

**“I TREAT MY WATER ACCORDING TO MY POCKET”: A QUALITATIVE ANALYSIS OF FACTORS INFLUENCING
HOUSEHOLD WATER TREATMENT PRACTICES IN MALAWI**

by

KAREN LEE SCHLANGER

(Under the Direction of Marsha Davis)

ABSTRACT

Diarrheal illness due to consumption of contaminated drinking water is a leading cause of morbidity for children under 5 years of age in developing countries. Programs promoting water treatment and storage at the point-of-use (e.g. at the household level) have demonstrated reductions in diarrheal disease by 29-44%. However, within the context of specific point-of-use interventions, little is known about how and why water treatment-related behavior change occurs among some targeted individuals and not others.

In March 2010, eight health centers in rural Malawi began offering a safe water intervention to women receiving antenatal services. The intervention included education, free distribution of a covered water storage container with a tap, and a bottle of WaterGuard, a sodium hypochlorite solution used to disinfect water. In May 2011, we conducted 90 interviews and 11 focus groups with program participants, friends and relatives of participants, husbands of participants, health workers, and vendors of WaterGuard, to explore beliefs, attitudes, experiences and conditions which influence water treatment practices, and how safe water messages and behaviors diffuse across a community.

The study revealed that many current and non-current users of WaterGuard reported similar attitudes, beliefs and even practices related to water treatment, although access to cash and perceptions about the value of WaterGuard and source water contamination at different times of the year appear to be strong influences on use over time. Our findings also suggest that while participation in the intervention was a key motivator for participants to use WaterGuard, on-going interpersonal communication and social reinforcements from family, neighbors, and health workers also appear critical for adoption and on-going use among both participants and their friends and relatives. We also found financial support from husbands necessary for women to sustain their use of WaterGuard. We did not find the chlorine scent and taste of WaterGuard to be as much of a barrier to use as has been reported in other studies of chlorine-based water treatment products. Our findings suggest that educational messages regarding the importance of treating drinking water throughout the year and the value of WaterGuard in relation costs for treating diarrhea should be emphasized.

INDEX WORDS: Household water treatment; Diarrhea prevention and control; WaterGuard; Malawi; Health knowledge, attitudes and practice; Motivation; Diffusion of innovation; Qualitative research; Water Purification; Hygiene kits; Women; Rural population; Health promotion; Behavior change; Health behaviors; Prenatal care

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**A Dissertation Submitted to the Graduate Faculty of The University of Georgia in Partial Fulfillment
of the Requirements for the Degree**

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DEDICATION

To my happy family—Chris and Junot

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CHAPTER 1: INTRODUCTION

Background:

Diarrheal illnesses are a leading cause of morbidity and mortality globally, accounting for approximately 21% of all childhood deaths in developing nations, or 2.5 million deaths annually among children less than 5 years of age (Kosek et al., 2003). Incidence of diarrhea is directly related to consumption of contaminated water (Cairncross & Valdmanis, 2006). However, given the limited resources and infrastructure in developing nations, as well as a lack of prioritizing the issue at national and international levels, in most contexts, establishing centralized safe sources of water for entire populations is not likely anytime in the foreseeable future (Mintz et al., 2001). Further, because of the high potential for recontamination during water collection, transport and storage, household-level water treatment and storage technologies (often referred to as point-of-use technologies) are necessary to reduce diarrheal illnesses now, and they will likely continue to be so for years to come (Waddington et al., 2009).

There is much evidence suggesting that diarrheal disease incidence can be reduced by 29-44% from a combination of household-level treatment and safe storage of water (Arnold & Colford, 2007; Fawtrell et al., 2005; Waddington et al., 2009). Much effort therefore has been invested in promoting the use of household water treatment products in developing countries through education and social marketing campaigns. One such product is a dilute sodium hypochlorite solution (chlorine bleach) which, when used properly, effectively disinfects water and also provides some residual protection against recontamination. However, while rates of

name recognition of household chlorine-based water treatment solutions such as WaterGuard and Clorin is often quite high, sustained rates of consistent use are typically low (Thevos et al., 2000).

In the African nation of Malawi, results from a national survey in 2010 indicated that 18% of children less than 5 years of age had a diarrhea episode in the previous 2 weeks, and 74% of those children were treated with oral rehydration solution for their symptoms (National Statistical Office & ICF Macro, 2011). In 2002, Population Services International (PSI), a non-governmental public health social marketing organization, began local production, promotion and distribution of WaterGuard throughout Malawi. However, in 2005 a national survey showed that while 65% of mothers in Malawi had heard of WaterGuard, only 7% reported current use of the product (Stockman et al., 2007). Clearly it is necessary to develop more effective interventions to promote sustained use of water treatment and safe storage at the household level to reduce the burden of childhood morbidity and mortality stemming from waterborne disease.

While dozens of educational and behavioral interventions have been evaluated to assess their impacts on water treatment and storage practices and diarrheal illness, few have attempted to explore *how* observed behavior change occurred, and *why* it occurs among some sub-populations more than others (Waddington et al., 2009; Figueroa & Kincaid, 2010). A more complete understanding of factors that influence water treatment decisions, including if, how, and when one treats drinking water, is important for developing more effective safe water behavioral interventions.

The following study investigates psychosocial and other contextual factors that influence water treatment practice among women participants of a safe water and hygiene intervention in rural Malawi, as well as factors that influence the water treatment practices of their friends and relatives. Looking at treatment influences among participants as well as their friends and relatives allowed us to explore the factors influencing treatment-related decisions, how the intervention may impact such behaviors, and how health technologies and behaviors diffuse across a community. Due to the potentially great benefit of increasing household level water treatment practices in developing nations, and the lack of research on the specific topic of how water treatment behaviors change in specific communities, results from this research are particularly timely and important.

Beginning in March 2010, in collaboration with the Clinton Health Access Initiative (CHAI), PSI, PATH (a US-based international public health non-profit), the Centers for Disease Control and Prevention (CDC), and the Malawi Ministry of Health, eight medical clinics in Machinga District, Malawi began offering hygiene education and a free hygiene kit to all women seeking antenatal care (ANC) services.¹ I will refer to this project as the Antenatal Care Safe Water and Hygiene Program or the ANC-SWHP.² The educational component of the intervention includes group education on hygiene practices (e.g. proper handwashing technique and the importance of and how to treat and store household drinking water) and home visits by health surveillance workers from the ANC clinic, who reinforce hygiene messages

¹ Antenatal services are the same as prenatal services. The use of the term antenatal is more common than the term prenatal in many parts of the world, including Malawi.

² The Malawi Ministry of Health, PSI, and CHAI funded implementation of the ANC-SWHP. PATH funded the evaluation of the ANC-SWHP, which included contracting with both CDC and me to assist them with the program evaluation.

during their routine ANC home visits (up to 5 visits per patient over the course of a year). The hygiene kits include a 20-liter plastic water storage container with a tap, a 150mL bottle of WaterGuard (a one-month supply), a 500-gram bar of soap, and 2 sachets of oral rehydration solution (Figure 1.1). In order to receive the hygiene kit the woman seeking services must attend their first ANC visit with their “husband”, who receives the same safe water education.³ As an incentive for attending on-going antenatal and postnatal checkups, the women also receive up to four additional free bottles of WaterGuard, four bars of soap, and on-going behavior change messages about hygiene at subsequent clinic visits.

Figure 1.1: Hygiene kit distributed through the ANC-SWHP



Source: CDC

³ Women are required to bring their “husband” to their first ANC visit in order to be eligible to participate in the ANC-SWHP (i.e. to receive the hygiene kit). However, the clinic does not require any documentation regarding marriage. The original study protocol as developed by CHAI included a provision for allowing women who do not have husbands or whose husbands are unable to attend the first ANC visit for legitimate reasons to obtain a letter from their village Chief (a typical procedure in Malawi) as a precondition for receiving the hygiene kit. Anecdotally, however at least some clinics did not implement this protocol, and any women who attend these clinics without a husband are not eligible to receive the hygiene kit. Throughout this dissertation I use the term “husband” to refer to a male partner who accompanied a participant to the clinic, as required for participation in the ANC-SWHP.

In Malawi, 92% of pregnant women receive some antenatal care, although rates of multiple antenatal visits are much lower, as are deliveries in health facilities (54%) and postnatal care (33%) (National Statistical Office and UNICEF, 2008). The motivation behind integrating the hygiene intervention with ANC services was three fold. First, it offered a platform where large numbers of a high-risk population could be reached with repeated hygiene services and messages by trusted sources, as a strategy to decrease diarrheal illnesses. Second, it was hypothesized that the repeated provision of free hygiene products could serve as an incentive for women to seek on-going antenatal care, deliver in a medical facility, and obtain post-natal checks, as a strategy to reduce both infant mortality and vertical HIV transmission.⁴ And third, it was hypothesized that requiring husbands to attend the ANC clinic before distributing the first hygiene kit would promote family centered care, including HIV education, testing, counseling, and treatment for both men and women.⁵

Between project inception and February 2011, over 20,000 hygiene kits were distributed through the ANC-SWHP. During the first year of the intervention, a randomly selected group of 106 women attending one of the eight ANC clinics agreed to participate in a quantitative program evaluation study of the ANC-SWHP. That quantitative study is separate from, but related to the qualitative study presented in this dissertation. Participating in the quantitative program evaluation involved completing baseline and follow-up surveys that assessed hand-

⁴ Transmission of HIV from mother to newborn (i.e. vertical transmission) can be reduced through treating HIV-positive mothers with antiretroviral medications during labor, delivery, and throughout any period of breastfeeding, and treating the infant with a course of antiretroviral drugs from birth to six weeks of age, if not breastfed, or until one week after breastfeeding has ended (WHO, 2010).

