

Trip Report: Investigation of an Outbreak of Typhoid Fever in Harare, Zimbabwe

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Subject: Trip Report: Investigation of an Outbreak of Typhoid Fever in Harare, Zimbabwe (Chapter 4 – Water, Sanitation, and Hygiene)

To: Social Mobilization Group and WASH Cluster partners involved in the evaluation of household level interventions

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**Investigation of an Outbreak of Typhoid Fever in Harare, Zimbabwe
(Chapter 4 – Water, Sanitation, and Hygiene)**

This trip report summarizes the field component of our investigation. Because of the preliminary nature of this report, future correspondence or reports might present results, interpretations, and recommendations that differ from those contained in this document. If further analysis substantially alters any of these findings or recommendations, you will be notified.

Abbreviations

CCORE	Collaborating Center for Operational Research and Evaluation
CDC	Centers for Disease Control and Prevention
CHCHD	City of Harare City Health Department
DZ	Dzivaresekwa suburb
<i>E. coli</i>	<i>Escherichia coli</i>
FCR	Free chlorine residual
EHO	Environmental Health Officers
GAA	German Agro Action
IEC	Information, education and communication
IMC	International Medical Corps
MOH	Ministry of Health & Child Welfare
MSF	Médecins Sans Frontières
NFI	Non Food Items
NGO	Non-governmental organization
OFDA	Office of U.S. Foreign Disaster Assistance
PSI	Population Services International
PoUWT	Point-of-Use Water Treatment
<i>S. Typhi</i>	<i>Salmonella enterica</i> serovar Typhi
SAFELTP	South Africa Field Epidemiology and Laboratory Training Program
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
WASH	Water, sanitation, and hygiene
WHO	World Health Organization

Executive Summary

Salmonella enterica serovar Typhi (*S. Typhi*) is a Gram negative bacterium that causes an estimated 22 million cases of typhoid fever and 216,000 deaths worldwide annually. Humans are the only reservoir for *S. Typhi*, and infection occurs by the fecal-oral route, usually through ingestion of contaminated food or water. Incidence is highest in developing countries, particularly in areas with poor sanitation or without access to safe water. Population growth in Harare, Zimbabwe has resulted in overcrowding in residential areas and has outpaced maintenance and expansion of the water supply and sewerage infrastructure. Limited access to piped treated water and frequent sewer blockages expose residents of the City of Harare to the risk of contracting enteric diseases. In late October, 2011, a cluster of suspected cases of typhoid fever was reported to the City of Harare City Health Department (CHCHD) and an investigation was initiated by local authorities. Cases continued to occur in November, and the Zimbabwe Ministry of Health and Child Welfare (MOHCW) requested assistance with the investigation from the US Centers for Disease Control and Prevention (CDC) on November 22, 2011. The objectives of the investigation were threefold: to assist in describing the epidemiology of the outbreak; to evaluate response efforts during the outbreak; and to evaluate and support environmental sampling in the epicenter of the outbreak. CDC initially provided epidemiologic and laboratory assistance in-country from December 19, 2011 through January 9, 2012. Incident cases of typhoid fever declined substantially during the first week of January 2012. However, in late January and early February 2012, the number of new typhoid cases reported daily increased and more than 3,900 total suspected cases had been reported through April 30 as a part of this ongoing outbreak. On February 15, 2012, Dr. Prosper Chonzi, Director of Health Services, CHCHD, requested further in-country technical assistance from CDC in epidemiologic and microbiological support; two CDC EIS officers, two microbiologists from the Kenyan Medical Research Institute/CDC-Kenya, and one South African FELTP trainee returned to Zimbabwe from March 3-31, 2012.

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Environmental Assessment

In order to assess the quality of the water being used by the community of DZ, the team, guided by the Environmental Health Officer and a staff member from the City of Harare Water Department, collected water samples for testing from six boreholes, and a convenience sample of seven wells and three municipal taps. After flame sterilization of the spigot, two of six boreholes tested positive for the presence of *E. coli* (an indicator for fecal contamination). Residents believe that boreholes are safe water sources that do not require treatment despite positive tests. CDC recommended shock chlorination of these borehole wells followed by repeated testing and monitoring, and provided approximately 400 rapid tests for total coliforms and *E. coli* to the City of Harare Municipal Water Laboratory and the MoHCW Government Analyst for this purpose.

Outbreak Response Supply Distribution

Between November 7th and December 15th, 2011, a 3-month supply of Aquatabs (sodium dichloroisocyanurate) was distributed to each household in DZ by Population Services International (PSI), Germany Agro Action (GAA), and GOAL (an international humanitarian organization) for home water chlorination. Water was temporarily trucked in by UNICEF and distributed to provide an alternative to shallow wells as a drinking water source while six borehole wells were placed in DZ by various donors (including GAA and the National Health Care Trust Zimbabwe). Soap (2 bars per household) and 3,000 buckets were distributed by GAA. Médecins Sans Frontières (MSF) Belgium provided ciprofloxacin, nurses at Rujeko clinic, and an ambulance with a driver to transport cases from Rujeko clinic to BRIDH. World Health Organization (WHO) supplied oral rehydration solution (ORS) for distribution at the health facilities. Challenges in outbreak response included the delay between detection of the outbreak and notification of NGO partners who were able to provide outbreak response supplies.

Evaluation of Household-Level Interventions

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Since October 2011, non-governmental organizations conducted social mobilization campaigns, including door-to-door participatory health and hygiene education in the affected communities. They also distributed non-food items (NFIs), including chlorine tablets, soaps, and water containers, in the two most affected suburbs of Harare, Dzivaresekwa and Kuwadzana, as well as other high-risk suburbs such as Hopley Farm. Despite these interventions, cases of typhoid fever continued to be reported from Kuwadzana and other areas outside the city. In March, 2012, the CDC team, UNICEF Collaborating Center for Operational Research and Evaluation (CCORE) and the Social Mobilization Group collaborated on a single evaluation to assess the impact of the typhoid outbreak social mobilization response in affected suburbs. The main objectives of the evaluation were: 1) to assess the coverage and consistency of the distribution process of NFIs; 2) to assess community knowledge and attitudes about typhoid fever and whether the health education messages led to behavior change during the outbreak; 3) to determine if the NFIs distributed were an effective and appropriate intervention during the outbreak; and, 4) to determine if knowledge and usage of point-of-use water treatment (PoUWT) products before the outbreak influenced uptake of water treatment products during the outbreak. To complete the objectives, a cross-sectional household survey was conducted in 227 households in Kuwadzana, 231 in Dzivaresekwa, and 100 in Hopley Farm.

The preliminary analysis of the data showed that the reported coverage of NFIs distribution was high in Kuwadzana and Dzivaresekwa, with over 80% of the respondents reporting having received at least one product since the beginning of the outbreak. However, there was a significant variation in the type and quantity of chlorine tablets received and the coverage was lower in Hopley Farm, with only 60% receiving at least one product. Overall, awareness of the typhoid fever outbreak was high, with over 90% of respondents having heard about typhoid fever outbreak in the two affected areas of Kuwadzana and Dzivaresekwa. However, accurate knowledge of the signs and symptoms of typhoid fever was limited: only 26% of the respondents reported fever as a presenting symptom of typhoid fever. Chlorine-based water treatment tablets were the main NFI distributed. Nearly 90% of households that received tablets reported ever using them.

However, only half of them reported using chlorine tablets daily, and overall, 15% of the households surveyed had treated water with the recommended free chlorine residual of 0.2mg/L-2.0mg/L on the day of the unannounced survey visit. The survey found good awareness of WaterGuard with over 70% of the respondents reporting having seen the advertisements, but lower usage, with only about 20% of respondents reporting having used WaterGuard.

Recommendations

Environmental Assessment

- Provide the community with health education messages in local languages on the importance of safe water collection, treatment, and storage, safe food preparation, and improved hygiene and sanitation practices at the household level.
- Source funding or donations that allow sustainable access and distribution of typhoid prevention supplies such as water storage containers with taps or spigots, soap for hand washing, and Aquatabs or WaterGuard for drinking water treatment.
- Consider shock chlorination and repeated testing of boreholes that test positive for *E. coli*. Boreholes that continue to test positive after remediation should be closed.
- Educate community members on home chlorination of borehole water to provide a residual-free chlorine barrier to contamination during storage in the home until it has been shown by the City Water Department to be safe.
- Long term: Improve the water supply, sanitation, and sewerage infrastructure in Harare and surrounding towns to allow for the provision of uninterrupted piped, treated municipal water supplies at increased pressure with minimal risk of back-flow or cross-contamination.

Evaluation of Household Level Interventions

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- Establish systems to ensure equitable and consistent distribution of products to targeted communities. This may be achieved through close monitoring of community volunteers responsible for distribution of products.
- Improve the effectiveness of educational campaigns by engaging the Social Mobilisation group. Messages can be distributed using mobile phone text messages and TV prime time, because mobile phones and TV were the most commonly owned communication devices. The messages should focus on increasing knowledge of correct home treatment methods for diarrheal diseases, typhoid fever symptoms and importance of treating drinking water from all sources daily.
- Coordinate response activities by various NGOs to ensure standardized product distribution. In particular, PoUWT products distributed should be of the same type and dosage to minimize confusion among recipients. Distribution of standardized containers may also improve correct use of water treatment products.
- Ensure that the instructions on the use of PoUWT products include frequency of treatment and the need to treat drinking water from all sources daily.
- Continue social marketing of WaterGuard for all household stored water treatment as a long term intervention. WaterGuard can be displayed by the cashier and offered as change in place of candies that are commonly offered due to unavailability of coins.

Detailed Report

Chapter 4: Water, Sanitation, and Hygiene

Environmental Assessment

With only intermittent access to piped, treated water from municipal systems, residents of DZ use shallow wells and unprotected springs to meet their water needs. No other improved water sources were available to this community before the outbreak. Frequent sewer blockages and burst sewer pipes result in sewage flowing in the streets, which can readily contaminate nearby sources of drinking water including shallow wells, unprotected springs, and boreholes that were installed in affected areas.

A census conducted by the City Health Department estimated 11,906 households in DZ. Between November 7th and December 15th, 2011, a 3-month supply of Aquatabs or Oasis brand chlorine tablets (sodium dichloroisocyanurate) was distributed to each household in DZ for home water chlorination, along with education about typhoid fever prevention and control. A 3-month supply was defined as enough chlorine tablets to treat 20L of water daily for 3 months. Water was temporarily trucked in and distributed while six boreholes were installed by various donors. Large PVC (polyvinyl chloride) pipes replaced the older cast iron sewage pipes in some areas, which may help protect the municipal water distribution system from contamination. However, financial resources limited the scope of these improvement projects. The City was responding quickly to reports of sewer blockages, clearing them and decontaminating the area with chloride of lime. Manpower and petrol expenses lead to long turnaround times for some sewage repairs.

A single sample from each of two boreholes was taken for analysis by the City of Harare Water Department on November 3, 2011. Both samples tested positive for total coliforms and negative for *E. coli*. Two water samples from one borehole were taken for analysis on December 19, 2011. The first sample tested positive for total coliforms, and negative for *E. coli*. The second sample was treated with Aquatabs before testing, and showed no total coliforms. Water from a spring yielded *E. coli* and total coliforms.

Although presence of total coliforms in ground water is not indicative of fecal contamination, health educators disseminated the message to the community to treat borehole water with Aquatabs before use and to refrain from using water from wells and springs. Municipal water is regarded as the safest source of water available provided it is collected, stored, and handled in ways that do not permit contamination.

Water Assessment Methods

In order to assess the quality of the water being used by the community of DZ, in January 2012, the team, guided by the EHO and a staff member from the City of Harare Water Department, collected water samples for testing from six boreholes, and a convenience sample of seven wells and three municipal taps. Diluted samples were tested from five wells to provide a semi-quantitative estimate of contamination.

- Eleven 100ml samples of water were collected from six boreholes, two shallow wells, and three taps. The first few liters of water were flushed before collecting water from the taps and boreholes. Collilert-18 powder was added to each sample and mixed until dissolved.
- 1ml samples of water were collected from each of five shallow wells. 99ml of distilled deionized water was added to each sample followed by Colilert-18 powder and gently mixed until dissolved.
- All samples were incubated at 35°C for 18-24 hours.

Four of six boreholes tested positive for the presence of *E. coli* (an indicator for fecal contamination) without flame sterilization of the spigot (data not shown). Two of six boreholes repeatedly tested positive after flame sterilization of the spigot (Table 7). The three municipal taps tested negative for total coliforms and *E. coli* whereas the seven shallow wells tested positive for *E. coli* (Table 8). Chlorine residual data were not available. Residents believe that boreholes are safe water sources that do not require treatment despite repeated positive tests. However, residents are hesitant about the safety of municipal taps despite repeated negative test results.

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In an effort to isolate *S. Typhi*, the team tested three boreholes (including the two boreholes that tested positive for the presence of *E. coli* after flame sterilization) and three shallow wells with a technique called ultrafiltration.

- 100 liters of water from each of six water sources was filtered through an ultrafilter for approximately one hour.
- 200ml of selenite broth was circulated through each filter for five minutes to elute the filter.
- Recirculated selenite broth was incubated at 35°C -37°C for 18-24 hours.
- Each sample was streaked on MacConkey agar and incubated at 37°C for 24 hours.
- Non-lactose-fermenting colonies were selected and placed in transported media and placed in a cooler box. These samples were shipped to CDC Atlanta for further testing.
- Upon further testing, *S. Typhi* was not isolated from any of the specimens that were tested. A negative result does not indicate that the water is safe to drink as *E. coli* was present in each source.

Outbreak Response Supply Distribution

Between November 7 and December 15, 2011, a 3-month supply of Aquatabs and Oasis brand chlorine tablets (sodium dichloroisocyanurate) were distributed to each household in DZ by Population Services International (PSI), Germany Agro Action (GAA), and GOAL (an international humanitarian organization) for home water chlorination. To provide an alternative to shallow wells as a drinking water source, water was temporarily trucked in by UNICEF and distributed while six borehole wells were placed in DZ by various donors (including GAA and the National Health Care Trust Zimbabwe). Soap (2 bars per household) and 3,000 buckets were distributed by GAA. Médecins Sans Frontières (MSF) Belgium provided ciprofloxacin, nurses at Rujeko clinic, and an ambulance with a driver to transport cases from Rujeko clinic to BRIDH. The World Health Organization (WHO) supplied oral rehydration solution (ORS) for distribution at the health facilities.

Challenges in outbreak response included the delay between detection of the outbreak and notification of NGO partners who were able to provide outbreak response supplies.

Evaluation of Household Level Interventions

Background

Since October 2011, CHCHD, supported by WHO, UNICEF, MSF-Belgium, and other non-governmental organization (NGO) partners, conducted interventions to control the typhoid fever outbreak. The intervention activities focused on improved case management, contact tracing, distribution of non-food items (NFIs), information, education and communication (IEC) materials in English and Shona, and holding public information campaigns in the affected high-density areas of Harare. In Dzivaresekwa, German Agro Action (GAA) and its partner organizations distributed a 3-month supply of Aquatabs brand or Oasis brand chlorine tablets and IEC materials to 12,221 households between October 2011 and January 2012. In addition, buckets and soap were distributed to 3,464 households, and WaterMaker brand flocculant/disinfectant sachets were provided to some households. Additionally, Population Service International (PSI), partnered with St. Johns Ambulance, implemented social mobilization in November and December 2011 in Dzivaresekwa. The team engaged the community through coordinated door-to-door participatory health and hygiene education (PHHE) and distributed a 3-month supply of Aquatabs brand chlorine tablets to 16,682 households. In Kuwadzana, GAA and its partners conducted door-to-door health education at 30,500 households and distributed a 3-month supply of chlorine tablets and 22,000 IEC materials in January and February 2012. Church leader training, awareness campaigns at church congregations, and drama sessions were also conducted. In both suburbs, residents were encouraged to buy WaterGuard to continue treating water at the household level after finishing the supply of free water treatment products. Further, social mobilization activities and NFI distributions were conducted in other areas that were identified as potential areas for typhoid fever by CHCHD. One of these areas was Hopley Farm, which is a densely populated squatter settlement located south of Harare with no sewer, piped water or refuse collection systems. Social

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mobilization was implemented in December 2011-January 2012 by PSI, similar to interventions conducted in Kuwadzana and Dzivaresekwa.

Despite these interventions, cases of typhoid fever continued to be reported in January-March 2012, which raised the question of whether these distributions were effective. CHCHD and the Social Mobilization Group, which consists of NGOs involved in the typhoid fever outbreak response, determined that an evaluation of the coverage and uptake by the affected populations of the water treatment interventions was needed before more resources were invested in social mobilization campaigns and NFI distributions. UNICEF's Collaboration Centre for Operational Research and Evaluation (CCORE) and Social Mobilization Group joined to plan an impact assessment of the responses to address this question of effectiveness.

Concurrently, the Office of Foreign Disaster Assistance (OFDA) requested CDC to evaluate the effectiveness and appropriateness of distributing Point-of-Use Water Treatment (PoUWT) products as an outbreak response measure. Since the national cholera outbreak in 2009, OFDA has supported PSI to establish local production and social marketing of WaterGuard liquid chlorine water treatment throughout Zimbabwe, though not specifically in Harare. OFDA was particularly interested in whether prior knowledge and use of PoUWT products, such as WaterGuard, influenced uptake of the free products distributed during the outbreak.

The CDC team, CCORE and the Social Mobilization Group agreed to collaborate on a single evaluation. The results from this combined evaluation of PoUWT product distribution during the typhoid fever outbreak in Zimbabwe, along with a concurrent evaluation of other educational campaigns conducted in response to the outbreak, can help guide interventions for the prevention and control of this outbreak and future outbreaks of typhoid fever and other waterborne diseases.

Upon arrival in Zimbabwe on March 3 2012, the CDC team from the USA and Kenya, and a South African Field Epidemiology and Laboratory Training (SAFELTP) student, met with the CHCHD and MoHCW to discuss the objectives of the survey and obtain approval for the protocol. Meetings were also held with the Social Mobilization

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Group to understand the interventions that have taken place since the onset of the outbreak, discuss the specific objectives of the assessment, and the development of the survey tool.

Goal and Objectives

The goal of the household survey was to assess the impact of the typhoid fever outbreak social mobilization response in affected suburbs of Harare. The objectives of the evaluation were to:

1. Assess the coverage and consistency of the distribution process;
2. Assess community knowledge and attitudes and whether the health education messages led to behavior change during the outbreak;
3. Determine if the NFIs distributed were an effective and appropriate intervention during the outbreak; and,
4. Determine if knowledge and usage of PoUWT products before the outbreak influenced uptake of water treatment products during the outbreak.

Methods

The evaluation used a mixed-method approach, including quantitative and qualitative data collection, and consisted of three parts:

- 1) Cross-sectional survey of about 600 households;
- 2) Tests of water quality, including free residual chlorine at the household level; and
- 3) Focus group discussions.

CDC coordinated the household surveys and water quality testing in March 2012; the focus group discussions will be facilitated by CCOPE in April 2012.

