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# DISTRIBUTION MODELS FOR WATER TREATMENT PRODUCTS IN MALAWI: LESSONS LEARNED

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This report was produced for review by the United States Agency for International Development. It was prepared by Emily Sanders, Kathryn Banke, and Vicki MacDonald for the Strengthening Health Outcomes through the Private Sector (SHOPS) project.

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# DISTRIBUTION MODELS FOR WATER TREATMENT PRODUCTS IN MALAWI: LESSONS LEARNED

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# ACRONYMS

| | |
|---|---|
| **ANC** | Antenatal care |
| **BCC** | Behavior change communication |
| **CDC** | Centers for Disease Control and Prevention |
| **CHAI** | Clinton Health Access Initiative |
| **DHO** | District Health Office |
| **EHO** | Environmental health officer |
| **FMCG** | Fast-moving consumer goods |
| **HSA** | Health Surveillance Assistant |
| **HTH** | Calcium Hypochlorite powder |
| **IDPP** | Integrated Diarrheal Prevention Project |
| **MCH** | Maternal and child health |
| **MOH** | Ministry of Health |
| **MSF** | Médecins Sans Frontières |
| **MVP** | Millennium Villages Project |
| **NGO** | Nongovernmental organization |
| **ORS** | Oral rehydration salts |
| **PMTCT** | Prevention of mother-to-child transmission |
| **PSI** | Population Services International |
| **SHOPS** | Strengthening Health Outcomes through the Private Sector |
| **SWHP** | Safe Water and Hygiene Promoters |
| **TA** | Traditional Authority |
| **UNICEF** | United Nations International Children's Education Fund |
| **UNDP** | United Nations Development Program |
| **USAID** | United States Agency for International Development |
| **VCT** | Voluntary counseling and testing |
| **WHK** | Water Hygiene Kit |
| **WHO** | World Health Organization |

# ACKNOWLEDGEMENTS

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# EXECUTIVE SUMMARY

Malawi has one of the highest infant and child mortality rates in the world. Diarrheal diseases, which lead to severe dehydration, are the fourth leading cause of childhood deaths in the country (WHO/UNICEF 2012). Unsafe drinking water is a significant source of exposure to diarrhea-causing pathogens (Prüss-Üstün et al. 2008). To combat this problem, the Ministry of Health (MOH) distributes free stock chlorine in the form of Calcium Hypochlorite powder (HTH) to areas of the country most affected by cholera during the rainy season each year, from December through May. In addition, since 2002, Population Services International (PSI) has socially marketed WaterGuard, a chlorine-based water treatment product for home use that is available in both liquid and powder form (known as PUR™), through commercial outlets.

In 2012, the United States Agency for International Development (USAID) in Malawi tasked the Strengthening Health Outcomes through the Private Sector (SHOPS) project with documenting the implementation of different models for promoting chlorine-based water treatment products and providing lessons learned and recommendations for scale up. SHOPS identified four different models for water treatment products, either currently in progress or that could be initiated, in four USAID-priority districts of southern Malawi (the region most prone to cholera outbreaks); SHOPS supported the implementation of these models from December 2012 through May 2013. The four models are shown in the table below.

| Model | Product | Place (District) | Price | Promotion (Distribution Channel) |
|---|---|---|---|---|
| Free chlorine distribution | HTH | Chikwawa | Free | Distributed at biweekly health talks by MOH health surveillance assistants (HSAs) |
| Water Hygiene Kits | Water Hygiene Kit (bucket, WaterGuard or PUR, and soap) | Machinga | Free | Distributed to pregnant women seeking antenatal care at public health facilities |
| Commercial sales | WaterGuard | Nsanje | Retail price (125 MWK) | Community education/demonstration activities driving sales to local retail outlets |
| Community-based sales | WaterGuard | Zomba | Retail price (125 MWK) | Community-based sales by women's self-help groups |

This report describes each of these models, presents data on their coverage, and draws lessons learned about their implementation to inform scale-up efforts. Each of the four models is described in a case study format, using primary data from a household survey on water treatment behavior conducted by SHOPS in June 2013, supplemented with secondary data from monitoring and field reports collected by implementing partners.

The implementation of the four different models revealed several broad lessons learned in relation to the promotion and distribution of water treatment products:

(1) While there is seasonal demand for water treatment products, the overarching challenge remains encouraging year-round, continuous water treatment.

(2) Of the water treatment products available (WaterGuard, PUR and HTH), WaterGuard is by far the most popular and is well regarded and considered easy to use. Its popularity may stem from years of branded marketing and its wide availability through a range of outlets. Given well-established brand recognition, with minimal support for marketing and distribution of WaterGuard, promotion of this treatment option should continue to be a priority.

(3) HTH is the least accepted product for water treatment, likely due to the infrequent availability of the product and the difficulty of correct dosing, which affects taste and smell of HTH-treated water. Given these issues, HTH is not recommended as a priority for USAID support, particularly since current users prefer WaterGuard. However, should HTH continue to be distributed, the experience in Chikwawa suggests that additional measures beyond training of HSAs are needed to ensure standardization in the use of HTH, thereby improving acceptance of HTH-treated water and reducing wastage.

(4) While past evaluations of the Water Hygiene Kit program in Malawi have shown promising results, it was unclear whether participation in an incentive program increases the likelihood of future WaterGuard purchase, or whether distribution of the free kits has any spillover effects into the broader community.

(5) While the community-based models implemented in Nsanje and Zomba did not show promising results, other studies have shown the importance of community-based channels in changing water treatment behavior.

(6) While radio is an effective channel for promoting water treatment messages, reliance on this channel alone misses roughly half of the population that does not own a radio in working condition. Therefore, complementary communications channels such as product demonstrations and community education sessions need to continue to be implemented.

Based on these lessons learned from the implementation of the four models, it is recommended to continue supporting WaterGuard at its cost recovery price, while monitoring the effect on use. At the same time, given that taste and smell are the most common reasons for non-use, other water treatment options such as filters should be considered. Given overall low rates of water treatment, as well as the high percentage of the population using public water sources, it is also recommended to explore a source-based water treatment model such as free point-of-collection chlorine dispensers. This model has the potential to be transformed into a community-managed and community-supported water treatment program.

# I. INTRODUCTION

Malawi has one of the highest infant and child mortality rates in the world: of every 1,000 children born in the country, 112 will die before the age of five, and 66 will die before their first birthday (NSO and ICF Macro 2011). Diarrheal diseases, which lead to severe dehydration, are the fourth leading cause of childhood deaths in Malawi (WHO/UNICEF 2012). In addition to a high burden of pediatric diarrheal diseases, each year there are multiple outbreaks of cholera in Malawi, especially around Lake Chirwa and Lower Shire Valley and along Lake Malawi in the southern region of the country. The most recent statistics from 2012 showed a total of 197 cases and 7 deaths reported in the southern districts of Machinga, Phalombe, and Zomba. Additional cases were also reported in Blantyre, Chikwawa, and Nsanje.

Unsafe drinking water is a significant source of exposure to diarrhea-causing pathogens (Prüss-Üstün et al. 2008). To combat this problem, the Ministry of Health (MOH) distributes free stock chlorine in the form of Calcium Hypochlorite powder (HTH) to areas of the country most affected by cholera during the rainy season each year, from December through May. In addition, since 2002, Population Services International (PSI) has socially marketed WaterGuard, a home water treatment chlorine product, through outlets for fast-moving consumer goods (FMCG) throughout Malawi. WaterGuard is commercially available in liquid form (bottles) and in powdered form (sachets of WaterGuard Wa Ufa, also known as Procter & Gamble's PUR).[1] A 150 ml bottle of WaterGuard treats 600 liters of water (covering the needs of a family of 4 to 5 people for about one month), while each WaterGuard Wa Ufa sachet treats 10 liters of water. Sales and distribution of WaterGuard have increased steadily, from 650,000 bottles in 2005 to over one million bottles in 2011. The retail price of WaterGuard as of December 2012 was 125 Malawi Kwacha (MWK) (compared to 80 MWK wholesale), or roughly $0.33 USD per bottle. This is a full product cost-recovery price.

In 2012, the U.S. Agency for International Development (USAID) in Malawi tasked the Strengthening Health Outcomes through the Private Sector (SHOPS) project with documenting the implementation of different models for promoting chlorine-based water treatment products and providing lessons learned and recommendations for scale up. SHOPS identified four different models for water treatment products either currently in progress or that could be initiated, focusing on four USAID-priority districts of southern Malawi (the region most prone to cholera outbreaks): Chikwawa, Machinga, Nsanje, and Zomba. A map of Malawi is provided in Appendix A. The four models are shown in Table 1.

**TABLE 1. MODELS FOR MARKETING WATER TREATMENT PRODUCTS**

| Model | Product | Place (District) | Price | Promotion (Distribution Channel) |
|---|---|---|---|---|
| Free chlorine distribution | HTH | Chikwawa | Free | Distributed at biweekly health talks by MOH health surveillance assistants (HSAs) |
| Water Hygiene Kits | Water Hygiene Kit (bucket, WaterGuard | Machinga | Free | Distributed to pregnant women seeking antenatal care at public health facilities |

[1] As of 2014, PUR is no longer available on the retail market in Malawi.

| | | | | |
|---|---|---|---|---|
| | or PUR, and soap) | | | |
| Commercial sales | WaterGuard | Nsanje | Retail price (125 MWK) | Community education/demonstration activities driving sales to local retail outlets |
| Community-based sales | WaterGuard | Zomba | Retail price (125 MWK) | Community-based sales by women's self-help groups |

SHOPS forged partnerships to facilitate the implementation of one model in each of the four districts and monitored coverage of water treatment products from December 2012 through May 2013, covering the rainy season. During this time, SHOPS also provided funds to PSI to ensure continuous supply of WaterGuard products to commercial wholesalers in all four districts and to run national radio advertising for WaterGuard on four radio stations (airing a total of 3,789 radio spots).

This report uses a case study format to describe each of these models, presenting data on their coverage and drawing lessons learned about their implementation to inform scale-up efforts. These four case studies combine primary and secondary data analysis, interpreted within the context of the specific activities being implemented in each district.

# 2. DATA SOURCES

Several sources of information were used to develop the case studies. Data on the implementation process and challenges for each model were obtained from two sources:

- Monthly field reports from implementing partners in each district
- Program monitoring data from implementing partners

Data on the coverage of each model were obtained from three sources:

- SHOPS surveyed 480 households in the four districts during June 2013 to collect data on water treatment knowledge and practices. (Details can be found in Appendix B.)
- SHOPS collected data on the distribution of water treatment products to households from monitoring reports by implementing partners.
- PSI provided WaterGuard commercial wholesale data.