⁵ All of the ANC clinics in this study use the Preventing Mother to Child Transmission (PMTCT) model for providing integrated-HIV services for pregnant women and their families. This model is used in at least 22 countries in Africa and is funded primarily through CHAI, the Global Fund to Fight AIDS, and the President's Emergency Plan for AIDS Relief (PEPFAR). HIV prevalence among pregnant women in Malawi was 12.6% in 2007 as measured through the Malawi ANC sentinel surveillance program (Malawi Ministry of Health, 2008).

washing and water treatment knowledge and practices, including testing of household water for chlorine residue, and providing the name of one friend or relative with a child less than 5 years old. One hundred five (105) of the identified friends and relatives also agreed to participate in the baseline and follow-up survey, allowing an assessment of the potential diffusion of safe water and hygiene messages and practices. The baseline and follow-up surveys were completed in March 2009 and March 2010, respectively.

Purpose of the study:

The purpose of the qualitative study presented in this dissertation is two fold. First, the qualitative research aims to complement water treatment related findings from the ANC-SWHP quantitative study described above. Documenting in detail the behaviors, experiences, attitudes, beliefs and motivations of program participants and their friends and relatives who did and did not treat their water consistently should provide useful insight for framing and accurately interpreting the results from the quantitative study regarding both direct and indirect program impacts. Second, this study aims to fill a gap in the literature regarding behavioral influences on household level water treatment practices. The topic of how water treatment technologies and associated behaviors diffuse across a community is a particularly understudied question in the POU water treatment intervention literature. This study was designed to explore not only what and how messages and behaviors are diffused to direct recipients of an intervention, but also if and how diffusion of water treatment messages and behaviors occurs more broadly within a community. This study therefore analyses the behaviors, motivations, beliefs and norms that surround water treatment decisions, both

among direct recipients of an intervention, and among their friends and relatives, with the aim of helping to guide the development of more effective client-centered water treatment interventions within Malawi and elsewhere.

The research presented in this dissertation is also part of a larger qualitative evaluation of the ANC-SWHP. The larger study looked at participants' and health workers' perceptions of and experiences with the ANC-SWHP, in addition to the household water treatment behaviors among participants and their friends and relatives, and the psychosocial and contextual factors that influence these behaviors. The focus of my dissertation research involves only the later topic.⁶ PATH, CDC and PSI and I collaboratively developed, implemented and analyzed the entire qualitative study. I was the lead and primary researcher for the data coding and analysis phases. Although closely related to the aims of the larger qualitative study, the research questions addressed in this dissertation are mine. Throughout the dissertation I distinguish the work and thinking that is primarily mine from work carried out collaboratively or by other team members. I use the pronoun "we" when describing the study protocol and activities that the research team did together or were done by an individual team member, and I use the pronoun "I" when discussing what is primarily my work and thinking. Jennifer Foster (PATH), Rob Quick (CDC), Janell Routh (CDC), Siri Wood (PATH) and I comprised the US-based research team. Dr.

⁶ Although not the focus of this dissertation, exploring participants' and health workers' perceptions of and experiences with the ANC-SWHP is an important area of study for a number of reasons. First, the ANC-SWHP in Machinga is only the second known program to integrate safe water education with antenatal services, so exploring participants' and health workers' perceptions of and experiences is useful for understanding program acceptability and impact on staff workload. Second, the ANC-SWHP in Machinga is the first known safe water program to require husbands to participate in order to receive a hygiene kit. There are numerous programmatic, gendered and ethical implications of such a practice that qualitative research can help explore, such as how such a requirement impacts accessing of antenatal care and safe water practices among both married and unmarried women, HIV testing and treatment for both men and women, sexual practices of married couples, and more generally, gender dynamics within marriages.

Routh, Dr. Wood and I traveled to Malawi to implement the study. A field staff was hired in Malawi to carry out the interviews and focus groups.

The study protocol and research methods were the same for the larger qualitative study and the sub study presented in this dissertation. We conducted semi-structured interviews with a stratified purposive sample of women who were enrolled in the ANC-SWHP quantitative evaluation study (both program participants and their friends or relatives with children under 5 years of age), and focus groups with a convenience sample of general ANC-SWHP clients. Additionally, to develop context for and better understand influences on women's behavior, the research team conducted interviews with a stratified purposive sample of the husbands of ANC-SWHP qualitative evaluation study participants, and convenience samples of nurses and health surveillance assistants that work at the antenatal clinic as well as local vendors of WaterGuard.

For the qualitative evaluation study presented here, I used several behavioral theories to guide the research. First, I drew from *Diffusion of Innovations* and social marketing theories, two of the theories the project partners considered influential in developing the intervention (Prochaska & DiClemente, 1983; Rogers, 2003; Storey et al., 2008; Wood et al., 2011). Additionally, I incorporated aspects of the *Health Belief Model*, the *Theories of Reasoned Action and Planned Behavior*, and *Social Cognitive Theory* into the work, because based on my review of the literature and knowledge of the topic, I believe using them to inform the study provided additional insight about why people do or do not consistently treat their water, and information about their motivations for doing so (Glanz, 2008). In sum, the focus of this research is to better understand how perceptions and experiences about need, benefits, barriers, subjective norms,

self-efficacy, social support, and spousal approval related to treating household drinking water impact water treatment behaviors, and how water treatment practices get diffused within a community. The ultimate aim of the research is to develop a more complete understanding of influential determinants of water disinfection practices, so as to inform future interventions.

Research questions:

In line with the study aims described above, the specific research questions this study seeks to answer are:

1. Among ANC-SWHP participants and their friends and relatives, how do experiences, behaviors, attitudes and beliefs related to treating household drinking water differ between current and non-current users of WaterGuard?
2. How do experiences, behaviors, attitudes and beliefs related to treating household drinking water differ between ANC-SWHP participants, and their friends and relatives?

An answer to the first research question provides insight into factors, including the ANC-SWHP intervention, that promote or impede water treatment behaviors. An answer to the second research question provides insight into whether, and how, diffusion of water treatment messages or behaviors occurs within a community.

CHAPTER 2: LITERATURE REVIEW

The following review of the literature both contextualizes and provides a rationale for this study. This review covers five broad topics. First, I describe the scope of the problem of waterborne diseases in the developing world. Second, I summarize the data on household water quality interventions, and provide a description of the most common household water treatment technologies and the behavioral strategies used to promote them. Third, I explain how behavioral theory is typically used in health promotion program planning and evaluation research, describe how the behavioral change framework was used in developing the ANC-SWHP intervention, and frame how behavioral theory was used to inform this study. Fourth, I discuss factors associated with household water treatment behaviors across settings, and in Malawi in particular, including identified barriers and how programs have tried to address these barriers. Finally, I end with a brief description of Malawi, to provide some context for understanding the study design and results.

Waterborne diseases in the developing world:

Approximately one billion people, or one sixth of the world's population, lack access to improved water sources, such as piped tap water or boreholes (WHO, 2000). Additionally, many more millions rely on contaminated water, either because "improved" water is still contaminated, or because it becomes contaminated (e.g. fecal contamination) through the process of collection, transport or storage (Han et al., 1989). Contaminated drinking water is a significant vehicle for diarrheal illness in developing countries. And the majority of the 2.5

million deaths among children under 5 years of age attributed to diarrheal illnesses are estimated to be due to waterborne diseases, such as cholera, typhoid fever, and amoebic and bacillary dysentery, or water-based diseases (caused by parasites found in organisms that live in water) such as schistosomiasis and dracunculiasis (Mintz et al, 2001). Beyond morbidity, diarrheal illnesses are known to increase malnutrition and susceptibility to infection, impair physical growth and cognitive development, and contribute to lower school attendance (Baqui et al., 1993; Guerrant et al., 1999; Petri et al., 2008).⁷

While the need to improve access to safe water sources has been emphasized as an essential strategy to improve health, development, and gender equity in developing nations, waiting for resource-intensive solutions (e.g. piped water) to come to fruition will leave millions of people without safe water for the foreseeable future (Mintz et al., 2001; Waddington et al., 2009). It is therefore clear that developing and promoting inexpensive and sustainable ways to disinfect water at the point of use (POU) are needed at the present time. POU technologies enable people without access to safe water to improve water quality by treating it and storing it safely at home.