Survey tool development and enumerator training

A single survey tool with 101 questions was developed by CDC, CCOPE and the Social Mobilization Group (Appendices 4 and 5). The survey included questions on demographics, water and PoUWT use before and after hearing about the typhoid fever outbreak, NFIs and IEC material received during the outbreak, and knowledge, attitudes, perceptions, and practices around typhoid fever. The final survey tool was translated from English into Shona and back translated into English by two professionals from the

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University of Zimbabwe Linguistics Department for validation. The final tool used during the survey comprised Shona questions and English responses, and took an average of 30 minutes to administer to each household.

Twelve enumerators were recruited by CCORE and were trained over 2 days at UNICEF. The training included household selection, obtaining consent, delivering questions, recording answers, and practice sessions giving and receiving the interview. Pretesting of both the English and the Shona versions of the tool was conducted during the same 2-day period. A pilot survey was conducted in a nearby suburb of Warren Park before the survey was initiated in Kuwadzana, Dzivaresekwa, and Hopley Farm.

Survey setting and population

The study was conducted in the two high density suburbs of Harare with the largest number of suspected typhoid fever cases: Dzivaresekwa and Kuwadzana, and in Hopley Farm, an area that was identified as at high risk for typhoid fever outbreak by CDCHD. The target population for the survey was residents of these three areas who had lived in the household for at least 6 months. Respondents were persons at least 16 years old who were responsible for treatment of water and child care in the household at the time of the survey. The survey was conducted between March 16 and 27, 2012.

Sampling frame

The team used detailed maps from the Surveyor General's Offices and, the City of Harare's Department of Engineering and Urban Planning to randomly select stand numbers of housing units for surveying in Kuwadzana and Dzivaresekwa. The maps from the Surveyor General's Offices included only stand numbers from housing units they had surveyed and no street names (Figure 4). The maps from the Surveyor General Offices were used for sampling housing units from Kuwadzana where the majority of the housing units had been surveyed. The team filled in street names using the Harare street map. The information on maps from the Department of Engineering and Urban Planning contained all the street names and stand numbers from housing units the Department had surveyed and also those that it had not surveyed (Figure 5). The maps from the Department of

Engineering and Urban Planning were used for sampling in Dzivaresekwa. Neither agency had recent maps available for Hopley Farm.

Sample size calculation

As the intervention was delivered at the household (rather than individual) level, the relevant unit for purposes of the sample size calculation and sampling strategy was the household. A household was defined as a group of individuals who share one cooking pot; a housing unit was defined as a housing structure, or a stand, on the map. The sample size required for this survey was calculated to achieve the objectives. A sample size of 592 was established using the formula below.

Calculations were based on the following assumptions:

- All households in the targeted areas were considered to be at risk
- Allowable margin of error was set at 5%
- We calculated the sample size based on exposure to program interventions of $\geq 50\%$ of the households in the targeted areas. We set exposure to interventions at 50%, which gives the maximum sample size.
- Allowance for loss due to non-response was set at 10%

$$n = \frac{Z^2 (p)(1-p)(f)(k)}{e^2}, \text{ where}$$

- n = minimum sample size required
- Z = level of confidence (95%)
- p = Proportion of households exposed to program interventions, set at 50%, (p=0.5)
- f = sample design effect (set at a default value of 2.0 (Simple Random Sampling not used))
- k = non response multiplier (average of 10% for developing countries, hence k set at 1.1)
- e = margin of error (0.05)

Using results from calculations (n=592), the sample size for this study was set to 600 households to be selected in the three identified areas. This sample was roughly distributed proportional to the population provided by CHCHD (129,235 in Kuwadzana Extension;

97,111 in Dzivaresekwa; and 25,405 in Hopley Farm zones 1 and 2), yielding the following sample size from each suburb: 250 households from Kuwadzana, 250 households from Dzivaresekwa and Kuwadzana phase 3, and 100 households from all six zones of Hopley Farm.

Sampling method

For Kuwadzana and Dzivaresekwa, in order to randomly select households from the maps obtained, all of the housing unit numbers that were legible on each map were entered into Excel spreadsheets named after the map number. The housing unit numbers were concatenated with the respective map number before they were all combined in a master Excel spreadsheet for each suburb. Random numbers between 0 and 1 were generated in Excel for each housing unit. The random numbers were sorted from highest to lowest and the housing units whose numbers corresponded to the first 250 highest random numbers were included in the sample. A unique questionnaire code was assigned to each selected housing unit.

In Kuwadzana, the team selected quadrants on the maps that included the majority of the residential area. Sections from some of the maps from the Surveyor General Office had illegible housing unit numbers and were not included in the sampling. Commercial stands and other non-residential stands were also excluded. The Kuwadzana phase 3 area was sampled with Dzivaresekwa as the two areas are adjacent to each other. A total of 4,984 housing units were entered in Excel.

For Dzivaresekwa, some sections of the map had both the old street map number and the new surveyed housing unit number. Residents were familiar with the street numbers and these were used during the sampling process. The team filled in all housing unit numbers that were missing on the maps before entering into the Excel spreadsheet. Not all housing units were entered as one of the maps was missing. Blocks of compound houses that were difficult to enumerate from the map were also excluded. Commercial stands and Dzivaresekwa extension, which falls under a different district, and Tynwald South, were not included in the sampling. A total of 5,956 housing units were entered in Excel.

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The randomly selected housing units in Dzivaresekwa and Kuwadzana were all marked on the maps. Each enumerator was allocated approximately 10 housing units that were in close proximity to visit daily. The outcome of the visit on the survey was recorded on the survey outcome tracking form (Appendix 6). At the end of each survey day, the survey team reviewed all survey forms for missing data and accuracy of information collected before leaving the field. All housing units surveyed were crossed out on the map and those that refused to be interviewed were marked so that no repeat visits would be made. When no one was available at the time of the visit, a total of three visits were made before dropping the housing unit from the survey frame. The Excel spreadsheet was also updated daily with information on the survey outcomes collected from the enumerators' data sheets. Pivot tables detailing the outcomes were computed daily.

An alternative systematic survey methodology was used for Hopley Farm because detailed maps were not available. The survey team worked with local resident volunteers to obtain information on the physical layout of the suburb. Enumerators were dropped off at strategic points along the main road in six Hopley Farm sections (Zones 1 through 6) and were instructed to walk in different directions and interview every *n*th house on each street depending on the number of housing units available in each zone. In zone 1, enumerators interviewed every 10th house from their starting point while in zone 2 to 5 every 3rd housing unit was interviewed. Zone 6 had very few housing units so enumerators interviewed every other house. Except for Zone 1, all zones had houses haphazardly built with no well-defined roads.

Only one household was interviewed per housing unit in all three of the suburbs. In cases where multiple households were living in the same housing unit, simple random selection using the hat method was used to select the household to interview. To assist with the selection of the household to interview, enumerators were provided with household selection form and alphabet letters in an envelope (Appendix 7). Enumerators were instructed to identify all the households at each housing unit available at the time of the survey, and then allocate an alphabet letter for each household. The enumerator then randomly chose an alphabet letter from an envelope to select a household to interview.

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Water quality testing (free chlorine residual testing)

The enumerator collected samples of untreated and reported-treated stored household water during the survey and tested them in the household for free residual chlorine using the Hach ColorWheel test kit (Loveland, CO, USA) and a DPD-1 free chlorine reagent. The enumerators were instructed to rinse two test tubes twice with water, then fill one tube with 5 mL of sample water as a control, and fill the second tube with the same quantity of sample water as the test sample. One sachet of DPD-1 powder was added to the test sample and mixed thoroughly. A color wheel was spun until the color of the control water matched the test sample water and the corresponding reading between 0-3.5 mg/L was recorded from the color wheel onto the survey sheet.

Data entry and analysis

All completed survey forms were sorted according to their unique code before data were entered into Microsoft Access and *EntryWare* at CCORE office by four trained data enterers under the supervision of survey team members. The data are being cleaned and analyzed using SAS version 9.3. and SPSS version 19.0. A single master database will be maintained at CCORE under guidance of CHCHD for data entry, cleaning and quality assurance. A copy of the database with all personal identifiers removed was provided to CDC investigators. Frequencies of the responses were calculated for each suburb and for all three combined. Univariate and multivariate analysis will be conducted for following outcome metrics: 1) reporting regularly treating water since the outbreak onset, 2) having reportedly treated stored water in the household on the day of unannounced visit, and 3) having reportedly treated stored water with free chlorine residual.

Preliminary Results

Of the randomly selected households 227 (90.8%) of 250 agreed to be interviewed in Kuwadzana, and 231 (92.4%) of 250 agreed to be interviewed in Dzivaresekwa; the target of 100 completed surveys was reached in Hopley Farm.

Respondent Characteristics

Overall, 470 (84.2%) of 558 respondents were female with a median age of 31 years (N = 553, range: 16-85 years) (Table 9-1). The target population was well-educated with

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approximately 80% of respondents and heads of households reporting having had secondary education or more. Pentecostal was the most commonly reported religion in Kuwadzana (40.7%, 87/214) and Dzivaresekwa (44.1%, 101/229), while Apostolic sect was the most commonly reported religion in Hopley Farm (39.8%, 39/98). Median reported monthly household income was US\$250 in Kuwadzana, US\$200 in Dzivaresekwa and US\$120 in Hopley Farm. Mobile phones and TV were owned by over 80% of households in Kuwadzana and Dzivaresekwa; mobile phones were also owned by 75% of households in Hopley Farm, but only 28% owned a TV. Median household size was 4-5 household members in all three suburbs.

	KUWADZANA		DZIVARESEKWA		HOPLEY FARM		TOTAL	
Sex and Age	N	n (%)	N	n (%)	N	n (%)	N	n (%)
Female	227	192 (84.6)	231	198 (85.7)	100	80 (80.0)	558	470 (84.2)
Median age	225	32	228	31	100	31	553	31
Age range		16-85		16-70		17-69		16-85
Education of Respondent	227		231		100		558	
<i>None</i>		5 (2.2)		5 (2.16)		6 (6.0)		16 (2.9)
<i>Primary</i>		34 (15)		40 (17.32)		22 (22.0)		96 (17.2)
<i>Secondary</i>		166 (73.1)		174 (75.32)		71 (71.0)		411 (73.7)
<i>More than secondary</i>		22 (9.7)		12 (5.19)		1 (1.0)		35 (6.3)
Education of Head of Household	226		231		100		557	
<i>None</i>		4 (1.8)		4 (1.73)		4 (4.0)		12 (2.2)
<i>Primary</i>		28 (12.4)		33 (14.29)		17 (17.0)		78 (14.0)
<i>Secondary</i>		138 (61.1)		157 (67.97)		77 (77.0)		372 (66.8)
<i>More than secondary</i>		42 (18.6)		25 (10.82)		2 (2.0)		69 (12.4)
<i>Don't know</i>		14 (6.2)		12 (5.19)		0 (0.0)		26 (4.7)
Religion	214		229		98		541	
<i>Pentecostal</i>		87 (40.7)		101 (44.1)		23 (23.5)		211 (39.0)
<i>Protestant</i>		48 (22.4)		54 (23.5)		14 (14.3)		116 (21.4)
<i>Apostolic Sect</i>		44 (20.6)		30 (13.1)		39 (39.8)		113 (20.9)
<i>Roman Catholic</i>		23 (10.8)		27 (11.8)		11 (0.1)		61 (11.3)

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<i>Muslim</i>	1 (0.5)	5 (2.2)	2 (2.0)	6 (1.1)
<i>Other Christian</i>	0 (0.0)	3 (1.3)	1 (1.0)	6 (1.1)
<i>Traditional</i>	1 (0.5)	0 (0.0)	1 (1.0)	2 (0.4)
<i>None</i>	10 (4.7)	9 (3.9)	7 (7.1)	26 (4.8)
Household Monthly Income	129	121	53	303
Median	US\$250	US\$200	US\$120	US\$200
Range	US\$0-2000	US\$0-2000	US\$0-600	US\$0-2000
Ownership of Communication Device and Stand				
<i>Radio</i>	227 109 (48.0)	229 109 (47.6)	99 36 (36.4)	555 254 (45.8)
<i>TV</i>	227 185 (81.5)	230 188 (81.7)	99 28 (28.3)	556 401 (72.1)
<i>Mobile</i>	227 207 (91.2)	230 218 (94.8)	99 75 (75.8)	556 500 (89.9)
<i>Own stand</i>	226 119 (52.7)	229 132 (57.6)	97 53 (54.6)	552 304 (55.1)
Household Size	227	231	100	558
Median	4	5	4	4
Range	1-11	1-17	1-10	1-17

General Health Knowledge, Attitudes, Practice

When asked about the biggest health problem facing their family, water was the most common response reported by 183 (33.1%) of 553 households, followed by diarrheal illness (19.5%, 108/553), and typhoid fever (17.0%, 94/553). Nurse/clinician (58.9%, 323/548), community health worker (50.9%, 279/548), and TV (31.9, 175/548) were the three most commonly reported sources of health information. People were generally aware of good hand hygiene practice: 495 (88.7%) and 394 (70.6%) of 558 respondents identified after defecating and before eating as the most important times to wash hands with soap respectively. Most (93.2%, 510/547) of households had soap available for observation. Accurate knowledge of how to make salt sugar solution varied between suburbs: while 133 (57.6%) of 213 respondents in Dzivaresekwa were able to report the correct way of making salt sugar solution, only slightly higher than 40% reported corrected formulation in Kuwadzana (41.3%, 93/225) and Hopley Farm (43%, 43/100). Knowledge about oral rehydration solution (ORS) was generally poor with over 40% of respondents reporting that

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they did not know how to make ORS. Most households in Kuwadzana (99.5%, 217/218) and Dzivaresekwa (99.5%, 218/219) reported a flush toilet when asked how human stool was disposed in the household, while pit latrine and Blair toilets (which are pit latrines with a ventilation pipe) were the most commonly reported by respondents in Hopley Farm (85.6%, 83/97). No observation was conducted to confirm the reported method of human stool disposal.

Table 9-2. General Health Knowledge, Attitudes, and Practices								
	KUWADZANA		DZIVARESEKWA		HOPLEY FARM		TOTAL	
	N	n (%)	N	n (%)	N	n (%)	N	n (%)
Biggest Health Problem Facing Your Family	225		229		99		553	
<i>Water</i>	63 (28.0)		92 (40.2)		28 (28.3)		183 (33.1)	
<i>Diarrhea</i>	44 (19.3)		39 (17.0)		25 (25.3)		108 (19.5)	
<i>Typhoid</i>	41 (18.2)		45 (19.7)		8 (8.1)		94 (17.0)	
<i>Respiratory</i>	38 (16.9)		33 (14.4)		10 (10.1)		81 (14.6)	
<i>Headache</i>	21 (9.3)		15 (6.6)		7 (7.1)		43 (7.8)	
<i>HIV</i>	9 (4.0)		18 (7.9)		10 (10.1)		37 (6.7)	
<i>Cholera</i>	4 (1.8)		6 (2.6)		2 (2.0)		12 (2.2)	
<i>Malaria</i>	2 (0.9)		1 (0.4)		2 (2.0)		5 (0.9)	
<i>Anemia</i>	1 (0.4)		0 (0.0)		0 (0.0)		1 (0.2)	
Source of Health Information	224		228		96		548	
<i>Nurse/clinician</i>	133 (59.4)		126 (55.3)		64 (66.7)		323 (58.9)	
<i>Community health worker</i>	99 (44.2)		136 (59.6)		44 (45.8)		279 (50.9)	
<i>TV</i>	90 (40.2)		79 (34.6)		6 (6.3)		175 (31.9)	
<i>Radio</i>	48 (21.4)		44 (19.3)		16 (16.7)		108 (19.7)	
<i>Neighbor</i>	24 (10.7)		18 (7.9)		2 (2.1)		44 (8.0)	
<i>Newspaper</i>	22 (9.8)		18 (7.9)		2 (2.1)		42 (7.7)	
<i>Church</i>	14 (6.3)		17 (7.5)		4 (4.2)		35 (6.4)	
<i>Brochure/flyer</i>	10 (4.5)		12 (5.3)		4 (4.2)		26 (4.7)	
<i>Community meeting</i>	5 (2.2)		5 (2.2)		5 (5.2)		15 (2.7)	
<i>Family</i>	6 (2.7)		2 (0.9)		2 (2.1)		10 (1.8)	
<i>Friend</i>	7 (3.1)		2 (0.9)		1 (1.0)		10 (1.8)	

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SMS	4 (1.8)	3 (1.3)	1 (1.0)	8 (1.5)
Internet	2 (0.9)	1 (0.4)	0 (0.0)	3 (0.5)
Theater/drama	1 (0.4)	0 (0.0)	0 (0.0)	1 (0.2)
Most Important Time to Wash Hands	227	231	100	558
<i>After defecating</i>	202 (89.0)	205 (88.7)	88 (88.0)	495 (88.7)
<i>Before eating</i>	156 (68.7)	166 (71.9)	72 (72.0)	394 (70.6)
<i>Before preparing food</i>	104 (45.8)	122 (52.8)	47 (47.0)	273 (48.9)
<i>After touching food</i>	26 (11.5)	42 (18.2)	12 (12.0)	80 (14.3)
<i>After cleaning a child's bottom</i>	29 (12.8)	38 (16.5)	12 (12.0)	79 (14.2)
<i>Before breast-feeding</i>	25 (11.0)	12 (5.2)	5 (5.0)	42 (7.5)
<i>Before feeding kids</i>	22 (9.7)	7 (3.0)	2 (2.0)	31 (5.6)
<i>After waking up</i>	10 (4.4)	10 (4.3)	3 (3.0)	23 (4.1)
<i>After cleaning house</i>	12 (5.3)	5 (2.2)	0 (0.0)	17 (3.0)
<i>All the time</i>	9 (4.0)	3 (1.3)	2 (2.0)	14 (2.5)
Accurate Knowledge of How to Make Sugar Salt Solution	225	231	100	556
<i>Correct formulation: 6 tsp sugar, 1/2 tsp salt, 750ml water</i>	93 (41.3)	133 (57.6)	43 (43.0)	269 (48.4)
<i>Incorrect formulation</i>	97 (43.1)	60 (26.0)	38 (38.0)	195 (35.1)
<i>Don't know</i>	35 (15.6)	38 (16.5)	19 (19.0)	92 (16.5)
Accurate Knowledge of How to Make ORS	219	222	88	499
<i>Correct formulation: 0.25, 0.75, 1 L per sachet</i>	79 (36.1)	86 (38.7)	39 (44.3)	204 (40.9)
<i>Incorrect formulation</i>	32 (14.6)	28 (12.6)	10 (11.4)	70 (14.0)
<i>Don't know</i>	108 (49.3)	108 (48.6)	39 (44.3)	225 (45.1)
Method of Human Stool Disposal	218	219	97	534
<i>Flush toilet</i>	217 (99.5)	218 (99.5)	11 (11.3)	446 (83.5)
<i>Pit latrine</i>	0 (0.0)	1 (0.5)	61 (62.9)	62 (11.6)
<i>Bucket system</i>	30 (13.8)	0 (0.0)	0 (0.0)	30 (5.6)
<i>Blair toilet</i>	1 (0.5)	0 (0.0)	22 (22.7)	23 (4.3)
<i>Bush/field</i>	5 (2.3)	1 (0.5)	0 (0.0)	6 (1.1)
Soap Available for Observation	220 210 (95.5)	228 213 (93.4)	99 87 (87.9)	547 510 (93.2)

Typhoid Fever Knowledge, Attitudes, and Practices

In Kuwadzana and Dzivaresekwa, 225 (99.1%) of 227 and 229 (99.1%) of 231 respondents reported that they had heard of typhoid fever and 209 (93.3%) of 224 and 213 (94.2%) of 226 had heard of the typhoid fever outbreak in the area respectively (Table 9-3). The majority (96.0%, 95/99) of respondents in Hopley Farm had heard of typhoid fever, but fewer (45.2%, 42/93) said they had heard about the typhoid fever outbreak in the area. This can be explained by no suspected or confirmed cases of typhoid fever were reported from Hopley Farm; some respondents may interpreted “in the area” differently. Similarly to the source of general health, community health worker and nurse/clinicians were the most commonly reported source of information about the outbreak. Households most commonly reported that typhoid fever was caused by drinking contaminated or untreated water (73.5%, 363/494), eating contaminated food (55.1%, 272/363), and poor hand hygiene (46.6%, 230/494). Accurate knowledge of the signs and symptoms of typhoid fever was limited. Of 469 respondents, only 124 (26.4%) reported that fever was a symptom of typhoid fever, while 429 (89.6%) reported that diarrhea was a symptom of typhoid fever. Overall, 112 of 558 households reported at least one case of diarrhea in their household in the preceding 2 weeks and 84 (15.6%) reported at least one suspected case of typhoid fever since October 2011. The majority of respondents in Kuwadzana (89.7%, 200/223) and Dzivaresekwa (89.5%, 205/229), and 66 (69.5%) of 95 respondents in Hopley Farm reported having received any information on typhoid fever prevention, indicating that messages were reaching the target population. When asked what practices can be used to help prevent typhoid fever, treating water (64.8%, 342/528), and washing hands after toileting (51.9%, 274/528) were most commonly reported.

