0.052)‡ {1.0, 1.78}	 0.86 (0.438) { .59, 1.26}
Soap observed at Hand washing site Yes N=460 No N= 515	 45.43 39.81	 3.15 (0.076)	 1.26 (0.076) { .98, 1.62}	 1.13 (0.445) { .83, 1.54}

†comparing current Clorin use between households with soap use in 24 hrs, and soap observed at hand-washing site versus those with no soap use, and soap missing at site

‡ significant p-values (α=0.05)

◦95% CI

* OR comparing Clorin use in households with soap use in 24 hrs, and soap present at site against those without soap use, or soap at site

*** OR adjusted for sdf (primary child caretaker) , ses indicator (housing conditions index), social marketing group

Table 4. When hand-washing is important

When Hand-washing is important	Rate of Clorin Use (%)	Chi square† (p-vaues)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values) {confidence intervals}
Before food preparation N=344	51.16	14.62 (0.000)‡	1.63 (0.000)‡ {1.27, 2.09}	1.31 (0.180) {.88, 1.94}
Other times N= 896	39.17			
Before meals N=1012	41.11	4.37 (0.037)‡	.73 (0.037)‡ { .55, .98}	.79 (0.284) {.51, 1.22}
Other times N= 228	48.68			
Before feeding children N=85	51.76	3.21 (0.073)	1.49 (0.075) {.96, 2.32}	2.71 (0.003)‡ {1.41, 5.22}
Other times N=1,155	41.82			
After changing baby N=101	43.56	0.05 (0.821)	1.05 (0.821) {.70, 1.58}	1.24 (0.508) {.66, 2.32}
Other times N=1,139	42.41			
After defacating N=874	40.62	4.29 (0.038)	.77 (0.038)‡ {.60, .99}	.84 (0.454) {.53, 1.33}
Other times N= 366	46.99			
After meals N=704	38.35	11.47 (0.001)‡	.68 (0.001)‡ {.53, .85}	.64 (0.035)‡ {.42, .97}
Other times N= 536	47.95			

†comparing current Clorin use among households reporting point at which hand-washing is most important compared to those not citing that point

‡ significant p-values (α=0.05)

◦95% CI

* OR comparing current Clorin use for households citing primary moment when they hand-wash versus those that do not cite that moment

*** OR adjusted for soap use in 24 hrs, soap observed at site, sdf (primary child caretaker), ses indicator (housing conditions index), social marketing group

Annex G

FACTORS AFFECTING DIARRHEA

Household socio-demographic characteristics: the primary child caretaker

Table 1. Gender

Gender	% of households with children under 5 years having diarrhea	Chi square† (p-values)	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence inter-vals}
Male N=210	19.05	5.49 (0.019)‡	1.59 (0.020)‡ {1.08, 2.34}	.71 (0.390) {.33, 1.54}
Female N=1053	12.92			

† comparing rates of diarrhea among male and females
◦95% CI
‡ significant p-values (α=0.05)
***OR adjusted for age, education (child caretaker), ses indicator (housing conditions index), social marketing group

Table 2. Age

Age group	% of households with children under 5 years having diarrhea	Chi-square †	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values) {confidence intervals}
Less than 20 N=99	21.21	11.40 (0.003)‡	1	1
20-40 N=834	10.43		.43 (0.002)‡ {.25, .74}	.49 (0.010)‡ {.29, .85}
40-80 N=109	8.26		.33 (0.010)‡ {.15, .77}	.33 (0.011)‡ {.14, .77}

† comparing rates of diarrhea across age-groups
‡ significant p-values (α=0.05)
◦95% CI
*OR comparison to age group 1
***OR adjusted for gender, education, ses (housing conditions index), social marketing group

Table 3. Education level

Education level	% of households with children under 5 years having diarrhea	Chi square†	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
No formal schooling N=98	19.39	5.87 (0.118)	1	1
Primary N=667	13.79		.67 (0.144) {.38, 1.15}	.70 (0.319) {.34, 1.42}
Secondary N=539	11.13		.52 (0.024)‡ {.30, .92}	.43 (0.027)‡ {.20, .91}
Post secondary N=13	7.69		.35 (0.323) {.04, 2.83}	0.64 (0.697) {.07, 6.0}

† comparing rates of diarrhea across the education categories
‡ significant p-values (α=0.05)
◦95% CI
*OR comparison to category 1
***OR adjusted for gender, age, ses (housing conditions index), social marketing group

Socio-demographic characteristics of children aged 5 years and less

Table 4. Age

Age group (months)	% of children under 5 years with diarrhea (2 weeks from the time of interview)	Chi-square† (p values)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values) {confidence intervals}
0-12 N=360	15.56	17.51 (0.002)	1	1
12-24 N=345	17.68		1.17 (0.449) {0.78, 1.73}	1.09 (0.675) { .72, 1.67}
24-36 N=348	12.64		.79 (0.267) { .51, 1.20}	.84 (0.428) { .54, 1.30}
36-48 N=383	14.62		0.93 (0.722) { .62, 1.39}	1.05 (0.827) { .69, 1.59}
48-60 N=127	3.15		.18 (0.001)‡ { .06, .50}	.20 (0.002)‡ { .07, .56}

† comparing rates of diarrhea across age-groups
‡ significant p-values (α=0.05)
◦95% CI
*OR comparison to age group 1
***OR adjusted for gender, ses (housing conditions index), social marketing group

Table 5. Gender

Gender	% of children under 5 years with diarrhea (2 weeks from the time of interview)	Chi square† (p-values)	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Male N=702	14.67	0.46 (0.499)	1.11 (0.499) {0.82, 1.49}	1.13 (0.419) {.84, 1.53}
Female N=766	13.45			

† comparing rates of diarrhea among male and females
◦95% CI
‡ significant p-values (α=0.05)
***OR comparing prevalence in males to females adjusted for age, ses indicator (housing conditions index), social marketing group

Table 6. Variation of diarrhea prevalence across risk groups (defined by housing conditions index)

Housing Conditions Index	% of households with children under 5 yearshaving diarrhea	Chi square† (p-value)	Odds ratios Unadjusted* (p-values)‡ {confidence intervals}◦
Low (6-11) N=158	15.82	1.23	.77 (0.269) {0.49, 1.22}
High (12-18) N=1161	12.66	(0.268)	

†comparing diarrhea prevalence between households with high versus low housing conditions scores
‡ significant p-values (α=0.05)
◦95% CI
* OR for households with high housing conditions scores compared to those with low scores

Table 7. Prevalence of diarrhea among households with varying risks controlling for key aspects of social marketing

Social Marketing Factors	Adjusted Odds Ratios (p-values) {confidence intervals}
Social marketing group	[1] 0.82 (0.475) { .48, 1.40 }
Information sources	[2] 0.93 (0.807) {0.52, 1.66}
Product knowledge	[3] 1.69 (0.294) {0.63, 4.48}
Household Clorin use	[4] 1.19 (0.744) {0.42, 3.32}

[1] Odds ratio comparing diarrhea prevalence among households with high housing conditions scores (low risk) versus those with low scores (high risk), adjusting for social marketing group and sdf of water manager

[2] Odds ratio comparing diarrhea prevalence among low risk versus high risk households adjusting for sources of information, social marketing group, sdf of water manager

[3] Odds ratio comparing diarrhea prevalence among low risk versus high risk households adjusting for product knowledge (knowledge of correct dosage instructions, Clorin efficacy and impact on family health), social marketing group, and sdf of water manager

[4] Odds ratio comparing diarrhea prevalence among low risk versus high risk households adjusting for household Clorin use (current Clorin use, function and length of use, most recent time of use), social marketing group, and sdf of water manager

Table 8. Prevalence of diarrhea among households with varying risks controlling for key aspects of water storage practices

Water Storage Practices	Adjusted Odds Ratios (p-values) {confidence intervals}
Storage Containers	[1] 0.90 (0.717) {0.53, 1.56}
Drinking water source	[2] 0.79 (0.468) {0.41, 1.50}
Time to taken to obtain drinking water	[3] .70 (0.280) {0.37, 1.33}
Perception of water quality	[4] .68 (0.513) {0.22, 2.15}
Perception of health risk	[5] .80 (0.419) {0.46, 1.38}

[1] Odds ratio comparing diarrhea prevalence among households with high housing conditions scores (low risk) versus those with low scores (high risk), adjusting for aspects of storage containers (if they are covered, neck size, location, method of water retrieval), social marketing group and sdf of water manager

[2] Odds ratio comparing diarrhea prevalence among low risk versus high risk households adjusting for water source, social marketing group, and sdf of water manager

[3] Odds ratio comparing diarrhea prevalence among low risk versus high risk households adjusting for time taken to obtain drinking water, social marketing group, and sdf of water manager

[4] Odds ratio comparing diarrhea prevalence among low risk versus high risk households adjusting for perception of water quality (household knowledge of causes of water contamination and perception of seasons of high and low drinking water quality), social marketing group, and sdf of water manager

[5] Odds ratio comparing diarrhea prevalence among low risk versus high risk households adjusting for perception of health risk (household knowledge of causes of diarrhea and perception of seasons of high and low diarrhea prevalence), social marketing group, and sdf of water manager

Annex H

Social Marketing

Table 1. Social marketing group

Social Marketing Group	% of households with children under 5 years having diarrhea	Chi-square † (p-values)	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Intervention (active marketing) N= 663	15.99	10.21 (0.001)‡	1.70 (0.002)‡ {1.22, 2.36}	1.76 (0.001)‡ {1.25, 2.47}
Control (passive marketing) N= 656	10.06			

† comparing prevalence in intervention and control

* OR comparing prevalence in intervention compared with control

***OR adjusted for sdf, ses (housing conditions index), social marketing group

Table 2. Information source

Information source	% of households with children under 5 years having diarrhea	Chi-square†	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
Exposed to radio N=717	11.30	3.22 (.082)	.75 (0.083) {.53, 1.04}	.77 (0.157) {.53, 1.11}
Not exposed to radio N=534	14.61			
Exposed to TV N=433	10.85	2.05 (0.152)	.77 (0.153) {.53, 1.10}	.84 (0.409) {.55, 1.27}
Not exposed to TV N=818	13.69			
Exposed to shop/market N=59	13.56	0.04 (0.841)	1.06 (0.841) {.50, 2.32}	.79 (0.570) {.34, 1.81}
Not exposed to shop/market N=1192	12.67			
Exposed to leaflet/booklet N=27	11.11	0.06 (0.801)	.86 (0.801) {.25, 2.88}	0.97 (0.968) {.28, 3.36}
Not exposed to leaflets/booklet N=1224	12.75			
Exposed to community based agent N=135	10.37	0.75 (0.388)	.77 (0.389) {.43, 1.38}	.63 (0.132) {.34, 1.15}
Not exposed to community based agent N=1116	12.99			
Exposed to newspaper N=20	10.00	0.13 (0.714)	.76 (0.715) {.17, 3.31}	1.03 (0.968) {.23, 4.70}
Not exposed to Newspaper N=1231	12.75			
SFH N=100	8.00	2.17 (0.140)	.58 (0.145) {.27, 1.21}	.44 (0.037)‡ {.20, .95}
Not exposed to SFH N=1151	13.12			

† comparing rates of diarrhea for households exposed to each information source versus those that were not exposed to the source
‡ significant p-values (α=0.05)
◦95% CI
*OR comparing exposed to source compared to those not exposed
***OR adjusted for sdf, ses (housing conditions index), social marketing group