⁷ See Eileen Stillwaggon's *AIDS and the Ecology of Poverty* (2006) for an informative discussion of how diarrheal illnesses have tremendous impact on HIV susceptibility in developing nations because of the impact such illnesses have on malnutrition. In fact, using data from her book, one could argue that increasing access to safe water could be a particularly effective strategy for reducing rates of HIV-infection in sub-Saharan Africa and elsewhere.

POU water treatment technologies and promotion of those technologies:

Water quality technologies and interventions at the household level:

A number of recent systematic reviews of water, sanitation and hygiene interventions suggest that interventions that improve household water quality at the POU can reduce incidence of diarrhea by 29-44%. In contrast, interventions that improve source water quality (e.g. chlorinating the source) reduce incidence of diarrhea by 11-21% and those that improve the source water supply only (e.g. digging boreholes) have an insignificant impact on diarrhea incidence (Arnold & Colford, 2007; Fawtrell et al., 2005; Waddington et al., 2009). These findings further suggest the importance of identifying effective POU technologies and interventions that can provide sustained improvement of household water quality, rather than waiting for or relying on large centralized water source improvement projects to reduce waterborne diseases.

The most common method of water disinfection throughout the world is boiling, which if done properly can inactivate viral, parasitic and bacterial pathogens. However, this method is economically and environmentally unsustainable, does not provide any residual protection (meaning that the water can get recontaminated once cooled), can be both time and labor intensive, and is associated with scalding and poor indoor air quality, (Mintz et al., 2001; Rosa & Clasen, 2010). A wide variety of POU technologies have been developed and tested, and those that have the most evidence supporting their ability to improve water quality and reduce waterborne diseases in real world contexts fall into five general types: 1) chlorination, typically with a dilute hypochlorite solution, 2) combined coagulant-chlorine disinfection system, which combines a dry coagulant-flocculant and tabular or granular chlorine, 3) solar, for example,

SODIS, a transparent polyethylene terephthalate bottle that is filled with water and exposed to UV and heat energy from the sun, 4) ceramic filters that filter microbes by size exclusion, and 5) biosand filters, which are slow sand filters (Sobsey et al., 2008). In Malawi, based on a national household survey conducted in 2006, it is estimated that 10.2% use boiling, 8.8% use a chlorine-based method, .2% use a filter, and 0% use solar methods to disinfect water at least some of the time (Rosa & Clasen, 2010).

In a recent effort to assess which POU technologies have the greatest potential for widespread and sustainable use in developing nations, Sobsey and colleagues (2008) reviewed the evidence concerning each of these technologies in terms of microbial efficacy, health impacts, quantity of water produced, and sustainability, where sustainability was a composite measure that included evaluations of quality, ease of use, cost and supply chain. Applying these criteria (some of which are more subjective than others) they gave biosand filters the highest score (13), and ceramic filters, liquid chlorine, SODIS, and coagulation/chlorination scores of 12, 11, 9 and 8 respectively (Sobsey et al., 2008). However, although the authors included cost in their analysis, the fact that both biosand and ceramic filters cost in the range of \$10-\$25 each may make them a less desirable choice for widespread dissemination in poor nations. Further, in a comparative cost-effectiveness analysis applied to Sub-Saharan African countries for all of the POU methods described above except for biosand filters, household chlorination was found to be the most cost-effective strategy, with an average cost effectiveness ratio (ACER) of US\$53 per disability adjusted life year (DALY) averted.⁸ Household solar disinfection, ceramic filtration,

⁸ The average cost effectiveness ratio (ACER) is a summary measure of the POU technology's net cost and effectiveness. The disability-adjusted life year (DALY) is a measure of the number of years lost due to ill-health, disability or early death. Cost of an intervention per DALY averted can be thought of as cost per one lost year of a

and combined coagulant-chlorination were found to have ACERs of US\$61, US\$142, US\$472 per DALY averted, respectively (Clasen et al., 2007).

Although it might be intuitively appealing to identify “the best” POU technology, as attempted by Sobsey and colleagues (2008), it is clear that each POU technology has attributes that may make it more or less appropriate, acceptable, or sustainable in a given context. For example, ceramic filters are relatively slow, SODIS cannot treat large quantities of water, chlorine leaves a chlorinated taste in the treated water and is less effective at disinfecting water with high organic content, boiling requires access to wood or other cooking fuel, and biosand filters are more expensive than these other options, but last a long time. It is therefore likely that various POU water treatment technologies will be needed to meet the technical needs, economic realities, consumer preferences, and cultural practices of the many different communities that make up the billions of people throughout the world who do not have access to safe water. The relative failure of some promoted POU technologies to be used and or sustained in certain populations while successfully disseminated in others suggests factors related to local economies, cultural acceptability and consumer preferences impact uptake (Clasen et al., 2009; Luoto et al., 2011).

Behavioral strategies used to promote POU technologies:

Because the pathogen, behavior, technology, and disease pathways related to water borne disease are multiple and complex, it makes sense that POU interventions often attempt to address multiple behaviors. POU safe water interventions always must address behaviors

“healthy” life (WHO, 2012).

related to proper water disinfection practices, but because of the high possibility of recontamination, they also typically address behaviors related to water collection, storage, and dispensing methods, as well as handwashing and other hygiene practices that are known to reduce diarrheal illness (e.g. latrine use) (Fewtrell et al., 2005). If interventions did not emphasize multiple behaviors, and recontamination did occur, people would not be likely to experience the benefit of reduced illness from treating water, and it would be unlikely that any attempted treatment behaviors would be sustained.

Interestingly, while it makes logical sense that interventions that address multiple hygiene-related behaviors would be more successful in terms of reduced incidence of diarrhea or pathogen content of water than interventions that only address treatment behaviors, Fewtrell and colleagues (2005) found that this has not been borne out in the evaluation data from POU interventions. Others have challenged this interpretation and suggest that further investigations of combined interventions are warranted (Garrett et al., 2008). In the mean time, because of the independent documented benefits of various behaviors individually on diarrheal illness (e.g. handwashing, use of a closed container with a spigot rather than dipping a cup into an open container to retrieve water) most POU interventions continue to integrate the promotion of these important related practices.

The Safe Water System (SWS), developed by the CDC in collaboration with the Pan American Health Organization, is one of the most successful and widely implemented POU safe water technology and behavioral interventions. The SWS is a simple and inexpensive system with three components: 1) POU water disinfection with a locally produced sodium hypochlorite solution (e.g. WaterGuard), 2) safe water storage in plastic containers (or adapted traditional

clay pots) with a narrow mouth, lid, and spigot to prevent recontamination, and 3) some or all of the following behavior change techniques: education, free samples, social marketing, social support, community mobilization, and motivational interviewing (DHHS, 2008; Garrett et al., 2008).

Using a variety of behavior change strategies and implementation models, field trials of SWSs in South America, Africa and Asia have demonstrated that these systems are effective, acceptable, inexpensive, and have the potential to be a sustainable way to improve water quality and prevent waterborne diseases (Quick et al., 1999; Quick et al., 2002; Luby et al., 2008; Lule et al., 2005). Field trials have demonstrated that use of the SWS reduces the risk of diarrhea by 25-85%, which is within the range of impact found for most POU disinfection studies (Arnold & Colford, 2007; Fawtrell et al., 2005; Waddington et al., 2009).⁹ Despite the high levels of impact or behavior change observed in many of these studies, it is clear they are not effective at modifying behaviors in at least some portion of the population. Additionally, as with most POU treatment and storage studies, these studies are often evaluated over short periods of time (e.g. 12 months or less) and therefore long-term impacts are not known. Research on impacts over longer periods of time consistently demonstrates that behavior change dissipates over time, sometime dramatically so (Arnold & Colford, 2007; Fawtrell et al., 2005; Waddington et al., 2009).

One of the most successful SWS programs to date was carried out in Malawi and used the model upon which the ANC-SWHP in Machinga is based. In that program, water treatment

⁹ Heterogeneity of results can be due to many factors including the extent to which water is the dominant pathway for diarrheal illness in a specific setting, the efficacy of the particular technology(s) under consideration, adherence among study participants, participant and observer bias, study design and execution, case definition of diarrhea.

(whether through WaterGuard or stock chlorine distributed freely during the rainy season by the government to prevent cholera) increased from 5% at baseline to 73% at the 9-month follow-up (as measured by the presence of residual chlorine), but then went down to 53% at the 33-month follow-up (Loharikar et al., 2010; PATH, 2011). So while a variety of SWS implementation models have demonstrated varying degrees of efficacy, there continues to be the need to modify programs to improve their effectiveness, particularly in terms of sustained behavior change.

Use of behavioral theory in health promotion:

All household-based interventions to reduce diarrheal illness require behavior change, whether for treatment, storage, handwashing or other hygiene practices. Therefore the process by which water treatment and storage behaviors are promoted is as critical as the technology itself. But the process of developing behavioral interventions is complex for it involves identifying the behaviors, attitudes and conditions that influence current practice, as well as those that will promote or inhibit the desired behavior change. Because of the complexity of the causes of diarrheal illness and the nature of behavior change, these types of efforts can benefit from collaboration across disciplines, including the engagement of behavioral theories (Stanton et al., 1992). Behavioral theories and models are important resources for efforts to understand and influence behavioral practices.