Table 9-3. Typhoid Fever Knowledge, Attitudes, and Practices								
	KUWADZANA		DZIVARESEKWA		HOPLEY FARM		TOTAL	
	N	n (%)	N	n (%)	N	n (%)	N	n (%)
Have Heard of Typhoid Fever	227	225 (99.1)	231	229 (99.1)	99	95 (96.0)	557	549 (98.6)
Have Heard of the Typhoid Fever Outbreak in this Area	224	209 (93.3)	226	213 (94.2)	93	42 (45.2)	543	464 (85.5)

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Heard about the Typhoid Outbreak in the Following Month *				
	206	202	46	454
<i>October 2011</i>	24 (11.7)	50 (24.8)	4 (8.7)	78 (17.2)
<i>November 2011</i>	34 (16.5)	51 (25.3)	5 (10.9)	90 (19.8)
<i>December 2011</i>	43 (20.9)	19 (9.4)	9 (19.6)	71 (15.6)
<i>January 2012</i>	60 (29.1)	26 (12.9)	7 (15.2)	93 (20.5)
<i>February 2012</i>	34 (16.5)	12 (2.9)	11 (23.9)	57 (12.6)
<i>Don't know</i>	11 (5.3)	44 (21.8)	10 (21.7)	65 (14.3)
Source of Information on the Typhoid Fever Outbreak *	209	215	46	470
<i>Community health worker</i>	76 (36.4)	114 (53.0)	11 (23.9)	201 (42.8)
<i>Nurse/clinician</i>	67 (32.1)	91 (42.3)	19 (41.3)	177 (37.7)
<i>TV</i>	79 (37.8)	59 (27.4)	4 (8.7)	142 (30.2)
<i>Neighbor</i>	71 (34.0)	42 (20.0)	7 (15.2)	121 (25.7)
<i>Radio</i>	48 (23.0)	37 (17.2)	14 (30.4)	99 (21.1)
<i>Newspaper</i>	26 (12.4)	20 (9.3)	1 (2.2)	47 (10.0)
<i>Family</i>	16 (7.7)	12 (5.6)	3 (6.5)	31 (6.6)
<i>Friend</i>	19 (9.1)	7 (3.3)	3 (6.5)	29 (6.2)
<i>Patients</i>	7 (3.3)	16 (7.4)	5 (10.9)	28 (6.0)
<i>Brochure/flyer</i>	7 (3.3)	12 (5.6)	1 (2.2)	20 (4.3)
<i>SMS</i>	7 (3.3)	5 (2.3)	3 (6.5)	15 (3.2)
<i>Church</i>	7 (3.3)	5 (2.3)	1 (2.2)	13 (2.8)
<i>Community meeting</i>	8 (3.8)	0 (0.0)	1 (2.2)	9 (1.9)
<i>Theater/drama</i>	3 (1.4)	0 (0.0)	1 (2.2)	4 (0.9)
<i>Internet</i>	1 (0.5)	1 (0.5)	0 (0.0)	2 (0.4)
Beliefs about the Cause of Typhoid Fever	207	205	82	494
<i>Drinking contaminated or untreated water</i>	154 (74.4)	163 (79.5)	46 (56.1)	363 (73.5)
<i>Eating contaminated food</i>	104 (50.2)	122 (59.5)	46 (56.1)	272 (55.1)
<i>Poor hand hygiene</i>	104 (50.2)	88 (42.9)	38 (46.3)	230 (46.6)
<i>Eating unwashed fruits/vegetables</i>	53 (25.6)	63 (30.7)	20 (24.4)	136 (27.5)
<i>Flies/insects</i>	43 (20.8)	41 (20.0)	23 (28.0)	107 (21.7)
<i>Not using a toilet</i>	10 (4.8)	9 (4.4)	9 (11.0)	28 (5.7)
<i>Spirits/curse</i>	1 (0.5)	1 (0.5)	0 (0.0)	2 (0.4)
<i>Person-to-person</i>	6 (2.9)	2 (1.0)	2 (2.4)	10 (2.0)
<i>Eating cold food</i>	6 (2.9)	7 (3.4)	3 (3.7)	16 (3.2)
<i>Eating fish</i>	6 (2.9)	6 (2.9)	3 (3.7)	15 (3.0)
Knowledge of Symptoms of Typhoid Fever	191	205	73	469
<i>Diarrhea</i>	171 (89.5)	182 (88.8)	67 (91.8)	420 (89.6)

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<i>Headache</i>	91 (47.6)	113 (55.1)	22 (30.1)	226 (48.2)
<i>Nausea and vomiting</i>	82 (42.9)	94 (45.9)	25 (34.2)	201 (42.9)
<i>Fever</i>	51 (26.7)	62 (30.2)	11 (15.1)	124 (26.4)
<i>Body weakness</i>	44 (23.0)	62 (30.2)	17 (23.3)	123 (26.2)
<i>Malaise/tired</i>	59 (30.9)	47 (22.9)	8 (11.0)	114 (24.3)
<i>Abdominal cramp</i>	31 (16.2)	45 (22.0)	8 (11.0)	84 (17.9)
<i>Loss of appetite</i>	12 (6.3)	12 (5.9)	3 (4.1)	27 (5.8)
<i>Constipation</i>	9 (4.7)	10 (4.9)	1 (1.4)	20 (4.3)
<i>Dehydration</i>	9 (4.7)	4 (2.0)	1 (1.4)	14 (3.0)
<i>Cough</i>	5 (2.6)	4 (2.0)	0 (0.0)	9 (1.9)
One or More Diarrhea Case in Past Two Weeks	227 35 (15.4)	231 55 (23.8)	100 22 (22.0)	558 112 (20.1)
One or More Fever Case Since October 2011	227 27 (11.9)	231 46 (19.9)	100 14 (14.0)	558 84 (15.6)
Any Household Members Hospitalized	223 18 (8.1)	229 32 (14.0)	99 4 (4.0)	551 54 (9.8)
Received Information on Typhoid Fever Prevention	223 200 (89.7)	229 205 (89.5)	95 66 (69.5)	547 471 (86.1)
Source of Information on Typhoid Fever Prevention	203	204	69	476
<i>Community health worker</i>	110 (54.2)	139 (68.1)	32 (46.4)	281 (59.0)
<i>Nurse/clinician</i>	85 (41.9)	0 (0.0)	35 (50.7)	220 (46.2)
<i>TV</i>	70 (34.5)	55 (27.0)	7 (10.1)	132 (27.7)
<i>Radio</i>	37 (18.2)	0 (0.0)	14 (20.3)	80 (16.8)
<i>Neighbor</i>	25 (12.3)	13 (6.4)	5 (7.3)	43 (9.0)
<i>Brochure/flyer</i>	19 (9.4)	0 (0.0)	3 (4.3)	41 (8.6)
<i>Newspaper</i>	14 (6.9)	12 (5.9)	3 (4.3)	29 (6.1)
<i>Family</i>	10 (4.9)	8 (3.9)	0 (0.0)	0 (0.0)
<i>Friend</i>	15 (7.4)	3 (1.5)	4 (5.8)	22 (4.6)
<i>Church</i>	12 (5.9)	6 (2.9)	1 (1.4)	19 (4.0)
<i>Community meeting</i>	7 (3.4)	4 (2.0)	3 (4.3)	14 (2.9)
<i>SMS</i>	8 (3.9)	3 (1.5)	1 (1.4)	12 (2.5)
<i>Theater/drama</i>	1 (0.5)	2 (1.0)	0 (0)	3 (0.6)
<i>Internet</i>	2 (1.0)	1 (0.5)	0 (0)	3 (0.6)
Typhoid Fever Prevention Practices	217	227	84	528
<i>Boil or treat water</i>	127 (58.5)	162 (71.4)	53 (63.1)	342 (64.8)
<i>Wash hands after toilet</i>	113 (52.1)	109 (48.0)	52 (61.9)	274 (51.9)
<i>Use soap/ash for hand washing</i>	60 (27.6)	99 (43.6)	34 (40.5)	193 (36.6)
<i>Wash fruits/vegetables</i>	69 (31.8)	90 (39.6)	29 (34.5)	188 (35.6)
<i>Eat hot food</i>	60 (27.6)	53 (23.3)	21 (25.0)	134 (25.4)
<i>Wash hands before eating/cooking</i>	63 (29.0)	53 (23.3)	16 (19.0)	132 (25.0)

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<i>Cook food thoroughly</i>	55 (25.3)	51 (22.5)	14 (16.7)	120 (22.7)
<i>Good hygiene</i>	25 (11.5)	16 (7.0)	7 (8.3)	48 (9.1)
<i>Clean cooking utensils</i>	10 (4.6)	23 (10.1)	13 (15.5)	46 (8.7)
<i>Drink borehole water</i>	6 (2.8)	23 (10.1)	2 (2.4)	31 (5.9)
<i>Clean toilet</i>	12 (5.5)	12 (5.3)	3 (3.6)	27 (5.1)
<i>Cover food</i>	8 (3.7)	6 (2.6)	4 (4.8)	18 (3.4)
Typhoid Fever Treatment	221	228	99	548
<i>Go to clinic/hospital</i>	216 (97.7)	225 (98.7)	98 (99.0)	539 (98.4)
<i>Home remedy</i>	82 (37.1)	76 (33.3)	37 (37.4)	195 (35.6)
<i>Go to traditional/herbal/faith healer</i>	2 (0.9)	1 (0.4)	1 (1.0)	4 (0.7)
<i>Buy medicine from drug store</i>	0 (0.0)	2 (0.9)	0 (0.0)	2 (0.4)
* among respondents how have heard of the typhoid fever outbreak in the area				

Water Treatment Beliefs and Behaviors Before the Typhoid Fever Outbreak

Only 62 (27.7%) of 224 households in Kuwadzana and 72 (31.7%) of 227 households in Dzivaresekwa, but 69 of 98 (70.4%) in Hopley Farm believed their current water was safe to drink (Table 9-4). Overall, 179 (36.0%) of 483 households responded that water was safe to drink because it had been treated, while 105 (21.7%) would know water was safe to drink if it appeared clear. Water was regarded as unsafe to drink when it appeared dirty (74.0%, 392/530), had a smell (15.5%, 82/530) or had color changes (6.8%, 36/530). Before the typhoid outbreak, the primary source of drinking water for 164 (74.6%) of 220 households in Kuwadzana, and 169 (76.1%) of 222 households in Dzivaresekwa was municipal tap water, while the remaining 20-25% primarily drank water from a borehole. Borehole water was the main alternative source of water in these two areas. In Hopley Farm, municipal/piped (35.7%, 35/98), borehole (29.6%, 29/98), and protected well water (32.7%, 32/98) were reported as primary sources. Social marketing of WaterGuard through advertisements had reached 173 (77.9%) of 222 households in Kuwadzana, and 161 (71.6%) of 225 households in Dzivaresekwa, while only 56 (57.1%) of 98 households in Hopley Farm reported they had seen advertisements for WaterGuard. The percentage of households that had seen WaterGuard in stores was 20-30% lower than the percentage of households that had seen WaterGuard advertisements in each of the suburbs. Only ~20% of the households had purchased WaterGuard in Kuwadzana and Dzivaresekwa, and 8.1% in

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Hopley Farm. Reasons for not purchasing included the product being too expensive (16.7%), water being already safe (12.8%), and other products being available for free (11.7%). Nearly all households knew at least one method of water treatment before the outbreak: ~75% knew boiling and ~60% knew chlorine tablets in Kuwadzana and Dzivaresekwa, while 81% knew chlorine tablets and 59% knew boiling in Hopley Farm. However, households that reported treating water daily using each method represented only approximately 25% of those reported knowing the method in Kuwadzana and Dzivaresekwa, and 39.5% (32 of 81) respondents who knew about chlorine tablets in Hopley Farm (table 9-9-1).

Table 9-4. Water Treatment Beliefs and Behaviors Before the Typhoid Fever Outbreak								
	KUWADZANA		DZIVARESEKWA		HOPLEY FARM		TOTAL	
	N	n (%)	N	n (%)	N	n (%)	N	n (%)
Believe that Current Water is Safe to Drink	224	62 (27.7)	227	72 (31.7)	98	69 (70.4)	549	203 (37.0)
Reasons that Water is Safe to Drink	202		202		79		483	
<i>Water is not safe</i>	85 (42.1)		86 (42.6)		24 (30.4)		195 (40.0)	
<i>Water is treated</i>	76 (37.6)		74 (36.6)		24 (30.4)		174 (36.0)	
<i>Water is clear</i>	35 (17.3)		38 (18.8)		32 (40.5)		105 (21.7)	
<i>Free of bacteria</i>	7 (3.5)		9 (4.5)		4 (5.1)		20 (4.1)	
<i>Told it is</i>	11 (5.4)		4 (2.0)		3 (3.8)		18 (3.7)	
Reason that Water is Not Safe to Drink	214		227		89		530	
<i>Water is dirty</i>	176 (82.2)		178 (78.4)		38 (42.7)		392 (74.0)	
<i>Smell of water</i>	46 (21.5)		30 (13.2)		6 (6.7)		82 (15.5)	
<i>Water is safe</i>	12 (5.6)		26 (11.5)		27 (30.3)		65 (12.3)	
<i>Color of water</i>	20 (9.3)		14 (6.2)		2 (2.2)		36 (6.8)	
<i>Thereis an outbreak</i>	17 (7.9)		15 (6.6)		2 (2.2)		34 (6.4)	
<i>Told it is</i>	7 (3.3)		7 (3.1)		4 (4.5)		18 (3.4)	
<i>Has bacteria</i>	7 (3.3)		3 (1.3)		4 (4.5)		14 (2.6)	
Primary Water Source Before the Typhoid Fever Outbreak	220		222		98		540	
<i>Municipal/piped</i>	164 (74.6)		169 (76.1)		35 (35.7)		368 (68.2)	
<i>Borehole</i>	55 (25.0)		50 (22.5)		29 (29.6)		134 (24.8)	
<i>Protected well</i>	1 (0.5)		3 (1.4)		32 (32.7)		36 (6.7)	
<i>Unprotected well</i>	0 (0.0)		0 (0.0)		2 (2.0)		2 (0.4)	
Secondary Water Source (s) Before the Typhoid Fever Outbreak	217		231		99		547	

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<i>Borehole</i>	104 (47.9)	64 (27.7)	22 (22.0)	190 (34.7)
<i>Municipal/piped</i>	40 (18.4)	19 (8.2)	20 (20.2)	79 (14.4)
<i>Protected well</i>	1 (0.5)	8 (3.5)	24 (24.2)	33 (6.0)
<i>Unprotected well</i>	1 (0.5)	5 (2.2)	7 (7.1)	13 (2.4)
<i>Shallow well</i>	2 (0.9)	1 (0.4)	0 (0.0)	3 (0.5)
<i>Rainwater</i>	1 (0.5)	1 (0.4)	0 (0.0)	2 (0.4)
WaterGuard Knowledge Before the Typhoid Fever Outbreak				
<i>Had seen ads for WaterGuard</i>	222 173 (77.9)	225 161 (71.6)	98 56 (57.1)	545 390 (71.6)
<i>Had seen WaterGuard in store</i>	223 139 (62.3)	227 116 (51.1)	98 30 (30.6)	548 285 (52.0)
<i>Had purchased WaterGuard</i>	224 49 (21.9)	225 44 (19.6)	99 8 (8.1)	548 101 (18.4)
Reasons for not using WaterGuard Before the Typhoid Fever Outbreak	215	219	96	530
<i>Never heard of WG</i>	36 (16.7)	57 (26.0)	39 (40.6)	132 (24.9)
<i>Too expensive/can't afford</i>	33 (15.3)	36 (16.4)	26 (27.1)	95 (17.9)
<i>Don't know how to use</i>	26 (12.1)	30 (13.7)	13 (13.5)	69 (13.0)
<i>Water already safe</i>	37 (17.2)	25 (11.4)	6 (6.3)	68 (12.8)
<i>Have free products</i>	28 (13.0)	21 (9.6)	13 (13.5)	62 (11.7)
<i>Boiling</i>	13 (6.0)	14 (6.4)	1 (1.0)	28 (5.3)
<i>Fear of chemicals</i>	14 (6.5)	9 (4.1)	2 (2.1)	25 (4.7)
<i>Always use</i>	7 (3.3)	8 (3.7)	1 (1.0)	16 (3.0)
<i>Use borehole water</i>	7 (3.3)	8 (3.7)	1 (1.0)	16 (3.0)
<i>Ignorance</i>	7 (3.3)	4 (1.8)	2 (2.1)	13 (2.5)
<i>Taste of water</i>	6 (2.8)	1 (0.5)	3 (3.1)	10 (1.9)
<i>Smell of water</i>	6 (2.8)	2 (0.9)	1 (1.0)	9 (1.7)
<i>Local stores don't sell</i>	3 (1.4)	0 (0.0)	1 (1.0)	4 (0.8)
Water Treatment Methods Known Before the Typhoid Fever Outbreak	218	222	100	540
<i>Boiling</i>	169 (77.5)	165 (74.3)	59 (59.0)	393 (72.8)
<i>Aquatabs/Oasis</i>	138 (63.3)	132 (59.5)	81 (81.0)	351 (65.0)
<i>WaterGuard</i>	66 (30.3)	50 (22.5)	19 (19.0)	135 (25.0)
<i>Bleach/Jik</i>	23 (10.6)	19 (8.6)	6 (6.0)	48 (8.9)
<i>WaterMaker</i>	2 (0.9)	7 (3.2)	0 (0.0)	9 (1.7)
<i>Filtering</i>	2 (0.9)	4 (1.8)	2 (2.0)	8 (1.5)
Knew Any Water Treatment Methods Before the Outbreak	218	222	100	540
	214 (98.2)	206 (92.8)	98 (98.0)	518 (95.9)
Knew Any Chlorine Based Water Treatment Methods Before the Outbreak	218	222	100	540
	171 (78.4)	158 (71.2)	88 (88.0)	417 (77.2)
Reported Using Any Water Treatment Methods Before the	218	222	100	540

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Outbreak				
	159 (72.9)	177 (79.4)	87 (87.0)	423 (78.2)

Coverage of distribution of Non Food Items (NFI)

The reported coverage of NFI product distributions with at least one product was 181 (80.8%) of 224 households in Kuwadzana, and 198 (88.4%) of 224 households in Dzivaresekwa, and 66 (66.0%) of 100 households in Hopley Farm (Table 9-5). Aquatabs were the most widely distributed product, reportedly received by 272 (49.4%) of 551 households, and reportedly used at least once a week by ~65% of households that received it (Table 9-9-3). WaterMaker was received by 49 (21.4%) of 229 households in Dzivaresekwa, but only 16% of the households that received the product reported using it at least once a week. Soap and water containers were distributed to 75 (13.6%) and 34 (6.2%) of 551 households respectively, and over 90% of households that received them reported using them daily.