Table 3. Household knowledge of CLORIN

Container Volumes	% of households with children under 5 years having diarrhea	Chi square†	Odds ratios Unadjusted* (p values)‡ {confidence inter-vals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
Households with correct dosage information for 2.5L N=471	10.83	1.45 (0.228)	.78 (0.229) {.52, 1.17}	1.08 (0.788) {.63, 1.84}
Incorrect dosage information N= 408	13.48			
Correct Dosage information for 5.0L N=518	10.81	1.77 (0.183)	.76 (0.184) {.50, 1.14}	1.02 (0.940) {.59, 1.77}
Incorrect dosage information N= 363	13.77			
Correct dosage Information for 20L N=505	9.70	5.53 (0.019)‡	.61 (0.019)‡ {.41, .92}	.64 (0.080) {.39, 1.06}
Incorrect dosage information N= 376	14.89			

† comparing rates of diarrhea among those who correctly describe dosages for each container volume
‡ significant p-values (α=0.05)
◦95% CI
*OR comparing prevalence for households correclty describing dosage for each volume compared with those that do not
***OR adjusted for sdf, ses (housing conditions index), social marketing group

Table 4. Knowledge of CLORIN efficacy and impact on family health

Household knowledge of Clorin efficacy	% of households with children under 5 years having diarrhea	Chi square†	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Households with knowledge of germicidal efficacy N=937	12.17	1.88 (0.170)	.63 (0.174) {.33, 1.22}	.59 (0.128) {.30, 1.16}
Households unaware of this activity N=67	17.91			
Households with perception of positive health impact on family N=709	11.85	0.06 (0.800)	1.12 (0.800) {.47, 2.69}	1.08 (0.864) {.44, 2.66}
Households without this perception N= 56	10.71			

† comparing rates of diarrhea among those who recognize Clorin efficacy versus those who do not
‡ significant p-values (α=0.05)
◦95% CI
*OR comparing prevalence of those recognizing Clorin efficacy to those that do not
***OR adjusted for sdf, ses (housing conditions index), social marketing group

Table 5. Prevalence by CLORIN use and presence of chlorine in drinking water

Current Clorin use and presence of chlorine in drinking water	% of households with children under 5 years having diar-rhea	Chi Square†	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values) {confidence intervals}
Clorin use Yes N=527	12.14	0.32 (0.570)	.91 (0.570) { .65, 1.27}	.89 (0.520)
No N=718	13.23			{.63, 1.26}
Chlorine presence Yes N=159	10.69	1.05 (0.304)	.76 (0.306) { .45, 1.29)	.65 (0.148) {.37, 1.16}
No N=1099	13.65			

† comparing rates of diarrhea among: current users and non users of Clorin, and presence and absence of chlorine in drinking water samples
‡ significant p-values (α=0.05)
◦95% CI
*OR comparing prevalence in: those using Clorin and those with positive chlorine tests
***OR adjusted for sdf, ses (housing conditions index), social marketing group

Table 6. Prevalence by Length of CLORIN use

Length of use (months)	% of households with children under 5 years having diarrhea	Chi square †	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Less than 6 N=240	13.75	3.31 (0.191)	1	1
6-12 N=157	14.01		1.02 (0.941) {0.57, 1.83}	0.94 (0.845) {0.51, 1.73}
Greater than 12 (1 year) N=177	8.47		0.58 (0.098) {0.31, 1.11}	0.56 (0.107) {0.28, 1.13}

†comparing prevalence across the time periods
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf (water manager), ses indicator (housing conditions index), and social marketing group

Table 7. Prevalence by the most recent time of CLORIN use.

Most recent time of Clorin use	% of households with children under 5 years having diarrhea	Chi square† (p-values)	Odds ratio Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Within 24 hours N=124	16.13	2.25(0.133)	1.50 (0.135) {0.88, 2.55}	1.21 (0.548) {0.65, 2.23}
Other times N= 704	11.36			
The day before N=212	13.21	0.34 (0.558)	1.15 (0.558) {0.72, 1.83}	0.34 (0.102) {0.12, 1.21}
Other times N= 616	11.69			
1 week ago N=310	10.32	1.43 (0.231)	0.76 (0.232) {0.49, 1.19}	0.63 (0.098) {0.37, 1.09}
Other times N= 518	13.13			
1 month+ N=640	11.09	2.57 (0.109)	0.68 (0.110) {0.43, 1.09}	0.46 (0.108) {0.17, 1.19}
Other times N= 188	15.43			

†comparing prevalence in households reporting Clorin use for each most recent time period versus those that did not report use in that time period
‡ significant p-values (α=0.05)
◦95% CI
* OR comparing prevalence for households reporting each most recent time period of Clorin use versus those that did not indicate use at that time period
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Annex I

Water storage practices

Table 1. Water source

Water source	% of households with children under 5 years having diarrhea	Chi square †	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
1.River/stream N=15	13.33	4.42 (0.219)	1	1
2.Unprotected sources (unprotected dugwell/spring) N=122	18.03		1.43 (0.653) {.30, 6.80}	1.25 (0.787) {.25, 6.28}
3. Protected sources (tubewell/borehole /protected dugwell) N=262	10.31		0.75 (0.710) {.16, 3.49)	.69 (0.657) {.13, 3.58)
4.Piped water N=920	13.15		.98 (0.984) {.22, 4.42}	1.00 (0.997) {.19, 5.23)

† comparing rates of diarrhea across source water categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf and ses indicator (housing conditions), social marketing group

Table 2. Container use

Container characteristics	% of households with children under 5 years having diarrhea	Chi square †	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
1. Neck-sizes				
Narrow N=1038	11.95	4.00 (0.046)‡	.65 (0.047)‡ {.43, .99}	1.16 (0.766) {.43, 3.16}
Wide, N=192	17.19			
2. Lid use				.
All covered N=911	11.09	6.62 (0.010)‡	.51 (0.011)‡ {.45, .98}	72 (0.287) {.39, 1.33}
None covered N=107	19.63			
3. Location				
On the floor N=812	12.07	1.81 (0.179)‡	.79 (0.179) {.57, 1.11}	.59 (0.015)‡ {.38, .90}
Elevated N=448	14.73			
4. Method of retrieval				
Pouring N=1080	11.85	5.24 (0.022)‡	.61 (0.023)‡ {.39, 0.93}	.47 (0.148) {.17, 1.31}
Dipping N=171	18.13			

† comparing rates of diarrhea among for households which exclusively use containers that are narrow necked compared to those who do not, cover their containers versus those who do not, store all containers on the floor versus those that do not, retrieve water by pouring versus those that do not

‡ significant p-values (α=0.05)

◦95% CI

* OR unadjusted

*** OR adjusted for sdf , ses indicator (housing conditions index), social marketing group

Table 3. Time to get water

Time (minutes)	% of households with children under 5 years having diarrhea	Chi square† (p-values)	Odds ratios Unadjusted* (p values){confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Less than 30 N=540	13.52	7.48 (0.006)‡	3.03 (0.009)‡ { 1.32, 6.95}	3.08 (0.010)‡ {1.31, 7.29}
Greater than 30 N=28	32.14			

† comparing rates of diarrhea across time categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: comparing rates of households taking more than 30 minutes to obtain their drinking water to those who take less than 30 minutes
*** OR adjusted for sdf (water manager), ses indicator (housing conditions index), social marketing group

Table 4. Water payment

Payment (Kwacha)	% of households with children under 5 years having diarrhea	Chi square† (p values)	Odds ratios Unadjusted* (p values){confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Less than K20,000 N=543	11.05	2.20 (0.138)	1.49 (0.140) {0.88, 2.52}	1.80 (0.057) {0.98, 3.14}
K20,000+ N=141	15.60			

† comparing rates of diarrhea in households paying more than 20000 kwacha to those paying less than this amount
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: comparisons of prevalence in households paying 2000+ to those paying less than this amount
*** OR adjusted for sdf (water manager), ses indicator (housing conditions index), social marketing group

Table 5. Treatment methods

Method of treatment	% of households with children under 5 years having diarrhea	Chi square† (p values)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Boiling N=309	12.62	0.22 (0.643)	1.10 (0.643) {.73, 1.68}	1.20(0.587) {.62, 2.35}
Other treatment methods N=588	11.56			
Bleach/chlorine N=19	5.26	0.82 (0.365)	.40 (0.381) {.053, 3.06}	.43 (0.441) {.05, 3.63}
Other treatment methods N= 878	12.07			
CLORIN N=663	12.07	0.05 (0.830)	1.05 (0.830) {.66, 1.67)	1.11 (0.790) {.52, 2.33}
Other treatment methods N=234	11.54			

† comparing rates of diarrhea among households using Clorin for each function compared with those who do not
‡ significant p-values (α=0.05)
◦95% CI
*OR comparing prevalence for households utilizing Clorin for each function against those who do not
***OR adjusted for sdf (water manager), ses (housing conditions index), social marketing group

Annex J

Perception of water quality and health risk

Table 1. Knowledge of water contamination

Causes of water contamination	% of households with children under5 years having diarrhea	Chi square† (p-values)	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
1.Contains dirt/waste N=283	14.13	0.20 (0.651)	.85 (0.652) {.42, 1.72}	1.02 (0.969) {.44, 2.31}
Other causes N=74	16.22			
2.Bacteria N=126	15.08	0.04 (0.839)	1.07 (0.839) {0.58, 1.96}	1.18 (0.642) {.59, 2.36}
Other causes N= 231	14.29			
3.Turbid appearance N=33	15.15	0.01 (0.920)	1.05 (0.920) {.38, 2.86}	.94 (0.916) {.33, 2.68}
Other causes N= 324	14.51			

†comparing prevalence for households having each perception of contamination causes versus those that do not have that perception
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted comparing prevalence for each perception of contamination causes as opposed to those that do not have that perception
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 2. Prevalence by the seasonal variation in perception of water quality: high water quality

Season	% of households with children under 5 years having diarrhea	Chi square† (p-values)	Odds ratios Undjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Cold-dry season N=512	13.67	10.06 (0.018)‡	1	1
Hot-dry season N=138	17.39		1.33 (0.271) { .80, 2.21}	1.14 (0.634) {.67, 1.94)
Warm-wet season N=114	17.54		1.34 (0.288) {.78, 2.32}	1.10 (0.749) {.62, 1.93}
All year the same N=521	9.60		.67 (0.042)‡ {.46, .99}	.60 (0.011)‡ {.40, .89}

†comparing prevalence across seasons
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 3. Prevalence by the seasonal variation in perception of water quality: low water quality

Season	% of households with children under 5 years having diar-rhea	Chi-square† (p-values)	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Cold-dry season N=24	16.67	8.12 (0.044)‡	1	1
Hot-dry season N=194	17.01		1.31 (0.358) {.74, 2.31}	.79 (0.320) { .50, 1.25}
Warm-wet season N=555	13.87		1.02 (0.916) {.63, 1.68}	1.19 (0.357) { .82, 1.74}
All year the same N=378	9.26		.65 (0.128) {.37, 1.13}	.88 (0.521) { .60, 1.31}

†comparing prevalence across seasons
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 4.Variation of prevalence by household knowledge of causes of diarrhea