In the field of health promotion, behavioral theories and models are used in multiple ways, including understanding problems, predicting behaviors, testing theories, guiding the development of interventions, guiding program evaluations, and building new theories.

Theories and models facilitate the development of health promotion activities based on evidence-based understanding of behavior, rather than relying on program developers' intuitions and experiences. Specifically, theories can help us understand why people behave in certain ways, identify what one needs to know before developing a program, guide the development of strategies to impact change, and help identify what should be measured in an evaluation (Glanz et al, 2008).

Glanz et al. (2008) suggest that there are two main types of health promotion theories, explanatory theories and change theories.¹⁰ Explanatory theories (e.g. *Theory of Planned Behavior and Reasoned Action*) help us understand why a problem exists and therefore are particularly suited to identifying factors that can potentially be modified through intervention to facilitate change. Change theories (e.g. *Diffusion of Innovations*) focus more specifically on describing how behavior change occurs at the level of an individual or community in ways that can inform intervention development and implementation. Regardless of the theory type used, it has been suggested that interventions informed by theory are more likely to succeed because behavioral theories can help identify behavioral influences and thereby point to promising strategies and processes for changing those influences (Glanz et al. 2008; Legler, 2002).

Depending on the theory or model used, the identification of influences can and will be at multiple levels, including the intrapersonal, interpersonal, community, physical, political and cultural environment, etc. In terms of program planning, this information can then be used to identify what one needs to know before developing a program and guide the selection of

¹⁰ While the distinction between explanatory theories and change theories can be useful, I believe it is a simplification, as many theories commonly used in the field of health promotion, such as Social Cognitive Theory, are a combination of the two types. Social Cognitive Theory holds that behavior is not just influenced by specific factors, but is a dynamic and ongoing process in which personal factors, environmental factors, and human behavior exert influence upon each other.

strategies to impact change. For example, if looking at household level water treatment practices, the *Health Belief Model* suggests that one needs to know the health beliefs and self-efficacy assessments of the target population in relation to diarrheal illness, safety of water, use of the specific POU water treatment technology under consideration before designing an intervention (Champion & Skinner, 2008). Without knowing such beliefs, one cannot effectively design a program to modify behaviors. If a planner identifies that a population does not have high levels of perceived susceptibility to waterborne diseases, the program may aim to address this. If however, a planner finds that people do consider themselves susceptible, she may design a program focused on increasing perceived benefits and decreasing perceived barriers to water disinfection or safe storage. Conversely, if one uses a socio-ecological perspective to look at the issue of diarrheal illness, one might identify access to safe water as a core behavioral influence, suggesting that focusing on strategies to improve the safe water infrastructure would be an effective way to reduce diarrheal illness apart from targeting the routine behaviors of individuals.

Some behavioral theories and models not only help identify behavioral influences, but also identify the types of strategies that may be effective at promoting change. For example, *Social Cognitive Theory* suggests that self-efficacy can be enhanced through skill mastery, social modeling, improving emotional states, and persuasion (McAlister et al., 2008). Therefore, applying *Social Cognitive Theory* to the develop a POU water treatment intervention might suggest that the intervention should include water treatment demonstrations, free WaterGuard samples, and on-going encouragement from a trusted individual to initiate, continue with, or return to consistent water treatment.

Use of theory in public health program evaluation and evaluation research:

The predictive capacity of theory helps identify targets for intervention as well as targets for program evaluation (Glanz et al, 2008). In essence, theory helps us appreciate that if we want to advance public health, we not only want to know if a program works, but why it does or does not work. Understanding why or how a program works can be particularly important for multifaceted interventions, because it can help us understand which components are necessary and if they can be replicated (Rimer et al., 2001). Conversely, understanding why a program does not work can prevent throwing out good intervention ideas that were not well executed.

Behavioral theories identify behavioral predictors, and these predictors should drive the intervention developed and determine targets of evaluation. For example, if using the *Theory of Planned Behavior*, and self-efficacy, perceived behavioral control, and perceived norms are selected as the main targets of intervention, then these behavioral mediators should be explored as part of the evaluation, whether through qualitative or quantitative methods. Without doing so, one has limited information about *why* the program is or is not successful and how it might contribute to public health knowledge.

Most health promotion evaluation is not about testing the validity of a theory, and so it not necessary that every construct in a particular theory be considered in every theory-informed intervention, nor that only one theory is used for either planning or evaluation purposes. In fact, using multiple theories or parts of multiple theories simultaneously has been encouraged as good practice that facilitates addressing complex problems (McLeroy et al.,

1993; Glanz et al, 2008). [This however does not suggest that it will be effective to pull out one or two constructs from multiple theories decontextualized from other related constructs.] The suggestion to consider multiple theories simultaneously is particularly salient in light of the limitations observed with individual focused theories (e.g. *Health Belief Model*, *Theory of Planned Behavior*), and has led many health promotion practitioners and researchers to incorporate ecological models into their work. Ecological models take into account broader factors that individual behavioral theories often ignore or minimize, such as interactions among individuals, communities and society (i.e. social determinants of health), and they encourage health promotion efforts that address multiple levels simultaneously (e.g. individual, community, and policy) (Sallis, Owen, and Fisher, 2008).

Behavioral theories and models are important reference points for understanding behaviors and can be effective tools for intervention development, but they are not the only tools or guides practitioners have for developing effective programs. Using behavioral theories and models avoids developing and evaluating programs on intuition or practical experience alone, but other tools, such as planning models or principles of practice, can also be extremely important for the success of health promotion efforts.¹¹ Freudenberg et al. (1995) described ten principles for effective public health practice that may be equally or more important than behavioral theory in driving the success of health promotion efforts. Described as hypotheses, these principles suggest that interventions should be tailored to specific populations, involve communities in planning and implementation efforts, advocate for resource and policy changes

¹¹ I am not suggesting that planning models and/or principles of practice are not theoretically driven. I would assume to some extent they are. What I am suggesting however is that we do not over emphasize the importance of using behavioral health theories and models for public health practice over and above the guidance we can gain from these other types of tools.

needed to achieve the desired health objectives, build on existing resources and assets, and focus on institutionalization and dissemination. Again, this is not to suggest that using behavioral theory is not essential to understanding behaviors, but to recognize that it is one of many tools that should inform program development.

How behavioral theory will be incorporated into this study:

In this qualitative evaluation study, based on the rationale described above, several behavioral theories guide my research. First, I draw from *Diffusion of Innovations*, the *Transtheoretical Model*, and social marketing theories, the three theories or theoretical frameworks the project partners considered influential in developing the intervention (Prochaska et al., 2008; Rogers, 2003; Storey et al., 2008). Additionally, I incorporate aspects of the *Health Belief Model*, the *Theories of Reasoned Action and Planned Behavior*, and *Social Cognitive Theory*, into my work because, based on my review of the literature and my knowledge of the topic, I consider them to be well suited to providing insight into why people do or do not consistently treat their water (Figueroa & Kincaid, 2010; Glanz, 2008). Specifically, I incorporated key relevant constructs and concepts from these behavioral theories into the questions we asked study participants. That is, we attempted to elicit attitudes and experiences of study participants framed by constructs from these theories. This strategy (i.e. using insights from multiple relevant theories in developing my methods) likely enabled us to develop a more accurate understanding of relevant influential determinants of water disinfection practices than if this work were guided by insights from only those theories used to guide the intervention.

Behavioral change frameworks and theories used in developing the ANC-SWHP:

As articulated by CDC and PATH, the ANC-SWHP in Malawi was developed using a framework that considers social marketing strategies, *Diffusion of Innovations* and the *Transtheoretical Model*. What follows is a description of each theory, model or approach and the extent to which and how it was used to inform this study.

Social Marketing:

Social marketing involves using commercial marketing approaches to promote the purchase of socially useful products, in order to change behaviors (Quick, 2003; Storey et al., 2008). Social marketing is not a theory but a strategy that is often informed by theories including those commonly used in health promotion, such as the *Health Belief Model*, *Social Cognitive Theory* and the *Theory of Reasoned Action and Planned Behavior* (Lefebvre, 2000). Social marketing in developing countries typically involves two key components: 1) product promotion through a variety of activities, including media campaigns, street theater, advertising, demonstrations, distribution of free samples, etc. to create demand, and 2) increasing local product access by establishing local production and creating local distribution mechanisms for the product. While social marketing has played an essential role in promoting the use of household water treatment technologies, it has been suggested that without incorporating other behavior change strategies, it may have limited impact (Quick, 2003). This is particularly relevant in economically disadvantaged or rural communities with limited commercial infrastructure, including in the communities where we are doing this research in Malawi (Olembo et al., 2004).