	KUWADZANA		DZIVARESEKWA		HOPLEY FARM		TOTAL	
	N	n (%)	N	n (%)	N	n (%)	N	n (%)
Received Any Products Since November 2011	224	181 (80.8)	224	198 (88.4)	100	66 (66.0)	548	445 (81.2)
Products Received	222		229		100		551	
<i>Aquatabs</i>	115 (51.8)		115 (50.2)		42 (42.0)		272 (49.4)	
<i>Oasis</i>	8 (3.6)		5 (2.2)		0 (0.0)		13 (2.4)	
<i>Tablets (unknown type)</i>	56 (25.2)		82 (35.8)		23 (23.0)		161 (29.2)	
<i>WaterMaker</i>	0 (0.0)		49 (21.4)		0 (0.0)		49 (8.9)	
<i>Soap</i>	5 (2.3)		28 (12.2)		42 (42.0)		75 (13.6)	
<i>Water containers</i>	3 (1.4)		30 (13.1)		1 (1.0)		34 (6.2)	
<i>ORS</i>	0 (0.0)		6 (2.6)		0 (0.0)		6 (1.1)	

Water treatment beliefs and behaviors since the onset of the typhoid fever outbreak

Following the onset of the outbreak, while the reported source of drinking water did not change significantly in Kuwadzana, the number of households reporting borehole water as the primary source water increased from 50 (22.5%) of 222 to 146 (64.0%) of 228 in

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Dzivaresekwa (Table 9-6). Households in Kuwadzana and Dzivaresekwa collected a median of 20 liters of water for daily, while households in Hopley Farm collected a median of 40 liters daily, reflecting availability of piped water in these suburbs. Buckets were the most commonly reported containers (77.9%, 425/533) used to collect water, followed by empty bottles (18.0%, 96/533). Of 435 households, 218 (50.1%) reported Aquatabs was the preferred method of water treatment, 118 (27.1%) reported boiling, and 62 (14.3%) reported WaterGuard. Commonly reported reasons for preferring one method over another were easier to use (37.8%), tastes better (14.5%) and kill germs (12.1%).

When asked if households had seen information about WaterGuard since the beginning of the outbreak, over 80% in Kuwadzana and Dzivaresekwa, and 63% in Hopley Farm responded positively. However, only 120 (21.7%) of 553 reported having used it during this outbreak and 92 (16.7%) reported purchasing it. The most commonly reported reasons for not using WaterGuard were too expensive (20.5%, 111/541), and had free products (12.9%, 70/541). The knowledge of WaterGuard was limited: only 133 (24.1%) of 551 and 105 (19.5%) of 538 of respondents knew the correct volume and the correct waiting time before drinking respectively.

Since the outbreak onset (~free product distribution), 398 (79.3%) of 502 households reported using Aquatabs, an increase from 252 (46.7%) of 549 before the onset of outbreak. Approximately half of the households that reported using tablets used them daily (Table 9-9-2). Boiling was reported by 113 (22.5%) of the households with about 30% of them using the method daily since the outbreak onset.

	KUWADZANA		DZIVARESEKWA		HOPLEY FARM		TOTAL	
	N	n (%)	N	n (%)	N	n (%)	N	n (%)
Primary Source of Water After the Outbreak Onset	224		228		100		552	
<i>Municipal/piped</i>		164 (73.2)		80 (35.1)		15 (15.0)		259 (46.9)
<i>Borehole</i>		57 (25.5)		146 (64.0)		26 (26.0)		229 (41.5)
<i>Protected well</i>		1 (0.5)		2 (0.9)		55 (55.0)		58 (10.5)
<i>Unprotected well</i>		1 (0.5)		0 (0.0)		4 (4.0)		4 (0.7)
<i>Shallow well</i>		0 (0.0)		0 (0.0)		0 (0.0)		1 (0.2)

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<i>Rainwater</i>	1 (0.5)	0 (0.0)	0 (0.0)	1 (0.2)
Secondary Sources of Water After the Outbreak Onset	212	225	97	534
<i>Municipal/piped</i>	35 (16.5)	52 (23.1)	17 (17.5)	104 (19.5)
<i>Borehole</i>	85 (40.1)	35 (15.6)	16 (16.5)	136 (25.5)
<i>Protected well</i>	1 (0.5)	1 (0.4)	10 (10.3)	12 (2.2)
<i>Unprotected well</i>	1 (0.5)	1 (0.4)	1 (1.0)	3 (0.6)
<i>Rainwater</i>	0 (0.0)	2 (0.9)	0 (0.0)	2 (0.4)
<i>Shallow well</i>	0 (0.0)	0 (0.0)	1 (1.0)	1 (0.2)
Water Collected Per Day, Liters	194	201	90	485
<i>Median</i>	20	20	40	20
<i>Range</i>	2-160	1-200	5-200	1-200
Containers Used to Collect Water	212	225	96	533
<i>Bucket</i>	145 (68.4)	176 (78.2)	94 (97.9)	415 (77.9)
<i>Bucket with tap</i>	64 (30.2)	38 (16.9)	6 (6.3)	108 (20.3)
<i>Empty Bottles</i>	42 (19.5)	47 (20.9)	7 (7.3)	96 (18.0)
<i>Jerry can</i>	1 (0.5)	1 (0.4)	0 (0.0)	2 (0.4)
<i>Drum</i>	2 (0.9)	1 (0.4)	0 (0.0)	3 (0.6)
Preferred Water Treatment Method	172	187	79	435
<i>Aquatabs</i>	83 (48.26)	88 (47.8)	47 (59.5)	218 (50.1)
<i>Boiling</i>	48 (27.91)	50 (27.2)	20 (25.3)	118 (27.1)
<i>WaterGuard</i>	26 (15.12)	26 (14.1)	10 (12.7)	62 (14.3)
<i>Borehole water</i>	6 (3.49)	11 (6)	0 (0.0)	17 (3.9)
<i>Tablet (not specified)</i>	3 (1.74)	6 (3.3)	2 (2.5)	11 (2.5)
<i>Oasis</i>	6 (3.49)	1 (0.5)	0 (0.0)	7 (1.6)
<i>WaterMaker</i>	0 (0.0)	2 (1.1)	0 (0.0)	2 (0.5)
Reason for Preferring a Water Treatment Method **	162	182	79	423
<i>Easier to use</i>	65 (40.1)	59 (32.4)	36 (45.6)	160 (37.8)
<i>Tastes better</i>	15 (9.3)	33 (18.1)	14 (17.7)	62 (14.7)
<i>Kill germs</i>	17 (10.5)	26 (14.3)	8 (10.1)	51 (12.1)
<i>Free</i>	19 (11.7)	22 (12.1)	7 (8.9)	48 (11.3)
<i>Smells better</i>	17 (10.5)	23 (12.6)	5 (6.3)	45 (10.6)
<i>Have used before</i>	14 (8.6)	12 (6.6)	4 (5.1)	30 (7.1)
<i>Prevents disease</i>	16 (9.9)	8 (4.4)	4 (5.1)	28 (6.6)
<i>Less expensive</i>	10 (6.1)	5 (2.7)	0 (0.0)	15 (3.5)
<i>Clean water</i>	4 (2.5)	12 (6.6)	1 (1.3)	17 (4.0)
WaterGuard Knowledge After the Typhoid Fever Outbreak Onset				

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<i>Have seen info about WaterGuard</i>	223	184 (82.5)	230	193 (83.9)	98	62 (63.3)	551	439 (79.7)
<i>Have used WaterGuard</i>	224	51 (22.8)	231	55 (23.8)	98	14 (14.3)	553	120 (21.7)
<i>Have bought WaterGuard</i>	223	38 (17.0)	229	44 (19.2)	98	10 (10.2)	550	92 (16.7)
Reason for not Using WaterGuard After the Outbreak	217		230		94		541	
<i>Too expensive/can't afford</i>		36 (16.6)		43 (18.7)		32 (34)		111 (20.5)
<i>Never heard of WG</i>		23 (10.6)		31 (13.5)		31 (33)		85 (15.7)
<i>Have free products</i>		17 (7.8)		37 (16.1)		16 (17)		70 (12.9)
<i>Don't know how to use</i>		17 (7.8)		26 (11.3)		11 (11.7)		54 (10.0)
<i>Fear of chemicals</i>		11 (5.1)		10 (4.3)		4 (4.3)		25 (4.6)
<i>Use borehole water</i>		5 (2.3)		16 (7.0)		1 (1.1)		22 (4.1)
<i>Water already safe</i>		4 (1.8)		5 (2.2)		4 (4.3)		13 (2.4)
<i>Smell of water</i>		7 (3.2)		3 (1.3)		1 (1.1)		11 (2.0)
<i>Taste of water</i>		10 (4.6)		6 (2.6)		3 (3.2)		19 (3.5)
<i>Boiling or filtering</i>		6 (2.8)		5 (2.2)		1 (1.1)		11 (2.0)
<i>Ignorance</i>		6 (2.8)		4 (1.7)		1 (1.1)		11 (2.0)
<i>Always use</i>		4 (1.8)		12 (5.2)		3 (3.2)		19 (3.5)
<i>Local stores don't sell</i>		0 (0.0)		1 (0.4)		3 (3.2)		4 (0.7)
Accurate Knowledge of Volume of WaterGuard to Use	224		228		99		551	
<i>Correct: add 1-2 caps of WaterGuard to 20L of water</i>		57 (25.5)		62 (27.2)		14 (14.1)		133 (24.1)
<i>Incorrect</i>		13 (5.8)		6 (2.6)		2 (2)		21 (3.8)
<i>Don't know</i>		154 (68.8)		160 (70.2)		83 (83.8)		397 (72.1)
Accurate Knowledge of How Long to Wait after Adding WaterGuard before Drinking	216		223		99		538	
<i>Correct: 30 min</i>		48 (22.2)		44 (19.7)		13 (13.1)		105 (19.5)
<i>Incorrect</i>		10 (4.6)		20 (9)		3 (3)		33 (6.1)
<i>Don't know</i>		158 (73.1)		159 (71.3)		83 (83.8)		400 (74.3)
Method of Water Treatment Used After the Typhoid Fever Outbreak Onset	189		215		98		502	
<i>Aquatabs/Oasis</i>		159 (84.1)		117 (54.4)		62 (63.3)		398 (79.3)
<i>Boiling</i>		50 (26.5)		49 (22.8)		14 (14.3)		113 (22.5)
<i>WaterGuard</i>		32 (16.9)		35 (16.3)		9 (9.2)		76 (15.1)
<i>WaterMaker</i>		0 (0.0)		25 (11.6)		0 (0.0)		25 (5.0)
<i>Bleach/Jik</i>		4 (2.1)		3 (1.4)		5 (5.1)		12 (2.4)
* When the respondent was not aware of the outbreak, November 2011 was used in place of outbreak onset								
** Among those reporting preferred water treatment								

Water treatment tablet

At least three different types of chlorine tablets were distributed in the response: 1) Oasis brand 67-mg tablets meant for 8-10 liters of water, 2) Aquatabs brand 67-mg tablets meant for 8-10 liters of water, and 3) Aquatabs brand 167-mg tablets meant for 20-25 liters of water. Four different types of chlorine tablets were observed during the survey (67-mg and 167-mg Aquatabs, and 67-mg and 167-mg Oasis). According to the NGOs involved in product distribution, written materials that were handed out during the distribution noted to use “1 tablet for 20 liters of water,” without specifying the tablet size. The households that received 67-mg tablets were instructed to use 2 tablets for 20 liters verbally by volunteers. NGOs distributed enough tablets to treat 20 liters of water daily for 3 month per household; households were to receive 90 167-mg tablets or 180 67-mg tablets.

Of households that reported receiving Aquatabs, Oasis or unknown tablets, over 90% of households in Kuwadzana and Dzivaresekwa reported receiving training through household visit, while 52% received household visit and 41% received group training in Hopley Farm (Table 9-7-1). Of 425 households that received tablets, 347 (81.7%) reported receiving Aquatabs only, 13 (3.1%) reported Oasis only, 5 (1.2%) reported both Aquatabs and Oasis, and 60 (14.1%) did not know which tablet they received. The number of Aquatabs tablets received ranged from 8 to 580 for 291 households that could recall the number of tablets received, with a median of 100 tablets. Of 363 households that had tablets available for observation, 241 (66.4%) had 67-mg Aquatabs only, 114 (31.4%) had 167-mg Aquatabs only, 3 (0.8%) had 67-mg Oasis tablets only, 5 (1.4%) had 167-mg Oasis tablets only, and 8 (2.2%) had Aquatabs 67-mg and 167-mg. Correct knowledge about volume of water per tablet was assessed among households where tablets were observed: while 33 (80.5%) of 41 households in Hopley Farm reported correct volume of water per tablet, only 79 (53.7%) of 147 households in Kuwadzana, and 93 (55.0%) of 169 households in Dzivaresekwa reported correct volume of water per tablet. The reported water volume per tablet for each tablet size varied significantly (Table 9-7-2). For 67-mg Aquatabs, 86 (39.8%) of 216 households reported using 1 tablet per 20 liters of water,

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which is incorrect, while 85 (39.4%) reported 2 tablets per 20 liters, and 26 (12.0%) reported 1 tablet per 10 liters, which are correct. There was less confusion for 167-mg Aquatabs, with 87 (79.8%) of 109 households reporting the correct usages of 1 tablet per 20 liters of water.

Of 436 households that received any tablets, 394 (90.4%) reported ever using the tablets given, and 282 (64.7%) reported they were still using the tablets at the time of survey (Table 9-7-1). The main reasons for tablet use were that it prevents disease (56.4%), and cleans water (38.8%), while do not like the smell (14.3%), do not like the taste (12.8%), use borehole water (9.3%) and product finished (9.1%) were commonly reported reasons for not using tablets.

Table 9-7-1. Water Treatment Tablet Information *								
	KUWADZANA		DZIVARESEKWA		HOPLEY FARM		TOTAL	
	N	n (%)	N	n (%)	N	n (%)	N	n (%)
Training Received with Distribution of Tablets	162		186		61		409	
<i>Household visit</i>		150 (92.6)		176 (94.6)		32 (52.5)		358 (87.5)
<i>Group Training</i>		1 (0.6)		11 (5.9)		25 (41.0)		37 (9)
<i>Poster/pamphlet</i>		3 (1.9)		0 (0.0)		1 (1.6)		4 (1)
<i>None</i>		0 (0.0)		0 (0.0)		0 (0.0)		0 (0.0)
Reported Type of Tablets Received	171		192		62		425	
<i>Aquatabs only</i>		140 (81.9)		156 (81.3)		51 (82.3)		347 (81.7)
<i>Oasis only</i>		9 (5.3)		4 (2.1)		0 (0.0)		13 (3.1)
<i>Both</i>		1 (0.6)		4 (2.1)		0 (0.0)		5 (1.2)
<i>Don't know</i>		21 (12.3)		28 (14.6)		11 (17.7)		60 (14.1)
Reported Number of Aquatabs Received	117		124		51		292	
<i>Median</i>		100		100		60		100
<i>Range</i>		8-400		20-580		10-200		8-580
Reported Number of Oasis Tablets Received	7		6				13	
<i>Median</i>		96		115				96
<i>Range</i>		40-200		80-160				40-200
Tablets Observed in Household	151		173		39		363	
<i>Aquatabs 67mg only</i>		134 (85.9)		108 (62.4)		4 (10.3)		241 (66.4)

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<i>Aquatabs 167mg only</i>	19 (12.2)	62 (35.8)	35 (89.7)	114 (31.4)
<i>Oasis 67mg only</i>	2 (1.3)	1 (0.6)	0 (0.0)	3 (0.8)
<i>Oasis 167mg only</i>	1 (0.6)	4 (2.3)	0 (0.0)	5 (1.4)
<i>Aquatabs 67mg and 167mg</i>	0 (0.0)	8 (4.6)	0 (0.0)	8 (2.2)
Accurate Knowledge of How Long to Wait after Tablets before Drinking	173	189	63	425
<i>Correct: 30 min</i>	125 (72.3)	115 (60.8)	42 (66.7)	282 (66.4)
<i>Incorrect</i>	34 (19.7)	53 (28)	12 (19)	99 (23.3)
<i>Don't know</i>	14 (8.1)	21 (11.1)	9 (14.3)	44 (10.4)
Accurate Knowledge of Volume of Water to Add to Each Tablet	147	169	41	357
<i>Correct**</i>	79 (53.7)	93 (55.0)	33 (80.5)	205 (57.4)
<i>Incorrect or don't know</i>	68 (46.7)	76 (45.0)	8 (19.5)	152 (42.6)
Have Used the Tablets Given	176 157 (89.2)	196 177 (90.3)	64 60 (93.8)	436 394 (90.4)
Still Using the Tablets Given	176 125 (71)	196 124 (63.3)	64 33 (51.6)	436 282 (64.7)
Reason for Using Tablets	176	196	64	436
<i>Prevents disease</i>	101 (57.4)	101 (51.5)	44 (68.8)	246 (56.4)
<i>Cleans water</i>	82 (46.6)	66 (33.7)	21 (32.8)	169 (38.8)
<i>Instructed to do</i>	20 (11.4)	21 (10.7)	5 (7.8)	46 (10.6)
<i>Was given</i>	9 (5.1)	16 (8.2)	4 (6.3)	29 (6.7)
<i>Water dirty currently</i>	8 (4.5)	8 (4.1)	1 (1.6)	17 (3.9)
<i>Kill germs</i>	1 (0.6)	1 (0.5)	3 (4.7)	5 (1.1)
Reason for Not Using Tablets	169	179	59	407
<i>Always use</i>	80 (47.3)	81 (45.3)	27 (45.8)	188 (46.2)
<i>Don't like smell</i>	23 (13.6)	31 (17.3)	4 (6.8)	58 (14.3)
<i>Don't like taste</i>	17 (10.1)	29 (16.2)	6 (10.2)	52 (12.8)
<i>Use borehole water</i>	12 (7.1)	23 (12.8)	3 (5.1)	38 (9.3)
<i>Product finished</i>	12 (7.1)	9 (5)	16 (27.1)	37 (9.1)
<i>Water already clean</i>	8 (4.7)	6 (3.4)	3 (5.1)	17 (4.2)
<i>Using other products</i>	6 (3.6)	5 (2.8)	3 (5.1)	14 (3.4)
<i>Boiling/filtering</i>	8 (4.7)	4 (2.2)	0 (0.0)	12 (2.9)
<i>Hard to use</i>	4 (2.4)	4 (2.2)	1 (1.7)	9 (2.2)
* Among those reported receiving any tablets (including some that received tablets before Oct 2011)				
** 67mg tablets: 1 tablet for 8-10L of water or 2 tablets for 20-25L of water. 167mg tablets: 1 tablet for 20-25L of water.				