Causes of diarrhea	% of households with children under 5 years having diar-rhea	Chi square †	Odds ratios Unadjusted* (p values)‡ {confidence intervals}◦	Odds ratios Adjusted*** (p values) {confidence intervals}
1.Dirty water N=914	12.80	0.16 (0.686)	.93 (0.686) {.66, 1.31}	1.02 (0.927) {.71, 1.46}
Other causes N= 404	13.61			
2.Dirty food N=975	12.51	0.95 (0.329)	.84 (0.329) {.59, 1.20}	.90 (0.590) {.63, 1.31}
Other causes N= 343	14.58			
3.Poor hygiene N=466	10.73	3.42 (0.064)	.72 (0.065) {.51, 1.02}	.77 (0.170) {.54, 1.12}
Other causes N= 852	14.32			
4.Feces N=24	8.33	0.50 (0.489)	.60 (0.493) {.14, 2.58}	.65 (0.567) {.14, 2.85}
Other causes N= 1,294	13.14			
5.Dirty hands N=45	4.44	3.04 (0.081)	0.30 (0.100) {.07, 1.26}	16 (0.075) {.02, 1.20}
Other causes N= 1,273	13.35			
6. Germs N=87	16.09	0.76 (0.383)	1.30 (0.385) {.72, 2.36}	1.30 (0.435) {.67, 2.52}
Other causes N= 1,231	12.84			
7. Flies N=98	17.35	1.72 (0.189)	1.44 (0.192) {.83, 2.50}	1.58 (0.147) {.85, 2.92}
Other causes N= 1,220	12.70			

†comparing diarrhea prevalence for households having each perception of diarrhea causes versus those that do not have that perception
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted comparing Clorin use for each perception of diarrhea causes as opposed to those that do not have that perception
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 5. Prevalence by the seasonal variation in perception of water quality: Low risk

Season	% of households with children under 5 years having diarrhea	Chi -square† (p values)	Odds ratios Unadjusted* (p values){confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Cold-dry N=861	13.24	19.25 (0.000)‡	1	1
Hot dry N=131	12.21		.91 (0.746) {.52, 1.59}	.78 (0.518) {.37, 1.65}
Warm wet N=119	21.01		1.74 (0.024)‡ {1.08, 2.83}	1.55 (0.203) {.80, 2.84}
Constant all year N=148	3.38		.23 (0.002)‡ {.09, .57}	.18 (0.004)‡ { .05, .57}

†comparing prevalence across seasons
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 6. Prevalence by the seasonal variation in perception of water quality: High risk

Season	% of households with children under 5 years having diarrhea	Chi square † (p-values)	Odds ratios Unadjusted* (p values){confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Cold-dry N=43	16.28	11.74 (0.008)‡	1	1
Hot dry N=641	14.35		.86 (0.728) {.37, 2.0)	.78 (0.604) {.30, 2.00)
Warm wet N=435	13.56		.81 (0.623) {.34, 1.90}	.70 (0.473) {.27, 1.85}
Constant all year N=157	4.46		.24 (0.012)‡ {.079, .73}	.13 (0.006)‡ {.03, .55}

† comparing rates of diarrhea across categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf and ses factors, social marketing group (ses=wall type, ownership of refrigerator, type of dwelling)

Annex K

Diarrhea prevalence by household hygiene behaviors

Table 1. Garbage disposal

Means of Garbage Disposal	% of households with children under 5 years having diarrhea	Chi square† (p-vaues)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values) {confidence intervals}
Collected from home N=24	12.50	0.36 (0.948)	1	1
Collected at neighborhood box N=24	16.67		1.40 (0.683) { .28, 7.06}	1.46 (0.652) {.28, 7.51}
Openly discarded within premises/just outside premises N=1258	13.04		1.09 (0.938) { .30, 3.55}	1.25 (0.723) {.36, 4.35}
Burned/buried/composted N=10	10.00		.78 (0.837) {.07 , 8.52}	.74 (0.809) {.06, 8.39}

†comparing diarrhea prevalence across the garbage disposal site categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf (household head), ses indicator (housing conditions index), and social marketing group

Table 2. Child fecal disposal

Means of Child Fecal Disposal	% of households with children under 5 years having diarrhea	Chi-square† (p-vaues)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Directly into Sanitation Facility N=415	17.11	3.13 (0.209)	1	1
Washed/rinsed away N=138	19.57		1.17 (0.513) {.72, 1.93}	1.04 (0.882) {.58, 1.88}
Discarded into/outside premises N=74	25.68		1.67 (0.082) {.94, 2.99}	1.40 (0.528) { .50, 3.94}

†comparing diarrhea prevalence across the fecal disposal site categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf (primary child caretaker), ses indicator (housing conditions index), and social marketing group

Table 3. Soap use behaviors

Soap use behaviors	% of households with children under 5 years having diarrhea	Chi-square† (p-vaues)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values) {confidence intervals}
Soap use in past 24 hrs Yes N=1062 No N= 257	 13.75 10.12	 2.41 (0.121)	 1.41 (0.122) {.91, 2.20}	 0.67 (0.115) {0.42, 1.10}
Soap observed at hand-washing site Yes N=470 No=547	 9.57 14.81	 6.38 (0.012)‡	 .60 (0.012)‡ {.41 , .90}	 .25 (0.002)‡ {.10, .60}

†comparing diarrhea prevalence between households with soap use in 24 hrs, and soap observed at hand-washing site versus those with no soap use, and soap missing at site

‡ significant p-values (α=0.05)

◦95% CI

* OR comparing diarrhea in households with soap use in 24 hrs, and soap present at site against those without soap use, or soap at site

*** OR adjusted for sdf (primary child caretaker) , ses indicator (housing conditions index), social marketing group

Table 4. Reasons for using soap

Reasons for Soap use	% of households with children under 5 years having diarrhea	Chi square† (p-vaues)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values) {confidence intervals}
Prevent disease N=649	9.55	13.70 (0.000)‡	.53 (0.000)‡ {.38, .75}	.27 (0.000)‡ {.14, .51 }
Other reasons N= 670	16.42			
Prevent diarrhea N=154	11.69	0.28 (0.596)	.87 (0.596) {.52, 1.46}	.51 (0.153) { .20, 1.28}
Other reasons N=1,165	13.22			
Remove dirt N=783	14.69	4.56 (0.033)‡	1.44 (0.033)‡ { 1.03, 2.03}	.81 (0.481) {.46, 1.45}
Other reasons N= 535	10.65			
Good hygiene N=206	15.05	0.86 (0.354)	1.22 (0.355) {.80, 1.86}	1.99 (0.049)‡ {1.00, 3.97}
Other reasons N=1,112	12.68			
Remove germs N=607	13.34	0.09 (0.762)	1.05 (0.762) {.76, 1.44}	1.04 (0.877) {.63, 1.73}
Other reasons N= 712	12.78			

†comparing diarrhea prevalence among households citing reason for hand-washing with soap compared to those not citing that reason
‡ significant p-values (α=0.05)
◦95% CI
* OR comparing diarrhea for households citing reason for hand-washing with soap versus those that do not cite that reason
*** OR adjusted for soap use in 24 hrs, soap observed at site, sdf (primary child caretaker), ses indicator (housing conditions index), social marketing group

Annex L

FACTORS LIKED AND DISLIKED ABOUT CLORIN

1. FACTORS THAT COULD ENCOURAGE SUSTAINED USE IN CURRENT USERS

Table 1 A. Product features that are liked by the consumers (Current users).

Multiple answers were possible for these questions

features	Rate of Clorin Use (%)	Chi-square †	Odds ratios Unadjusted* (p values){confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Color N=288	54.51	11.33 (0.023)‡	1	1
Label N=272	62.87		2.95 (0.000)‡ {2.20, 3.96}	1.45 (0.036)‡ {1.02, 2.07}
Form N=138	48.55		1.64 (0.009)‡ {1.14, 2.38}	.84 (0.409) {.55, 1.28}
Size N=43	66.04		3.39 (0.000)‡ {1.88, 6.12}	1.58 (0.152) {.84, 2.96}
Lid N=35	48.57		1.65 (0.152) {.83, 3.26}	.79 (0.529) {.38, 1.64)

† comparing rates of current Clorin use across categories

‡ significant p-values (α=0.05)

◦95% CI

* OR unadjusted: reference group is category 1

*** OR adjusted for sdf and ses indicator (housing conditions index), social marketing group

Table 1 B. Product features that are liked by the consumers (past users only).

Multiple answers were possible for these questions

features	Rate of Clorin Use (%)	Chi-square †	Odds ratios Unadjusted* (p values){confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
Color N=290	26.90	15.19 (0.004)‡	1	1
Label N=272	25.37		1.25 (0.192) {0.90, 1.73 }	1.22 (0.249) { .87, 1.71 }
Form N=138	39.13		2.36 (0.000)‡ {1.60, 3.48}	2.20 (0.000)‡ { 1.47, 3.28 }
Size N=53	20.75		.96 (0.907) { .48, 1.91 }	.97 (0.940) { .49, 1.94 }
Lid N=36	44.44		2.93 (0.002)‡ { 1.48, 5.80 }	2.79 (0.004)‡ { 1.37, 5.65)

† comparing rates of *past* Clorin use across categories
‡ significant p-values (α=0.05)
◦95% CI
* OR unadjusted: reference group is category 1
*** OR adjusted for sdf and ses indicator (housing conditions index), social marketing group

Table 2 A. Features identified as requiring improvement (Current users).
Multiple answers were possible for these questions

Product features	Rate of Clorin Use (%)	Chi square† (p values)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
1.Form N=40 Other features N= 1,055	45.00 47.87	0.13 (0.722)	.89 (0.722) {.47, 1.68}	1.15(0.688) {.58, 2.26}
2.Size N=225 Other features N= 870	70.22 41.95	57.25 (0.000)‡	3.26 (0.000)‡ {2.38, 4.47}	2.59 (0.000)‡ {1.85, 3.61}
3.Price N=250 Other features N= 845	33.60 51.95	26.04 (0.000)‡	.46 (0.000)‡ {.35, .62}	.60 (0.001)‡ {.44, .82}
4.Color N=7 Other features N= 1,088	42.86 47.79	0.07 (0.794)	.82 (0.795) {.18, 3.67}	.66 (0.600) {.14, 3.14}
5.Labelling N=12 Other features N= 1,083	33.33 47.92	1.01 (0.314)	.54 (0.322) {.16, 1.82}	.65 (0.509) {.18, 2.32}
6.Concentration N=64 Other features N= 1,031	35.94 48.50	3.81 (0.051)‡	0.60 (0.053)‡ {.35, 1.01}	.65 (0.135) {.37, 1.14}
7. Lid N=7 Other features N= 1,088	71.43 47.61	1.58 (0.209)	2.75 (0.228) {.53, 14.24}	3.01 (0.203) { .55, 16.43}

† comparing rates of current Clorin use among households identifying each feature compared with those which do not
‡ significant p-values (α=0.05)
◦95% CI
*OR comparing Clorin use for households identifying each feature versus those that do not
***OR adjusted for sdf (water manager) , ses (housing conditions index), social marketing group

Table 2 B. Features identified as requiring improvement (Past users only).
Multiple answers were possible for these questions

Product features	Rate of Clorin Use (%)	Chi square† (p values)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
1.Form N=41	39.02	3.55 (0.059)	1.84(0.063) {.97, 3.50}	1.87 (0.073) {.94, 3.71}
Other features N= 1,058	25.80			
2.Size N=225	25.78	0.039 (0.843)	.96 (0.843) {.69, 1.35 }	1.34 (0.104) {.94, 1.93}
Other features N= 874	26.43			
3.Price N=252	35.71	14.96 (0.000)‡	1.81 (0.000)‡ {1.34, 2.45}	1.84 (0.000)‡ {1.32, 2.56 }
Other features N= 847	23.49			
4.Color N=7	57.14	3.45 (0.063)	3.78 (0.083) {.83, 16.97 }	5.95 (0.023)‡ {1.27, 27.82 }
Other features N= 1,092	26.10			
5.Labelling N=12	58.33	6.42 (0.011)‡	4.00 (0.019)‡ {1.26, 12.69}	4.31 (0.017)‡ { 1.30, 14.30 }
Other features N= 1,087	25.94			
6.Concentration N=64	40.63	7.20 (0.007)‡	2.00 (0.008)‡ { 1.20, 3.37 }	2.00 (0.012)‡ {1.16, 3.46}
Other features N= 1,035	25.41			
7. Lid N=7	28.57	0.02 (0.891)	1.12 (0.891) {.22, 5.81}	1.11 (0.905) {.17, 7.11 }
Other features N= 1,092	26.28			