Social marketing has been the most widely used strategy to promote household water treatment in Malawi. In 2002, PSI International, a public health social marketing NGO that has taken the lead in social marketing of water disinfection technologies in dozens of developing countries, initiated a social marketing program for WaterGuard, a locally produced dilute hypochlorite solution, in Malawi. The ANC-SWHP collaborates closely with PSI, where PSI provides the WaterGuard and carries out related social marketing activities across the targeted communities. Based on results from a national survey in 2005, 65% of mothers in Malawi had heard of WaterGuard, although only 7% reported current use of the product (Stockman et al., 2007). In the current study we incorporated questions to assess the breadth and potential influence of PSI's social marketing efforts on people's use of WaterGuard. These included questions about what promotional materials people had seen, perceptions of how these messages had impacted their treatment practices, and people's experience with WaterGuard availability in stores.

Diffusion of Innovations:

Diffusion of Innovations is a theory of change that seeks to explain how and why new ideas spread through communities and cultures. As described by Rogers (2003), innovations can spread through various communication channels, but there are five characteristics of innovations that are particularly important in explaining their adoption: 1) advantage over alternatives/existing practices; 2) compatibility with the potential users' values, experiences and perceived needs; 3) low complexity; 4) trialability—the ability to try out the innovation before deciding to adopt it fully; and 5) observability—the extent to which the impact of the

intervention can be observed, potentially encouraging discussions between adopter and others in their social networks. A main hypothesis of the theory is that when a large enough proportion or critical mass of a population adopts a new innovation, it becomes self-sustaining. In the ANC-SWHP, the hope is that innovation will spread through both the social marketing efforts of PSI as well as via individual ANC-SWHP participants, who by adopting water treatment practices themselves influence the adoption by others.

Rogers (2003) further suggests that there are five categories of adopters of innovation: innovators, early adopters, early majority adopters, late majority adopters (skeptics) and laggards. He argues that it may be useful to consider these categories when developing an intervention, because people in the different categories may need different interventions, or more or less of a particular intervention, in order to move them to being adopters. In describing the results from three SWS programs that tested the effects of various combinations of three behavioral strategies (social marketing, motivational interviewing, and community mobilization), Quick (2003) suggests that social marketing strategies may be sufficient to motivate innovators and early adopters, but that additional and more intensive behavioral strategies may be necessary to motivate early majority adopters or skeptics.

The theory of *Diffusion of Innovations* has been incorporated into this study both in terms of the research design and specific lines of inquiry. In terms of design, comparing water treatment influences and motivating factors between participants and friends and relatives allows us to explore how water treatment technologies and behaviors diffuse across a population. Additionally, specific lines of inquiry explored in our interview guides addressed some of the key components of the theory of *Diffusion of Innovations*, such as identifying the

category of adopter of each respondent, and whether and how respondents' experiences and perspectives relate to the theories' five characteristics of innovations.

The Transtheoretical Model:

The *Transtheoretical Model* developed by Prochaska and DiClemente (1983) conceptualizes change as a process rather than an event, but unlike the *Theory of Diffusion of Innovations*, focuses on the individual level rather than group process. The model suggests that as a person attempts to change, he or she will typically move through five stages (although the process may not be linear): precontemplation, contemplation, preparation, action, and maintenance (Prochaska et al., 2008). This model further posits that people at different stages of change use different processes to progress to the next stage, and therefore interventions must take individuals' location in the change process into account. Stage-based interventions rely on using strategies such as message tailoring or motivational interviewing, which are very client-centered, to address people where they are in the change process. While it was likely very useful for PATH and CDC to consider women's readiness for change related to water treatment practices when developing the ANC-SWHP, my impression is that the *Transtheoretical Model* did not particularly inform how the intervention was ultimately designed, because it was designed in such a way that all participants are supposed to receive the same messages and products. I therefore did not use the *Transtheoretical Model* to inform the development of the question guide or how the data was analyzed. However, because the interview question guide was developed collaboratively, and the project partners report that the model informed the program design, it is possible that other members of the research team

used the *Transtheoretical Model* to inform how they approached development of the interview guides.¹²

Other behavioral change theories and models used to inform this study:

Aspects of the *Health Belief Model*, the *Theories of Reasoned Action and Planned Behavior*, and *Social Cognitive Theory* were also incorporated into this study because when I compare the intervention components to common behavioral models used in the field of public health, it is apparent that important behavioral constructs that may be driving water treatment behaviors would be missing if we limited the lines of inquiry here to only aspects of social marketing, Diffusion of Innovations, and the *Transtheoretical Model*. For example, the ANC-SWHP incorporates husband involvement as a strategy for promoting water treatment and other hygiene-related behaviors. In order to assess if and how this involvement of husbands impacts WaterGuard use, it may be beneficial to look at participants' beliefs about what their husbands think or feel about treating their household drinking water with WaterGuard. None of the three theories used to design the study particularly focus on the importance of such normative beliefs, but normative beliefs are a key construct of the *Theory of Reasoned Action and Behavior* (Montano & Kasprzyk, 2008). It therefore seems useful to engage the *Theory of Reasoned Action and Behavior* to provide insight regarding normative beliefs.

¹² In a recent research article about the program the ANC-SWHP is based on, research partners Siri Wood and Jennifer Foster frame their research findings using the *Transtheoretical Model* (Wood et al., 2011). Therefore it is likely that these same project partners used the *Transtheoretical Model* to inform how they approached development of the interview guides for this study.

Beyond engaging behavior theories with constructs that are reflected in how the ANC-SWHP intervention was designed or intended to work, my review of the literature on water treatment influences also led me to identify other theories or behavioral constructs that appeared useful to incorporate into the study because of evidence that suggests these theories may drive water treatment practices. For example, Figueroa & Kincaid (2010) report that discouragement from influential others has been found to negatively impact water treatment behaviors, which suggested to me that it could be useful to ask respondents questions about both positive and negative social support for using WaterGuard. Because social support is one of many key concepts in Bandura's *Social Cognitive Theory*, I felt it was beneficial to engage *Social Cognitive Theory* to guide the development of questions (Bandura, 1986). What follows is a brief description of the three additional theories or models I used to inform this research, because the theory includes constructs that are reflected in how the ANC-SWHP is hypothesized to work, or the literature suggests the constructs used in the theory are relevant for explaining water treatment behaviors.

Health Belief Model:

The *Health Belief Model* was one of the first articulated health behavior theories and continues to be widely utilized (Champion & Skinner, 2008). The model postulates that the following six constructs both predict and explain health related behaviors: *perceived susceptibility* to getting the disease or condition, *perceived severity* of the seriousness of the condition and its consequences, *perceived benefits* of taking the proposed action to reduce risk, *perceived barriers* to taking the recommended action (both material and psychological), *perceived self-efficacy* to overcome barriers and take the recommended action, and *cues to*

action. The *Health Belief Model* has been found to be useful in predicting as well as promoting a variety of health behaviors. Two meta-analyses of studies of the *Health Belief Model* concluded that there is substantial empirical support for the efficacy of the model's predictive validity, with "perceived barriers" and "perceived benefits" typically found to be the strongest predictors of behavior (Harrison et al., 1992; Janz & Becker, 1984).

The *Health Belief Model* suggests that perceptions about one's susceptibility to, and the seriousness of an illness (together referred to as *perceived threat*) influence health behaviors (Champion & Skinner, 2008). Studies carried out in places where treatment of water is not a common practice have found a common belief that diarrhea is normal and not a big enough concern to take action to prevent (Baclig & Patrick, 1990; Clasen, 2009; Figueroa & Kincaid, 2010). So, while the ANC-SWHP intervention itself may not have been explicitly designed to increase people's beliefs about the likelihood of acquiring waterborne diseases or the seriousness of these diseases, probing these beliefs may be useful in describing influences on people's water treatment behaviors. The interview guide was developed to probe respondents about all of the constructs of the *Health Belief Model*, including perceived susceptibility of oneself or family members getting diarrhea from drinking untreated water, perceived severity of diarrheal illness, perceived benefits of treating one's drinking water, perceived barriers to purchasing or using WaterGuard to treat drinking water, self-efficacy regarding purchasing or using WaterGuard, and treatment cues (e.g. motivators and reminders).

Theory of Reasoned Action and Planned Behavior:

Developed by Fishbein and Ajzen, the *Theory of Reasoned Action and Planned Behavior* posits that intention is the immediate precursor of behavior (Montaño & Kasprzyk, 2008). Intention, in turn, is determined by three constructs: (1) favorable or unfavorable *attitudes* toward that behavior, (2) *subjective norms* (perceived social pressure to enact or avoid the behavior), and (3) *perceived behavioral control* to perform that behavior. Each construct, in turn, is determined by an underlying set of salient personal beliefs. *Attitudes* are predicted by *behavioral beliefs*, that is, beliefs about the likelihood of the consequences of a behavior and whether those consequences are important. *Subjective norms* are predicted by *normative beliefs*, the set of beliefs on the perceived approval or disapproval of significant others to perform the behavior, and the motivation to comply with these beliefs. *Perceived behavioral control* is predicted by the perceived occurrence of factors that serve to facilitate or inhibit behavior and their relative power to do so (*control beliefs*). The model suggests that characteristics such as age, sex, race/ethnicity, personality, education, income, and life experiences ultimately determine each set of beliefs. The *Theory of Reasoned Action and Planned Behavior* has been found to successfully predict and explain a wide range of health behaviors (Montaño & Kasprzyk, 2008).