Table 9-7-2: Reported Number of Tablets and Water Volume Used for each Aquatabs Tablet Size (TOTAL) *			
Tablet size	Number of tablet	Volume of water (L)	Response n, %
67mg Aquatabs (N=216)	1	2	1 0.5
		10	26 12.0
		20	86 39.8
		25	9 4.2

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	2	10	2	0.9
		20	85	39.4
		25	4	1.9
	4	20	3	1.4
<i>167mg Aquatabs (N = 109)</i>	1	10	1	0.9
		20	87	79.8
		25	5	4.6
	2	20	12	11.0
		25	4	3.7
* Among households which Aquatabs were available for observation and provided both tablet number and water volume.				

WaterMaker

Of 45 respondents who received WaterMaker, 30 (66.7%) reported they had used the WaterMaker given, while 4 (8.6%) reported they were still using at the time of survey (Table 9-7-3). Using other products (30.2%) and hard to use (23.3%) were the most commonly reported reasons for not using. No respondents reported all steps of use correctly.

Table 9-7-3. WaterMaker Information		
	DZIVARESEKWA	
	N	n (%)
Training Received with Distribution of Tablets	44	
<i>Household visit</i>	39 (88.6)	
<i>Group Training</i>	4 (9.1)	
<i>Poster/pamphlet</i>	0 (0.0)	
<i>None</i>	0 (0.0)	
Reported Number of Sachets Received	34	
<i>Median</i>	5	
<i>Range</i>	1-20	
Accurate Knowledge of How Much Water to Use	46	
<i>Correct: 20 L</i>	30 (65.2)	
<i>Incorrect</i>	4 (8.7)	
<i>Don't know</i>	12 (26.1)	
Accurate Knowledge of How Long to Stir	45	
<i>Correct: 5 min</i>	5 (11.1)	

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	<i>Incorrect</i>	10 (22.2)
	<i>Don't know</i>	30 (66.7)
Accurate Knowledge of How Long to Wait after Stirring		46
	<i>Correct: until settled or 5 min</i>	20 (43.5)
	<i>Incorrect</i>	11 (23.9)
	<i>Don't know</i>	15 (32.6)
Accurate Knowledge of How Long to Wait after Filtering		43
	<i>Correct: 15 min or 30 min</i>	13 (30.2)
	<i>Incorrect</i>	6 (14)
	<i>Don't know</i>	24 (55.8)
Reported All Steps Correctly		49 0 (0.0%)
Have Used the WaterMaker Given		45 30 (66.7)
Still Using the WaterMaker Given		45 4 (8.9)
Reason for Using WaterMaker		45
	<i>Cleans water</i>	4 (8.9)
	<i>Instructed to do</i>	4 (8.9)
	<i>Prevents disease</i>	1 (2.2)
	<i>Water dirty currently</i>	1 (2.2)
	<i>Was given</i>	3 (6.7)
Reason for Not Using WaterMaker		43
	<i>Using other products</i>	13 (30.2)
	<i>Hard to use</i>	10 (23.3)
	<i>Product finished</i>	8 (18.6)
	<i>Don't like smell</i>	6 (14.0)
	<i>Don't like taste</i>	5 (11.6)
	<i>Boiling/filtering</i>	2 (4.7)
	<i>Water already clean</i>	0 (0.0)

Drinking Water on the Day of Unannounced Visit and Water testing

The final part of the survey involved observation and testing of stored water for free chlorine residual (FCR). The commonly reported sources of current drinking water varied by suburb: municipal water (69.9%, 158/226) and boreholes (29.6%, 67/226) in Kuwadzana; boreholes (62.9%, 144/229) and municipal water (35.4%, 81/229) in Dzivaresekwa; and protected wells (59.0%, 59/100) and boreholes (27.0%, 27/100) in Hopley Farm (Table 9-8-1). Overall, 419 (75.4%) of 556 households had stored drinking water available at the time of the unannounced survey visit. Of the households with stored drinking water, ~70% were observed to use 20 liter storage containers, while ~25% had containers smaller than 20 liters. The majority (~97%) stored water in covered containers.

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Of 407 households where container type was noted, 227 (68.1%) were buckets, 81 (19.9%) were empty bottles, and 45 (11.1%) were jerry cans. Among households with stored water, only 82 (45.8%) of 179 households in Kuwadzana, 61 (37.0%) of 165 households in Dzivaresekwa, and 15 (20.6%) of 73 households in Hopley Farm reported that the stored water was treated. Aquatabs was the most common treatment method, used by 74.7% of households with treated stored water, followed by WaterGuard (14.0%) and boiling (6.0%). The water had been treated between 1-168 hours before the visit with a median of 24 hours among 153 respondents. Respondents used the stored treated water for drinking (99.3%), cooking (59.5%), and washing fruits and vegetables (23.5%).

CDC's recommended level of FCR in drinking water treated with chlorine-based household water treatment is 0.2-2.0 mg/L. Only 53 (65.4%) of 81 reportedly stored water tested in Kuwadzana, 28 (46.7%) of 60 in Dzivaresekwa, and 4 (33.3%) of 12 in Hopley Farm had the recommended FCR. Approximately 30% of untreated water had the recommended FCR in Kuwadzana and Dzivaresekwa: 75% of the untreated water with recommended FCR were municipal water, and 25% were borehole water. FCR in borehole water is likely due to bucket chlorination or chlorine residual from shock chlorination. Among households with treated water with FCR ≥ 0.2 mg/L, 20 (33.3%) of 60 households in Kuwadzana, 13 (34.3%) of 38 households in Dzivaresekwa, and none of 6 households in Hopley Farm had untreated water with FCR ≥ 0.2 mg/L (i.e., both treated and untreated water had FCR ≥ 0.2 mg/L). Of 109 respondents that reported treating stored water with Aquatabs, 63 (57.8%) had the recommended FCR, 30 (27.5%) had FCR < 0.2 mg/L and 16 (14.7%) had FCR > 2.0 mg/L (Table 9-8-2).

	KUWADZANA		DZIVARESEKWA		HOPLEY FARM		TOTAL	
	N	n (%)	N	n (%)	N	n (%)	N	n (%)
Source of Current Drinking Water	226		229		100		555	
<i>Municipal water</i>	158 (69.9)		81 (35.4)		10 (10.0)		249 (44.9)	
<i>Borehole</i>	67 (29.6)		144 (62.9)		27 (27.0)		238 (42.9)	
<i>Unprotected well</i>	0 (0.0)		1 (0.4)		4 (4.0)		5 (0.9)	

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<i>Protected well</i>	1 (0.4)	2 (0.9)	59 (59.0)	62 (11.2)
<i>Rainwater</i>	0 (0.0)	1 (0.4)	0 (0.0)	1 (0.2)
Drinking Water Currently Stored at Home	227 179 (78.9)	230 167 (72.6)	99 73 (73.7)	556 419 (75.4)
Observed Size of Drinking Water Storage Container *	179	167	73	419
<i><20L</i>	61 (34.1)	36 (21.7)	5 (6.8)	102 (24.3)
<i>20L</i>	106 (59.2)	121 (72.5)	64 (87.7)	419 (69.5)
<i>>20L</i>	12 (6.7)	10 (6.0)	4 (5.5)	26 (4.7)
Drinking Water Storage Container is Covered *	179 174 (97.2)	164 160 (97.6)	73 70 (95.9)	414 402 (97.1)
Observed Type of Drinking Water Storage Container *	174	163	70	407
<i>Bucket</i>	100 (57.5)	115 (70.6)	62 (88.6)	277 (68.1)
<i>Empty bottles</i>	48 (27.9)	31 (19.0)	2 (2.9)	81 (19.9)
<i>Jerry can</i>	22 (12.8)	17 (10.4)	6 (8.6)	45 (11.1)
<i>Drum</i>	3 (1.7)	0 (0.0)	0 (0.0)	3 (0.7)
<i>Bucket with tap</i>	1 (0.6)	0 (0.0)	0 (0.0)	1 (0.3)
Reported Stored Drinking Water is Treated *				
Among Households with Stored Water	179 82 (45.8)	165 61 (37.0)	73 15 (20.6)	414 158 (38.2)
Among All Households Surveyed	227 82 (36.1)	231 61 (26.4)	100 15 (15.0)	558 158 (28.3)
Reported Method of Water Treatment **	76	60	14	150
<i>Aquatabs</i>	57 (75)	45 (75)	10 (71.4)	112 (74.7)
<i>Oasis</i>	4 (5.3)	2 (3.3)	1 (7.1)	7 (4.7)
<i>WaterMaker</i>	1 (1.3)	0 (0.0)	0 (0.0)	1 (0.7)
<i>WaterGuard</i>	9 (11.8)	9 (15)	3 (21.4)	21 (14.0)
<i>Boiling</i>	5 (6.6)	4 (6.7)	0	9 (6.0)
Hours Since Water Treatment **	80	60	13	153
<i>Median</i>	24	24	6	24
<i>Range</i>	1-168	1-167	0-24	0-168
Use of Treated Water **	79	58	15	153
<i>Drinking</i>	78 (98.7)	58 (100.0)	15 (100.0)	152 (99.3)
<i>Cooking</i>	49 (62.0)	30 (51.7)	12 (80.0)	91 (59.5)
<i>Bathing</i>	4 (5.1)	1 (1.7)	2 (13.3)	7 (4.6)
<i>Washing hands</i>	8 (10.1)	5 (8.6)	3 (20.0)	16 (10.5)

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<i>Washing dishes</i>	6 (7.6)	6 (10.3)	3 (20.0)	15 (9.8)
<i>Washing clothes</i>	0 (0.0)	1 (1.7)	2 (13.3)	3 (2)
<i>Washing fruits and vegetables</i>	23 (29.1)	10 (17.2)	3 (20.0)	36 (23.5)
Consented to Giving Treated Water for Testing **	82 81 (98.9)	61 60 (98.4)	15 12 (80.0)	158 153 (96.8)
Chlorine Residual Level in Treated Water				
Among Household that Provided Water for Testing	81	60	12	153
<0.2mg/L	21 (25.9)	22 (36.7)	6 (50.0)	49 (32.0)
0.2mg/L-2mg/L	53 (65.4)	28 (46.7)	4 (33.3)	85 (55.6)
>2mg/L	7 (8.6)	10 (16.7)	2 (16.7)	19 (12.4)
Among All Households Surveyed	227	231	100	558
<0.2mg/L	21 (9.3)	22 (9.5)	6 (6.0)	49 (8.8)
0.2mg/L-2mg/L	53 (23.3)	28 (12.1)	4 (4.0)	85 (15.2)
>2mg/L	7 (3.1)	10 (4.3)	2 (2.0)	19 (3.4)
Consented to Giving Untreated Water for Testing	222 200 (90.1)	228 193 (84.6)	99 80 (80.8)	549 473 (86.2)
Chlorine Residual Level in Untreated Water	200	193	80	473
<0.2mg/L	144 (72.0)	137 (71.0)	78 (97.5)	359 (75.9)
0.2mg/L-2mg/L	56 (28.0)	56 (29.0)	2 (2.5)	114 (24.1)
>2mg/L	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Chlorine Residual >0.2mg in both Treated and Untreated Water ***	60 20 (33.3)	38 13 (34.2)	6 0 (0.0)	104 33 (31.7)
* Among those who had stored drinking water on the day of the visit				
** Among those who had reportedly treated stored water on the day of the visit				
*** Among households with treated water with FCR > 0.2 mg				

Table 9-8-2. FCR level in Treated Water and Treatment Method: Total			
Water Treatment Method	FCR level		
	<0.2 mg/L	0.2-2 mg/L	> 2mg/L
<i>Aquatabs (N = 109)</i>	30 (27.5)	63 (57.8)	16 (14.7)
<i>Oasis (N = 5)</i>	2 (40.0)	3 (60.0)	0 (0.0)
<i>WaterMaker (N = 1)</i>	0 (0.0)	1 (100.0)	0 (0.0)
<i>WaterGuard (N = 21)</i>	10 (47.6)	9 (42.9)	2 (9.5)
<i>Boiling (N = 9)</i>	6 (66.7)	3 (33.3)	0 (0.0)

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Table 9-9-1: Reported Frequency of Water Treatment Methods Used Before the Typhoid Fever Outbreak (among those reported knowing the method)																				
	KUWADZANA					DZIVARESEKWA					HOPLEY FARM					TOTAL				
	N	Never	Rarely	1/week	Daily	N	Never	Rarely	1/week	Daily	N	Never	Rarely	1/week	Daily	N	Never	Rarely	1/week	Daily
Boiling n (%)	164	55 (33.5)	39 (23.8)	26 (15.9)	44 (26.8)	165	43 (26.1)	58 (35.2)	21 (12.7)	43 (26.1)	59	16 (27.1)	26 (44.1)	4 (6.8)	13 (22.0)	388	114 (29.4)	123 (31.7)	51 (13.1)	100 (25.8)
Aquatabs/Oasis n (%)	133	47 (35.3)	35 (26.3)	27 (20.2)	24 (18.1)	132	35 (26.5)	43 (32.6)	22 (16.67)	32 (24.2)	81	12 (14.8)	20 (24.7)	17 (21.0)	32 (39.5)	346	94 (27.2)	98 (28.3)	66 (19.1)	88 (25.4)
WaterGuard n (%)	62	33 (53.2)	10 (16.1)	9 (14.5)	10 (16.1)	50	23 (46.0)	13 (26.0)	3 (6.0)	11 (22.0)	19	13 (68.4)	3 (15.8)	--	3 (15.8)	313	69 (52.7)	26 (19.9)	12 (9.2)	24 (18.3)
Bleach/Jik n (%)	23	10 (43.5)	7 (30.4)	5 (21.7)	1 (4.3)	19	11 (57.9)	2 (10.5)	4 (21.1)	2 (10.5)	6	2 (33.3)	2 (33.3)	--	2 (33.3)	48	23 (47.9)	11 (22.9)	9 (18.8)	5 (10.4)
WaterMaker n (%)	1	--	1 (100)	--	--	7	4 (57.1)	2 (28.6)	--	1 (17.3)	0	--	--	--	--	8	4 (50.0)	3 (37.5)	--	1 (12.5)
Filter n (%)	1	1 (100)	--	--	--	2	1 (50.0)	--	1 (50.0)	--	2	--	1 (50.0)	--	1 (50.0)	5	2 (40.0)	2 (20.0)	--	2 (40.0)

Table 9-9-2: Reported Frequency of Water Treatment Used After the Typhoid Fever Outbreak (among those reported usage)																
	KUWADZANA				DZIVARESEKWA				HOPLEY FARM				TOTAL			
	N	Rarely	1/week	Daily	N	Rarely	1/week	Daily	N	Rarely	1/week	Daily	N	Rarely	1/week	Daily
Aquatabs/Oasis n (%)	153	41 (26.8)	36 (23.5)	76 (49.7)	177	54 (30.5)	33 (18.6)	90 (50.9)	62	17 (27.4)	8 (12.9)	37 (59.7)	392	112 (28.6)	77 (19.6)	203 (51.8)
Boiling n (%)	49	24 (49.0)	11 (22.5)	14 (28.6)	49	23 (46.9)	8 (16.3)	18 (36.7)	14	9 (64.3)	2 (14.3)	3 (21.4)	112	56 (50.0)	21 (18.8)	35 (31.2)
WaterGuard n (%)	29	9 (31.1)	14 (48.3)	6 (20.7)	34	11 (32.4)	6 (17.7)	17 (50.0)	9	2 (22.2)	2 (22.2)	5 (55.6)	72	22 (30.6)	22 (30.6)	28 (38.9)
Bleach/Jik n (%)	4	1 (25.0)	--	4 (75.0)	3	1 (33.3)	2 (66.7)	--	5	2 (40.0)	3 (60.0)	--	12	4 (33.3)	2 (16.7)	6 (50.0)

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WaterMaker <i>n (%)</i>	0	--	--	--	25	21 (84.0)	1 (4.0)	3 (12.0)	0	--	--	--	25	21 (84.0)	1 (4.0)	3 (12.0)
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Table 9-9-3: Reported Frequency of Use of Received Products (among those reported receiving products)

	KUWADZANA					DZIVARESEKWA					HOPLEY FARM					TOTAL				
	N	Never	Rarely	1/week	Daily	N	Never	Rarely	1/week	Daily	N	Never	Rarely	1/week	Daily	N	Never	Rarely	1/week	Daily
Aquatabs <i>n (%)</i>	111	11 (9.9)	26 (23.4)	24 (21.6)	50 (45.1)	111	9 (8.1)	29 (26.1)	25 (22.5)	48 (43.2)	42	2 (4.8)	8 (19.1)	6 (14.3)	26 (61.9)	264	22 (8.3)	63 (23.9)	55 (20.8)	124 (47.0)
Oasis <i>n (%)</i>	8	2 (25.0)	1 (12.5)	1 (12.5)	4 (50.0)	5	1 (20.0)	2 (40.0)	1 (20.0)	1 (20.0)	0	--	--	--	--	13	3 (23.1)	3 (23.1)	2 (15.4)	5 (38.5)
Tablets <i>(unknown type) n (%)</i>	56	10 (17.9)	17 (30.4)	9 (16.1)	20 (35.7)	82	8 (9.7)	23 (28.1)	12 (14.6)	39 (47.6)	23	3 (13.0)	3 (13.0)	2 (8.7)	15 (65.2)	161	21 (13.0)	43 (26.7)	23 (14.3)	74 (46.0)
WaterMaker <i>n (%)</i>	0	--	--	--	--	49	22 (44.9)	19 (38.8)	1 (2.0)	7 (14.3)	0	--	--	--	--	49	22 (44.9)	19 (38.8)	1 (2.0)	7 (14.3)
Soap <i>n (%)</i>	5	--	--	1 (20.0)	4 (80.0)	28	--	--	1 (3.6)	27 (96.43)	42	--	--	1 (2.4)	41 (97.6)	75	--	--	3 (4.0)	72 (96.0)
Water containers <i>n (%)</i>	3	--	--	--	3 (100.0)	30	2 (6.7)	--	--	28 (93.3)	1	--	1 (100.0)	--	--	34	2 (5.9)	--	--	32 (94.1)
ORS <i>n(%)</i>	0	--	--	--	--	6	4 (66.7)	2 (33.3)	--	--	0	--	--	--	--	6	4 (66.7)	2 (33.3)	--	--

Summary and Recommendations

Based upon the initial findings and observations, the following conclusions and recommendations can be made:

Objective 1: Assess the coverage and consistency of the distribution process

There was good reported coverage of products received since the beginning of the outbreak with over 80% of the respondents reported having received at least one product in Kuwadzana and Dzivaresekwa. Some inconsistencies existed in the type and amount of products distributed per household, and the coverage was lower in Hopley Farm. We therefore recommend adoption of systems to ensure equitable and consistent distribution of products to targeted communities. This may be achieved through careful planning and close coordination and monitoring of community volunteers responsible for distribution of products.