# 3. CASE STUDIES

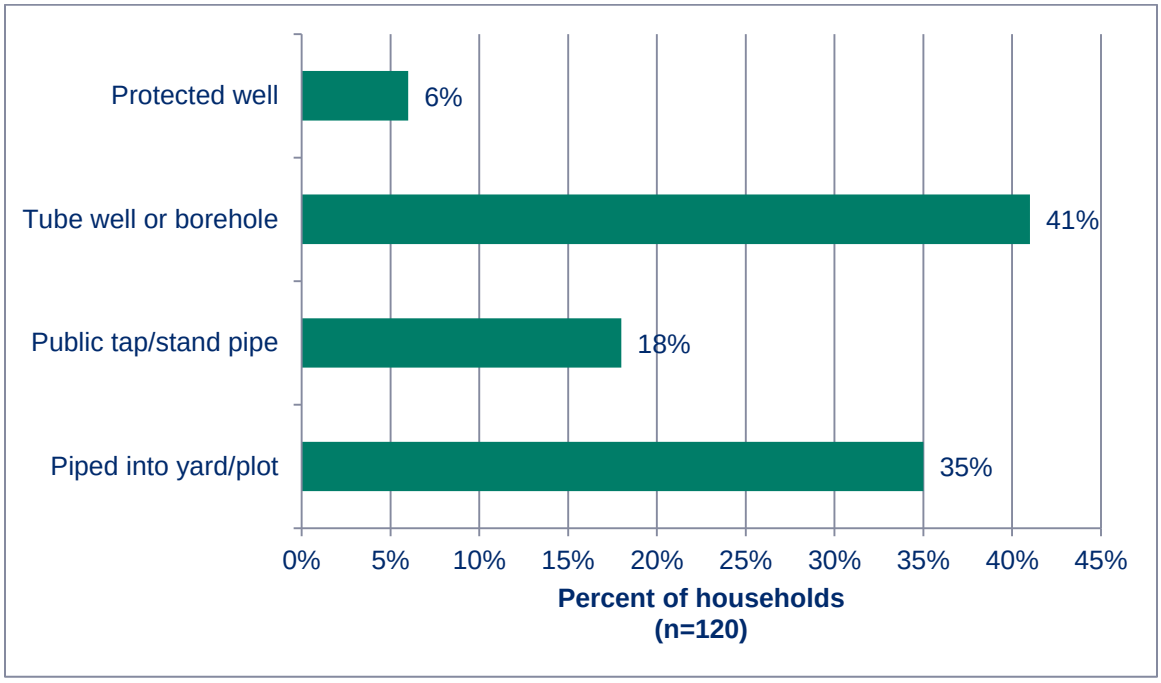
## 3.1 FREE CHLORINE DISTRIBUTION IN CHIKWAWA

### 3.1.1 BACKGROUND

Chikwawa is located at the southwestern tip of Malawi, along the border with Mozambique. Most respondents in the SHOPS survey (75 percent) were employed full time. Twenty-seven percent had never attended school, 44 percent had at least some primary education, and 29 percent had some secondary or higher education. Most households (73 percent) had a radio in working condition, and 17 percent had a television in working condition. (See Appendix C for a summary of demographic information for all districts in the SHOPS survey.)

All households interviewed in Chikwawa were collecting water from improved water sources (Figure 1). The most common water source was a tube well or borehole (41 percent of households). Approximately one-third of the households had water piped into their yard or plot.

**FIGURE 1. MAIN SOURCE OF HOUSEHOLD DRINKING WATER (JUNE 2013, CHIKWAWA)**




The MOH — with support from UNICEF, the World Health Organization (WHO), and various partner nongovernmental organizations (NGOs) such as World Vision and Médecins Sans Frontières (MSF) — provides free HTH to selected DHOs in Malawi, particularly during cholera outbreaks. During the rainy season, HTH distribution is intensified to high-risk communities with no access to improved water sources. Each 25kg container of HTH, when reconstituted, makes

approximately 1,300 liters of 1% stock solution; 150 milliliters of 1% stock solution is sufficient to treat the water of one household for two weeks (the shelf life of the stock solution).

In each district, the DHO is able to extend delivery of essential health services into the community through HSAs – salaried community health workers (male and female) with at least a secondary level education who are based at the community level. More than 3,000 of the estimated 10,500 HSAs working at the community level in Malawi have been trained to provide preventive and curative care, including the Community Case Management of Childhood Illnesses. Their duties include preparing and distributing the 1% stock solution to households in their catchment areas during health talks, as well as treating public wells and other communal water sources with HTH. These activities have been supported by a communication campaign managed by the Cholera Task Force and Health Education Unit of the MOH that focuses on community meetings, with some theater performances as well. According to reports from HSAs, a common problem at the household level is over-dosing of stock solution in treating water; this results in a strong chlorine taste and reluctance by household members to treat water. Stock-outs of HTH at central and district levels of the MOH have also been an ongoing issue, and supply of HTH is often dependent on donations from NGOs.

### 3.1.2 IMPLEMENTATION PROCESS

SHOPS supported the implementation of a two-part model: ensuring continuous supply of HTH throughout the rainy season, through regular monitoring to avoid stock-outs, accompanied by training HSAs in correct dosing and storage techniques for treatment of water with HTH. A series of two-day HSA trainings were conducted in December 2012 and January 2013 by environmental health officers from the Chikwawa DHO, with support from SHOPS and the Community Health Sciences Unit at the MOH. In total, 192 HSAs (out of a district total of 310) were trained using the new water treatment curriculum.

These activities carried out from December 2012 through May 2013, focusing on the catchment areas of the health facilities in the northernmost part of the district, where diarrhea prevalence is highest — representing about 55 percent of the total district population (Table 2).

**TABLE 2. POPULATION TARGETED BY SHOPS-SUPPORTED ACTIVITIES (CHIKWAWA)**

| Targeted Health Facility Catchment Area | Total Population |
|---|---|
| Chikwawa District Hospital | 34,885 |
| Chipwaila Health Centre | 33,819 |
| Dolo Health Centre | 31,915 |
| Ndakwela Health Centre | 30,636 |
| Kasinthula Health Centre | 9,727 |
| Mkumaniza Health Center | 10,173 |
| Ngabu Rural Hospital | 55,295 |
| Montfort Mission Hospital | 45,203 |
| Bereu Dispensary | 19,194 |
| **Total Target Population** | **270,847** |
| **Total Target Households** | **58,880*** |
| **Total District Population** | **489,030** |
| **% of District Population** | **55%** |

Source: DHO records

*Estimate based on average household size of 4.6 (Malawi Demographic and Health Survey, 2010).

The model of MOH-supported distribution of HTH works as follows. On a monthly basis, HSAs collect tins of HTH from the DHO to stock their health centers. The HSAs then convert the HTH into 1% stock solution, using the nationally recommended formula of 5.5 tablespoons of HTH per 5 liters of water. HSAs distribute this stock solution to households in villages during biweekly health talks; with a shelf life of two weeks, the stock solution has to be used within that time period. The stock solution is given out to households in plastic bottles provided by the households. These bottles ideally should be 150 ml in size, which would cover typical household consumption in a two week period; in practice, they are generally between 300 and 500 ml, often empty Coca-Cola bottles. Households are instructed to discard any remaining solution after two weeks and collect re-supply at the next biweekly health talk, although it is not clear to what extent this recommendation is followed. HSAs estimate the required amount of 1% stock solution based on the village population and its past records of demand. Ideally, this stock solution should be stored in an opaque, air-tight container, but the bottles supplied by households are generally clear.

To address widespread complaints about the smell/taste of water treated with stock solution (due to over-chlorination), SHOPS revised the water treatment section of the Malawi National Cholera Training Manual. The new version recommends a more standard measurement: a *one* dose application of 5 ml (or one bottle cap full) of 1% stock solution for each water storage container, ranging from 15 to 25 liters in size (most households collect their water in 18–20-liter jerry cans). This recommendation, which was confirmed with the U.S. Centers for Disease Control and Prevention (CDC), results in 2–3 mg/L chlorine residual, which is within the recommended range. To prevent degradation of the stock solution, given that most stock solution is collected and kept in clear bottles, households were advised to store the stock solution in a dark place. (See training materials in Appendix D.)

According to DHO records, between December 2012 and May 2013 the trained HSAs gave more than 3,000 health talks to residents in their assigned villages to encourage use of HTH and correct water treatment techniques. These talks were conducted biweekly in villages in the target area. At these talks, HSAs distributed a two-week supply of HTH to a member of each household attending, accounting for between 14 and 67 percent of all target households each month, depending on level of attendance (Table 3).

**TABLE 3. NUMBER OF HEALTH TALKS HELD AND ATTENDANCE (CHIKWAWA)**

| District | December 2012 | January 2013 | February 2013 | March 2013 | April 2013 | May 2013 | Total |
|---|---|---|---|---|---|---|---|
| Number of community health sessions | 670 | 731 | 582 | 500 | 257 | 293 | 3,033 |
| Total attendance at community health sessions (Number of people) | 60,254 | 60,252 | 52,729 | 45,447 | 20,258 | 23,938 | 262,878 |
| Number of households given HTH | 24,946 | 39,291 | 29,907 | 24,536 | 11,019 | 8,423 | 138,122* |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| (% of target households in Chikwawa) | (42%) | (67%) | (51%) | (42%) | (19%) | (14%) | |

*Note: This number does not account for double counting of households attending health talks across multiple months

Total distribution in that period amounted to 82 tins (25kg each) of HTH, procured by SHOPS for the DHO in Chikwawa — equivalent to six 150 ml bottles of 1% stock solution per household in the target area. This supply was meant to cover the target catchment areas from December 2012 through May 2013 and was distributed through DHO channels. It was the only source of HTH in the district during this time. During this same period, wholesale commercial sales of WaterGuard liquid for the entire district were very low, equivalent to 83 (150 ml) bottles per 1,000 households.

Despite these efforts, several challenges were encountered during the implementation process. First, many HSAs were using inconsistent measurements (such as un-level spoons) for the preparation of the stock solution, indicating that further standardization is needed in the national recommendations. Second, although users were instructed to use a 5-ml bottle cap or spoon to treat each 15–25 liter container of water, the caps and spoons used by households varied in size. Third, the 300–500 ml bottles used by families to collect stock solution led to an excess supply, far more than needed to treat the water of one household for two weeks. This excess may result in wastage, potential over-chlorination of the water, or household use beyond the two-week shelf life. Nonetheless, DHO and HSA leadership in Chikwawa reported that households were very happy with this water treatment model and returned frequently for refills of the product. Notably, not a single case of cholera was reported in Chikwawa district in 2013 (compared with 361 cases in 2012 and more than 300 cases in 2011).

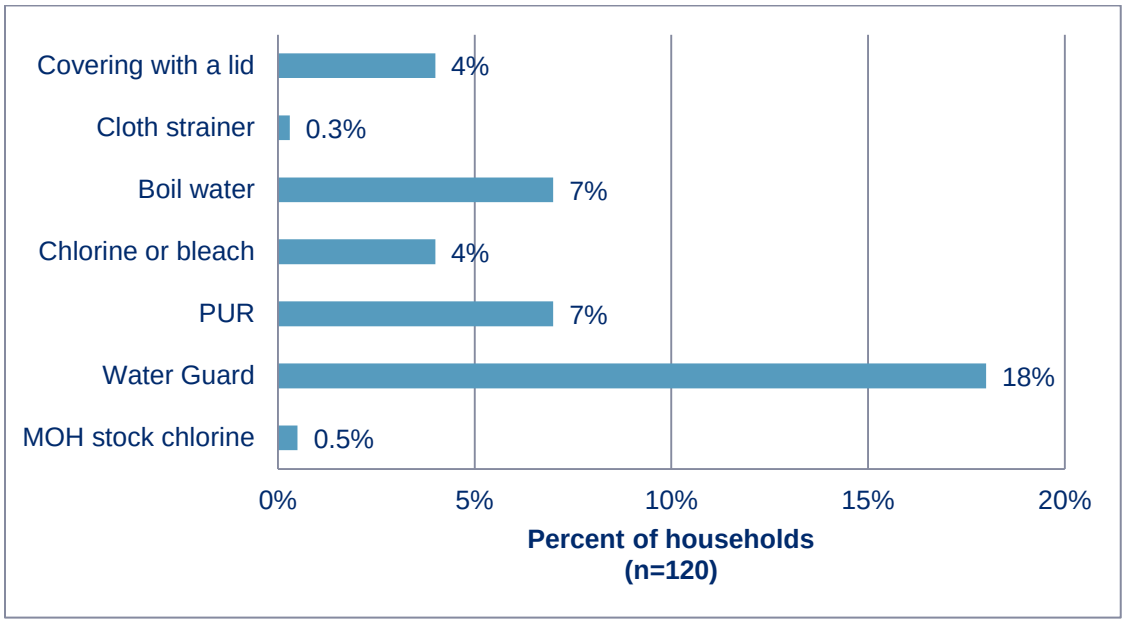
### 3.1.3 WATER TREATMENT USE AND MESSAGE EXPOSURE

When surveyed immediately following the end of the monitoring period, 32 percent of the heads of households in the district said they had heard or seen any information about water treatment in the past month. Among those who had heard or seen water treatment information, the two most commonly cited sources of information were health workers/HSAs (42 percent) and radio (38 percent). Just over one-third (38 percent) said they had heard or seen information specifically about WaterGuard in the past month. Among those who had heard a message about WaterGuard in the past month, the most common source of information was radio (85 percent), followed by health workers/HSAs (14 percent). Nearly all respondents (94 percent) said they had heard of WaterGuard. Respondents overall had very high levels of knowledge about the causes of waterborne illnesses: 99.8 percent knew that diarrhea could be caused by contaminated drinking water, and 98 percent knew that adding chlorine makes water safe for drinking.