The ANC-SWHP was developed with the intent that newly educated program participants could influence the behaviors of their close friends and family. It therefore seems appropriate to explore people's behavioral norms and normative beliefs, as described in the *Theory of Reasoned Action and Planned Behavior*, if trying to understand hygiene behaviors and the influence of the ANC-SWHP on those behaviors. Further, data from other POU water treatment studies suggest that normative beliefs, as well as other constructs addressed in the

Theory of Reasoned Action and Planned Behavior, influence water treatment practices (Figueroa & Kincaid, 2010; Wood et al., 2010). For example, Wood and colleagues (2010) found that people's beliefs that drinking untreated water can lead to diarrhea, that using WaterGuard can decrease episodes of diarrhea, and that decreasing diarrhea benefits them in many ways, appeared to motivate people to treat their water (2011). Given these findings about the influence of behavioral beliefs and outcomes, it seemed appropriate to develop the interview guide using the constructs of the *Theory of Reasoned Action and Planned Behavior* as a guide. The interview guide was therefore developed to probe respondents about all of the core constructs of the theory of reasoned action and planned behavior.

Social Cognitive Theory:

Social Cognitive Theory is based on the work of Albert Bandura. The theory explains behavior in terms a dynamic interaction ("reciprocal determinism") between personal factors, behaviors and environmental influences (Bandura, 1986). That is, individuals and groups influence their environments *and* environments influence individuals and groups. The theory is used for understanding and predicting both individual and group behavior and in identifying potential behavioral change strategies (McAlister et al., 2008).

A number of core concepts in *Social Cognitive Theory* are particularly relevant to understanding health behaviors. *Self-efficacy* is a key concept in *Social Cognitive Theory* and one that many other behavioral health theories have subsequently included (e.g. the *Health Belief Model*). *Self-efficacy* includes one's confidence to perform a specific behavior and the theory suggests that self-efficacy can be strengthened through experience, social modeling,

verbal persuasion and reinforcement. *Outcome expectations* is another core concept of *Social Cognitive Theory* and includes one's beliefs about the anticipated result of a particular behavior and the value of that result. The construct of *outcome expectations* overlaps in many ways with the constructs of *behavioral beliefs* and the *evaluation of behavioral outcomes* from the *Theory of Reasoned Action and Behavior*, and *perceived benefits* from the *Health Belief Model*. Another key component of *Social Cognitive Theory* is the concept of *observational learning* through social modeling and verbal persuasion. Observational learning appears to be a particularly relevant construct for the ANC-SWHP, with its inclusion of social modeling and verbal persuasion strategies from HSAs and media messaging from PSI. The interview guides were developed to probe respondents about the following constructs of *Social Cognitive Theory*: self-efficacy, observational learning via social modeling and verbal persuasion, social support, and outcome expectations (Bandura, 1986; McAlister et al., 2008).

To reiterate, for this research I used insights from behavioral theories beyond those that were used to develop the intervention because, based on my review of the literature and other professional experience, I believe this strategy enabled us to gain a more accurate understanding of the influential determinants of water disinfection practices than if this work was guided by only those theories used to develop the intervention.

Factors associated water treatment behaviors and identified barriers:

Dozens of home water treatment and storage interventions have been rigorously evaluated to assess impacts on water treatment and storage practices, diarrheal illness, and the pathogen content of water (Arnold & Colford, 2007; Fawtrell et al., 2005). Although such

studies often describe potential barriers that may have impacted the desired behavior change, few have explicitly attempted to explore in any detail how observed behavior change occurred and why it occurs among some targeted individuals and not others, (Waddington et al., 2009; Figueroa & Kincaid, 2010). In fact, only one study was found in the literature that was specifically designed to identify, through qualitative research, and then quantify, through multiple logistic regression, psycho-social factors (as well as socio-demographic and environmental factors) that influence water treatment and hygiene behaviors (Figueroa & Hulme, 2007 as cited in Figueroa & Kincaid, 2010).¹³

The study by Figueroa & Hulme (as cited in Figueroa & Kincaid, 2010), which took place in Sindh, Pakistan, found that participants with higher levels of knowledge of treatment methods, stronger pro-treatment attitudes (e.g. perceived susceptibility, perceived benefits), higher levels of encouraging or being encouraged by others to treat water, and who perceived more friends and fellow community members to treat their water (i.e. social norms) were more likely to treat their water, and that these variables were mediators of the relationship between exposure to the educational campaign and safe water treatment behaviors. Their model explained 42% of the variance in water treatment and was able to correctly classify 86% of the study population as users or non-users of a POU water treatment method. However, because of the contextual and cultural specificity of influences on water treatment practices, it is not a given that the same beliefs, values or experiences or even the same psycho-social factors found in Sindh, Pakistan are what drives water treatment practices elsewhere. The data from Figueroa

¹³ The study by Figueroa and Hulme was not published in a peer-reviewed journal, but data from the study was presented in a report by Figueroa and Kincaid (2010).

and Hulme study do however suggest that the psycho-social variables and other behavioral constructs included in many behavioral health theories have the potential to influence water treatment practices, and that once identified, these factors should be addressed or promoted in programs aimed at increasing household water treatment behaviors.

Other studies have identified isolated behavioral factors that appear to promote or impede safe water and storage practices, but these findings are typically secondary, buried within larger studies. Due to the scattered nature of this data, and in an attempt to draw more attention to the need to understand and address such factors when developing household water treatment and storage interventions, Figueroa and Kincaid (2010) compiled findings from multiple studies on individual beliefs, values, family relationships, social norms and ecological factors that appear to drive or impede water treatment behaviors in specific contexts and cultures. Their report identifies examples where social, cultural and behavioral norms are not supportive of water treatment behaviors in settings where household water treatment levels are very low, as well as studies where specific psychosocial factors were found to correlate with water treatment practices, as either supports or impediments. Rather than summarizing the entire report, it may be useful to highlight a few of their findings to illustrate how social conditions, cultural practices, and behavioral attitudes appear to influence water treatment behaviors in specific settings.

- Knowledge: A number of studies identify lack of knowledge about the potential of contaminated water to cause diarrhea as a barrier to sustained water treatment (Barbieri, 1993 as cited in Figueroa & Kincaid, 2010; Goldman et al., 2001; McLennan, 2000).

- Perceived seriousness of diarrhea: A few studies found a common belief to be that diarrhea is considered normal (e.g. a normal part of digestion) and typically not of enough concern to warrant preventative action (Baclig & Patrick, 1990; Clasen, 2009; Olango & Aboud, 1990).
- Perceived risk of getting diarrhea: While some studies found that people's perceived risk of diarrheal illness (particularly cholera) motivated them to treat their water, many studies did not find this to be the case. For example, in a study in the Dominican Republic, a caregiver's knowledge of a child's risk for diarrhea was not associated with water boiling practices (McLennan, 2000)
- Perceived control: In the same study in the Dominican Republic, the most common reason cited for not boiling water, among people who knew that drinking unsafe water could cause diarrhea, was that children would still drink untreated water outside the house (McLennan, 1998)
- Attitudes toward the product: Many studies suggest that products that are easily accessible, affordable, fit in with existing household water use practices (e.g. use of modified traditional clay pots with a lid and spigot which allows water to stay cool), are perceived to be easy to use, and produce water that tastes and smells good have a better chance of being adopted. (Figueroa & Kincaid, 2010).
- Self-efficacy: A few studies conclude that self-efficacy concerning treating water was a reason for the programs' success (Quick et al., 2002).

Much more common than identifying a broad spectrum of psychosocial factors associated with water treatment behaviors, evaluations of POU interventions typically identify a

few barriers to adopting and sustaining use. With regard to promoting chlorine based water treatment products, a number of barriers have been identified across settings, program models, and behavioral strategies employed. Affordability is consistently identified as the primary barrier to sustained water treatment behaviors. The other most frequently identified barriers are lack of access or availability of the treatment product (e.g. not sold in nearby stores), dislike of the smell or taste of the treated water (e.g. chlorine taste, perception that treated water does not quench thirst), and lack of awareness of the need to treat water (Figueroa and Hulme, 2008; Loharikar et al, 2010; Ram et al., 2007; Ryman et al., 2012; Stockman et al., 2007).

To varying degrees most POU water disinfection programs attempt to address at least some of these commonly articulated barriers. Ways of addressing these problems include subsidizing the price of the chlorine solution to make it more affordable, distributing free samples to allow people to try the product and behavior, experience its' effects, and possibly enable a reassessment of the value of the product, providing education on proper use of the product to avoid experiences of over-chlorinating; raising awareness of water borne disease risks, and increasing distribution networks through existing vendors or establishing opportunities through micro-finance schemes.