† comparing rates of ***past*** Clorin use among households identifying each feature compared with those which do not
‡ significant p-values (α=0.05)
◦95% CI
*OR comparing Clorin use for households identifying each feature versus those that do not
***OR adjusted for sdf (water manager) , ses (housing conditions index), social marketing group

Table 3. Reasons why households began using Clorin

Reasons for initial use	Chi square† (p values)	Odds ratios Unadjusted* (p values) {confidence intervals}	Odds ratios Adjusted*** (p values){confidence intervals}
SFH N=10	0.01 (0.931)	.91 (0.931) {.11, 7.34}	0.67 (0.720) {.07, 6.17}
Neighbors N=6	0.62 (0.433)	predicts success perfectly	predicts success perfectly
District Health Clinic N=185	9.62 (0.002)‡	3.40 (0.003)‡ {1.50, 7.69}	3.77 (0.005)‡ {1.47, 9.57}
Unsafe drinking water N=190	1.16 (0.282)	1.42 (0.284) {.75, 2.68}	2.81 (0.015)‡ {1.22, 6.46}
Recent diarrhea case N=91	3.32 (0.068)	.54 (0.072) {.28, 1.06}	1.00 (0.991) {.43, 2.33}

† comparing rates of current Clorin use among households identifying each reason for beginning use versus those that do not identify that reason

‡ significant p-values (α=0.05)

◦95% CI

*OR comparing current Clorin use for households identifying each reason for initial use compared to those that do not identify that reason

***OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 4. Preferred price of purchase

Price	Chi-square †	Odds ratios Unadjusted* (p values)‡{confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
0 N=84	55.04 (0.000)‡	1	1
0-500 N=569		6.45 (0.000)‡ {3.05, 13.61}	7.23 (0.000)‡ {3.24, 16.11}
500+ N=559		9.95 (0.000)‡ {4.71, 21.0}	10.37 (0.000)‡ {4.65, 23.09}

† comparing rates of current Clorin use across price categories

‡ significant p-values (α=0.05)

◦95% CI

* OR unadjusted: reference group is category 1

*** OR adjusted for sdf and ses indicator (housing index), social marketing group

2. Factors affecting non-users

Table 5. Factors that halted CLORIN use in Past Users

Reasons for non-use	Chi-square† (p values)	Odds ratios Unadjusted* (p values)‡{confidence intervals}◦	Odds ratios Adjusted*** (p values){confidence intervals}
Bad smell N=96	4.37 (0.036)‡	.62 (0.038)‡ {.39, .97}	2.61 (0.048)‡ {1.01, 6.76}
Bad taste N=59	0.1024 (0.749)	1.06 (0.749) {.64, 1.87}	4.05 (0.005)‡ { 1.51, 10.84}
Cannot afford N=262	4.64 (0.031)‡	1.40 (0.031)‡ { 1.03, 1.91}	7.10 (0.000)‡ {2.60, 19.45}
Drinking water is safe N=87	25.11 (0.000)‡	.25 (0.000)‡ {0.14, 0.44}	1.33 (0.609) {0.45, 3.92}
Don't know about it N=73	41.44 (0.000)‡	.09 (0.000)‡ {0.03, 0.22}	0.35 (0.061) {0.12, 1.05}

† comparing rates of ***past*** Clorin use among households identifying each reason for ceasing use versus those that did not identify that reason
‡ significant p-values (α=0.05)
◦95% CI
*OR comparing current Clorin use for households identifying each reason for ceasing use compared to those that did not identify that reason
***OR adjusted for sdf, ses indicator (housing conditions index), social marketing group

Table 6. Reasons for never use of Clorin

Reasons for non-use	smell	taste	price	Believe water is safe	Unaware of CLORIN	Other (unspecified)
N=425	71 (16.71%)	40 (9.41%)	131(30.82%)	77 (18.12%)	66 (15.53%)	40 (9.4%)

ZAMBIA NATIONAL EVALUATION OF SAFE WATER SYSTEMS

INTRODUCTION FOR HEAD OF HOUSEHOLD

My name is …… The Mwengu Social and Health Research Center (Ndola) in collaboration with Johns Hopkins University and funded by USAID is conducting a national survey to evaluate progress that has been made in the government's program to provide access to safe drinking water for all households. The purpose of the survey is to help us evaluate the quality of your drinking water, household sanitation and hygiene and to identify your essential needs for improving the health of your family. In this survey, we will only interview caretakers of children five years old and below, together with those who are responsible for managing drinking water in households

The questions we are asking of participating households include:

- Information about the household and the people living here
- The current situation of water supply and sanitation
- Knowledge and practices concerning hygiene
- Other health care and household practices

Because time and resources are limited, households have been randomly selected to be included in the survey. Names and addresses of participants will not be included in the analysis or report, nor will information about your household be shared with anyone else. Participation is voluntary. If for any reason you do not wish to participate, this is your choice, and if you object to answering any specific questions in the questionnaire, this is also your choice. There are no disadvantages, if you decide not to participate or not to answer certain questions. However, we would appreciate your collaboration greatly.

The whole interview will take approximately 45 minutes and involve several members of your household. We would also like to test the quality of your drinking water. Do you agree to participate?

Yes No

Signature if **YES** _____

Interviewer, if the household refuses to participate, or if the survey cannot be done at the present time for other reasons, please, fill out the following page to the extent possible, including household characteristics and the people living there.

Start Time: ___/___/___/___ hrs

A - LOCATION

A1: PROVINCE ----------

A2: DISTRICT ----------

A3: COMPOUND/VILLAGE NUMBER ----------

A4: HOUSEHOLD NUMBER ----------

A5: QUESTIONNAIRE NUMBER ----------

A6 : SOCIAL ECONOMIC STATUS : 1. LOW INCOME 2. MEDIUM INCOME

NAME OF HEAD OF HOUSEHOLD: _____

Gender of Head of Household: **M** **F** (*circle one*) Age: _____ (*in years*)

Interview Language: ➔

Bemba…..1 Lunda…..5
English…..2 Luvale….6
Kaonde….3 Nyanja….7
Lozi……4 Tonga…..8
Other: _____

B - HOUSEHOLD CHARACTERISTICS and ELIGIBILITY

B.1: Wall Construction	B.2: Floor Construction	B.3: Roof Construction
Brick or cement blocks 1	Earth/Mud/Dung 1	Iron sheets……1
Stone 2	Wood Planks/Parquet 2	Earth 2
Mud.....3	PVC/Terrazo Tiles…….. 3	Tin 3
Raffia 4	Cement……4	Straw.....4
Other : _____ 5	Other _____ 5	Other _____5
Missing/Don't Know……9	Missing/Don't Know…… 9	Missing/Don't Know……9
B.4: TYPE OF DWELLING HOUSE ☐ HUT ☐	**B.5**: Children 0-59 months living here: YES ☐ NO ☐	**B.6**: Caretakers of children 0-59 months present: YES ☐ NO ☐

NUMBER OF VISITS TO HOUSEHOLD

	1	2	FINAL VISIT	* RESULT OF EACH VISIT
Date	☐☐☐	☐☐☐	☐☐☐	NO RETURN VISIT NEEDED Completed.....1 Refused.....2 Partially completed, return visit not agreed to.....3 People absent for extended period..4 Dwelling empty.....5 RETURN VISIT INDICATED Partially completed, return agreed...6 No elegible person present.....7 Other: _____ 8
Interviewer ID	☐☐	☐☐	☐☐	
Result*	☐	☐	☐	
If return visit indicated, enter date for next visit		☐☐☐	☐☐☐	

FIELD			OFFICE
Interviewer Completed Date ☐☐☐	**Field Supervisor Checked Date** ☐☐☐	**Study Supervisor Checked Date** ☐☐☐	**Data Entry Specialist Entry Date** ☐☐☐
Person's ID ☐☐	**Person's ID** ☐☐	**Person's ID** ☐☐	**Person's ID** ☐☐

TABLE C: HOUSEHOLD CENSUS

We would like to start this discussion by listing the people who are members in this household.

ID#	NAME	PRIMARY DRINKING WATER CARETAKER	SEX	AGE FOR PEOPLE AGE 5 YEARS AND OVER	AGE FOR CHILDREN 0- 59 MONTHS	PRIMARY CARETAKER OF EACH CHILD 0-59 MONTHS		ORPHAN, LOST BOTH OR ONE PARENT BECAUSE OF:*	
	Head of Household in Row 1 [Do not list visitors.]	Check the appropriate row	Circle M or F	In **YEARS**, Use 2 digits	In **MONTHS**, Use 2 digits	ID # OF CHILD CARETAKER FROM COLUMN A	RELATIONSHIP OF CARETAKER TO CHILD**	Other (*check*)	HIV/ AIDS (*check*)
A	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**	**J**
1			**M F**						
2			**M F**						
3			**M F**						
4			**M F**						
5			**M F**						
6			**M F**						
7			**M F**						
8			**M F**						
9			**M F**						
10			**M F**						
11			**M F**						
12			**M F**						

* If one parent is lost due to HIV/AIDS or other circumstances, check one column. If child lost both parents due to same cause, tick twice in the same column. If both parents are lost due to different causes, check both columns.

** Codes for Column H
Mother..... 01
Grandmother..... 02
Sister..... 03
Aunt 04
Father 05
Brother..... 06
Other family (female) .. 07
Other family (male) 08
Not family (female) 09
Not family (male)……..10

CENSUS CONTINUATION IF NECESSARY

ID#	NAME	PRIMARY DRINKING WATER CARETAKER	SEX		AGE FOR PEOPLE AGE 5 YEARS AND OVER		AGE FOR CHILDREN 0- 59 MONTHS		PRIMARY CARETAKER OF EACH CHILD 0-59 MONTHS		ORPHAN, LOST BOTH OR ONE PARENT BECAUSE OF:*	
	Head of Household in Row 1 [Do not list visitors.]	Check the appropriate row	Circle M or F		In **YEARS**, Use 2 digits		In **MONTHS**, Use 2 digits		ID # OF CHILD CARETAKER FROM COLUMN A	RELATIONSHIP OF CARETAKER TO CHILD**	Other (*check*)	HIV/ AIDS (*check*)
A	**B**	**C**	**D**		**E**		**F**		**G**	**H**	**I**	**J**
13			**M**	**F**								
14			**M**	**F**								
15			**M**	**F**								
16			**M**	**F**								
17			**M**	**F**								
18			**M**	**F**								
19			**M**	**F**								
20			**M**	**F**								
21			**M**	**F**								
22			**M**	**F**								
23			**M**	**F**								
24			**M**	**F**								

* If one parent is lost due to HIV/AIDS or other circumstances, check one column. If child lost both parents due to same cause, tick twice in the same column. If both parents are lost due to different causes, check both columns.