In terms of water treatment practices, 39 percent of heads of households surveyed said they had done something to make their water safer in the past week. Figure 2 shows the current treatment methods reported by respondents. (Note that respondents could select more than one option. This applies to all current treatment methods reported in this report.) The most commonly reported method used to make water safer was WaterGuard (18 percent of all

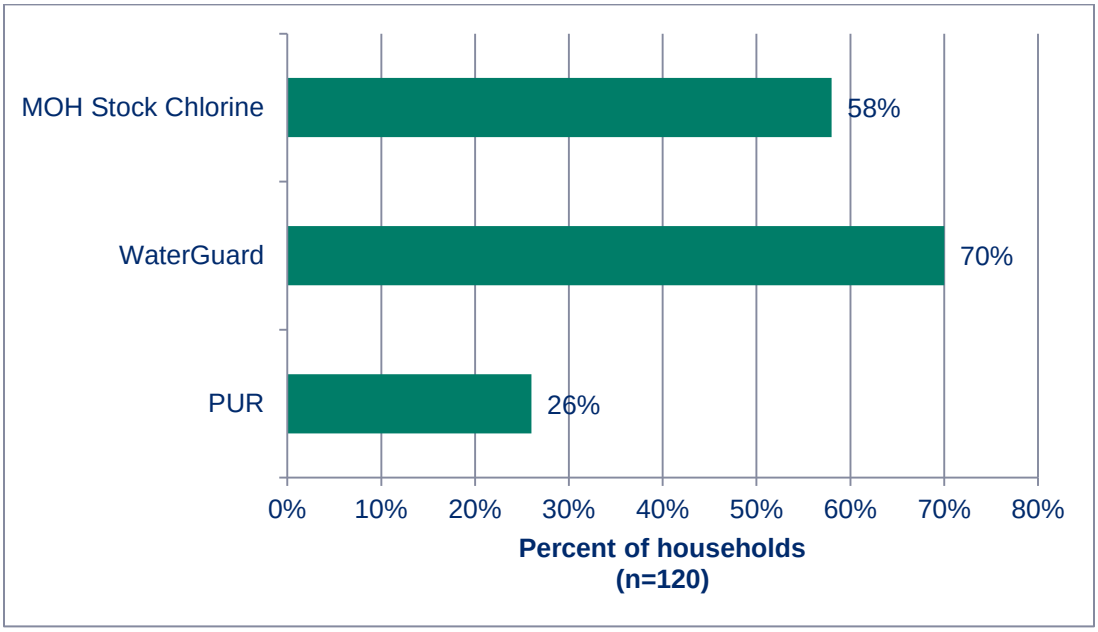
households in the district). Only 0.5 percent of respondents reported using MOH stock chlorine (or HTH), although 4 percent reported using chlorine/bleach.

**FIGURE 2. METHOD USED TO MAKE WATER SAFER IN THE PAST WEEK (JUNE 2013, CHIKWAWA)**




Most (79 percent) respondents stated that they had at some time used a water treatment product (WaterGuard, HTH, and/or PUR; other methods were not asked about in the survey). The most commonly reported products that respondents had ever used were WaterGuard (70 percent) and MOH stock chlorine (HTH) (58 percent) (Figure 3). Approximately one-quarter (24 percent) of households surveyed said there were members of their household who did not want to use either WaterGuard or chlorine to treat their water, mainly because they did not like the smell.

**FIGURE 3. EVER USE OF WATER TREATMENT PRODUCTS (JUNE 2013, CHIKWAWA)**




When asked where they had received their product, 78 percent of HTH users reported that they had received the product from an HSA (i.e., through the SHOPS-supported model). The second most common source was a health facility (14 percent).

### 3.1.4 LESSONS LEARNED

Despite efforts to improve the availability and ensure the correct use of HTH, overall use of this product throughout the district was low compared to other water treatment methods. Several factors may account for this finding. Regarding data collection, the SHOPS survey was district-wide and not limited to target areas, and it was conducted at the end of the rainy season, when water treatment is less in demand. Substantively, moreover, the continued over-chlorination of HTH-treated water may have engendered reluctance to use the product.

Overall, the implementation of this model revealed the need for additional measures, beyond just training, to ensure standardization in the use of HTH in order to improve acceptance of HTH-treated water and prevent wastage of stock solution. The use of empty 150 ml bottles should be promoted for collection of stock solution, or alternatively, 150 ml bottles should be distributed. This would not only prevent wastage (since households are currently bringing 300-500 ml bottles to collect stock solution, gathering far more than required for two weeks of water treatment), but it would also help ensure the correct measure in treating water: exactly 5 ml of stock solution to treat household water in an 18–20 liter jerry can (since the caps of the larger bottles may hold more than 5 ml of liquid). One potential solution is the use of empty WaterGuard bottles: these hold 150 ml of liquid, have caps that hold 5 ml, and moreover are opaque, preventing degradation of the solution.

Another lesson learned was that the spoons utilized for preparation of the stock solution by HSAs are not standard in size, leading to variations in the strength of the stock solutions. One

potential solution is to provide standard-sized tablespoons to HSAs. Another is to provide pre-measured packets of HTH powder for preparation of the stock solution. These innovations may not only increase acceptability of the product but also encourage use beyond the rainy season.

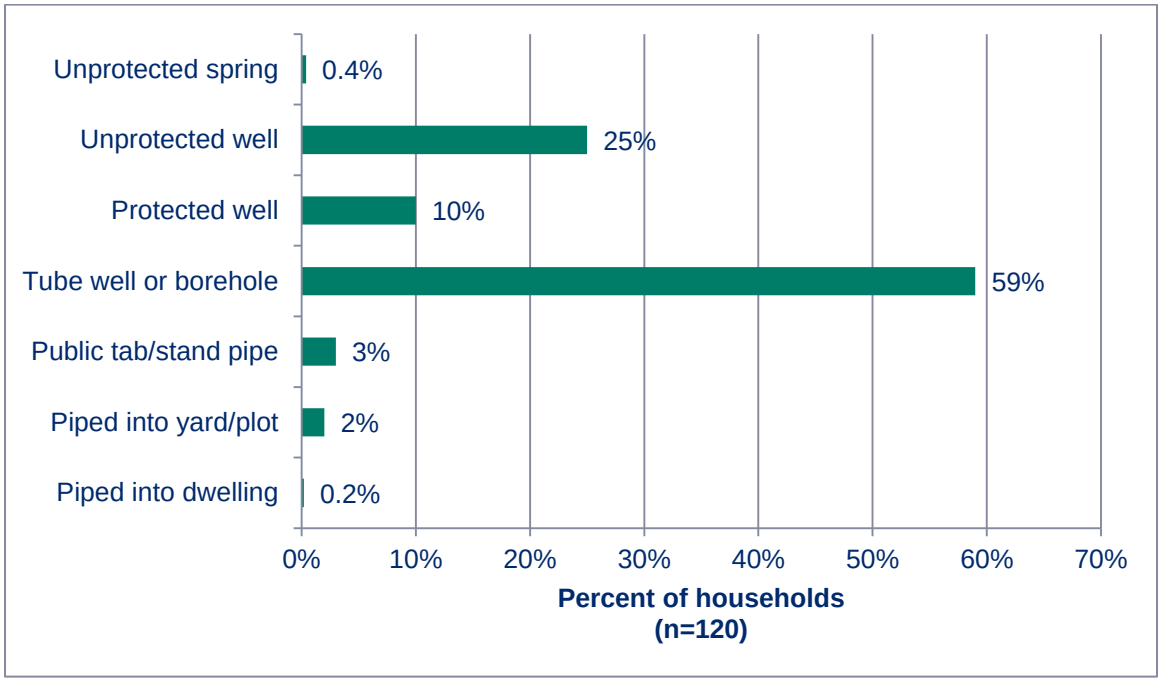
## 3.2 DISTRIBUTION OF FREE WATER HYGIENE KITS TO PREGNANT WOMEN IN MACHINGA

### 3.2.1 BACKGROUND

Machinga is located in southeastern Malawi, along the border with Mozambique. Most of the respondents in the SHOPS survey (72 percent) in Machinga were employed full time; 43 percent never attended school, 53 percent had some primary education or completed primary education, and 3 percent had secondary or higher education. Only 28 percent of households had a radio in working condition, and just 4 percent had a television in working condition.

While most households interviewed in Machinga were using improved water sources, one in four were using an unimproved source (unprotected well or spring) (Figure 4).

**FIGURE 4. MAIN SOURCE OF DRINKING WATER (JUNE 2013, MACHINGA)**




Several organizations working in the water, sanitation, and hygiene sector have provided WaterGuard free to the target populations in the areas of Malawi in which they work, particularly during cholera outbreaks. In 2007–2011, with support from USAID, CDC and UNICEF, the Clinton Health Access Initiative (CHAI) and PSI implemented projects with the primary objective of distributing free WaterGuard in three districts, through peri-urban and rural health clinics. CHAI worked in Machinga, and PSI worked in Blantyre and Salima districts. The projects

provided free “hygiene kits” containing WaterGuard (either liquid or PUR sachets), oral rehydration salts (ORS), soap, and a safe water storage container. These kits were distributed to pregnant women at the first ANC visit, as incentives to improve uptake of antenatal care (ANC) and voluntary counseling and testing (VCT) services. Up to three refills of WaterGuard and soap are then provided as an incentive to return for follow-up services and delivery.

A secondary objective of these projects was to increase product trial and to normalize key behaviors for safe water and handwashing among pregnant women. A qualitative research study evaluated the PSI and CHAI activities and found that an extended free trial of WaterGuard overcame initial cost barriers. By enabling women and their families to experience the health benefits of the product, appreciate its value and relevance to their lives, and get used to its taste, the program influenced women’s decisions to adopt, purchase, and continue using WaterGuard (Wood et al. 2011). Additionally, an earlier evaluation of the PSI program suggested evidence of “spillover effects” from the program, as improvements were seen in the water treatment practices of the friends and relatives of program participants (Sheth et al. 2008).

### 3.2.2 IMPLEMENTATION PROCESS

SHOPS supported the extension of CHAI’s Machinga Integrated Antenatal Water Hygiene Kit (WHK) Program that had begun in September 2009 to address problems of safe water and low ANC attendance. The program extension was implemented in partnership with the Machinga DHO and CDC; in order to ensure sustainability of the program after donor support ended, ownership of the program was transferred to the DHO during 2013. The WHK program was implemented at 16 out of 21 public health facilities throughout the district, targeting roughly 74 percent of the district’s total population (Table 4).