In the context of entrenched poverty, it is not surprising that cost is consistently identified as the biggest barrier to sustained water disinfection practices. However, some researchers have suggested that this problem may not be as insurmountable as sometimes assumed. High rates of purchase and use of chlorine-based treatment products have occurred in places with high levels of extreme poverty (Quick et al., 2003). And, while many studies

indicate that cost is the most common reason given for non-use, four of five studies that looked at the issue found that wealth was not correlated with use of a sodium hypochlorite solution (Dubois et al., 2010; Freeman et al., 2009; Luby et al., 2008; Ram et al. 2007; Sheth et al., 2010). In a recent POU study in Malawi, women from the lower three wealth quintiles were more than twice as likely as wealthier women to be current WaterGuard users (Sheth et al., 2010).

Given the cultural and contextual specificity of influences on household water treatment behaviors, it is most relevant for this study to catalogue what is known about these influences specifically in Malawi. In an evaluation of the program on which the ANC-SWHP is based (which was carried out in Blantyre and Salima Districts in Malawi in 2007-2008), Sheth et al. (2010) found that one year after baseline, WaterGuard use and purchase were both associated with increased home-visits from health surveillance workers, suggesting that on-going social support from a trusted source is an important motivator for sustained water treatment behaviors. In a qualitative study of the same program, Wood et al. (2011) similarly found that respondents consistently stressed the influence of health workers regarding their awareness of the need, value, and relevance of water treatment, and their decision to both try the WaterGuard samples they were given and to purchase and continue using WaterGuard once those samples were used up. Such findings emphasize the importance of personal communication in motivating water treatment practices in Malawi.

Other relevant findings from the study by Wood et al. (2011) are that the extended free trial of WaterGuard (up to four free bottles) facilitated adoption and sustained use of WaterGuard by giving people time to experience reduced diarrheal illness in their homes, thus increasing perceptions of the benefit of using WaterGuard. Extended free trials also allowed

participants to get used to the taste of WaterGuard treated water, and to overcome the initial cost of purchasing WaterGuard, thus reducing some of the typical barriers to use. The most common reason cited for not using WaterGuard among non-users was cost. At the same time, among current users of WaterGuard, Wood and colleagues found that many study participants used cost-benefit language to describe how they valued WaterGuard, weighing the costs of WaterGuard against the costs associated with medicine and medical care for diarrhea.

Individual and interpersonal psychosocial factors explored in this study:

Of importance to note is that the majority of the core constructs in the theories and models utilized in designing this study (i.e. the *Health Belief Model*, the *Theories of Reasoned Action and Planned Behavior*, *Social Cognitive Theory*) are conceptualized in relation to individual and intrapersonal factors. Individual factors can include both cognitive factors (e.g. knowledge, beliefs, and attitudes such as perceived risk and severity, and subjective and perceived norms) and emotional factors (e.g. emotional responses, self-efficacy, trust of others, social-influence). Interpersonal factors can include social (e.g. social-support) as well as household level factors (e.g. gender norms, spheres of control). However, despite the limited research on the social, cultural, behavioral and environmental influences on POU water treatment and storage practices, it is clear that these factors take place at levels of the individual, interpersonal, and community levels, as well as in relation to the natural, social and political environment or context. This research explores individual cognitive and emotional factors, interpersonal factors, experiences and context. However, the study's lack of focus on exploring the meta-level influences of water treatment behaviors, such as national and

international development policy, can be seen as a weakness and an indicator of questions for further study.

Background on Malawi:

The Republic of Malawi is located in the southeastern part of Africa. It is a landlocked country bordered by Zambia, Tanzania, and Mozambique, and is approximately the size of the state of Pennsylvania. Malawi has a population of approximately 16 million, and ranks among the world's most densely populated and least developed countries (CIA, 2012). Malawi became independent from Britain in 1964 and held its first democratic elections in 1994. The country's two official languages are English and Chichewa. Approximately 80% of the population lives in rural areas and the economy is predominately agricultural. Many people living in rural areas are subsistence farmers, and the biggest agricultural exports are tobacco, tea, and sugar cane. Life expectancy in Malawi is 51 years. Malawi has the 22nd highest maternal mortality rate in the world, 510/100,000 births, and the 9th highest HIV prevalence rate, 11% of the population. Malawi has the 17th lowest gross domestic product per capita in the World. In 2001, per capita household consumption was estimated to be the equivalent of \$132 per year (CIA, 2012).

The majority of rural homes in Malawi are made of baked or unbaked brick, dirt floors, and thatched roofs. According to a recent national survey in Malawi, among people living in rural areas, approximately 4% have electricity and 2% have piped water in their homes, (National Statistical Office and ICF Macro, 2011). The majority of rural families retrieve their drinking water from a public standpipe or borehole (69%), 17% obtain it from an unprotected dug well, and 6% from a protected dug well. Forty six percent (46%) of rural households report

that their round trip walk to obtain drinking water takes more than 30 minutes. In terms of toilet facilities, 78% of rural households report using an open pit latrine, 6% report using a pit latrine with a cement slab, and 13% report no toilet facilities at all. Sixty-six percent (66%) of rural households report cooking in a building separate from their living quarters and 28% report cooking outside. The vast majority of the rural population use wood as cooking fuel (94%), and 98% use an open fire to cook their food (National Statistical Office and ICF Macro, 2011).

Figure 2.1: Map of Malawi with Machinga District highlighted



Source: <http://www.nationsonline.org/oneworld/map/malawi-administrative-map.htm>

CHAPTER 3: METHODS

Rationale for using qualitative methods for this study:

We used qualitative methods for this study because the study aims to establish in-depth understanding of people's experiences and what drives their decisions and behaviors.

Specifically, we were interested in understanding how and why people in Machinga, Malawi make decisions about treating their household water, and the influences and context that surround those decisions. Qualitative research is characterized by establishing rich descriptions of complex phenomena that enable an understanding of context and behavioral patterns and attempt to grasp phenomena in a holistic way (Patton, 2002). Qualitative methods get information from participants' perspectives and often ask them to describe factors influencing their own behavior. Further, because qualitative methods provide information grounded in people's experiences and beliefs, it is not constrained, as quantitative research often is, by predetermined categories of analysis (Farquar et al., 2006).

Although there have been dozens of quantitative intervention studies that identify isolated factors or conditions associated with people who treat their water in a particular context (e.g. greater contact with the intervention, rural residence, during a cholera outbreak), it is well recognized that such factors do not provide much detail regarding the beliefs and conditions which influence people's decisions about water treatment (Sheth et al., 2010; Waddington et al., 2009). Without a more comprehensive investigation into these factors, we will be limited in our ability to improve programs to make them more successful. It is hoped that qualitative research on this topic can help fill in the blanks regarding some of the gaps in

understanding that result if we only consider quantitative data about the levels of use and correlated factors.

Although my dissertation research is a qualitative study, it is part of a larger mixed-methods approach that includes both qualitative and quantitative methods. This qualitative research aims to complement findings from the ANC-SWHP 12-month follow-up quantitative program evaluation survey (completed in March 2011) that assessed use of WaterGuard and changes in knowledge and water, sanitation, and hygiene practices among both program participants and a sample of participants' friends and relatives with children less than 5 years of age. By exploring in detail the experiences, attitudes, beliefs and motivations of program participants who do and do not treat their water consistently, we hope to better understand these factors and be better prepared to adequately interpret the findings from the quantitative survey data. Additionally, although qualitative studies are not intended to produce generalizable results, the study also aims to shed light on motivations, beliefs and norms that surround water treatment decisions in ways that may be useful for improving water treatment initiatives in Malawi and elsewhere. Perhaps these findings could facilitate the development of interventions that use more client-centered or tailored approaches.

Research design:

This research was carried out in May-June 2011 in Machinga District, Malawi. The research involved conducting 51 semi-structured interviews with a convenience sample of women enrolled in the ANC-SWHP quantitative evaluation study, including women who received ANC-SWHP services as well as their identified friends and relatives with children less

than five years of age. The research also involved conducting 11 semi-structured focus groups with a convenience sample of women who received ANC-SWHP services, but who were not necessarily part of the ANC-SWHP quantitative evaluation study. Between March 2010 and February 2011 approximately 20,000 women participated in the ANC-SWHP and received hygiene kits at one of eight participating clinics in Machinga District. One hundred and six (106) women who participated in the ANC-SWHP were enrolled in the quantitative evaluation study, as were 105 of their friends and relatives with children under the age of five years old. Individual interview respondents for this study were drawn from this pool of 211 women, whereas focus group respondents were drawn from the pool of 20,000 program participants. Below, I refer to interviewees who were ANC-SWHP program participants as *participants*, and women we interviewed who were friends or relatives of ANC-SWHP participants as *friends and relatives*, unless further clarification is needed.