** Codes for Column H

Mother..... 1
Grandmother..... 2
Sister..... 3
Aunt 4
Father 5
Brother 6
Other family (female) 7
Other family (male) 8
Not family (female) 9
Not family (male)……..10

D - Household Questionnaire

(INTERVIEW HEAD OF HOUSEHOLD OR HIS/HER REPLACEMENT)

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
1.	I would like to ask _____[*name of head of household or replacement*] some questions about your family and household.	ID number from census list: ☐☐	
2.	What is your current marital status?	MARRIED .....1 SINGLE.....2 SEPARATED / DIVORCED .....3 WIDOW / WIDOWER 4	
3.	What is the highest level of school you have attended? (PROBE AND THEN CIRCLE ONLY ONE)	NO FORMAL SCHOOLING.....1 PRIMARY, INCOMPLETE.....2 PRIMARY, COMPLETED.....3 SECONDARY, INCOMPLETE .....4 SECONDARY, COMPLETED .....5 SECONDARY, PROFESSIONAL LEVEL.....6 COLLEGE/UNIVERSITY, INCOMPLETE.....7 COLLEGE/UNIVERSITY, COMPLETED.....8 DON'T KNOW_____99	
4.	Can you read and write? *(CIRCLE ONLY ONE)*	CAN READ .....1 CAN WRITE.....2 BOTH READ AND WRITE .....3 NEITHER READ NOR WRITE 4	
5.	Does your household have the following items (IF in working order only)? (READ ALL ITEMS OUT LOUD AND CIRCLE THOSE MENTIONED)	ELECTRICITY .....1 CAR/TRUCK.....2 MOTORCYCLE .....3 BICYCLE .....4 BOAT/DUGOUT/OUTBOARD.....5 RADIO WITHOUT CASSETTE PLAYER .....6 RADIO WITH CASSETTE PLAYER.....7 TELEVISION.....8 REFRIGERATOR .....9 SEWING MACHINE.....10 KEROSENE OR GAS COOKER .....11 COLMAN/PRESSURE LAMP.....12 LARGE LIVESTOCK .....13 SMALL LIVESTOCK.....14 LAND FOR SUBSISTENCE FARMING .....15 LAND FOR CASH CROP (COFFEE, COCOA, TEA, VEGETABLES, OTHERS).....16 SHELVES .....17 CHAIRS OF SOLID WOOD……18 TABLES OF SOLID WOOD .....19 GAS GENERATOR OR SOLAR PANEL.....20 CHAIRS OF METAL……21 TABLES OF METAL……22 CHAIRS OF GRASS……23 TABLES OF GRASS……24	

6.	Do you own this dwelling you are living in now?	YES.....1 NO .....2 DON'T KNOW.....99	➔8
7.	If not, how likely is it that you could be evicted from this dwelling: Would you say very likely, somewhat likely, or not at all likely? (CIRCLE ONLY ONE)	VERY LIKELY .....1 SOMEWHAT LIKELY .....2 NOT AT ALL LIKELY .....3 DON'T KNOW 99	
8.	Does this household have a sanitation facility?	YES.....1 NO 2	➔9
8a	What type of sanitation facility is available to this household? (CHECK ONE)	FLUSH TOILET WITH CONNECTION TO A PUBLIC SEWER..... 11 FLUSH TOILET WITH CONNECTION TO SEPTIC SYSTEM..... 12 POUR-FLUSH LATRINE..... 13 COVERED PIT LATRINE (WITH SLAB, SIMPLE PIT, VIP)..... 14 UNCOVERED PIT LATRINE (NO SLAB, OPEN PIT)15 SERVICE OR BUCKET LATRINE (WHERE EXCRETA ARE MANUALLY REMOVED).....16 OTHER _____ 88 (SPECIFY) DON'T KNOW..... 99	
8b	Where is your sanitation facility located? (CIRCLE ONLY ONE)	IN DWELLING .....1 IN YARD/PLOT .....2 OUTSIDE YARD/PLOT/COMPOUND, SHARED PRIVATE FACILITY.....3 OUTSIDE YARD/PLOT/COMPOUND, SHARED PUBLIC FACILITY.....4 DON'T KNOW.....99	
8c	How many households share this sanitation facility?	_____ HOUSEHOLDS NOT SHARED .....0 DON'T KNOW.....99 100 OR MORE 1	

9.	What is the principal way you dispose of your garbage?	COLLECTED FROM HOME BY GOVERNMENT ..... 11 BY COMMUNITY ASSOCIATION ..... 12 BY PRIVATE COMPANY ..... 13 COLLECTED AT NEIGHBORHOOD BOX BY GOVERNMENT ..... 21 BY COMMUNITY ASSOCIATION ..... 22 BY PRIVATE COMPANY ..... 23 THROWN OUT OPEN WASTE PIT ..... 31 IN A DISTANT PLACE (IN OPEN) ..... 32 OUTSIDE PREMISES/IN STREET (IN OPEN, NO PIT) ..... 33 WITHIN PLOT/YARD OR PREMISES ..... 34 BURNED ..... 41 BURIED ..... 42 COMPOSTED ..... 43 RECYCLED ..... 44 FED TO ANIMALS ..... 45 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	 ➔11 ➔11 ➔11 ➔11 ➔11 ➔11 ➔11 ➔11 ➔11 ➔11 ➔11
10.	If garbage is collected, how frequently?	AT LEAST ONCE PER WEEK ..... 1 AT LEAST ONCE EVERY OTHER WEEK ..... 2 AT LEAST ONCE PER MONTH ..... 3 LESS FREQUENT ..... 4 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
	E. Water Supply (Questions addressed to the primary drinking water caretaker)		
11.	Now, I would like to ask _____[*name of water caretaker*] about household drinking water management:	ID number from census list: 	
12.	What is the highest level of school you attended?	NO FORMAL SCHOOLING ..... 11 PRIMARY, INCOMPLETE ..... 12 PRIMARY, COMPLETED ..... 13 SECONDARY, INCOMPLETE ..... 14 SECONDARY, COMPLETED ..... 15 SECONDARY, PROFESSIONAL LEVEL ..... 16 COLLEGE/UNIVERSITY, INCOMPLETE ..... 17 COLLEGE/UNIVERSITY, COMPLETED ..... 18 DON'T KNOW 99	
13.	Can you read and write?	CAN READ ..... 1 CAN WRITE ..... 2 BOTH READ AND WRITE ..... 3 NEITHER READ NOR WRITE 4	
14.	How often do you listen to the radio?	EVERY DAY ..... 1 SEVERAL TIMES PER WEEK ..... 2 AT LEAST ONCE PER WEEK ..... 3 LESS FREQUENTLY ..... 4 NEVER 5	
15.	How often do you watch TV?	EVERY DAY ..... 1 SEVERAL TIMES PER WEEK ..... 2 AT LEAST ONCE PER WEEK ..... 3 LESS FREQUENTLY ..... 4 NEVER 5	
16.	What is the principal source of drinking water for members of your household? [17] (CHECK ONE)	PIPED WATER ..... 11 PROTECTED TUBEWELL OR BOREHOLE ..... 12 UNPROTECTED TUBEWELL OR BOREHOLE ..... 13 PROTECTED DUG WELL ..... 14 UNPROTECTED DUG WELL ..... 15 PROTECTED SPRING ..... 16 UNPROTECTED SPRING ..... 17 PROTECTED RAIN WATER COLLECTION ..... 18 UNPROTECTED RAIN WATER COLLECTION ..... 19 SMALL WATER VENDORS/PEDDLERS ..... 20 TANKER TRUCK ..... 21 BOTTLED WATER ..... 22 SURFACE WATER SPRING ..... 41 RIVER/STREAM ..... 42 POND/LAKE ..... 43 DAM ..... 44 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	
16a	Where is your principal source of drinking water located?	IN DWELLING ..... 1 IN YARD/PLOT ..... 2 OUTSIDE YARD/PLOT/, SHARED PRIVATE SOURCE ..... 3 OUTSIDE YARD/PLOT/, SHARED PUBLIC SOURCE ..... 4 DON'T KNOW 99	→18 →18

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
17.	How long does it take you to go to your principal water source, get water, and come back? (RECORD IN THREE NUMBERS ONLY)	MINUTES [ ][ ][ ]	

F - CONTINUITY OF WATER SUPPLY

18	In the last two weeks, how frequently has water been available from your principal source? (PROBE AND CIRLCE ONLY ONE)	ALL THE TIME ..... 11 SEVERAL HOURS EVERY DAY ..... 12 A FEW TIMES A WEEK ..... 13 LESS FREQUENTLY ..... 14 NOT AT ALL ..... 15 DON'T KNOW 99	
18a	When you have disruptions, what do you do to get water for drinking?	WAIT UNTIL WATER BECOMES AVAILABLE AGAIN ..... 1 GET WATER FROM A DIFFERENT SOURCE ..... 2 OTHER ..... 88 (SPECIFY) DON'T KNOW 99	➔19 ➔19 ➔19
18b	When you GET WATER FROM A DIFFERENT SOURCE, what is the **main** source of drinking water for members of your household? [18] (CHECK ONE)	PIPED WATER ..... 11 PROTECTED TUBEWELL OR BOREHOLE ..... 12 UNPROTECTED TUBEWELL OR BOREHOLE ..... 13 PROTECTED DUG WELL ..... 14 UNPROTECTED DUG WELL ..... 15 PROTECTED SPRING ..... 16 UNPROTECTED SPRING ..... 17 PROTECTED RAIN WATER COLLECTION ..... 18 UNPROTECTED RAIN WATER COLLECTION ..... 19 SMALL WATER VENDORS/PEDDLERS ..... 20 TANKER TRUCK ..... 21 BOTTLED WATER ..... 22 SURFACE WATER SPRING ..... 41 RIVER/STREAM ..... 42 POND/LAKE ..... 43 DAM ..... 44 OTHER ..... 88 (SPECIFY) DON'T KNOW 99	
18c	Where is your alternative source of drinking water located? (CIRLCE ONLY ONE)	IN DWELLING ..... 1 IN YARD/PLOT ..... 2 OUTSIDE YARD/PLOT/, SHARED PRIVATE SOURCE ..... 3 OUTSIDE YARD/PLOT/, SHARED PUBLIC SOURCE ..... 4 DON'T KNOW 99	
19.	Do you pay for water?	YES ..... 1 NO 2	➔22

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
20.	If yes, when do you pay?	EVERY LOAD ..... 1 EVERY DAY..... 2 EVERY WEEK ..... 3 EVERY MONTH..... 4 PER CUBIC METER/WATERMETER ..... 5 OTHER..... 8 (SPECIFY) DON'T KNOW..... 9	
21.	How much do you pay?	ZK_____	

G - WATER STORAGE, HANDLING AND TREATMENT

22.	Do you store drinking water in containers in the household?	YES..... 1 NO..... 2 DON'T KNOW..... 99	 ➔34 ➔34
23.	If not piped into dwelling, who usually collects water? (CIRCLE ALL THAT APPLY)	ADULT WOMEN .....1 SCHOOL AGE FEMALE CHILDREN.....2 ADULT MEN .....3 SCHOOL AGE MALE CHILDREN .....4 YOUNG, PRE-SCHOOL AGE CHILDREN .....5 OTHER _____88 (SPECIFY)	
23a	Who is usually responsible for water stored in the household? (CIRCLE ONLY ONE)	ADULT WOMEN .....11 SCHOOL AGE FEMALE CHILDREN.....12 ADULT MEN .....13 SCHOOL AGE MALE CHILDREN .....14 GRANDMOTHER.....15 GRANDFATHER.....16 OTHER FEMALE HOUSEHOLD MEMBER .....17 OTHER MALE HOUSEHOLD MEMBER .....18 OTHER _____ 88 (SPECIFY) DON'T KNOW.....99	
24.	How many containers of drinking water do you use per day?	NUMBER: ……..___ DON'T KNOW……99	
25.	What are the container volumes? (CONFIRM AND CIRCLE ALL THAT APPLY)	2.5 LITERS (Butiza) ..... 1 5 LITERS ..... 2 20 LITERS..... 3 OTHER: NUMBER OF LITERS ..... ___	
26.	What types of containers are they? (CONFIRM AND CIRCLE ALL THAT APPLY) Check later which ones are used to treat drinking water with CLORIN	CLAY JARS..... 1 PLASTIC CONTAINERS..... 2 METAL CONTAINERS..... 3 OTHER _____88 (SPECIFY)	
26a.	What types of neck do they have? (CONFIRM AND CIRCLE ALL THAT APPLY)	NARROW NECKED..... 1 WIDE NECKED..... 2 OF BOTH TYPES 3	➔27