Objective 2: Assess community knowledge and attitudes and whether the health education messages led to behavior change during the outbreak

Overall, there was good knowledge of the typhoid fever outbreak in Kuwadzana and Dzivaresekwa with over 90% having heard about typhoid fever outbreak in their areas. Gaps in knowledge of the major symptoms of typhoid fever existed as only 26% of the respondents knew about fever as a presenting symptom of typhoid fever. Also, less than 50% of respondents reported treating water daily. Only about 50% of respondents knew the correct formulation of salt sugar solution, and nearly 50% reported they did not know the formulations for ORS. We recommend the Social Mobilization group consider improving effectiveness of educational campaigns through using mobile phones text messages and TV prime time, which were the most commonly owned communication devices. The messages should focus on increasing knowledge of fever as a symptom of typhoid fever, importance of treating water daily and correct home treatment methods for diarrheal diseases, including ORS. The question of whether knowledge about typhoid fever led to behavior change during the outbreak will be determined in further analyses.

Objective 3: Determine if the NFIs distributed were an effective and appropriate intervention during the outbreak

Chlorine based water treatment tablets were the main NFIs distributed. Nearly 90% of households that received tablets reported ever using them. However, only about half reported daily use, and only about 15% of households surveyed had treated water and achieved the recommended FCR of 0.2-2.0mg/L on the day of the unannounced survey visit. Two different types of chlorine tablets (Aquatabs and Oasis) and two sizes of Aquatabs (67-mg and 167-mg) were distributed, and the reported dosage (tablets per volume of water) varied largely, indicating confusion on correct use. We recommend improving coordination of response activities of NGOs to ensure standardized product distribution and usage instructions. In particular, PoUWT products should be of the same type and dosage to minimize confusion among recipients. Distribution of standardized containers may also improve correct use of

water treatment products. The instructions on the use of PoUWT products should include frequency of treatment and the need to treat water from all sources daily.

Objective 4: Determine if knowledge and usage of PoUWT products before the outbreak influenced uptake of water treatment products during the outbreak

Further analysis is required to achieve this objective. The survey found solid awareness of WaterGuard with over 70% reporting having seen the advertisements, but only about 20% had ever used the product. The reasons for non-use included water being already safe and the product being too expensive. We recommend continuing social marketing of WaterGuard for all household stored water treatment as a long term intervention. WaterGuard can be displayed by the cashier and offered as change in place of candies that are commonly offered due to unavailability of coins.

Communication of Results and Recommendation

Following the completion of the evaluation, a summary was communicated to MoHCW and CHCHD on March 29, 2011, and to UNICEF, OFDA, GAA, PSI, and other NGOs involved in the outbreak response during a WASH meeting on March 30, 2012. A workshop to describe the detailed method of the survey was also held on March 28, 2012 at UNICEF. CCOPE reported further results, in consultation with CDC, on April 27, 2012. A written trip report distributed via email will also be provided.

Budget

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Jennifer Murphy

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Figure 4: Map of Housing Units in Kuwadzana

A section of Kuwadzana from a map obtained from Surveyor General's Office: only the numbered housing units were entered into Excel.

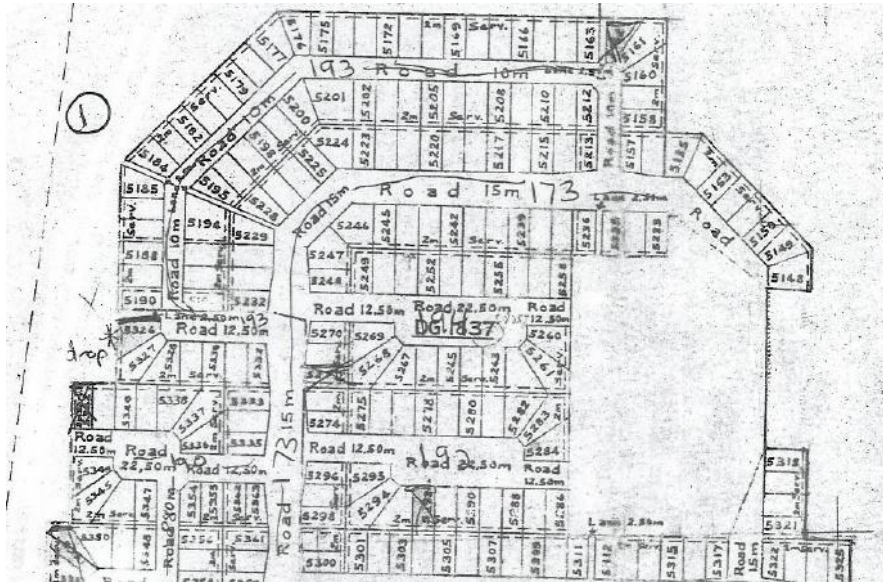


Figure 5: Map of Housing Units in Dzivaresekwa

A section of Dzivaresekwa from a map obtained the City of Harare's Department of Engineering and Urban Planning. Only the street numbers (smaller numbers) were entered.



Table 7: Environmental Water Sample Results of Boreholes, Dzivaresekwa (DZ), Zimbabwe, January 2012

Water Source Tested	Presence of Total Coliforms	Presence of <i>E. coli</i>
Borehole 1: DZ 1	Positive	Negative
Borehole 2: DZ 3	Positive	Positive*
Borehole 3: DZ 3	Positive	Positive*
Borehole 4: Kuwadzana	Positive	Negative
Borehole 5: Kuwadzana	Positive	Negative
Borehole 6: DZ 4	Positive	Negative

***Positive for *E. coli* after flame sterilization of the spigot**

Table 8: Environmental Water Sample Results of Municipal Taps and Wells, Dzivaresekwa (DZ), Zimbabwe, January 2012

Water Source Tested	Presence of Total Coliforms	Presence of <i>E. coli</i>
Tap 1: DZ 2	Negative	Negative
Tap 2: DZ 3	Negative	Negative
Tap 3: DZ 4	Negative	Negative
Well 1: DZ 3	Positive	Positive
Well 2: DZ 2	Positive	Positive
Well 3: DZ 3	Positive	Positive
Well 4: DZ 3	Positive	Positive
Well 5: DZ 3	Positive	Positive
Well 6: DZ 3	Positive	Positive
Well 7: DZ 4	Positive	Positive

Appendix 4: Zimbabwe Typhoid Fever Outbreak Response Assessment: Household Survey English Version

Good morning / good afternoon. My name is _____. I am part of a team of people who are conducting a survey in response to the typhoid fever outbreak on behalf of the Harare City Health Department. The purpose of the survey is to understand the impact of the outbreak and the effectiveness of the assistance provided. Our team will interview about 600 people. Your house has been selected to participate in the survey. I would like to talk to someone who is responsible for water and children in the household. If you participate, I will ask you questions about typhoid and your drinking water and collect a sample of your water. The interview will take approximately 30-40 minutes. No

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one except the survey team will know that it was you who provided these answers. Do you have any questions? Are you willing to participate? If so, I will sign this form to indicate that you are a participant. If you have any questions, please contact the City Health Department.

_____ Date ____/____/____
 Person Obtaining Consent

District:	<input type="text"/>	Name of Assessor:	<input type="text"/>
Stand number:	<input type="text"/>	Date:	<input type="text"/>
Start time:	<input type="text"/>	Questionnaire Code:	<input type="text"/>

Q1. Circle respondents' gender.

Male	1	Female	0
------	---	--------	---

Q2. How old are you? Years

Q3. What is your highest level of education?

None	0	Primary	1	Secondary	2	More than Secondary	3
------	---	---------	---	-----------	---	---------------------	---

Q4. What is the head of the household's highest level of education?

None	0	Primary	1	Secondary	2	More than Secondary	3	DK	99
------	---	---------	---	-----------	---	---------------------	---	----	----

Q5. What is your religion?

Traditional	1	Roman Catholic	2
Pentecostal	3	Protestant	4
Muslim	5	Other Christian	6
Apostolic Sect (specify):	7	None	8
		Other:	

Q6. How much money does your household make in a month on average? USD

DK	99	Refused	88
----	----	---------	----

Q7. Does your household have ... a functional radio?	Yes	1	No	0	Don't Know	99
Q8. ... a functional TV?	Yes	1	No	0	Don't Know	99
Q9. ... a functional Mobile telephone?	Yes	1	No	0	Don't Know	99
Q10. Does your household own this stand?	Yes	1	No	0	Don't Know	99

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Q11. What do you think are the biggest health problems facing your family? [MA, prompt “any more”]

Diarrhea	1	Typhoid	2	Cough/respiratory	3
Malaria	4	Anemia	5	HIV	6
Water	7	Cholera	8	Other:	

Q12. From whom, where, or what do you receive information about health for your family (i.e. about cholera, HIV, vaccines)? [MA, prompt “any more”]

Family	1	Neighbor	2	Community health worker	3
Friend	4	Theatre/drama	5	Nurse/clinician	6
TV	7	Newspaper	8	Community meeting	9
Radio	10	Internet	11	Brochure/flyer	12
SMS	13	Don’t know	14	Other:	

Q13. What are the most important times to wash hands with soap? [MA, prompt “any more”]

After defecating	1	Before feeding kids	2	Before eating	3
Before preparing food	4	Before breast-feeding	5	After cleaning a child’s bottom	6
After caring for animals	7	After touching food	8	Other:	

Q14. To make sugar salt solution, how many teaspoons of sugar and salt do you add to how many mls of water?

Sugar		teaspoons	Salt		teaspoons	Water		mls	DK	99
-------	--	-----------	------	--	-----------	-------	--	-----	----	----

Q15. To make oral rehydration solution (ORS), how much water do you need to add to each sachet?

	Liters	DK	99
--	--------	----	----

Q16. How does your household dispose of human stool? [MA, prompt “any more”]

Flush toilet	1	Bush/field	2	Streets/drains	3
Dumping site	4	Flying toilet	5	Bucket system	6
Cat sanitation	7	Refuse to answer	8	Other:	

Q17. Have you ever heard of typhoid?

Yes	1	No [GOTO 23]	0	DK [GOTO 23]	99
-----	---	--------------	---	--------------	----

Q18. Have you heard about the typhoid outbreak in this area?

Yes	1	No [GOTO 21]	0	DK [GOTO 21]	99
-----	---	--------------	---	--------------	----

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Q19. In what month did you first hear about the current typhoid outbreak in your area?

October 2011	1	November 2011	2	December 2011	3
January 2012	4	February 2012	5	Don't know	9 9
Other:					

Q20. From whom, where, or what did you hear about the typhoid outbreak? [MA, prompt "any more"]

Family	1	Neighbor	2	Community health worker	3
Friend	4	Theatre/drama	5	Nurse/clinician	6
TV	7	Newspaper	8	Community meeting	9
Radio	10	Internet	11	Brochure/flyer	12
SMS	13	Don't know	14	Other:	

Q21. What causes typhoid? [MA, prompt "any more"]

Drinking contaminated/untreated water	1	Eating contaminated food	2	Poor hand hygiene	3
Eating unwashed fruits/veggies	4	Flies/insects	5	Not using a toilet	6
Spirits/curse	7	Person-to-person	8	Don't know	99
Other:					

Q22. What are the signs and symptoms of typhoid fever? [MA, prompt "any more"]

Fever	1	Body weakness	2	Nausea & vomiting	3
Headache	4	Constipation	5	Malaise/tired	6
Cough	7	Dehydration	8	Abdominal cramps	9
Diarrhea	10	Don't know	99	Other:	

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Q 23. What are the ages and genders of the people who live in this household?

I will now ask you some questions about diarrhea. Diarrhea is defined as loose or watery stool (bloody or not bloody) three or more times in 24 hours. Which of the household members you mentioned have had diarrhea in the last two weeks?

I will now ask you some questions about typhoid. Typhoid is a fever for more than 3 days, AND malaise, headache, vomiting, diarrhea, constipation or cough. Which of the household members have had symptoms consistent with typhoid fever since October of last year?

#	Gender (circle one)	Age in years	Diarrhea (circle one)	Typhoid (circle one)
1	M / F		Yes No Don't know	Yes No Don't know
2	M / F		Yes No Don't know	Yes No Don't know
3	M / F		Yes No Don't know	Yes No Don't know
4	M / F		Yes No Don't know	Yes No Don't know
5	M / F		Yes No Don't know	Yes No Don't know
6	M / F		Yes No Don't know	Yes No Don't know
7	M / F		Yes No Don't know	Yes No Don't know
8	M / F		Yes No Don't know	Yes No Don't know
9	M / F		Yes No Don't know	Yes No Don't know
10	M / F		Yes No Don't know	Yes No Don't know
11	M / F		Yes No Don't know	Yes No Don't know
12	M / F		Yes No Don't know	Yes No Don't know
13	M / F		Yes No Don't know	Yes No Don't know
14	M / F		Yes No Don't know	Yes No Don't know
15	M / F		Yes No Don't know	Yes No Don't know

Q24. Has anyone in your household been hospitalized for typhoid fever since October 2011?

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Yes	1	No [GOTO Q26]	0	Don't know [GOTO Q26]	99
-----	---	----------------------	---	------------------------------	----

Q25. What are the ages and sexes of people who have been hospitalized?
[write number from Q 23]

--	--	--

Q 26. Have you received any information on how to prevent typhoid fever?

Yes	1	No [GOTO Q28]	0	Don't know [GOTO Q28]	99
-----	---	----------------------	---	------------------------------	----

Q 27. From whom, where, or what did you hear about prevention of typhoid?
[MA, prompt "any more"]

Family	1	Neighbor	2	Community health worker	3
Friend	4	Theatre/drama	5	Nurse/clinician	6
TV	7	Newspaper	8	Community meeting	9
Radio	10	Internet	11	Brochure/flyer	12
SMS	13	Don't know	99	Other:	

Q 28. Can you state practices which can prevent you and your family from getting typhoid fever?
[MA, prompt "any more"]

Wash hands after toilet	1	Wash fruits/vegetables	2	Use soap/ash for hand washing	3	
Boil or treat water	4	Cook food thoroughly	5	Wash hands before eating/cooking	6	
Eat hot food	7	Clean cooking utensils	8	DK	99	Other:

Q29. **What would you do if you or your family members got typhoid fever?** [MA, prompt "any more"]

Go to clinic/hospital	1	Buy medicine from drug store	2	Go to traditional/herbal/faith healer	3
Home remedy	4	Don't know	99	Other:	

Q30. Do you believe your current drinking water is safe to drink?

Yes	1	No	0	DK	99
-----	---	----	---	----	----

Q31. How would you know that your water is safe to drink?
[MA, prompt "any more"]

Water clear	1	Free of bacteria	2	Told so by city	3
Water is treated	4	Water is not safe	5	Other:	

Q32. How would you know that

Water dirty	1	Has bacteria	2	There is an outbreak	3
-------------	---	--------------	---	----------------------	---

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your water is not safe to drink? [MA, prompt “any more”]	Told it is	4	Water is safe	5	Other:
---	------------	---	---------------	---	--------

I am now going to ask you about your drinking water before the typhoid outbreak began. [if the respondent doesn't know when the outbreak began, use before Oct 2011]

Q33. What was your **primary** source of drinking water **before** the typhoid outbreak? [SA]

Municipal/piped	1	Shallow well	2	Borehole	3
Unprotected well	4	Protected well	5	Rainwater	6
River/stream	7	Spring	8	Other:	

Q34. From what other sources did you get your drinking water **before** the typhoid outbreak?
[MA, prompt “any more”]

Municipal/piped	1	Shallow well	2	Borehole	3
Unprotected well	4	Protected well	5	Rainwater	6
River/stream	7	Spring	8	Other:	

Q35. Please tell me all of the different methods for treating water at the household level that you had heard of **before** the typhoid outbreak.
[Circle the number. MA, prompt “any more”] Now tell me if you used these methods before the typhoid outbreak and how often you used each one before the outbreak.
[Circle to indicate frequency]

Type	Knew	Used			
Bleach/Jik	1	Never	Rarely	1/week	Daily
Aquatabs/Oasis	2	Never	Rarely	1/week	Daily
WaterGuard	3	Never	Rarely	1/week	Daily
WaterMaker	4	Never	Rarely	1/week	Daily
Boiling	5	Never	Rarely	1/week	Daily
Filter: Type: _____	6	Never	Rarely	1/week	Daily
Other:		Never	Rarely	1/week	Daily

Q36. Had you seen advertisements for WaterGuard before the typhoid outbreak?

Yes	1	No	0	DK	99
-----	---	----	---	----	----

Q37. Had you seen WaterGuard in stores before the typhoid outbreak?

Yes	1	No	0	DK	99
-----	---	----	---	----	----

Q38. Did you buy WaterGuard before the typhoid outbreak?

Yes	1	No	0	DK	99
-----	---	----	---	----	----

Q39. Why did you not use WaterGuard before the typhoid outbreak? [MA, prompt “any more”]

Never heard of WG	1	Local stores don't sell	2	Too expensive/can't afford	3
Water already safe	4	Fear of chemicals	5	Don't know how to use	6
Smell of water	7	Taste of water	8	Have free products	9
Boiling	10	Filtering	11	Other:	

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Q40. Have you received any products to prevent typhoid or treat your water since November 2011?

Yes	1	No [GOTO Q42]	0	Don't know [GOTO Q42]	99
-----	---	---------------	---	-----------------------	----

Q41. Please tell me all of the different products that you received to prevent typhoid or treat your water. [Circle the number if they have received. MA, prompt "any more"] How frequently do you use the product(s) received? (Circle)

Type	Received	Used			
Aquatabs	1	Never	Rarely	1/week	Daily
Oasis tablets	2	Never	Rarely	1/week	Daily
Tablets unknown type	3	Never	Rarely	1/week	Daily
WaterMaker	4	Never	Rarely	1/week	Daily
Soap	5	Never	Rarely	1/week	Daily
Water containers	6	Never	Rarely	1/week	Daily
Other:		Never	Rarely	1/week	Daily

I am now going to ask you about your drinking water since the typhoid outbreak began. [if the respondent doesn't know when the outbreak began, use since Oct 2011]

Q42. What was your primary source of drinking water since the typhoid outbreak began? [SA]

Municipal/piped	1	Shallow well	2	Borehole	3
Unprotected well	4	Protected well	5	Rainwater	6
River/stream	7	Spring	8	Other:	

Q43. From what other sources did you get your drinking water since the typhoid outbreak began? [MA, prompt "any more"]

Municipal/piped	1	Shallow well	2	Borehole	3
Unprotected well	4	Protected well	5	Rainwater	6
River/stream	7	Spring	8	Other:	

Q44. How many Liters per day of water do you collect from all sources?