**TABLE 4. POPULATION TARGETED BY SHOPS-SUPPORTED ACTIVITIES (MACHINGA)**

| Targeted Health Facility Catchment Area | Total Population |
|---|---|
| Chikweo | 76,092 |
| Gawanani | 10,066 |
| Machinga | 20,137 |
| Mangamba | 14,090 |
| Mkwepere | 18,739 |
| Mpiri | 26,459 |
| Mposa | 22,046 |
| Nainunje | 12,980 |
| Namandanje | 12,307 |
| Namanja | 32,109 |
| Nayuchi | 15,626 |
| Ngokwe | 35,668 |
| Nsanama | 39,653 |
| Ntaja | 41,487 |
| Ntholowa | 11,853 |
| Nyambi | 23,470 |
| **Total Target Population** | **412,782** |
| **Total Target Households** | **83,636** |
| **Total District Population** | **554,840** |
| **% of District Population** | **74%** |

Source: DHO records

The main objectives of the CHAI's Machinga Integrated Antenatal Water Hygiene Kit (WHK) Program were outlined in a memorandum of understanding signed by all partners (SHOPS, CHAI and the Machinga DHO). These were: (1) to enable scale-up of activities that reduce the risk of diarrhea illnesses to pregnant mothers and infants, by increasing access to proven preventive interventions like water treatment; and (2) to enable the seamless transition of the rollout of the WHK program to the DHO.

Specifically, the roles of the various program partners were as follows:

- ***Technical Assistance Support***: CHAI provided technical assistance for the transition of activities between partners and the DHO/MOH, including coordinating ongoing supportive supervision of the activities as well as mentoring facilities on stock management practices. CHAI, together with the District Prevention of Mother-to-Child Transmission (PMTCT) and Safe Motherhood Coordinator, the District Health Environmental Officer, and Zone Supervisors, conducted monthly supervision visits to all WHK facilities in the district, collecting monthly data for monitoring program progress and holding quarterly review meetings to assess capacity and readiness for the DHO to assume responsibility for managing the program. SHOPS provided in-kind resources for these activities (e.g., meeting venues, petrol).
- ***Commodity and Programmatic Resources***: SHOPS supported the direct procurement of buckets, WaterGuard bottles, and sachets of WaterGuard Wa Ufa (PUR) for the WHK. These procurements supplemented a remaining budget of nearly $15,000 (funded by Procter and Gamble, the manufacturer of PUR sachets) to expand the scope of interventions to ensure a supply of point-of-use water purification sachets sufficient to supply about 12,800 pregnant women, at four antenatal visits and at delivery. Additionally, SHOPS was responsible for transporting WHK commodities from the suppliers to the Machinga District Hospital stores, where the store clerk would pre-assemble the supplies. CHAI and the store clerks were responsible for transporting the WHK commodities to implementing sites in a timely fashion. When the program was scaled up to include an additional site, Mkwepere. CHAI and the DHO took charge of community sensitization to raise awareness of the WHK program at this new location.
- ***Implementation, Supervision and Reporting:*** The DHO led project implementation, supervision, reporting and stock management. With support from CHAI, the Machinga DHO was also responsible for lobbying for additional resources from government and district partners to facilitate the transition period.

In total, 340,756 sachets of WaterGuard Wa Ufa (PUR) and 9,986 bottles of liquid WaterGuard were distributed through the 16 health facilities from December 2012 to May 2013 (Table 5). Over the monitoring period, 5,046 new clients (pregnant women accessing ANC services) received kits, and 26,118 PUR or WaterGuard refills were provided.

**TABLE 5. NUMBER OF SACHETS OR BOTTLES OF WATERGUARD DISTRIBUTED (DECEMBER 2012–MAY 2013, MACHINGA)**

| Month | Wa Ufa (PUR) | Liquid WaterGuard |
|---|---|---|
| December 2012 | 991 | 0 |
| January 2013 | 93,834 | 0 |
| February 2013 | 90,020 | 0 |
| March 2013 | 100,186 | 0 |

| | | |
|---|---|---|
| April 2013 | 23,981 | 3,259 |
| May 2013 | 30,744 | 6,727 |
| **TOTAL** | **340,756** | **9,986** |

During this time period, wholesale commercial sales of WaterGuard liquid in the district were equivalent to 124 (150 ml) bottles per 1,000 households.

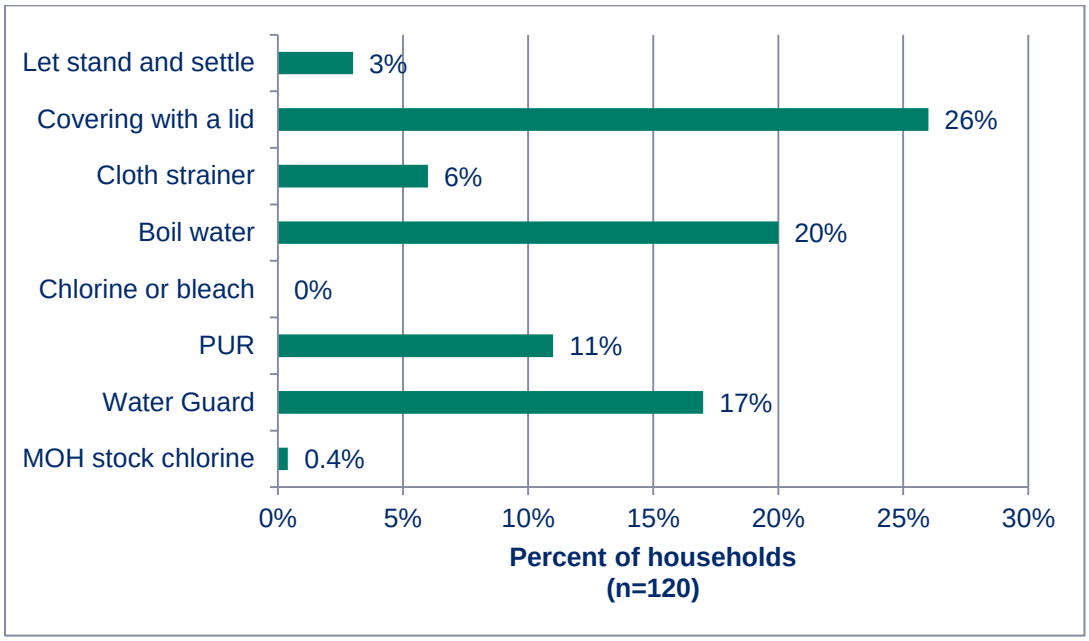
### 3.2.3 WATER TREATMENT USE AND MESSAGE EXPOSURE

Immediately following the monitoring period, the SHOPS survey found that only 10 percent of respondents in Machinga said they had heard or seen general information about water treatment in the past month; 14 percent had heard or seen a message about WaterGuard in the past month. The most commonly cited sources of WaterGuard information were radio (80 percent), followed by an HSA/health worker (58 percent) and community meeting or chief (31 percent). Nearly all respondents (94 percent) said they had “ever” heard of WaterGuard.

Respondents overall had high levels of knowledge about waterborne illnesses; however, 36 percent responded incorrectly that clear water did not have to be treated with WaterGuard. Regarding availability and access, 17 percent of respondents strongly disagreed that they knew where to find WaterGuard, and 41 percent strongly disagreed that WaterGuard was available within walking distance of their home. Availability thus presents a challenge for achieving the intended long-term effects of the WHK program (i.e., purchase of WaterGuard following free distribution of the WHK kits).

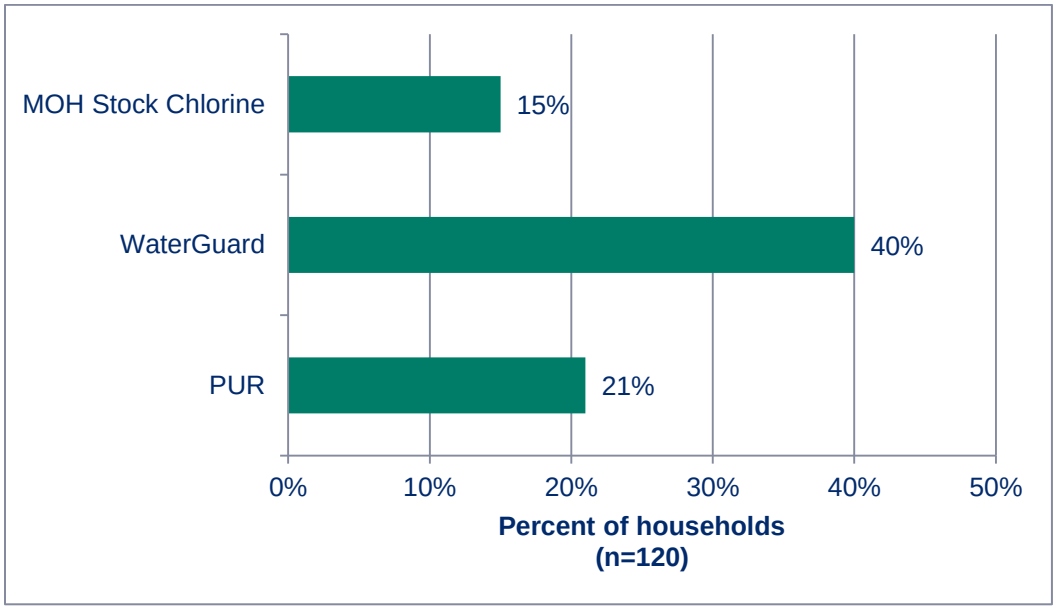
In terms of water treatment practices, 57 percent of households surveyed said they had done something to make their water safer in the past week. Figure 5 below shows the treatment method(s) that respondents said their household had used in the week preceding the survey. The most frequently used method reported was “covering with a lid,” even though this is not considered an appropriate method for making water safe to drink. The most frequently reported safe method was boiling (20 percent of households); 17 percent reported using WaterGuard, and 11 percent reported using PUR to disinfect their water.

**FIGURE 5. METHODS USED TO MAKE WATER SAFER IN THE PAST WEEK (JUNE 2013, MACHINGA)**




About half (51 percent) of all respondents had ever used at least one of the water treatment products (WaterGuard, HTH, and/or PUR). Forty percent had ever used WaterGuard, 21 percent had ever used PUR, and 15 percent reported having ever used MOH stock chlorine (Figure 6). Just 6 percent of households surveyed said there were members of their household who did not want to use WaterGuard or chlorine to treat their water; most reported that this was because they did not like the smell.

**FIGURE 6. EVER USE OF WATER TREATMENT PRODUCTS (JUNE 2013, MACHINGA)**



Among the few that treated their water with WaterGuard and/or PUR in the past week, the majority said that they were using the product *every time* they collect water (59 and 53 percent, respectively).

Among current WaterGuard users, 69 percent sourced their product from a retail shop. Thirteen percent said they received the product from an HSA, and 10 percent said they received it from a health facility. Current PUR users obtained the product either from a retail shop (52 percent) or from an HSA (48 percent). Roughly 6 percent of all households surveyed said they had "ever" paid for WaterGuard.

### 3.2.4 LESSONS LEARNED

Use of water treatment products (WaterGuard and PUR) was low throughout the district, compared to other treatment methods. More troublesome was the high percentage of respondents that considered that covering their water container with a lid was an acceptable method of making water safer to drink. Together, these findings indicate not only the limited potential of spillover effects from the WHK program, but also a clear need for further community education concerning safe water treatment and storage.