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
26b	If all or some are narrow neck, is the diameter of the neck small enough to prevent a child's hand to enter? (VERIFY BY COMPARING TO TEMPLATE)	YES ..... 1 NO ..... 2 CANNOT ASSESS 3	
27.	Are the containers covered? (CONFIRM AND CHECK)	YES, ALL ARE ..... 1 NO, NONE ARE ..... 2 SOME ARE 3	
28.	OBSERVE: WHERE ARE THE WATER CONTAINERS PLACED? CIRCLE WHAT APPLIES	ON THE FLOOR ..... 1 ELEVATED ABOVE THE FLOOR 2	
29.	Who draws water from these containers? (CIRCLE ALL THAT APPLY)	ADULTS ..... 1 SCHOOL AGE CHILDREN ..... 2 CHILDREN UNDER 5 3	
30.	How do you get water from the drinking water container?	POURING ..... 1 DIPPING ..... 2 BOTH POURING AND DIPPING ..... 3 CONTAINER HAS A SPIGOT ..... 4 OTHER ..... 88 (SPECIFY) DON'T KNOW 99	➔32 ➔32 ➔32 ➔32
31.	What do you use to get water from the containers?	SAME RECEPTACLE USED TO DRINK FROM ..... 1 RECEPTACLE RESERVED FOR RETRIEVING WATER 2	
32.	Are the water containers cleaned?	YES ..... 1 NO ..... 2 DON'T KNOW 99	 ➔34 ➔34

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
33.	When were they cleaned last?	TODAY ..... 11 YESTERDAY ..... 12 LESS THAN ONE WEEK AGO ..... 13 LESS THAN A MONTH AGO ..... 14 LESS FREQUENT ..... 15 NEVER ..... 16 DON'T REMEMBER 98	
34.	Do you think the water you drink is safe directly from the source?	YES ..... 1 NO ..... 2 DON'T KNOW 99	➔35a ➔35a
35.	Why do you think it isn't safe? (CIRCLE ALL THAT APPLY)	CONTAINS DIRT ..... 1 CONTAINS CHEMICAL POLLUTANT ..... 2 CONTAINS BACTERIA ..... 3 TASTES SALTY ..... 4 NOT CLEAR / SEDIMENTS ..... 5 COLORED ..... 6 ANIMALS HAVE COME IN CONTACT WITH IT ..... 7 OTHER _____ 88 (SPECIFY)	
35a	Have you ever done anything to your household drinking water to make it safer? **Note: people may still treat even if they believe water is safe**	YES ..... 1 NO ..... 2 DON'T KNOW 99	➔39 ➔39

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
36.	What did you do to the water to make it safer to drink? (CIRCLE ALL THAT APPLY)	BOIL ..... 1 BLEACH/CHLORINE (OTHER THAN CLORIN)..... 2 ADD CLORIN ..... 3 FILTER IT THROUGH CLOTH ..... 4 WATER FILTER (CERAMIC, SAND, COMPOSITE) 5 SOLAR DISINFECTION..... 6 OTHER_____ 88 (SPECIFY) DON'T KNOW 99	
37.	When did you treat your drinking water last? (RECORD APPROPRIATE CODES IN THE RESPONSE CATEGORY) ENTER ONE OF FOLLOWING CODES TODAY..... 1 YESTERDAY ..... 2 LESS THAN ONE WEEK AGO..... 3 LESS THAN A MONTH AGO ..... 4 LESS FREQUENT ..... 5 NEVER ..... 6 DON'T REMEMBER 9	BOIL ..... ___ BLEACH/CHLORINE (OTHER THAN CLORIN)... ___ ADD CLORIN ..... ___ FILTER IT THROUGH CLOTH ..... ___ WATER FILTER (CERAMIC, SAND, COMPOSITE) ..... ___ SOLAR DISINFECTION..... ___ OTHER_____ ___	➔39
38.	If water is treated by a method other than boiling, may I see the product or device? (CIRCLE ALL THAT APPLY, VERIFY THAT THE BOTTLES ARE NOT EMPTY)	CLORIN IS PRESENT (LIQUID PRESENT)..... 1 BLEACH/CHLORINE (OTHER THAN CLORIN)..... 2 CLOTH FILTER PRESENT..... 3 WATER FILTER PRESENT..... 4 SOLAR DISINFECTION PRESENT..... 5 NONE AVAILABLE ..... 6 OTHER_____ 88 (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
39	Have you used clorin in the past?	YES ..... 1 NO ..... 2 DON'T KNOW 99	 ➔39e ➔39e
39a	When did you use CLORIN last for any uses mentioned? (RECORD APPROPRIATE CODES IN THE RESPONSE CATEGORY) ENTER ONE OF FOLLOWING CODES TODAY ..... 1 YESTERDAY ..... 2 LESS THAN ONE WEEK AGO ..... 3 LESS THAN A MONTH AGO ..... 4 LESS FREQUENT ..... 5 NEVER ..... 6 DON'T REMEMBER 9	TREAT ALL WATER ..... _____ TREAT DRINKING WATER ONLY ..... _____ FOR DOING LAUNDRY ..... _____ FOR CLEANING ..... _____ FOR DISINFECTING BABY BOTTLE ..... _____ OTHER _____ _____88 (SPECIFY) DON'T KNOW 99	
39b	What do you use CLORIN for?	**TREAT** ALL WATER ..... 1 TREAT DRINKING WATER ONLY ..... 2 FOR DOING LAUNDRY ..... 3 FOR CLEANING WALLS, FLOORS, POTS ..... 4 FOR DISINFECTING BABY BOTTLE ..... 5 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	
39c	Who in the household treated drinking water the last time with CLORIN?	ADULT WOMEN .....11 SCHOOL AGE FEMALE CHILDREN .....12 ADULT MEN .....13 SCHOOL AGE MALE CHILDREN .....14 GRANDMOTHER .....15 GRANDFATHER .....16 OTHER FEMALE HOUSEHOLD MEMBER .....17 OTHER MALE HOUSEHOLD MEMBER .....18 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	
39d	Who in the household bought CLORIN the last time?	ADULT WOMEN .....11 SCHOOL AGE FEMALE CHILDREN .....12 ADULT MEN .....13 SCHOOL AGE MALE CHILDREN .....14 GRANDMOTHER .....15 GRANDFATHER .....16 OTHER FEMALE HOUSEHOLD MEMBER .....17 OTHER MALE HOUSEHOLD MEMBER .....18 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	
39 d	When did you buy CLORIN last?	TODAY ..... 11 YESTERDAY ..... 12 LESS THAN ONE WEEK AGO ..... 13 LESS THAN A MONTH AGO ..... 14 LESS FREQUENT ..... 15 NEVER ..... 16 DON'T REMEMBER 98	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
39e	Which month (s) of the year do you think is the quality of your water best? READ THE CHOICES OUT LOUD AND CIRCLE THE ANSWER/S GIVEN	OCTOBER - DECEMBER ..... 1 JANUARY - MARCH ..... 2 APRIL - JUNE ..... 3 JULY - SEPTEMBER ..... 4 ALL YEAR THE SAME ..... 5 NONE……..6 DON'T KNOW 99	
39f	Which season the year do you think is the quality of your water best? (READ THE CHOICES OUT LOUD AND CIRCLE THE ANSWER/S GIVEN)	COLD-DRY SEASON ..... 1 HOT-DRY SEASON ..... 2 WARM-WET SEASON ..... 3 ALL YEAR THE SAME ..... 5 NONE……..6 DON'T KNOW 99	
39g	Which month (s) during the year do you think is the quality of your water worst? READ THE CHOICES OUT LOUD AND CIRCLE THE ANSWER/S GIVEN	OCTOBER - DECEMBER ..... 1 JANUARY - MARCH ..... 2 APRIL - JUNE ..... 3 JULY - SEPTEMBER ..... 4 ALL YEAR THE SAME ..... 5 DON'T KNOW 99	
39h	Which season do you think is the quality of your water worst? READ THE CHOICES OUT LOUD AND CIRCLE THE ANSWER/S GIVEN	COLD-DRY SEASON ..... 1 HOT-DRY SEASON ..... 2 WARM-WET SEASON ..... 3 ALL YEAR THE SAME ..... 5 DON'T KNOW 99	