	Liters	DK	99
--	--------	----	----

Q45. What containers do you use to collect water? [MA, prompt "any more"]

Bucket	1	Non-collapsible Jerry can	2	Collapsible Jerry can	3	
Drum	4	Empty bottles	5	Bucket with tap	6	Other:

Q46. Please tell me all of the different methods for treating water at the household level that you have used since the typhoid outbreak began. [Circle the number MA,

Type	Used	Bought/ Given	How often			
Bleach/Jik	1	B / G	Never	Rarely	1/week	Daily
Aquatabs/Oasis	2	B / G	Never	Rarely	1/week	Daily
WaterGuard	3	B / G	Never	Rarely	1/week	Daily

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<p>prompt “any more”]</p> <p>Now tell me if you bought or were given these products (circle) and how often you have used each one since the outbreak began. [Circle to indicate frequency]</p>	WaterMaker	4	B / G	Never	Rarely	1/week	Daily
	Boiling	5		Never	Rarely	1/week	Daily
	Filter: Type: _____	6	B / G	Never	Rarely	1/week	Daily
	Other:		B / G	Never	Rarely	1/week	Daily

Q 47. **IF BOUGHT ANY PRODUCT:** Where do you buy your water treatment product? [MA, prompt “any more”]

Local business	1	Local kiosk	2	School	3
Church organization	4	Health promoter	5	Health center	6
Don't know	99	Other:			

Q48. Which **one** household water treatment method do you prefer? [SA]

Aquatabs	1	Oasis	2	WaterMaker	3	WaterGuard	4
Boiling	5	Don't know	99	Other:			

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Q49. Why do you prefer this one? [MA, prompt “any more”]

Tastes better	1	Easier to use	2	Have used before		3
Less expensive	4	Smells better	5	Free	6	Other:

Q50. Had you seen information about WaterGuard since the beginning of the typhoid outbreak?

Yes	1	No	0	DK	99
-----	---	----	---	----	----

Q51. Have you used WaterGuard since the beginning of the outbreak?

Yes	1	No	0	DK	99
-----	---	----	---	----	----

Q52. Have you bought WaterGuard since the beginning of the outbreak?

Yes	1	No	0	DK	99
-----	---	----	---	----	----

Q53. Why do you sometimes not buy WaterGuard since the outbreak? [MA, prompt “any more”]

Never heard of WG	1	Local stores don’t sell	2	Too expensive/can’t afford		3
Water already safe	4	Fear of chemicals	5	Don’t know how to use		6
Smell of water	7	Taste of water	8	Have free products		9
Boiling	10	Filtering	11	Other:		

Q54. To use WaterGuard for clear water, how many caps of WaterGuard do you add to how many liters of water?

	Caps		Liters	DK	99
--	------	--	--------	----	----

Q55. How many minutes do you wait after adding WaterGuard before drinking?

	Minutes	DK	99
--	---------	----	----

IF RECEIVED AQUATABS/OASIS ASK THIS SECTION

Q56. What training on tablets did you receive? [MA, prompt “any more”]

Household visit	1	Group training	2	Poster/pamphlet	3
None	0	Don’t know	99	Other:	

Q57. Did you receive Aquatabs, Oasis or both?

Aquatabs only	1	Oasis only	2	Both	3	Don’t know	99
---------------	---	------------	---	------	---	------------	----

Q58. How many of each tablet did you receive?

Aquatabs		Strips	OR	Tablets	DK	99
Oasis		Strips	OR	Tablets	DK	99
DK which		Strips	OR	Tablets	DK	99

Q59. Can you bring me the tablets?

Yes	1	No [GOTO Q62]	0	Finished [GOTO Q62]	98
-----	---	---------------	---	---------------------	----

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Q60. **OBSERVE:** Grams of tablet (Aquatabs)

	mg
	mg

Q61. **OBSERVE:** Grams of tablet (Oasis tablets)

Q62. When using Aquatabs, how many tablets do you add to what volume? **[If don't know, show sample]**

Tablet		Volume		Liters	Don't know	99
--------	--	--------	--	--------	------------	----

Q63. When using Oasis, how many tablets do you add to what volume of water? **[If don't know, show sample]**

Tablet		Volume		Liters	Don't know	99
--------	--	--------	--	--------	------------	----

Q64. How many minutes after treating do you drink the water?

	Minutes	DK	99
--	---------	----	----

Q65. Have you ever used the tablets given?

Yes	1	No	0	DK	99
-----	---	----	---	----	----

Q66. Are you still using the tablets given?

Yes	1	No	0	DK	99
-----	---	----	---	----	----

Q67. Why use tablets?
[MA, prompt "any more"]

Cleans water	1	Prevents disease	2	Water dirty currently	3	
Was given	4	Instructed to do	5	Never used	0	Other:

Q68. Why not use tablets? [MA, prompt "any more"]

Hard to use	1	Water already clean	2	Don't like smell	3
Don't like taste	4	Product finished	5	Using other products	6
Boiling/filtering	7	Always use	8	Other:	

IF RECEIVED WATERMAKER ASK THIS SECTION

Q69. What training on WaterMaker did you receive?
[MA, prompt "any more"]

Household visit	1	Group training	2	Poster/pamphlet	3
None	0	Don't know	99	Other:	

Q70. How many sachets did you receive?

	Sachets	DK	99
--	---------	----	----

Q71. How many liters of water do you add the sachet to?

	Liters	DK	99
--	--------	----	----

Q72. How many minutes do you stir after you add the sachet?

	Minutes	DK	99
--	---------	----	----

Q73. How long do you wait after stirring to filter through cloth?

Until settled	1	DK	99	Other:
---------------	---	----	----	--------

Q74. How many minutes after filtering do you wait to drink?

	Minutes	DK	99
--	---------	----	----

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Q75. Have you ever used the WaterMaker received?

Yes	1	No	0	DK	99
Yes	1	No	0	DK	99

Q76. Are you still using the WaterMaker received?

Q77. Why use WM?
[MA, prompt
“any more”]

Cleans water	1	Prevents disease	2	Water dirty currently		3
Was given	4	Instructed to do	5	Never used	0	Other:

Q78. Why not use WM? [MA, prompt
“any more”]

Hard to use	1	Water already clean	2	Don't like smell		3
Don't like taste	4	Product finished	5	Using other products		6
Boiling/filtering	7	Always use	8	Other:		

ASK EVERYONE

Q79.a What source is your current drinking water from? [write number]	Q79.b Is your drinking water stored?		Q79.c OBSERVE: How many liters is the storage container?	Q79.d OBSERVE: Is it covered?		Q79.e OBSERVE: What container is it in? [write number]	Q79.f Is the water treated?		Q79.g What was it treated with? [write number]	Q79.h How many hours ago was it treated?
	Yes	No		Yes	No		Yes	No		
	1	0	L	1	0		1	0		Hrs

Q79.a	Municipal/piped water	1	Shallow well	2	Borehole	3
	Unprotected well	4	Protected well	5	Rainwater	6
	River/Stream	7	Spring	8	Other: [write in]	

Q79.e	Bucket	1	Non-collapsible Jerry can	2	Collapsible Jerry can		3
	Drum	4	Empty bottles	5	Bucket with tap	6	Other: [write in]

Q79.g	Aquatabs	1	Oasis	2	WaterMaker	3	WaterGuard	4	Other: [write in]
-------	----------	---	-------	---	------------	---	------------	---	-------------------

Q80. For what do you use the treated water? [MA, prompt ‘any more’]

Drinking	1	Cooking	2	Bathing	3
Washing hands	4	Washing dishes	5	Washing clothes	6

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Washing fruits/vegetables	7	Other:
---------------------------	---	--------

Q81.	Can you give me some of the treated water?	Yes	1	No [GOTO Q83]	0
------	--	-----	---	---------------	---

Q82.	TEST: Chlorine residual		mg/L		
------	-------------------------	--	------	--	--

Q83.	Can you give me some of the untreated water?	Yes	1	No [GOTO Q85]	0
------	--	-----	---	---------------	---

Q84.	TEST: Chlorine residual		mg/L		
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Q85.	Can you bring me your soap? [Observe]	Yes	1	No	0
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Perceptions and Motivation						
Please tell me if you 'agree' or 'disagree' with the following questions. When I say I, I mean you. INTERVIEWER: Probe whether respondent Agree/Disagree strongly		Strongly Agree	Agree Somewhat	Not sure	Disagree Somewhat	Strongly Disagree
	I am able to use water treatment product(s) to improve water quality.	5	4	3	2	1
Q	I am confident that I can effectively treat water with water treatment products.	5	4	3	2	1
Q	I am able to persuade my partner/family members to treat water to improve the quality of drinking water.	5	4	3	2	1
	My friends encourage me to treat water all year around.	5	4	3	2	1
	My family members support my decision to treat water.	5	4	3	2	1
	My friends talk a lot about water treatment.	5	4	3	2	1
	Treating water makes the water taste bad.	5	4	3	2	1
	Water treatment products contain chemicals which are not good for health.	5	4	3	2	1
	Water treatment products do not kill all the germs in water.	5	4	3	2	1
	Typhoid is a serious problem in our community.	5	4	3	2	1
	Diarrheal diseases can kill.	5	4	3	2	1
	In this community, people suffer from typhoid due to poor water quality.	5	4	3	2	1
	In my community, many people continue to get typhoid.	5	4	3	2	1
	My family members are more vulnerable to get typhoid if I don't treat water with chlorination agents.	5	4	3	2	1
	The risk of family members getting typhoid seems to be increasing.	5	4	3	2	1
	Whenever my family members drink water, I think about their risk of getting typhoid.	5	4	3	2	1

Appendix 5: Zimbabwe Typhoid Fever Outbreak Response Assessment: Household Survey Shona Version

Mangwanani/Masikati. Ini ndinonzi _____. Ndiri mumwe weboka revanhu vari kufamba vachiitira bazi reKanzuru yeHarare rinoona nezveutano tsvakurudzo kuti tinzwe pfungwa dzevanhu maererano nechirwere cheTaifodhi chadai kutekeshera. Tiri kuda kuziva kuti chirwere ichi chatekeshera zvakadii uye kuti rubatsiro rwuri kupiwa rwuri kurerutsa dambudziko iri zvakadii. Boka redu richataura nevanhu vanosvika mazana matanhatu. Mhuri yenyu yasarudzwawo kuti ipe pfungwa dzayo patsvakurudzo iyi. Ndichakubvunzai nezveTaifodhi, mvura yamunonwa uye ndichatora mvura shoma pane yamunonwa kuti ndigoiwongorora. Hurukuro yedu ichatora maminiti angangosvika makumi matatu kana mana. Hapana mumwe munhu asiri pano achaziva kuti ndozvamataura. Mune zvamungada kubvunza here? Saka munoda here kubatsira patsvakurudzo iyi? Kana muchida ndichasaina zita rangu papepa iri kuratidza kuti hamuna kumanikidzwa. Kana muchinge muine zvimwe zvamungada kuziva sungunukai kufonera vebazi rekanzuru rinoona nezveutano.

_____/_____/_____
 Zita remunhu awana mvumo _____ Dheti _____

Dunhu:	<input type="text"/>	Zita romutsvagurudzi :	<input type="text"/>
Nhamba yesitendi :	<input type="text"/>	Dheti:	<input type="text"/>
Nguya yatanga hurukuro :	<input type="text"/>	Nhamba yegwaro remibvunzo :	<input type="text"/>

Q86. Isa denderedzi panoratidza kuti munhu murume kana mukadzi here

Male	1	Female	0
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Q87. Mune makore mangani ? Years

Q88. Makadzidza kusvika papi ?

None	0	Primary	1	Secondary	2	More than Secondary	3
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Q89. Munhu anokuchengetai mumba muno akadzidza zvakadii?

None	0	Primary	1	Secondary	2	More than Secondary	3	DK	99
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Q90. Muri vechitendero chipi ?

Traditional	1	Roman Catholic	2
Pentecostal	3	Protestant	4
Muslim	5	Other Christian	6
Apostolic Sect (specify):	7 _____	None	8
Other:			

Q91. Mumba menyu munowana mari pamwedzi pane zvamunoita mose? USD

DK	99	Refused	88
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Q92. Mune redhiyo inoshanda here ?

Yes	1	No	0	Don't Know	99
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Q93. Tivhi yenyu inoshanda here ?

Yes	1	No	0	Don't Know	99
Yes	1	No	0	Don't Know	99
Yes	1	No	0	Don't Know	99

Q94. Mune foni yemuhomwe inoshanda here ?

Q95. Sitendi ino ndeyenyu here ?

Q96. Sokuona kwenyu nderepi dambudziko reutano ramungati ndiro rinonyanyoshungurudza mhuri yenyu ? [MA, prompt "any more"]

Diarrhea	1	Typhoid	2	Cough/respiratory	3
Malaria	4	Anemia	5	HIV	6
Water	7	Cholera	8	Other:	

Q97. Munowanzowanepi mashoko ane chokuita nezveutano? Kana kuti ndiani anokuudzai nezveutano hwakaita secholera, HIV, majekiseni anodzivirira zvirwere. [MA, prompt "any more"]

Family	1	Neighbor	2	Community health worker	3
Friend	4	Theatre/drama	5	Nurse/clinician	6
TV	7	Newspaper	8	Community meeting	9
Radio	10	Internet	11	Brochure/flyer	12
SMS	13	Don't know	14	Other:	

Q98. Inguva dzipi dzamunofunga kuti ndipo pakakosha kuti mugeze maoko enyu nesipo? [MA, prompt "any more"]

After defecating	1	Before feeding kids	2	Before eating	3
Before preparing food	4	Before breast-feeding	5	After cleaning a child's bottom	6
After caring for animals	7	After touching food	8	Other:	

Q99. Kana muchigadzira mvura iye yeshuga nesauti munoshandisa zvipuno zvingani zveshuga uye zvipunu zvingani zvesauti uye mvura yakawanda zvakadini ?

Sugar		teaspoons	Salt		teaspoons	Water		mls	DK	99
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Q100. Munoshandisa mvura yakawanda zvakadini kana muchishandisa chipepa chimwe chete chepauzwa yeshuga nesauti pakugadzira mvura inowedzerwa mumuviri kana munhu arasikirwa nemvura yakawanda mumuviri ?

	Liters	DK	99
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Q101. Munoitira tsvina pai ? [MA, prompt "any more"]

Flush toilet	1	Bush/field	2	Streets/drains	3
Dumping site	4	Flying toilet	5	Bucket system	6

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Cat sanitation	7	Refuse to answer	8	Other:
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Q102.	Makambonzwa here nezvetaifodhi ?	Yes	1	No [GOTO 23]	0	DK [GOTO 23]	99
Q103.	Makambonzwa here nezvektekeshera kwetaifodhi munharaunda ino ?	Yes	1	No [GOTO 21]	0	DK [GOTO 21]	99

Q104.	Makatanga kunzwa nezvektekeshera kwetaifodhi munharaunda yenyu ino mumwedzi upi ?	October 2011	1	November 2011	2	December 2011	3
		January 2012	4	February 2012	5	Don't know	99
		Other:					

Q105.	Makazviziva sei, kana kuti akakuudzai nezvektekeshera kwetaifodhi ndiani? [MA, prompt "any more"]	Family	1	Neighbor	2	Community health worker	3
		Friend	4	Theatre/drama	5	Nurse/clinician	6
		TV	7	Newspaper	8	Community meeting	9
		Radio	10	Internet	11	Brochure/flyer	12
		SMS	13	Don't know	14	Other:	

Q106.	Taifodhi inokonzwa nei ? [MA, prompt "any more"]	Drinking contaminated/untreated water	1	Eating contaminated food	2	Poor hand hygiene	3
		Eating unwashed fruits/veggies	4	Flies/insects	5	Not using a toilet	6
		Spirits/curse	7	Person-to-person	8	Don't know	99

Q107.	Munoona sei kuti munhu abatwa netaifodhi ? [MA, prompt "any more"]	Fever	1	Body weakness	2	Nausea & vomiting	3
		Headache	4	Constipation	5	Malaise/tired	6
		Cough	7	Dehydration	8	Abdominal cramps	9
		Diarrhea	10	Don't know	99	Other:	

Q108.	Vanhu vanogara mumba menyu vane makore mangani okuberekwa uye vanhukadzi vangani, vanhurume vangani ? Ndichakubvunzai	#	Gender (circle one)	Age in years	Diarrhea (circle one)	Typhoid (circle one)
		1	M / F		Yes No Don't know	Yes No Don't know
		2	M / F		Yes No Don't know	Yes No Don't know
		3	M / F		Yes No Don't know	Yes No Don't know

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mibvunzo inechokuita nezvechirwere chemanyoka. Munhu ane manyoka anowanzoita tsvina ye mvura mvura, pamwe katatu kana kudarika pazuva. Pavanhu vamunogara navo pane akamboita manyoka here pamasvondo maviri apfuura? Iye zvino ndava kukubvunzai nezvetaifodhi. Kana munhu abatwa netaifodhi, anopisa muviri kwemazuva anodarika matatu pamusoro pazvo oita chimwe kana zvimwe chezvintevera: kuneta ,kudemwa nemusoro , kurutsa, kuita manyoka, kufufutirwa kana kukosora .Ndiani mumhuri menyu akamborwara saizvozvi kubva munaGumiguru [Okutobha] gore rapera?	4	M / F		Yes	No	Don't know	Yes	No	Don't know
	5	M / F		Yes	No	Don't know	Yes	No	Don't know
	6	M / F		Yes	No	Don't know	Yes	No	Don't know
	7	M / F		Yes	No	Don't know	Yes	No	Don't know
	8	M / F		Yes	No	Don't know	Yes	No	Don't know
	9	M / F		Yes	No	Don't know	Yes	No	Don't know
	10	M / F		Yes	No	Don't know	Yes	No	Don't know
	11	M / F		Yes	No	Don't know	Yes	No	Don't know
	12	M / F		Yes	No	Don't know	Yes	No	Don't know
	13	M / F		Yes	No	Don't know	Yes	No	Don't know
	14	M / F		Yes	No	Don't know	Yes	No	Don't know
	15	M / F		Yes	No	Don't know	Yes	No	Don't know

Q109. Pane wemumhuri menyu akambopinda muchipatara here achinzi abatwa netaifodhi kubva muna Okutobha gore rapera ?

Yes	1	No [GOTO Q26]	0	Don't know [GOTO Q26]	99
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Q110. Munhu wacho akasimbirwa netaifodhi akapinda muchipatara ane makore mangani uye munhurume here kana munhukadzi ? **[write number from Q 23]**

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Q111. Pane zvakambonzwa here maererano nenzira dzokudzivirira taifodhi ?