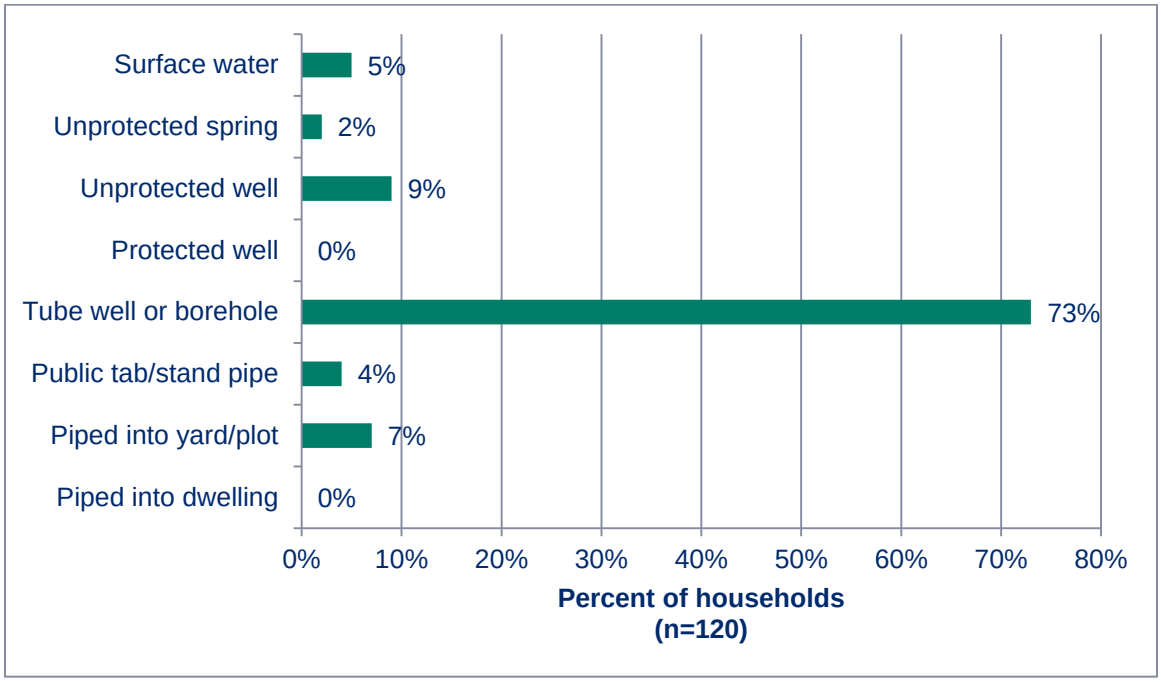
One of the main challenges of the WHK model is its lack of sustainability, as the program is reliant upon donor organizations for the provision of the free kits. Once donor support ends, alternate sources of funding must be identified to maintain the supply of the kits. Thus it is important to involve the DHO in the program from the beginning, and identify ways for the DHO to take ownership and continue to implement the activities using its own resources. This will require provision of capacity building and technical assistance to the DHO.

## 3.3 COMMERCIAL SALES WITH COMMUNITY DEMONSTRATION ACTIVITIES IN NSANJE

Nsanje is the southernmost district in Malawi, located in the Lower Shire River Valley. Most of the respondents in the SHOPS survey (86 percent) were employed full time and had at least some primary education (75 percent). Approximately half (52 percent) of households had a working radio, and 7 percent had a television in working condition.

Most households interviewed in Nsanje were collecting water from improved water sources; however, 16 percent were using an unimproved water source (an unprotected well or spring or surface water) (Figure 7).

**FIGURE 7. MAIN SOURCE OF DRINKING WATER (JUNE 2013, NSANJE)**




### 3.3.1 BACKGROUND

Currently, PSI/Malawi distributes WaterGuard products through more than 2,000 commercial FMCG outlets nationwide. Approximately 40 percent of WaterGuard products are sold in urban areas, 40 percent in peri-urban areas, and 20 percent in rural areas. To promote the product, PSI has implemented a range of behavior change communications (BCC) activities, both branded and generic, designed to encourage water treatment, safe water storage, and improved hygiene and sanitation practices.

During the period 2006–2011, PSI worked in partnership with the MOH to implement the Integrated Diarrheal Prevention Project (IDPP) targeting all three regions of Malawi. The project distributed both WaterGuard and diarrhea treatment products through commercial outlets on a national scale. In addition, a nationwide BCC campaign was designed to promote the correct, consistent use of these products as well as the adoption of improved hygiene and sanitation practices. As part of the IDPP, PSI — in partnership with local NGOs and community-based organizations — established community-based distribution channels using field volunteers, called “Safe Water and Hygiene Promoters” (SWHPs). Trained by PSI staff and supervised by field officers from each partner organization, SWHPs sold WaterGuard (and the diarrhea management products) to their surrounding community. These community agents promoted a cluster of health practices: point-of-use water treatment and safe water storage; proper hygiene and sanitation behaviors; and early recognition and treatment of diarrhea.

During the implementation period of the IDPP, USAID heavily subsidized the price of WaterGuard. Sales and distribution increased steadily, from 650,000 bottles in 2005 to more than one million bottles in 2011. In 2011, when USAID ended its grant to PSI for WaterGuard promotion, PSI was forced to raise the price to its current market price of 125 Malawi Kwacha (MWK) (80 MWK wholesale), or roughly $0.33 USD for one 150 ml bottle. Since the removal of

the subsidy, although PSI has not implemented any programming beyond commercial sales and radio spots, sales have remained generally stable despite the increased price.

### 3.3.2 IMPLEMENTATION PROCESS

SHOPS contracted PSI to complement a commercial sales model in Nsanje district with targeted push activities, using an approach similar to the SWHP program to encourage sales of the product at local retail outlets. Focusing on the flood-prone northern part of the district, covering about 40 percent of the district's population (Table 6), SHOPS assembled a team of Targeted Outreach Educators — unpaid volunteers from the local community with some level of secondary education. These volunteers were trained to conduct product demonstrations and to promote demand for WaterGuard through door-to-door outreach as well as community meetings. Rather than conduct direct sales, the Targeted Outreach Educators did a "commercial push," directing interested households to the closest retail shop stocking WaterGuard. Targeted Outreach Educators also conducted demand generation activities with retail shops in those areas, referring interested shops to PSI's sales team. The PSI sales team visited Nsanje on a weekly basis to distribute WaterGuard and to compile reports summarizing deliveries by sales outlet. In addition, sales management personnel conducted bi-weekly sales supervision visits to check the extent and quality of WaterGuard coverage.

**TABLE 6. POPULATION TARGETED BY SHOPS-SUPPORTED ACTIVITIES (NSANJE)**

| Targeted Health Facility Catchment Area | Total Population |
|---|---|
| Nsanje District Hospital | 35,648 |
| Tengani Health Centre | 20,394 |
| Nyamithuthu Health Centre | 7,440 |
| Phokera Health Centre | 9,366 |
| Kalemba Health Centre | 23,277 |
| Sorgin Health Centre | 13,611 |
| **Total Target Population** | **109,736** |
| **Total Target Households** | **22,317** |
| **Total District Population** | **270,236** |
| **% of District Population** | **41%** |

Source: DHO records

PSI was able to initiate these activities in Nsanje only in March 2013, as the recruitment of Targeted Outreach Educators took far longer than anticipated. Thus, the program had only been implemented for a total of three months before the SHOPS survey was conducted.

During the period of March–May 2013, PSI trained four Targeted Outreach Educators on messaging to encourage water treatment and in conducting WaterGuard demonstrations. These four Targeted Outreach Educators conducted 557 WaterGuard demonstrations reaching an audience totaling 9,349, through 111 household visits and 24 shop visits in addition to outreach activities at "open day" events and community meetings.

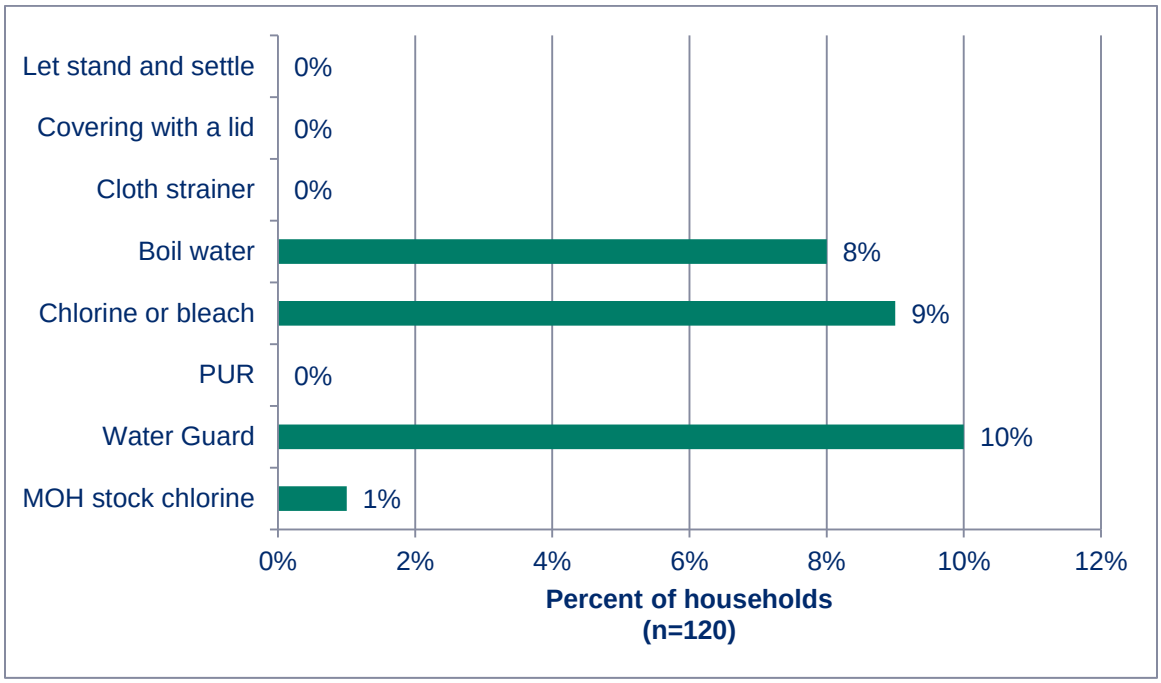
From March to May 2013, a total of 8,496 bottles of liquid WaterGuard were sold to wholesalers, the equivalent of 145 (150 ml) bottles per 1,000 households — the highest per capita sales of WaterGuard among the four districts. However, during this time period, two local NGOs (Kalibu Mwa Yesu and Cadecom) were distributing free WaterGuard to the community, which may have undermined retail sales.

### 3.3.3 WATER TREATMENT USE AND MESSAGE EXPOSURE

Of the 120 heads of households surveyed districtwide immediately following the monitoring period, 23 percent said they had heard or seen information about water treatment in the past month and 29 percent had heard or seen a message about WaterGuard specifically. Of these, most cited information from the radio (81 percent) followed by an outreach van or meeting (11 percent) and HSA/health worker (6 percent). This indicates some exposure to the WaterGuard campaign messages aired via radio, but very low exposure through the Targeted Outreach Educators. Nearly all respondents (96 percent) said they had "ever" heard of WaterGuard. Respondents overall had high knowledge about waterborne illnesses and how to use WaterGuard and where to obtain it: 98.6 percent agreed that they knew where to get WaterGuard and most (85 percent) agreed that that WaterGuard could always be found nearby.