H – MARKETING OF CLORIN

40.	Have you ever heard of CLORIN, a chemical that is used to make drinking water safe**?**	YES ..... 1 NO 2	➔62
40a	Where did you hear about it? (CIRCLE ALL THAT APPLIES)	RADIO ..... 1 TELEVISION ..... 2 SHOP/MARKET ..... 3 LEAFLETS/BOOKLETS ..... 4 COMMUNITY BASED AGENT ..... 5 ADVERTISEMENT IN NEWSPAPER ..... 6 SOCIETY FOR FAMILY HEALTH……7 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	
41.	Have you ever used CLORIN to treat drinking water?	YES ..... 1 NO ..... 2 DON'T KNOW 99	➔44
42.	Why haven't you ever used it? (CIRCLE ALL THAT APPLY)	BAD SMELL ..... 1 BAD TASTE ..... 2 CAN'T AFFORD IT ..... 3 DRINKING WATER IS SAFE ..... 4 DON'T KNOW MUCH ABOUT IT ..... 5 THIS IS NOT THE DIARRHEA SEASON ..... 6 OTHER _____ 88 (SPECIFY)	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
43.	What could persuade you to use CLORIN?	CAMPAIGN.....1 ADVERTISEMENT .....2 NEIGHBORS .....3 LOWER PRICE .....4 .....5 NOTHING WOULD PERSUADE ME .....8 DON'T KNOW.....99	
44.	How much would you pay for CLORIN?	NOTHING……..1 LESS THAN 100 ZK……2 100 – LESS THAN 200 ZK……3 200 – LESS THAN 300 ZK……4 300 – LESS THAN 400 ZK……5 400 – LESS THAN 500 ZK……6 500 ZK OR MORE……7	
45.	Are you using CLORIN to treat drinking water now?	YES.....1 NO 2	➔47
46.	Why aren't you using it now ? (CIRCLE ALL THAT APPLY)	BAD SMELL.....1 BAD TASTE.....2 CAN'T AFFORD IT .....3 DRINKING WATER IS SAFE .....4 DON'T KNOW MUCH ABOUT IT .....5 THIS IS NOT THE DIARRHEA SEASON.....6 OTHER _____88 (SPECIFY)	
47.	**How long have you been using it to treat your drinking water?**	**MONTHS ....._____** **DON'T KNOW 99**	
47a	What caused you to start using CLORIN? (CIRCLE ALL THAT APPLY)	SFH VISITATION.....1 EVERYONE HERE DOES IT .....2 DHMB SAID SO.....3 OUR DRINKING WATER ISN'T SAFE.....4 MEMBERS OF THE FAMILY GOT DIARRHEA.....5 OTHER _____88 (SPECIFY) DON'T KNOW.....99	
48.	How is CLORIN packaged?	IN A BLUE BOTTLE.....1 IN A SATCHET……2 IN A PACKET.....3 IN A HEAP……..4 OTHER_____88 (SPECIFY) DON'T KNOW……99	
49.	Which quarter do you think would be the most appropriate for you to purchase and use CLORIN? READ THE CHOICES OUT LOUD AND CIRCLE THE ANSWER/S GIVEN	OCTOBER - DECEMBER .....1 JANUARY - MARCH.....2 APRIL - JUNE.....3 JULY - SEPTEMBER.....4 ALL YEAR THE SAME .....5 DON'T KNOW.....99	
49a	Which season do you think would be the most appropriate for you to purchase and use CLORIN? READ THE CHOICES OUT LOUD AND CIRCLE THE ANSWER/S GIVEN	COLD-DRY SEASON .....1 HOT-DRY SEASON .....2 WARM-WET SEASON .....3 ALL YEAR THE SAME .....5 DON'T KNOW.....99	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
50.	Where have you seen or heard messages about CLORIN most often? (CIRCLE ALL THAT APPLY)	RADIO .....1 TELEVISION.....2 SHOP/MARKET.....3 LEAFLETS/BOOKLETS .....4 COMMUNITY BASED AGENT.....5 ADVERTISEMENT IN NEWSPAPER .....6 OTHER _____88 (SPECIFY) DON'T KNOW.....99	
50 a.	When did you hear about CLORIN last?	TODAY..... 11 YESTERDAY ..... 12 LESS THAN ONE WEEK AGO..... 13 LESS THAN A MONTH AGO..... 14 LESS FREQUENT ..... 15 NEVER ..... 16 DON'T REMEMBER 98	
51.	Who in this community is promoting the use of CLORIN? (CIRCLE ALL THAT APPLY)	SOCIETY FOR FAMILY HEALTH .....1 DHMB .....2 HEALTH CENTER.....3 HEALTH NEIGHBORHOOD.....4 COMMUNITY BASED AGENT.....5 NOONE.....6 OTHER _____88 (SPECIFY) DON'T KNOW.....99	
52.	How is CLORIN promotion carried out in this community? (CIRCLE ALL THAT APPLY)	THROUGH POSTERS .....1 HOUSE TO HOUSE VISITS.....2 MAN BY SFH.....3 DRAMA BY SFH.....4 COMMUNITY BASED AGENT.....5 HEALTH CENTER CAMPAIGN.....6 OTHER _____88 (SPECIFY) DON'T KNOW.....99	
53.	Where do you buy CLORIN? (CIRCLE ALL THAT APPLY)	HEALTH CENTER.....1 CHEMIST.....2 SHOP/MARKET.....3 DOOR TO DOOR SALESPERSON .....4 COMMUNITY BASED AGENT.....5 OTHER_____88 (SPECIFY) DON'T KNOW.....99	
54.	How far away is the place where you buy CLORIN?	AT MY DOOR .....1 LESS THAN 15 MINUTES.....2 15 TO 30 MINUTES.....3 GREATER THAN 30 MINUTES .....4 OTHER _____88 (SPECIFY) DON'T KNOW.....99	
55.	How much do you pay for a bottle of CLORIN?	ZKWACHA....._____ OTHER.....88 DON'T KNOW.....99	
56.	What do you think a reasonable price for a bottle of CLORIN would be so that the majority of households could afford to use it?	ZKWACHA....._____ OTHER....._____ DON'T KNOW.....99	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
57.	What do you like about the CLORIN bottle?	COLOR ..... 1 LABEL ..... 2 FORM ..... 3 SIZE ..... 4 CLOSURE/LID/CAP * If one parent is lost due to HIV/AIDS or other circumstances, check one column. If child lost both parents due to same cause, tick twice in the same column. If both parents are lost due to different causes, check both columns. 5 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	
58.	How should CLORIN be improved?	SELL WITHOUT BOTTLE (I BRING MY OWN) ..... 11 SELL IN REUSABLE BOTTLE ..... 12 SMALLER BOTTLE ..... 13 LARGER BOTTLE ..... 14 LOWER PRICE ..... 15 CHANGE COLOR ..... 16 CHANGE FORM ..... 17 CHANGE LABEL ..... 18 LESS CONCENTRATED ..... 19 MORE CONCENTRATED (USE LESS PER CONTAINER) ..... 20 DIFFERENT CLOSURE ..... 21 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	
58a	What do you think about the quantity of liquid in the bottle?	THE RIGHT AMOUNT ..... 1 TOO MUCH ..... 2 TOO LITTLE ..... 3 DON'T KNOW 4	
59.	When you treat water with CLORIN, how much do you put into containers of the following sizes? 2.5 LITERS	INNER LID 1/2 ..... 1 INCORRECT 2	
59a	In a 5 LITERS container	INNER LID FULL (1) ..... 1 INCORRECT.. 2	
59b	20 LITERS container	INNER LID 1 AND OUTER LID 1 ..... 1 INCORRECT.. 2	
59c	Who in the household usually treats drinking water with CLORIN?	ADULT WOMEN ..... 11 SCHOOL AGE FEMALE CHILDREN ..... 12 ADULT MEN ..... 13 SCHOOL AGE MALE CHILDREN ..... 14 GRANDMOTHER ..... 15 GRANDFATHER ..... 16 OTHER FEMALE HOUSEHOLD MEMBER ..... 17 OTHER MALE HOUSEHOLD MEMBER ..... 18 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	

NO.	QUESTIONS AND FILTERS	CODING CATEGORIES	SKIP
59d	Who in the household **usually** buys CLORIN?	ADULT WOMEN ..... 11 SCHOOL AGE FEMALE CHILDREN ..... 12 ADULT MEN ..... 13 SCHOOL AGE MALE CHILDREN ..... 14 GRANDMOTHER ..... 15 GRANDFATHER ..... 16 OTHER FEMALE HOUSEHOLD MEMBER ..... 17 OTHER MALE HOUSEHOLD MEMBER ..... 18 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	
60.	How do you think CLORIN makes the drinking water safer?	HELPS KILL GERMS/BACTERIA ..... 1 IMPROVES THE TASTE ..... 2 OTHER _____ ..... 88 DON'T KNOW 99	
61.	Since you have been using CLORIN, do you think it has improved the health of your family?	YES ..... 1 NO ..... 2 DON'T KNOW 99	

I - QUESTIONNAIRE FOR PRIMARY CARETAKER OF CHILD LESS THAN 60 MONTHS

Hygiene Behaviors

62.	Now, I would like to ask _____[*name of the child care-taker*] about hygiene:	ID number from list: ☐☐	
63.	What is the highest level of school you attended?	NO FORMAL SCHOOLING ..... 11 PRIMARY, INCOMPLETE ..... 12 PRIMARY, COMPLETED ..... 13 SECONDARY, INCOMPLETE ..... 14 SECONDARY, COMPLETED ..... 15 SECONDARY, PROFESSIONAL LEVEL ..... 16 COLLEGE/UNIVERSITY, INCOMPLETE ..... 17 COLLEGE/UNIVERSITY, COMPLETED ..... 18 DON'T KNOW _____ 99	
64.	Can you read and write?	CAN READ ..... 1 CAN WRITE ..... 2 BOTH READ AND WRITE ..... 3 NEITHER READ NOR WRITE 4	
65.	Where did [*name of child*] defecate the last time?	USED SANITATION FACILITY ..... 11 USED POTTY ..... 12 USED WASHABLE DIAPERS ..... 13 USED DISPOSABLE DIAPERS ..... 14 WENT IN HOUSE/YARD ..... 15 WENT OUTSIDE THE PREMISES ..... 16 WENT IN HIS/HER CLOTHS ..... 17 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	➔67
66.	The last time [*name of child*] pasted stools, where were the feces disposed of? *(IF "WASHED OR RINSED AWAY", PROBE WHERE THE WASTE WATER WAS DISPOSED OF. IF "THROWN OUT", PROBE WHERE IT WAS THROWN SPECIFICALLY.*	INTO SANITATION FACILITY ..... 11 RINSED/WASHED AWAY WATER DISCARDED INTO SANITATION FACILITY ..... 21 WATER DISCARDED INTO SINK OR TUB CONNECTED TO SEWER/SEPTIC SYSTEM . 22 WATER DISCARDED INTO COVERED GREY-WATER PIT ..... 23 WATER DISCARDED INTO THE OPEN OR OPEN GREY-WATER PITS ..... 24 THROWN OUT INTO GARBAGE PIT ..... 31 INTO TRASH ..... 32 INTO YARD ..... 33 OUTSIDE THE PREMISES ..... 34 BURIED ..... 41 DID NOTHING ..... 51 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	

J: HYGIENE AND HEALTH KNOWLEDGE

67.	Do you have soap in your household today?	YES ..... 1 NO ..... 2 DON'T KNOW 99	
68.	Have you used soap during the past 24 hours?	YES ..... 1 NO ..... 2 DON'T KNOW 99	

69.	When you used soap during the past 24 hours, what did you use it for? If for washing hands is mentioned, probe what was the occasion, but do not read the answers. (DO NOT READ THE ANSWERS, ASK TO BE SPECIFIC, ENCOURAGE "WHAT ELSE" UNTIL NOTHING FURTHER IS MENTIONED AND CHECK ALL THAT APPLY)	WASHING CLOTHS ..... 1 WASHING MY BODY ..... 2 WASHING MY HANDS ..... 3 WASHING MY CHILDREN ..... 4 WASHING CHILD'S BOTTOMS ..... 5 WASHING MY CHILDREN'S HANDS ..... 6 WASHING HANDS AFTER DEFECATING ..... 7 WASHING HANDS AFTER CLEANING CHILD ..... 8 WASHING HANDS BEFORE FEEDING CHILDREN 9 WASHING HANDS BEFORE PREPARING FOOD . 10 WASHING HANDS BEFORE EATING ..... 11 OTHER _____ 88 (SPECIFY) DON'T REMEMBER 96	
70.	What do you think can cause diarrhea in children under 5 years of age? (DO NOT READ THE ANSWERS, ENCOURAGE BY ASKING IF THERE IS ANYTHING ELSE UNTIL S/HE SAYS THERE IS NOTHING ELSE AND CHECK ALL MENTIONED)	BAD/DIRTY WATER ..... 1 BAD/DIRTY FOOD ..... 2 POOR HYGIENE ..... 3 FECES/DEFECATING IN THE OPEN ..... 4 DIRTY HANDS ..... 5 GERMS ..... 6 FLIES ..... 7 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	
71a	In which month (s) of the year do you think diarrhea is least common in children under five years of age? READ THE CHOICES OUT LOUD AND CIRCLE THE ANSWER/S GIVEN	OCTOBER - DECEMBER ..... 1 JANUARY - MARCH ..... 2 APRIL - JUNE ..... 3 JULY - SEPTEMBER ..... 4 ALL YEAR THE SAME ..... 5 DON'T KNOW 99	
71b	In what season of the year do you think diarrhea is least common in children under five years of age? READ THE CHOICES OUT LOUD AND CIRCLE THE ANSWER/S GIVEN	COLD-DRY SEASON ..... 1 HOT-DRY SEASON ..... 2 WARM-WET SEASON ..... 3 ALL YEAR THE SAME ..... 5 DON'T KNOW 99	
71c	In which month (s) of the year do you think diarrhea is most common in children under five years of age? READ THE CHOICES OUT LOUD AND CIRCLE THE ANSWER/S GIVEN	OCTOBER - DECEMBER ..... 1 JANUARY - MARCH ..... 2 APRIL - JUNE ..... 3 JULY - SEPTEMBER ..... 4 ALL YEAR THE SAME ..... 5 DON'T KNOW 99	
71d	In what season of the year do you think diarrhea is most common in children under five years of age? READ THE CHOICES OUT LOUD AND CIRCLE THE ANSWER/S GIVEN	COLD-DRY SEASON ..... 1 HOT-DRY SEASON ..... 2 WARM-WET SEASON ..... 3 ALL YEAR THE SAME ..... 5 DON'T KNOW 99	
72.	Do you think diarrhea can be prevented in children under 5 years of age?	YES ..... 1 NO ..... 2 DON'T KNOW 99	 →74 →74