Yes	1	No [GOTO Q28]	0	Don't know [GOTO Q28]	99
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Q112. Makazvinzwa kupi kana kuti nani nezvenzira dzekudzivira taifodhi? ? **[MA, prompt "any more"]**

Family	1	Neighbor	2	Community health worker	3
Friend	4	Theatre/drama	5	Nurse/clinician	6
TV	7	Newspaper	8	Community meeting	9
Radio	10	Internet	11	Brochure/flyer	12

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SMS	13	Don't know	99	Other:
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Q113. Mungatiudze here nzira dzamunoshandisa kuti imi kana vamwe vamunogara navo vasabatwe netaifodhi ?
[MA, prompt "any more"]

Wash hands after toilet	1	Wash fruits/vegetables	2	Use soap/ash for hand washing	3	
Boil or treat water	4	Cook food thoroughly	5	Wash hands before eating/cooking	6	
Eat hot food	7	Clean cooking utensils	8	DK	99	Other:

Q114. Chii chamunoita kana mukaona kuti imi kana mumwe wamunogara naye abatwa netaifodhi ? [MA, prompt "any more"]

Go to clinic/hospital	1	Buy medicine from drug store	2	Go to traditional/herbal/faith healer	3
Home remedy	4	Don't know	99	Other:	

Q115. Sokuona kwenyu munotendera here kuti mvura yamunonwa yakakodzera kunwa?

Yes	1	No	0	DK	99
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Q116. Munoziva sei kuti mvura yamunonwa yakakodzera kunwa ?
[MA, prompt "any more"]

Water clear	1	Free of bacteria	2	Told so by city	3
Water is treated	4	Water is not safe	5	Other:	

Q117. Munoziva sei kuti mvura yamunonwa haina kukodzera kunwa?
[MA, prompt "any more"]

Water dirty	1	Has bacteria	2	There is an outbreak	3
Told it is	4	Water is safe	5	Other:	

Ndavakuchibvunza nezvemvura yamainwa taifodhi isati yatekeshera munzvimbo ino.(kana vasingazive kuti taifodhi yakatanga riinhi bvunzai zvavaiita tisati tasvika munaOkutobha wegore rapera.

Q118. Maiwanzotora kupi mvura yenyu yokunwa dambudziko retaifodhi iri risati ravako ? [SA]

Municipal/piped	1	Shallow well	2	Borehole	3
Unprotected well	4	Protected well	5	Rainwater	6
River/stream	7	Spring	8	Other:	

Q119. Ndokupi kumwe kwamaitora mvura yokunwa dambudziko

Municipal/piped	1	Shallow well	2	Borehole	3
Unprotected well	4	Protected well	5	Rainwater	6

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retaifodhi risati ratekeshera ? [MA, prompt “any more”]	River/stream	7	Spring	8	Other:
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Q 120. Ndiudzeiwo nzira dzose dzamakambonzwa kuti munokwanisa kuchenesa nadzo mvura yamunonwa mumba menyu dambudziko retaifodhi risati ravako..
[Circle the number. MA, prompt “any more”]
Ndinoda kuti mundiudze kana maimboshandisa imwe yenzira idzi taifodhi isati yanetsa uye kuti maishandisa imwe yenzira idzi yoga yoga kakawanda zvakadii?
[Circle to indicate frequency]

Type	Knew	Used
Bleach/Jik	1	Never Rarely 1/week Daily
Aquatabs/Oasis	2	Never Rarely 1/week Daily
WaterGuard	3	Never Rarely 1/week Daily
WaterMaker	4	Never Rarely 1/week Daily
Boiling	5	Never Rarely 1/week Daily
Filter: Type: _____	6	Never Rarely 1/week Daily
Other:		Never Rarely 1/week Daily

Q121. Makambenge maona here mushonga wekuuraya utachiona mumvura yokunwa unonzi Water Guard uchishambadzirwa, taifodhi isati yavako ?

Yes	1	No	0	DK	99
Yes	1	No	0	DK	99
Yes	1	No	0	DK	99

Q122. Makambenge mamboona here mushonga weWater Guard wacho muzvitoro taifodhi isati yavapo ?

Q123. Makambotenga here mushonga weWater Guard musati manzwa nezvetaifodhi ?

Q124. Seiko maisashandisa Water Guard dambudziko retaifodhi risati ravapo ? [MA, prompt “any more”]

Never heard of WG	1	Local stores don't sell	2	Too expensive/can't afford	3
Water already safe	4	Fear of chemicals	5	Don't know how to use	6
Smell of water	7	Taste of water	8	Have free products	9
Boiling	10	Filtering	11	Other:	

Q 125. Pane mishonga yokudzivirira taifodhi kana mimwewo yokuchenesa mvura yokunwa yamakambopiwa here kubva munaMbuzi [Novhembra] gore rapera ?

Yes	1	No [GOTO Q42]	0	Don't know [GOTO Q42]	99
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Q Ndeipi mishonga

Type	Received	Used
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126. yokuchenesa mvura yokunwa kana yokudzivira taifodhi yamakambopiwa [Circle the number if they have received. MA, prompt “any more”] Munoshandisa mishonga iyi kakawanda zvakadii? (Circle)	Aquatabs	1	Never	Rarely	1/week	Daily
	Oasis tablets	2	Never	Rarely	1/week	Daily
	Tablets unknown type	3	Never	Rarely	1/week	Daily
	WaterMaker	4	Never	Rarely	1/week	Daily
	Soap	5	Never	Rarely	1/week	Daily
	Water containers	6	Never	Rarely	1/week	Daily
Other:		Never	Rarely	1/week	Daily	

Ndavakuchibvunza nezvemvura yamunonwa kubvira zvakatanga dambudziko rekutekeshera kwetaifodhi (kana vasingazive kuti taifodhi yakatanga riinhi bvunzai zvavaiita kubvira munaOkutobha wegore rapera).

Q127. Kubva pamakanzwa nezvetaifodhi mvura yamunonwa munonyanyoitira kupi ? [SA]	Municipal/piped	1	Shallow well	2	Borehole	3
	Unprotected well	4	Protected well	5	Rainwater	6
	River/stream	7	Spring	8	Other:	

Q128. Ko imwe mvura yamunonwa munoitora kupi ? [MA, prompt “any more”]	Municipal/piped	1	Shallow well	2	Borehole	3
	Unprotected well	4	Protected well	5	Rainwater	6
	River/stream	7	Spring	8	Other:	

Q129. Munochera marita mangani emvura pazuva ?		Liters	DK	99
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Q130. Munocherera mvura yenyu pai ? [MA, prompt “any more”]	Bucket	1	Non-collapsible Jerry can	2	Collapsible Jerry can	3
	Drum	4	Empty bottles	5	Bucket with tap	6

Q131. Ndedzipi nzira dzamashandisa kuchenesa mvura yenyu yokunwa kubva pakatanga dambudziko retaifodhi [Circle the number MA, prompt “any more”] Makatenga here kana kuti makapiwa mishonga iyi.? Munoshandisa kangani	Type	Used	Bought/ Given	How often			
	Bleach/Jik	1	B / G	Never	Rarely	1/week	Daily
	Aquatabs/Oasis	2	B / G	Never	Rarely	1/week	Daily
	WaterGuard	3	B / G	Never	Rarely	1/week	Daily
	WaterMaker	4	B / G	Never	Rarely	1/week	Daily
Boiling	5			Never	Rarely	1/week	Daily

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nzira imwe neimwe kubvira zvakatanga dambudziko retaifodhi.. [Circle to indicate frequency]	Filter: Type: _____	6	B / G	Never	Rarely	1/week	Daily
	Other:		B / G	Never	Rarely	1/week	Daily

Q132. **KANA PANE MUSHONGA WAMAKATENGA**
:Makautenga kupi ? [MA, prompt “any more”]

Local business	1	Local kiosk	2	School	3
Church organization	4	Health promoter	5	Health center	6
Don't know	99	Other:			

Q133. Ndeipi nzira imwechete yekuchenesa mvura yokunwa yamunonyanyoda kushandisa ? [SA]

Aquatabs	1	Oasis	2	WaterMaker	3	WaterGuard	4
Boiling	5	Don't know	99	Other:			

Q134. Munoidirei nzira iyi?
[MA, prompt “any more”]

Tastes better	1	Easier to use	2	Have used before		3
Less expensive	4	Smells better	5	Free	6	Other:

Q135. Makanga mambonzwa nezveWater Guard here kubva pakatanga dambudziko retaifodhi ?

Yes	1	No	0	DK	99
Yes	1	No	0	DK	99
Yes	1	No	0	DK	99

Q136. Mati mamboshandisa Water Guard here kubva pakatanga dambudziko retaifodhi ?

Q137. Mati mambotenga Water Guard here kubva pakatanga dambudziko retaifodhi ?

Q138. Zvii zvinoita kuti imwe nguva murege kutenga Water Guard kunyangwe dambudziko retaifodhi riripo ?
[MA, prompt “any more”]

Never heard of WG	1	Local stores don't sell	2	Too expensive/can't afford		3
Water already safe	4	Fear of chemicals	5	Don't know how to use		6
Smell of water	7	Taste of water	8	Have free products		9
Boiling	10	Filtering	11	Other:		

Q139. Kana muchishandisa Water Guard pamvura yakachena munoshandisa chipimo chakadzi chemvura netuvharo twemushonga tungani ?

	Caps		Liters	DK	99
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Q140. Munozoshandisa mvura kwapera maminitsiakadzi mushure mekunge maisa WaterGuard ?

	Min	DK	99
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KANA VAKAPIWA MAPIRITSI ANONZI AQUATABS/OASIS BVUNZAI MIBVUNZO IYI _____

Q141. Makawana dzidziso ipi maererano nezvekushandisa mapiritsi okuchenesa mvura yokunwa ?
[MA, prompt “any more”]

Household visit	1	Group training	2	Poster/pamphlet	3
None	0	Don't know	99	Other:	

Q142. Makapiwa mapiritsi anonzi maAquatabs kana kuti maOasis kana kuti dzose mhando mbiri here?

Aquatabs only	1	Oasis only	2	Both	3	Don't know	99
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Q143. Makapiwa mapiritsi mangani emhando imwe neimwe?

Aquatabs		Strips	OR		Tablets	DK	99
Oasis		Strips	OR		Tablets	DK	99
DK which		Strips	OR		Tablets	DK	99

Q144. Munganditaridza here mamwe emapiritsi acho kana munawo?

Yes	1	No [GOTO Q62]	0	Finished [GOTO Q62]	98
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Q145. **OBSERVE:** Grams of tablet (Aquatabs)

	mg
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Q146. **OBSERVE:** Grams of tablet (Oasis tablets)

	mg
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Q147. Kana muchishandisa mapiritsi eAquatabs munoshandisa mangani mumvura yakawanda zvakadzi ?

Tablet		Volume		Liters	Don't know	99
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Q148. Kana muchishandisa mapiritsi orudzi rweOasis munoshandisa mangani uye mumvura yakawanda sei ?

Tablet		Volume		Liters	Don't know	99
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Q149. Munomira kwemaminitsi akadzi musati manwa mvura yacho kana maisa mapiritsi ?

	Minutes	DK	99
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Q150. Mati mamboshandisa here mapiritsi amakapiwa ?

Yes	1	No	0	DK	99
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Q151. Muchiri kumashandisa here ?

Yes	1	No	0	DK	99
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Q152. Munomashandisirei mapiriti iwaya ?
[MA, prompt “any more”]

Cleans water	1	Prevents disease	2	Water dirty currently		3
Was given	4	Instructed to do	5	Never used	0	Other:

Q153. Koseiko musingamashandise?
[MA, prompt “any more”]

Hard to use	1	Water already clean	2	Don't like smell	3
Don't like taste	4	Product finished	5	Using other products	6
Boiling/filtering	7	Always use	8	Other:	

KANA VAKAPIWA MAPAKITI EWATERMAKER, BVUNZAI MIBVUNZO

IYI

Q154. Makawana dzidziso ipi maererano nezvekushandisa mushonga wepaudha unonzi WaterMaker unoshandiswa kuchenesa mvura yokunwa ?
[MA, prompt “anymore”]

Household visit	1	Group training	2	Poster/pamphlet	3
None	0	Don't know	99	Other:	

Q155. Makapiwa tumapakiti tungani ?

Q156. Munodira paketi rimwe chete mumvura yakawanda zvakadii ?

Q157. Kana madira paudha yacho mumvura munokonzonga kana kukurunga kwemaminitsi mangani ?

Q158. Kana makurunga munombomira kwenguva yakadii musati mamimina mvura yacho nemucheka ?

Q159. Kana mamimina munombomira kwemaminitsi mangani musati manwa mvura yacho ?

	Sachets		DK	99
	Liters		DK	99
	Minutes		DK	99
Until settled	1	DK	99	Other:
	Minutes		DK	99

Q160. Makashandisa here paudha inonzi Water Maker yamakapiwa kuti muchenese mvura ?

Q161. Muchiri kuishandisa here kutaura kudai ?

Yes	1	No	0	DK	99
Yes	1	No	0	DK	99

Q162. Sei muchiri kushandisa Water Maker? [MA, “any more”]

Cleans water	1	Prevents disease	2	Water dirty currently		3
Was given	4	Instructed to do	5	Never used	0	Other:

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Q163. Sei musingachashandise Water Maker?
[MA, prompt “any more”]

Hard to use	1	Water already clean	2	Don't like smell	3
Don't like taste	4	Product finished	5	Using other products	6
Boiling/filtering	7	Always use	8	Other:	

BVUNZAI MUNHU WESE

Q164	Q79.a Munitora kupi mvura yenyu yekunwa ? [write number]	Q79.b Mune mvura yekunwa yamakachen geta here?		Q79.c OBSERVE : Tini rinochengeta marita mangani emvura?	Q79.d OBSERVE: E: Yakavharwa here mvura?		Q79.e OBSERVE: Yakachengeterwa pai? [write number]	Q79.f Yakacheneswa here mvura yacho?		Q79.g Yakacheneswa nei? [write number]	Q79.h Yava nemaawa mangani yacheneswa?	
		Yes	No		Yes	No		Yes	No			
		1	0		L	1	0		1	0		Hrs

Q79.a	Municipal/piped water	1	Shallow well	2	Borehole	3
	Unprotected well	4	Protected well	5	Rainwater	6
	River/Stream	7	Spring	8	Other: [write in]	

Q79.e	Bucket	1	Non-collapsible Jerry can	2	Collapsible Jerry can	3
	Drum	4	Empty bottles	5	Bucket with tap	6

Q79.g	Aquatabs	1	Oasis	2	WaterMaker	3	WaterGuard	4	Other: [write in]
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Q165. Mvura yamunenge machenesa munoishandisa chii ? [MA, prompt ‘any more’]

Drinking	1	Cooking	2	Bathing	3
Washing hands	4	Washing dishes	5	Washing clothes	6
Washing fruits/vegetables	7		Other:		

Q166. Mungandipawo here mvura shoma yamakachenesa ?

Yes	1	No [GOTO Q83]	0
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Q167.	TEST: Chlorine residual	mg/L		
Q168.	Mungandipawo here mvura shoma yamusina kuchenesa nemushonga kana mapiritisi?	Yes	1	No [GOTO Q85]
Q169.	TEST: Chlorine residual	mg/L		
Q170.	Ndingaonewo here sipo yamunoshandisa ? [Observe]	Yes	1	No
				0

ZVINOFUNGA VANHU NEZVINOITA KUTI VADE KANA KUSADA KUSHANDISA NZIRA DZOKUDZIVIRIRA TAIFODHI						
Pandinokubvunzai mibvunzo inotevera kana muchibvumirana neni itii 'hongu' kana musingabvumirane nezvandinenge ndataura moti, 'kwete'. Pandinenge ndichishandisa mazwi okuzvinongedza okuti "ndi..." ndinenge ndibvira imi kwete ini. Mutsvagurudzi: Mvunzisa kana vachinyano wirirana kana kusawirirana nemibvunzo		Strongly Agree	Agree Somewhat	Not sure	Disagree Somewhat	Strongly Disagree
Q86	Ndinokwanisa kushandisa mishonga yokuisa mumvura kuti ichene	5	4	3	2	1
Q87	Ndine chokwadi chokuti ndinonyatsokwanisa kushandisa mishonga yacho kuti mvura inyatsochena..	5	4	3	2	1
Q88	Ndinokwanisa kukurudzira mumwe wangu kana mhuri yangu kuti vashandise nzira dzokuchenesa mvura yokunwa.	5	4	3	2	1
Q89	Shamwari dzangu dzinondikurudzira kuti ndishandise mishonga yokuchenesa mvura nguva dzose.	5	4	3	2	1
Q90	Mhuri yangu inonditsigira zvandinoita kuti tinwe mvura yakachena	5	4	3	2	1
Q91	Shamwari dzangu dzinogara dzichingotaura nyaya yokuchenesa mvura yokunwa.	5	4	3	2	1
Q92	Mvura yakaiswa mushonga hainaki.	5	4	3	2	1
Q93	Mishonga yokuchenesa mvura inezvimwe zvaiinazvo zvinokuvadza muviri.	5	4	3	2	1
Q94	Mishonga yokuchesa mvura yatinoshandisa haiurayi utachiona hwose hunenge huri mumvura.	5	4	3	2	1
Q95	Taifodhi idambudziko guru kwazvo munharaunda medu.	5	4	3	2	1
Q96	Manyoka anogona kuuraya.	5	4	3	2	1
Q97	Vanhu vomuno munharaunda medu vari kubatwa netaifodhi nokuti vari kunwa mvura ine tsvina.	5	4	3	2	1
Q98	Munharaunde medu vanhu vachiri kungorwara netaifodhi.	5	4	3	2	1
Q99	Kana ndikasawana mishonga yokuchenesa mvura mhuri yangu inogona kutobatwa netaifodhi.	5	4	3	2	1
Q100	Mamiriro ezvinhu anoratidza kuti zviri nyore kwazvo	5	4	3	2	1

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	kuti mhuri yangu ibatwe netaifodhi chero nguva ipi zvayo.					
Q101	Pose pandinoona mhuri yangu ichinwa mvura ndinongofunga kuti vanogona kutobatwa netaifodhi.	5	4	3	2	1

Appendix 6: Zimbabwe Typhoid fever Outbreak Response Assessment Household Survey: Outcome tracking form

Stand number	Street name	Questionnaire Code	Visit 1		Visit 2		Visit 3		Comment
			Date: time	outcome	Date: time	outcome	Date: time	outcome	

Name of Enumerator: _____ Date: _____

OUTCOME

1=Survey done 2=refused 3=None residential stand 4=No one home 5= Can't find the stand 6=Other (specify)

Appendix 7: Zimbabwe Typhoid fever Outbreak Response Assessment Household Survey: Household sampling form

Name of Enumerator: _____ Date: _____

Stand number: _____

Stand number: _____

Household Letter	Home today & meets criteria	Drawn from envelope
A	Yes No	
B	Yes No	
C	Yes No	
D	Yes No	
E	Yes No	
F	Yes No	
G	Yes No	
H	Yes No	
I	Yes No	
J	Yes No	

Household Letter	Home today & meets criteria	Drawn from envelope
A	Yes No	
B	Yes No	
C	Yes No	
D	Yes No	
E	Yes No	
F	Yes No	
G	Yes No	
H	Yes No	
I	Yes No	
J	Yes No	

Stand number: _____

Stand number: _____