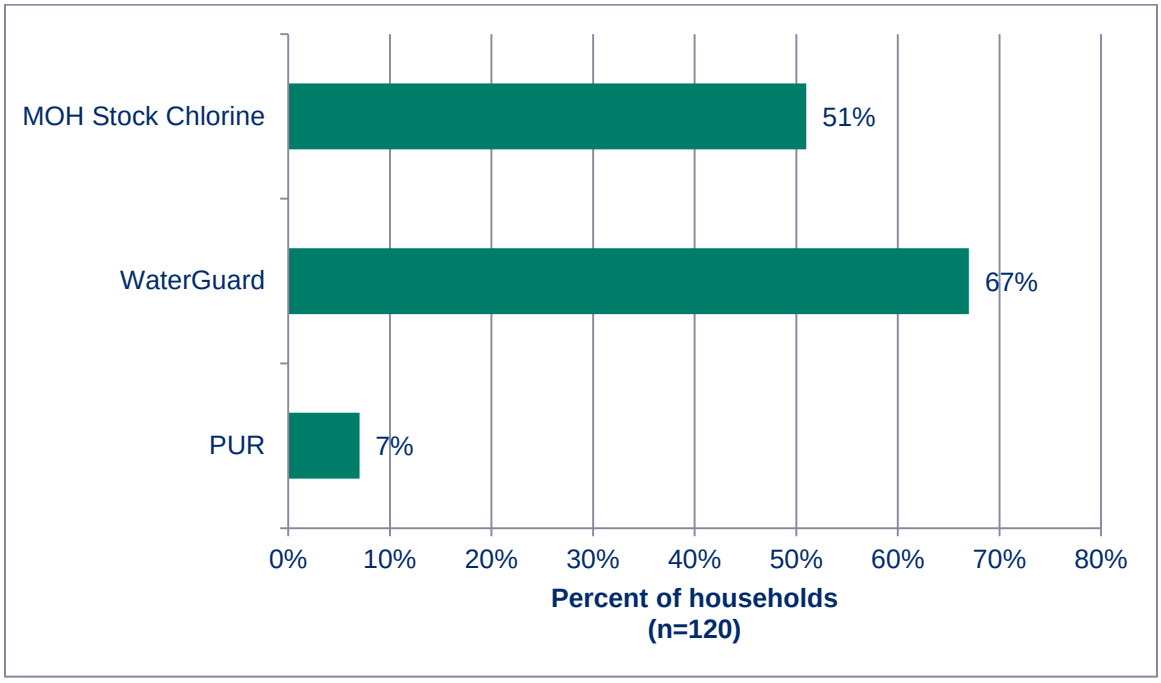
Regarding water treatment practices, only 27 percent of households said they had done anything to make their water safer in the past week. Figure 8 shows the current treatment method reported by respondents. WaterGuard was the most popular method of water treatment (used by only 10 percent of total households), followed by chlorine/bleach and boiling.

**FIGURE 8. METHODS USED TO MAKE WATER SAFER IN THE PAST WEEK (JUNE 2013, NSANJE)**




Most respondents (84 percent) had used a water treatment product in the past (WaterGuard, HTH, or PUR). Two-thirds had used WaterGuard, while 51 percent had used HTH and just 7 percent had ever used PUR (Figure 9). Thirteen percent of households surveyed said there were members of their household who did not want to use chlorine to treat their water, primarily because they did not like the smell.

**FIGURE 9. EVER USE OF WATER TREATMENT PRODUCTS (JUNE 2013, NSANJE)**




Among the few current WaterGuard users in Nsanje, 59 percent reported that they use it every time they collect water and 13 percent reported daily use.

Among current WaterGuard users, the most commonly reported source was a retail shop (51 percent). Over one-third reported that they obtained the WaterGuard from other sources, primarily during a campaign (likely from one of the NGOs distributing WaterGuard for free). Five percent of all households reported that they had ever paid for WaterGuard.

### 3.3.4 LESSONS LEARNED

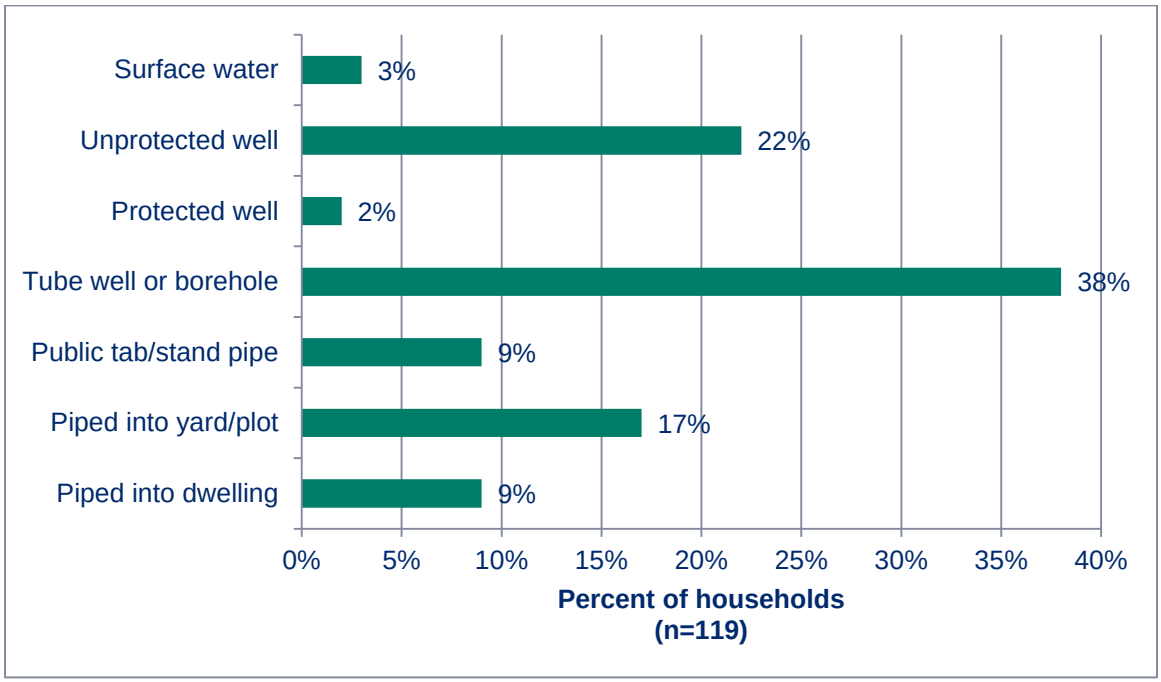
Given the slow startup of this model, it is difficult to draw many conclusions about its implementation or coverage. While no conclusions can be drawn about the commercial distribution of WaterGuard with "push activities," it is clear that sales of WaterGuard continued despite the increased price, and that there remains a commercial market for the product. One challenge that PSI will need to manage is the distribution of free product by NGOs and donor agencies, which can undermine retail sales and willingness to pay.

## 3.4 COMMUNITY-BASED SALES IN ZOMBA

Zomba is located in southeastern Malawi, sharing a border with Mozambique along Lake Malawi. Most respondents in the SHOPS survey were employed full time (77 percent); 63 percent had some primary school or completed primary school, and 20 percent had completed at least some secondary education. Sixty-two percent of households had a working radio, and 22 percent had a television in working condition.

Most households interviewed in Zomba were using improved water sources (Figure 10). However, a quarter of household were getting their drinking water from unprotected sources (unprotected wells and surface water).

**FIGURE 10. MAIN SOURCE OF DRINKING WATER (JUNE 2013, ZOMBA)**




### 3.4.1 BACKGROUND

Beginning in 2009, the United Nations Development Program (UNDP), through its Growing Sustainable Business project, has implemented the "Women Direct to Home Distribution" project in collaboration with the Malawi Investment Promotion Council and Unilever LTD. The business model of the project is direct-to-home sales through women in "difficult to reach" rural markets. Currently, the project is being implemented by two different NGOs in two districts, Lilongwe and Zomba. The Millennium Villages Project (MVP) engages women's groups involved in income-generating activities in the Traditional Authority (TA) of Thondwe in Zomba. All the women have been trained in basic business management, sales promotion, and marketing. Currently there are 95 women trained and operating as community-based sales agents in Zomba. Previously MVP had partnered with Unilever Ltd. to directly supply the sales agents with various commodities (soap, food items, etc.) as part of a basket of products to be sold in their communities. However, Unilever's recent exit from Malawi left MVP in search of new commercial partnerships/products for the continuation of the project.

### 3.4.2 IMPLEMENTATION PROCESS

SHOPS sought to explore the viability of community-based sales for extending access and availability of water treatment products into rural/remote areas through a partnership with MVP in TA Thondwe. TA Thondwe has a population of 49,590 (representing 8 percent of Zomba district's total population of 614,268), with an estimated 10,780 households. In October 2012, SHOPS signed a memorandum of understanding with PSI and MVP whereby PSI would train the existing sales agents (95 women) in TA Thondwe in product knowledge, demonstrations, stocking and sales skills, as well as supply them with an initial (free) stock of 2 cartons (24

bottles) of WaterGuard. The sales agents would then be able to order re-supply which would be delivered to them directly by PSI.

PSI trainers conducted two sales agent trainings. The first training, in December 2012, was followed by a second in February 2013, due to low attendance at the first training and in spite of some difficulties in scheduling. Following the training, the women were supplied with the initial free stock of two cartons of WaterGuard.

In addition to the training difficulties, floods and a cholera emergency during the monitoring period meant that several other NGOs working in the district were providing free WaterGuard, PUR, and HTH to the community through HSAs. As a result, the MVP sales agents were unable or unwilling to market WaterGuard. The overall result was that participants quickly lost interest in participating in the program. None re-ordered products from PSI, and most sold their initial supply to local wholesalers at a price well below the wholesale value. There is thus no data available on sales and distribution of the product through this program.

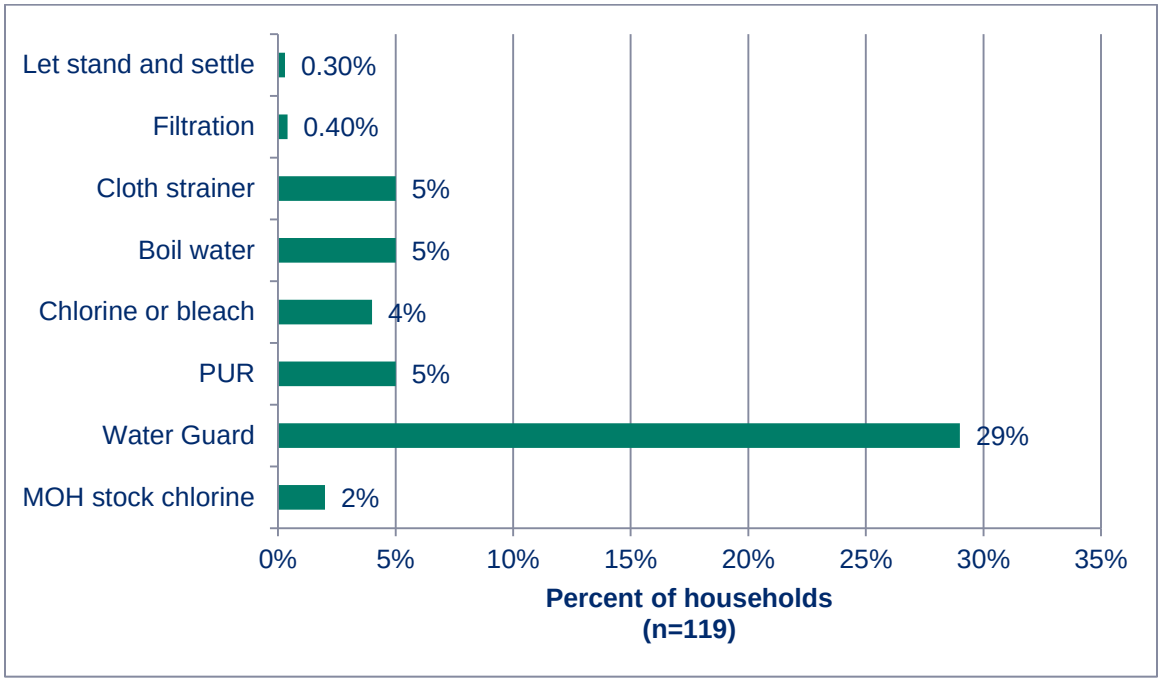
During this time period, commercial sales of WaterGuard liquid at wholesale were 139 (150 ml) bottles per 1,000 households.

### 3.4.3 WATER TREATMENT USE AND MESSAGE EXPOSURE

While the community-based sales model was not implemented as planned, data from the SHOPS survey gives a sense of the coverage of and exposure to the various water treatment activities that were occurring in Zomba during the monitoring period. Forty-four percent of heads of households surveyed districtwide, immediately following the monitoring period, said that they had heard or seen information about water treatment in the past month, and 40 percent had heard or seen a message about WaterGuard specifically. Among those who had heard or seen a message about WaterGuard in the past month, the most commonly cited sources were radio (60 percent) and health worker/HSA (33 percent). This indicates some exposure to the WaterGuard campaign messages aired via radio. Nearly all (91 percent) said they had ever heard of WaterGuard. Respondents overall had high knowledge about waterborne illnesses and how to use and where to get WaterGuard. Almost all agreed that that WaterGuard could always be found nearby and within walking distance of their home (94 percent and 93 percent, respectively).