73.	If yes, how do you think diarrhea can be prevented? (DO NOT READ THE ANSWERS, ENCOURAGE BY ASKING IF THERE IS ANYTHING ELSE UNTIL S/HE SAYS THERE IS NOTHING ELSE AND CIRCLE ALL MENTIONED) ***Only if CLORIN is specifically mentioned check number 17, else check number 8.***	WASH HANDS....1 USE SOAP....2 USE SANITATION FACILITY TO DEFECATE....3 DISPOSE CHILDREN'S FECES IN SANITATION FACILITY....4 BURY FECES....5 DRINK CLEAN WATER....6 STORE WATER SAFELY....7 TREAT WATER (BOIL, FILTER, CHLORINATE)....8 PREPARE FOOD HYGIENICALLY/ PROTECT....9 DISPOSE OF GARBAGE IN A PIT....10 BREAST FEEDING IN GENERAL....11 BREAST FEEDING ONLY UNTIL 6 MONTHS....12 NO OTHER FOOD/DRINK BEFORE 6 MONTHS....13 MEASLES VACCINATION....14 VITAMIN A....15 GOOD NUTRITION....16 USE CLORIN....17 OTHER _____ 88 (SPECIFY) DON'T KNOW.... 99	
74.	What can the community as a whole, not just you, do to prevent diarrhea? (DO NOT READ THE ANSWERS, ENCOURAGE BY ASKING IF THERE IS ANYTHING ELSE UNTIL S/HE SAYS THERE IS NOTHING ELSE AND **(CIRCLE ALL THAT APPLIES)** Only if CLORIN is specifically mentioned check number 8, else check number 5. It is better to separate: first, check if people suggest to make certain items available, if they also mention "at low costs", then check number 9 separately	PROVIDE CLEAN WATER....1 HELP TO CONSTRUCT LATRINES....2 MAKE MATERIALS FOR LATRINE CONSTRUCTION AVAILABLE....3 MAKE SOAP AVAILABLE....4 MAKE WATER DISINFECTANT AVAILABLE....5 CLEAN VILLAGE CAMPAIGNS....6 WASH AND WASTE....7 MAKE CLORIN AVAILABLE....8 MAKE ITEM(S) AVAILABLE AT LOW COST....9 OTHER _____ 88 (SPECIFY) DON'T KNOW.... 99	
75.	When is it important to wash your hands? (DO NOT READ THE ANSWERS, ENCOURAGE BY ASKING IF THERE IS ANYTHING ELSE UNTIL S/HE SAYS THERE IS NOTHING ELSE) **(CIRCLE ALL THAT APPLIES)**	BEFORE PREPARING FOOD OR COOKING....1 BEFORE EATING....2 BEFORE FEEDING CHILDREN....3 AFTER CHANGING BABY....4 AFTER DEFECATING....5 AFTER EATING....6 OTHER _____ 88 (SPECIFY) DON'T KNOW.... 99	
76.	Do you believe that washing hands just with water (without soap) is as good as washing hands with water and soap?	WATER WITHOUT SOAP IS AS GOOD....1 WATER WITH SOAP IS BETTER....2 DON'T KNOW....99	

77.	Why is it important to wash hands with soap? (DO NOT READ THE ANSWERS, ENCOURAGE BY ASKING IF THERE IS ANYTHING ELSE UNTIL S/HE SAYS THERE IS NOTHING ELSE) **(CIRCLE ALL THAT APPLIES)**	PREVENT DISEASE ..... 1 PREVENT DIARRHEA ..... 2 CLEAN HANDS/REMOVE DIRT ..... 3 BECAUSE IS GOOD HYGIENE ..... 4 PREVENT DIRT GETTING INTO MOUTH ..... 5 PREVENT DIRT GETTING INTO FOOD ..... 6 REMOVE GERMS ..... 7 HEARD FROM PARENTS/OTHER FAMILY ..... 8 HEARD FROM OTHER PEOPLE ..... 9 HEARD FROM RADIO/TV ..... 10 OTHER PEOPLE/EVERYBODY DOES SO ..... 11 OTHER _____ 88 (SPECIFY) DON'T KNOW 99	

K: Observation of Handwashing Place and Essential Supplies

78	May I see the sanitation facility?	YES ..... 1 NO 2	➔end
78a	Do you have a place where you <u>usually</u> wash hands, and if so, where is it? (*Check all that apply*)	YES, INSIDE OR NEXT TO SANITATION FACILITY 1 YES, INSIDE OR NEXT TO KITCHEN ..... 2 YES, INSIDE LIVING QUARTERS ..... 3 YES, OUTSIDE IN YARD ..... 4 NO 5	
78b.	Can you show me everything you use to wash hands?	YES ..... 1 NO 2	➔78
78c.	OBSERVATION ONLY: IS THERE WATER? INTERVIEWER: TURN ON TAP AND/OR A CHECK CONTAINER AND NOTE IF WATER IS PRESENT	YES, FOUND IN HANDWASHING PLACE ..... 1 BROUGHT BY CARETAKER WITHIN 1 MIN ..... 2 NO 3	

78d.	OBSERVATION ONLY: IS THERE SOAP OR DETERGENT OR ASH? (*Circle the item present*)	FOUND IN HANDWASHING PLACE..... 1 BROUGHT BY CARETAKER WITHIN 1 MIN ..... 2 NO 3	
78e.	OBSERVATION ONLY: IS THERE A HANDWASHING DEVICE SUCH AS A TAP, BASIN, BUCKET, SINK, OR TIPPY TAP?	YES, FOUND IN HANDWASHING PLACE ..... 1 BROUGHT BY CARETAKER WITHIN 1 MIN ..... 2 NO 3	
78f.	SINCE I HAVE NOT SEEN ANYTHING HERE, WOULD YOU TELL ME WHAT YOU DO IN ORDER TO DRY YOUR HANDS.	USE CLOTHES I AM PUTTING ON……..1 AIR DRY……2	
78g.	OBSERVATION ONLY: IS THERE A TOWEL OR CLOTH TO DRY HANDS?	YES, FOUND IN HANDWASHING PLACE ..... 1 BROUGHT BY CARETAKER WITHIN 1 MIN ..... 2 NO 3	

78h.	SANITATION FACILITY OBSERVATION: OBSERVE ACCESS TO THE FACILITY; ARE THERE OBSTACLES IN THE PATH, ARE THERE SIGNS OF REGULAR USE?	DENSE VEGETATION ..... 1 WASTE OR DEBRIS IN ITS PATH ..... 2 MAJOR CREVICES OR POTHOLES..... 3 MUD ..... 4 ENTRANCE IS OBSTRUCTED ..... 5 PATH SEEMS CLEAR ..... 6 PATH WELL WORN AS SIGN OF REGULAR USE 7 OTHER OBSERVATION_____ 8 CANNOT ASSESS..... 9	
78i.	SANITATION FACILITY OBSERVATION: IS THERE FECAL MATTER PRESENT INSIDE THE FACILITY ON FLOOR OR WALLS (HUMAN OR ANIMAL)?	YES ..... 1 NO ..... 2 CANNOT ASSESS..... 8	
78j.	ARRANGEMENT OF HAND WASHING ITEMS AND LOCATION:	SHARED WITH OTHER ANIMALS……..1 AT TAP WHERE UTENCILS ARE CLEANED……..2 RUNNING TAP 1 MINUTE AT AWAY ……..3 NONE……4	

L - FORM FOR ALL CHILDREN LESS THAN 60 MONTHS

Questions [Note that Child 1 is the child whose care-taker was interviewed]	Child 1		2		3		4		5		6		7	
1 Name of child [f ID is taken from table C name is not needed here]														
2 ID# of child (From Census List)														
3 Age of child in months (2 digits) If ID is taken from table C age is not needed here														
4 ID # of caretaker (2 digits)														
5 First name of caretaker [f ID is taken from table C name is not needed here]														
6 Caretaker available for interview?	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**
7 Has this child had diarrhea during the last 2 weeks? (diarrhea = 3 or more liquid stools in a 24 hour period) **INDICATOR: % OF CHILDREN WITH DIARRHEA IN LAST 2 WEEKS**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**	**Y**	**N**
8 For how many days did this diarrhea last? (2 digits)	___	___	___	___	___	___	___	___	___	___	___	___	___	___
9 Has this child got diarrhea today? (1=yes, 2=no, 3=don't know)	**1**	**2** **3**	**1**	**2** **3**	**1**	**2** **3**	**1**	**2** **3**	**1**	**2** **3**	**1**	**2** **3**	**1**	**2** **3**

1.	Questionnaire Number	☐☐☐☐	
2.	Water Sample Taken from Point of Use of Drinking Water Currently Used in the Household	YES.....1 NO 2	➔
3.	Time the sample was taken	DATE: MONTH _____ DAY _____ TIME: HOUR _____ MINUTES _____	
4.	Source of the water sample	DIRECT FROM A TAP .....1 FROM A CONTAINER.....2	➔9
5.	Description of the container (CIRCLE ALL THAT APPLY)	TYPE OF CONTAINER CLAY .....1 PLASTIC.....2 METAL.....3 OTHER _____ .....4 COVERED YES.....5 NO .....6 TYPE OF NECK NARROW .....7 WIDE .....8 LOCATION OF THE CONTAINER ON THE FLOOR.....9 ELEVATED OFF THE FLOOR .....10 IN THE REFRIGERATOR .....11 HOW IS WATER TAKEN FROM THE CONTAINER POURING .....12 DIPPING.....13 SPIGOT 14	
6.	Volume of the container	LITERS: ....._____	
7.	The water caretaker claims chlorine/bleach has been added to the water	YES CLORIN .....1 CHLORINE/BLEACH OTHER THAN CLORIN.....2 NO 3	➔9
8.	When was the last time the chlorine/bleach/CLORIN was added?	DATE: MONTH _____ DAY _____ TIME: HOUR _____ MINUTES _____	

RESULTS OF THE ANALYSES			
OBSERVATIONS AT THE TIME THE SAMPLE WAS TAKEN			
9.	Water is colored	YES .....1 NO 2	
10.	Water has an odor	YES .....1 IF YES, DESCRIBE: _____ NO 2	
11.	Water is clear	YES .....1 NO (CLOUDY).....2	
TEST RESULTS			
12.	Time the tests were done	DATE: MONTH _____ DAY _____ TIME: HOUR _____ MINUTES _____	
13.	Place the tests were done	IN THE FIELD .....1 IN A LABORATORY 2	
14.	Temperature	From. fridge (4 – 8 degrees)……..1 Room température (15 – 25 degrees).....2	
14.	Clorin present?	YES……1 NO……..2	
15.	Free Chlorine	MG/LITER.....____	
16	Total Chlorine	MG/LITER.....____	

END:

1. **Before leaving this household, verify the questionnaires.**
2. **Take the water sample or schedule it for another time.**
3. **Finally thank the head of household and others who participated in the interview.**

END TIME:___/___/___/___/hrs