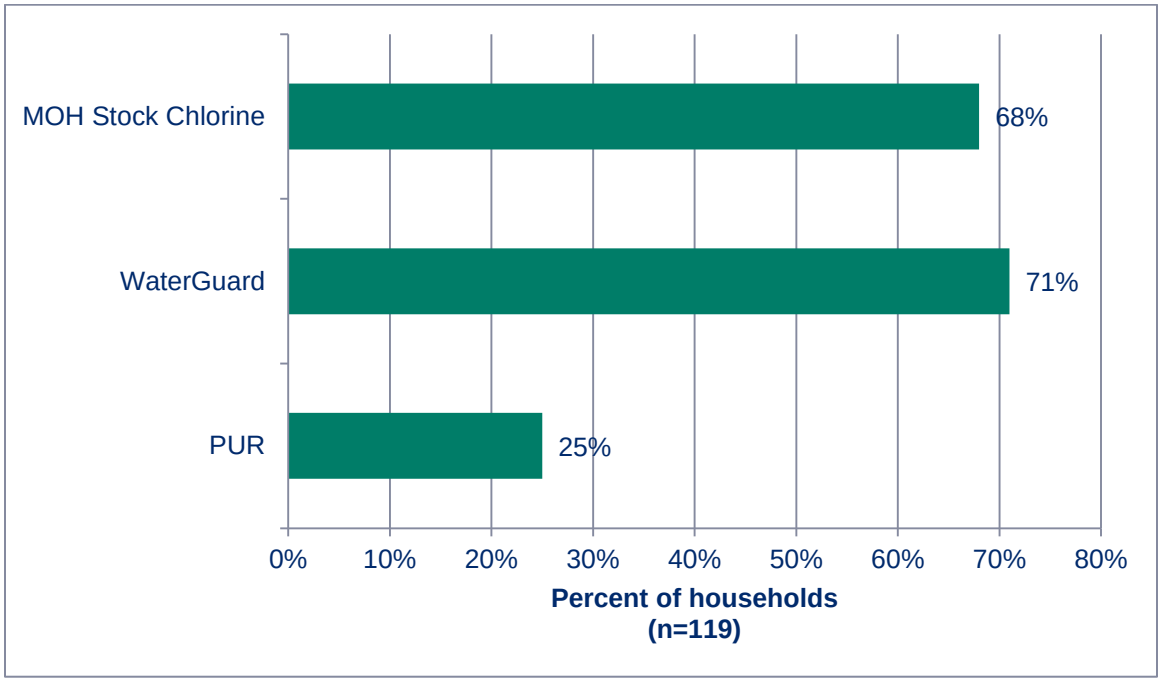
In terms of water treatment practices, only 34 percent of households surveyed said they had done anything to make their water safer in the past week. Figure 11 shows the current treatment method reported by respondents. WaterGuard was by far the most frequently used method of water treatment (29 percent), followed by PUR, cloth strainers, and boiling water (5 percent each).

**FIGURE 11. METHOD USED TO MAKE WATER SAFER IN THE PAST WEEK (JUNE 2013, ZOMBA)**




Almost all (90 percent) respondents had ever used a water treatment product (WaterGuard, HTH and/or PUR). Seventy-one percent had ever used WaterGuard, 25 percent had ever used PUR, and 68 percent had ever used HTH (Figure 12). Over a quarter (28 percent) of households surveyed said there were members of their household who did not want to use WaterGuard or chlorine to treat their water, mainly because they do not like the smell.

**FIGURE 12. EVER USE OF WATER TREATMENT PRODUCTS (JUNE 2013, ZOMBA)**



Among current WaterGuard users in Zomba, 35 percent reported that they used the product every time they collect water, and 20 percent said they used it daily.

Among current WaterGuard users, 48 percent reported that their product came from an has. This was not surprising, given the influx of NGOs distributing free product through health centers in the district. The second most commonly reported source was retail shops (38 percent). Fourteen percent of all households reported that they had ever paid for WaterGuard. Willingness to pay was not assessed.

### 3.4.4 LESSONS LEARNED

While the implementation of the community-based sales model did not work as planned, in large part for reasons outside of the control of the implementers, another attempt to run this model in Malawi is recommended. The model has been used successfully for getting health products into rural/remote settings in several countries, for example, Hindustan Unilever's Shakti model in India. In implementing this approach, however, several factors need to be taken into account including: training the sales agents on appropriate price points for their products in order to generate revenue; how to deal with the potential influx of free product, undermining the commercial market (during cholera emergencies); and ensuring smooth coordination and communication among implementing partners, to enable better oversight of and support for the program.

# 4. CONCLUSIONS AND RECOMMENDATIONS

Across all four districts, the SHOPS survey results showed that, of all the chlorine-based water treatment products (WaterGuard, PUR and/or HTH), WaterGuard was the most accepted. At the time of the survey — conducted long after the end of the rainy season — use of water treatment products was relatively low overall (ranging from 11 to 25.5 percent), but ever use of a water treatment product was quite high, ranging from 51 to 90 percent. Several studies have shown that seasonal and situational water treatment is a long-established practice in East Africa (POUZN 2007; Quick 2003). While there exists seasonal demand for water treatment products, the greater challenge remains encouraging year-round, continuous water treatment.

The implementation of the four different models revealed several overarching lessons learned in the promotion and distribution of water treatment products:

(1) Of the water treatment products available, (WaterGuard, PUR, and HTH) WaterGuard is by far the most popular and is well regarded and considered easy to use. Its popularity may stem from years of branded marketing, as well as its wide availability through a range of outlets. The viability of a purely commercial model for WaterGuard is difficult to assess, given the myriad of different programs in place within districts, including an influx of free product distributed by NGOs during the rainy season and in emergency situations. After years of subsidization, WaterGuard is currently sold at a full cost recovery price, and it appears that consumers continue to purchase the product at this elevated price point. Given well established brand recognition even with minimal support for marketing and distribution of WaterGuard, promotion of this treatment option should continue to be a priority.

(2) HTH is the least accepted product for water treatment, likely due to infrequent availability of the product and difficulties in correct dosing which affect taste and smell of HTH-treated water. Given these issues, it is not recommended that HTH should be a priority for USAID support, particularly since current users prefer WaterGuard. However, should HTH continue to be distributed, the experience in Chikwawa suggests that additional measures beyond training of HSAs are needed to ensure standardization in the use of HTH, improving acceptance of HTH-treated water and reducing wastage. Possible solutions include promoting the use of empty 150 ml bottles, providing standard-sized tablespoons to HSAs, and providing pre-measured packets of HTH powder.

(3) While past evaluations of the Water Hygiene Kit program in Malawi have shown promising results, it was unclear whether participation in an incentive program increases the likelihood of future WaterGuard purchase, or whether distribution of the free kits has any sort of spillover effects into the broader community.

(4) While the community-based models implemented in Nsanje and Zomba did not show promising results, other studies have shown the importance of community-based channels in changing water treatment behavior (Kremer et al. 2010; Olembo et al. 2004; Ram et al. 2007; Thevos et al. 2000a, 2000b).

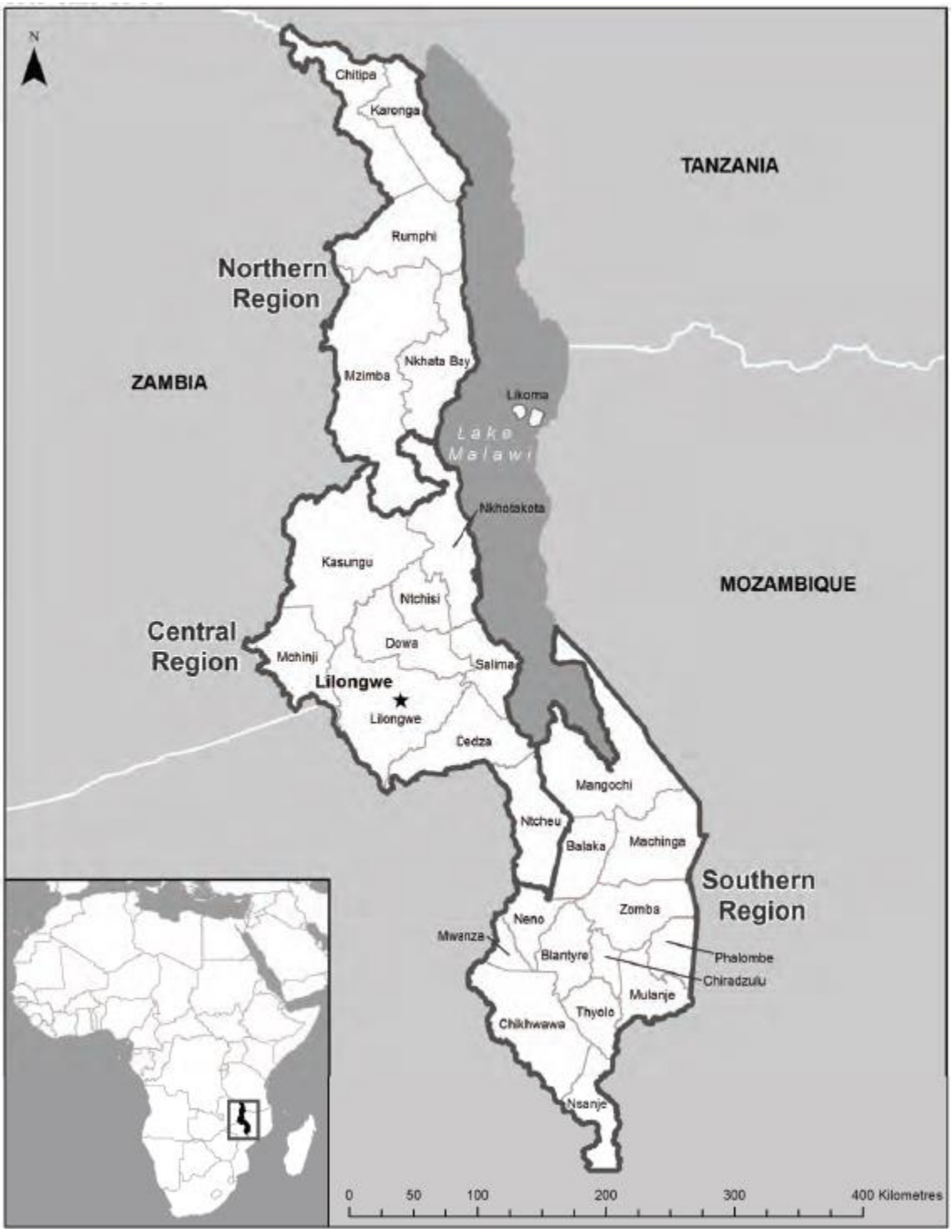
(5) Radio is an effective channel for promoting water treatment messages. However, reliance on this channel alone misses roughly half of the population that does not own a radio in working condition. Therefore, complementary communications channels such as product demonstrations and community education sessions need to continue to be implemented.

Given the number of people that rely upon seasonal use of WaterGuard, it is important to continue making this product available through commercial channels with minimal support. This includes promoting the product through both community-based and mass media channels, as well as considering offering free product during rainy season/emergency situations.

Given the low rate of treatment with WaterGuard overall, despite the promotion and availability of the product in Malawi for over a decade, and the challenges around the taste/smell of chlorine-based products, it is worth exploring the promotion of alternative products such as filters and solar disinfectants. In addition, in view of the overall low use of water treatment year-round, as well as the high number of people using public water sources in the southern zone and throughout Malawi, a source-based water treatment model may be another appropriate solution. One example particularly suited to the Malawian context is free point-of-collection chlorine dispensers at local water sources that release a pre-measured dose of chlorine appropriate for treating the amount of water in a typical jerry can. This method is cost-effective, easy to maintain, and solves the issue of over-chlorination (by standardizing measurement and making it less subject to human error). Moreover, the presence of a dispenser at public water sources serves as a reminder to treat water, activating or reinforcing social norms around water treatment. Evidence from randomized evaluations indicates that "free point of collection water treatment systems designed to make water treatment convenient, salient, and public, combined with a local promoter, can generate take up of more than 60 percent" (Kremer et al. 2010). This model could ultimately be transitioned to a community ownership model, whereby the community pays for and maintains the chlorine dispensers, thus ensuring a more sustainable solution.[2] Ultimately, a combination of point-of-use and source-based water treatment models may be a promising approach to increase water treatment rates in these communities.

[2] As of December 2013, SHOPS is collaborating with Innovations for Poverty Action (IPA) to test the effectiveness of community-operated, point-of-collection chlorine treatment for drinking water in Zomba district. In addition to funding the pilot of 50 communal dispensers, SHOPS will train those responsible for maintaining the community water source and will assess the ability of the private sector to supply chlorine to communities with dispensers. IPA will be systematically evaluating the pilot.

# APPENDIX A. MAP OF MALAWI



# APPENDIX B. SUMMARY OF SHOPS SURVEY METHODOLOGY

Malawi is composed of three regions (Northern, Central, and Southern), which are divided into 28 districts and further into approximately 250 traditional authorities (administrative divisions). In each district, three traditional authorities (TAs) were selected, with probability proportional to the number of households in that TA. In each sampled TA, two enumeration areas (EAs) were selected, with probability proportional to the number of households in the EA. This gave a sample of six EAs in each district. In each selected EA, 20 households (at least seven with children under age five) were sampled. A total of 599 heads of household were interviewed in the five districts (120 each in Chikwawa, Machinga, and Nsanje; 119 in Zomba). Trained interviewers administered a structured questionnaire to a randomly selected adult aged 16–59 in each selected household. Sampling weights reflecting probability of selection into the sample were assigned to each household, and were used in all analyses of the survey data.

There were two main limitations to this survey methodology:

(1) The survey was conducted district-wide instead of solely in the targeted areas of each district, and therefore results cannot be interpreted as assessing the impact of a particular model. The survey was conducted district-wide due to initial plans to use the SSDI-Communications survey (conducted during November 2012) as a baseline, and thus the sampling strategy was designed to replicate that used in the SSDI-Communications survey. However, the data from the SSDI-Communications survey were not made available until March 2013 and turned out to be non-comparable with the SHOPS survey. Thus, only the SHOPS survey results are presented in this report.

(2) The survey was conducted during June 2013, nearly a month after the monitoring period ended. SHOPS provided support for the implementation of the four models into June 2013; however, given that the survey took place well after the end of the rainy season in Malawi (December 2012–March 2013) when water treatment is highest, results may reflect water treatment behavior for those months only.

# APPENDIX C. SHOPS SURVEY SUMMARY OF DEMOGRAPHIC VARIABLES

| | Chikwawa | Machinga | Nsanje | Zomba | National (DHS) |
|---|---|---|---|---|---|
| Average number of children under 5 per household | 1.2 | .84 | 1.1 | 1.04 | |
| Proportion of respondents who were female | 63% | 89% | 40% | 73% | N/A |
| Age of respondent | | | | | |
| 15-24 | 16% | 27% | 22% | 18% | N/A |
| 25-49 | 73% | 40% | 66% | 52% | N/A |
| 50-59 | 11% | 33% | 12% | 30% | N/A |
| Education of respondent | | | | | |
| Never attended school | 27% | 43% | 25% | 18% | 15% |
| Some primary or completed primary | 44% | 53% | 59% | 63% | 65% |
| Some secondary or completed secondary | 28% | 3% | 16% | 20% | 18% |
| Any post-secondary | 2% | 0% | 0% | 0.3% | 2% |
| Employment status of respondent | | | | | |
| Unemployed | 9% | 22% | 3% | 16% | 12% |
| Student | 4% | 1% | 11% | 6% | N/A |
| Part Time | 13% | 5% | 0% | 1% | N/A |
| Full time | 75% | 72% | 86% | 77% | N/A |
| Asset ownership (% of households) | | | | | |
| Radio (in working condition) | 73% | 28% | 52% | 62% | 53% |
| TV (in working condition) | 17% | 4% | 7% | 22% | 11% |
| Refrigerator | 15% | 1% | 7% | 4% | 4% |
| Regular phone | 10% | 5% | 4% | 2% | 2% |
| Mobile phone | 58% | 24% | 42% | 58% | 39% |
| Bicycle | 69% | 65% | 66% | 66% | 44% |
| Ox cart | 10% | 1% | 0% | 6% | 2% |
| Motorcycle/car | 9% | 4% | 2% | 5% | 3% |
| Have electricity (% of households) | 16% | 2% | 7% | 10% | 9% |
| Type of cooking facility (% of | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| households) | | | | | |
| Electric cooker | 1% | 0% | 0% | 0.1% | 2% |
| Clay stove | 0% | 0% | 0.4% | 0% | 0% |
| Cook over fire | 83% | 93% | 93% | 82% | 85% |
| Paraffin stove | 0% | 0.4% | 0% | 0% | 0% |
| Charcoal stove | 16% | 7% | 7% | 18% | 12% |
| Main source of drinking water (% of households) | | | | | |
| *Improved Source* | | | | | |
| Piped into dwelling | 0% | 0.2% | 0% | 9% | 7% |
| Piped into yard/plot | 35% | 2% | 7% | 7% | |
| Public tap/stand pipe | 18% | 3% | 4% | 9% | 16% |
| Tube well or borehole | 41% | 59% | 73% | 38% | 51% |
| Protected well | 6% | 10% | 0% | 2% | 6% |
| *Non-improved Source* | | | | | |
| Unprotected well | 0% | 25% | 9% | 22% | 15% |
| Unprotected spring | 0% | 0.4% | 2% | 0% | 2% |
| Cart with small tank | 0% | 0% | 0% | 0% | 0.1% |
| Surface water | 0% | 0% | 5% | 3% | 3% |
| **Total number of households** | **120** | **120** | **120** | **119** | |

# APPENDIX D. HSA TRAINING

## How to Make Water Safe for Drinking

**Even if it looks clean, water can contain cholera and other germs.**

**There are two ways to ensure water is safe for drinking:**

- **Boiling:** Water must boil vigorously for at least one minute to remove all contaminants/pathogens.
- **Chlorination:** Water treated with a chlorine solution must sit for at least 30 minutes before it is safe to drink.

**Safe storage of boiled or treated water ensures drinking water is not re-contaminated:**

- Safe water containers should be clean and kept closed or covered at all times.
- Containers with a small opening or spout (i.e. jerry cans) are best, as they prevent dirty objects (cups hands, etc) from coming in contact with the clean water.
- The two-cup system should be used with open containers (i.e. Basins).

**Safe water should be used within 24 hours.** After 24 hours, water should be boiled again or another dose of chlorine added to ensure safety.

## How to Treat Water with MOH Chlorine

The MOH 1% chlorine solution to treat drinking water is a safe and effective dose following internationally accepted standards set by the WHO.

**A 5 to 10 ml dose of 1% chlorine solution is usually sufficient to treat 20 liters of water.**

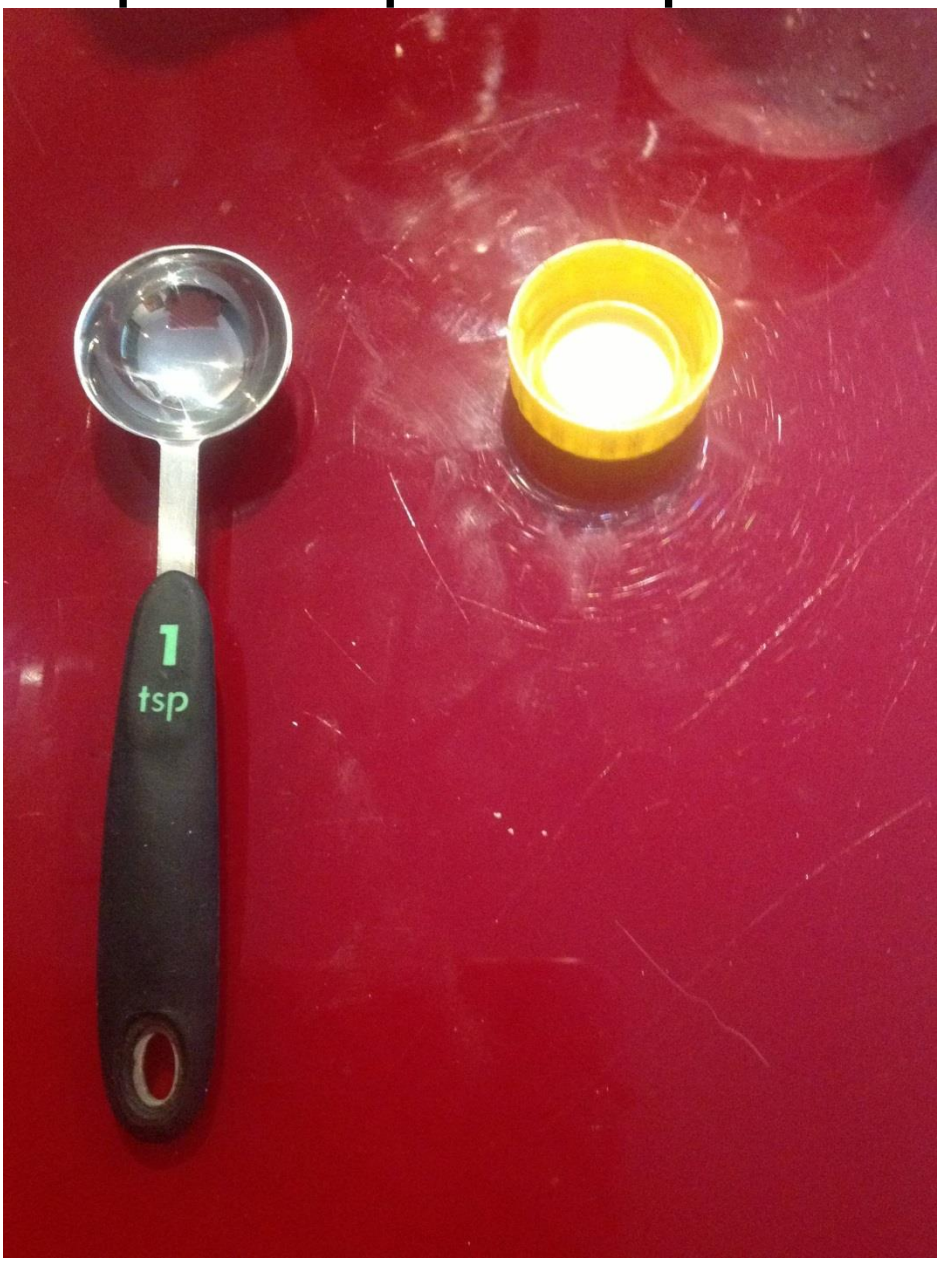
- Standard water storage containers are 20 liter jerry cans, 15 liter smaller jerry cans and basins, and 25 liter jerry cans and water drums.
- For all of these containers, one 5 ml plastic bottle capful of 1% solution is sufficient to treat drinking water.

Families should double this dose (two capful if the water is turbid (dirty, opaque, discolored) and during cholera outbreaks.

**Key messages for home water treatment**:

- Chlorine will not harm your health, cholera kills**.** It is safer to add more chlorine than less to drinking water. The taste of chlorine provides reassurance that your water is safe to drink.
- Maintain safe water daily. Do not delay or reduce chlorine doses; you can help prevent a cholera outbreak this way.
- Safe storage and hand washing are essential to ensure water is safe to drink.

# Sample 5ml Cap and Teaspoon



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