Interview respondents recruited for this study were stratified based on clinic catchment areas and WaterGuard use as reported in the recent ANC-SWHP follow-up quantitative survey. More specifically, we interviewed at least four *participants* and two *friends and relatives* from each of the eight clinic catchment areas who participated in the ANC-SWHP quantitative evaluation study. Additionally, to the extent possible, we attempted to have at least half of the interviews in each clinic area with women whose household drinking water tested negative for chlorine residue during the quantitative follow-up study three months prior to the qualitative study. We were not always able to follow this latter strategy however, because some study sites had few evaluation study participants whose water tested negative, particularly among *participants*, or those individuals were not accessible during our fieldwork. Overall, 31% (16/51)

of *participants* and *friends and relatives* included in the analysis had tested negative for chlorine residue during the quantitative evaluation study in March 2011. Focus group participants were stratified by clinic location only and, to reiterate, were not necessarily part of the ANC-SWHP quantitative evaluation study. We attempted to hold at least one focus group with ANC-SWHP participants in each clinic, but due to logistical factors held at least one focus group with ANC-SWHP in seven of the eight clinic sites.

As part of a larger qualitative study that explored opinions and experiences with ANC-SWHP program implementation, in addition to understanding motivators for WaterGuard use and non-use, we also conducted semi-structured interviews with a convenience sample of 16 husbands of ANC-SWHP participants who were part of the evaluation study, 16 ANC nurses and health surveillance assistants, and 7 local vendors of WaterGuard, and we conducted interviews and focus groups with health surveillance assistants from the antenatal clinics. The findings from these additional interviews and focus groups will not be presented here in full, but rather only to the extent that they help elucidate or interpret findings from the main study respondents (*participants*, and *friends and relatives*). Below, unless further clarification is useful, I refer to the men we interviewed, who were husbands of women who participated in the ANC-SWHP quantitative program evaluation study, as *husbands*, ANC nurses as *nurses*, health surveillance assistants as *HSAs*, and vendors of WaterGuard as *vendors*.

Recruitment:

We used different strategies to recruit members of the different respondent categories. For interviews with *participants, friends and relatives, and husbands*, we first created a list of potential respondents per clinic area (including names, addresses and GIS coordinates of their homes) from lists of people who were part of the ANC-SWHP quantitative evaluation study. To the extent possible, for *participants and friends and relatives*, we created the list to include equal proportions of people whose' chlorine test results were positive and negative from the quantitative assessment carried out in March 2011. Within this stratification determination, we compiled the list using a simple randomization strategy, although we did exclude several people who field staff from the March study indicated would likely not be good interviewees due to comprehension or language issues, as well as a few others who were noted to live far from the clinic (more than 45 minutes by car) and would therefore pose scheduling challenges. The list we created included more respondents than needed, to ensure that we would have sufficient numbers of respondents to interview.

During each day of fieldwork, when the research team arrived at a clinic, we shared the list of potential respondents with the supervising health surveillance worker who would go down the list and assign the HSA assigned to that catchment area to travel with members of the research team to the homes of the potential recruits. The health surveillance worker directed the driver and research team members to the homes of the potential recruits. If the party in question was at home, the field staff described the study and read the consent script to him or her. Once the respondent provided verbal consent, the field staff team turned on the audio recorder and proceeded with the interview. No names or other study identifiers were recorded

on the audio files, and subsequently no identifying information was included on any of the study transcripts. Respondents' spouses, HSAs or other adults were asked to leave the interview area before interviews began to facilitate confidentiality and unbiased responses. If potential respondents were not home, the field staff traveled on to the home of the next name on the list. No *participants, husbands, or friends or relatives* refused to participate.

To recruit ANC-SWHP *participants* for the focus groups, the research team contacted the clinic coordinator by cell phone the day before we were scheduled to visit a particular health facility, and asked him or her to invite 6-8 ANC-SWHP participants with a child between the age of 6 months -1 year old to participate in a focus group the following day (regardless of their WaterGuard practices). We did not dictate how these women were actually recruited – it is likely that some were recruited because they were being seen at the clinic and others were recruited at their homes by an HSA. Women with children between 6 months and 1 year of age under the age were targeted because they were likely to have similar dates of participation in the ANC-SWHP as the *participants* being recruited for individual interviews. Focus group participants received a small travel stipend for their participation (~US\$1.36).

We recruited *nurses* and *HSAs* in-person at each of the eight health clinics. A member of the research team individually approached potential *HCWs* and *HSAs* and invited them to participate. If the staff person expressed interest in participating, the interview would take place once the staff person had time and provided verbal consent.

Similarly, research field staff recruited WaterGuard *vendors* in village centers located near the targeted eight health clinics. The field staff would walk around in a village center until they identified a vendor who sold WaterGuard. A staff member would then approach the

vendor, describe the study, and ask if the vendor was interested in participating. If the vendor expressed interest, the field staff would obtain verbal consent and begin the interview. Several vendors declined participation specifically because they felt participation would interrupt their ability to serve customers.

Field procedures:

Janell Routh from CDC interviewed and hired nine field staff and two field supervisors from a pool of experienced health field workers identified by PSI in Blantyre, Malawi. Field staff reported directly to field supervisors, and field supervisors reported directly to Dr. Routh. Field staff and supervisors were bi-lingual, speaking both English and Chichewa, the two official languages of Malawi. Janell Routh of CDC, Siri Wood of PATH, Mirriam Mlenga, a trainer from PSI, and I collaboratively developed and facilitated a five-day training of the field staff. The training covered the following topics: study background, purposes and procedures; human subjects protections training; skill development on qualitative interviewing and focus group techniques, including probing and note taking; review of all interview and focus group guides; field-testing all interview guides; and study procedures.

For each of the eleven days of fieldwork, field procedures were quite similar. The entire field team along with Janell Routh, Siri Wood, and myself traveled in two cars to the day's targeted clinic.¹⁴ After a brief meeting with our clinic contact to organize the day of research, we would assign the day's work. Depending on how the day was organized, one or two

¹⁴ I was present in Malawi for the entire training period and 7 of 11 days of fieldwork. Siri Wood from PATH was present for the entire training period and 5 days of field work, and Janell Routh from CDC, the lead field researcher, was present for the entire 11 days of field work and supervised transcription work after fieldwork was completed.

interview teams of two would go in each car, along with a field supervisor, either myself or Siri Wood, and an HSA from that clinic who worked in the area or was familiar with the location of the homes of the mothers and husbands we proposed to interview. The group would then begin to locate potential interview respondents. Once a subject was found and she agreed to participate, one field team and usually either a field supervisor or myself or Siri Wood would stay to conduct the interview, while the other interview team, field supervisor, and HSA would continue on, usually by car, to find the next person on the interview list.

Field staff worked in the field in groups of two, where one was the interviewer and the other the note-taker and audio-recorder operator. Field supervisors were present to provide supervision and guidance to the interview teams. My presence and that of Siri Wood from PATH was to address research-related issues, and more importantly, to help us better understand and interpret the study findings by enabling us to observe the realities of how people live in their compounds in relation to their daily practices related to water and sanitation. Field supervisors and core research team members typically did not sit in on entire interviews with mothers and husbands, although we were often near enough to observe the interview.

During the interviews with *participants* and *friends and relatives*, the field team also made observations of respondents' drinking water storage set up in the home (e.g. if *participants* were still using the storage container they received from the program, whether the storage container in use had a lid and a tap, whether a bottle of WaterGuard was visible) and performed an objective test for residual chlorine using Free and Total Chlorine kits by Hach Co. (Loveland, CO). As is described in more detail on pages 68-69, we ended up not using the

objective test for chlorine in our analysis, both because it was not consistently employed and because we lost some of the chlorine testing results.

Focus groups with ANC-SWHP *participants* and interviews and focus groups with health workers typically occurred in the afternoons at clinics, when the clinics were less crowded. Interviews and focus groups were typically carried out in Chichewa, although a couple of health workers preferred to have their interviews held in English.

Each field team typically completed three interviews or focus groups per day over the course of eleven days of fieldwork. Interview teams completed a summary form and field notes (in English) for each interview. Once interviews and focus groups were completed for the day, the field notes and audio-files were collected and stored in a secure location with the core research team. Digital recordings were downloaded each evening during fieldwork onto both my password protected laptop and that of Janell Routh, and then erased from the digital recorders.

Transcriptions were completed the week after fieldwork was completed by a subset of the field staff with good translation and writing skills. Audio-files of interviews and focus groups were simultaneously transcribed and translated. In other words, field staff listened to the audio files in Chichewa and immediately transcribed the recordings into English. These hand-written transcripts (without names or other identifiers) were completed in Malawi and subsequently entered into word-processing documents in the United States.

Interview and focus group question guides:

The entire qualitative research team, composed of Jennifer Foster (PATH), Siri Wood (PATH), Janell Routh (CDC), and myself, collaboratively developed the interview and focus group topic guides. However given my specific research questions, I put a significant amount of effort into assuring that the guides would effectively solicit input about people's experiences and perceptions related to the key constructs from the theories and models that were used to develop the intervention, as well as relevant constructs from other theories and models my review of the literature and experience suggest are likely to influence household water treatment behaviors (as discussed in Chapter 2). Specifically, I made sure that in addition to asking about water treatment related behaviors, the questions on the interview guides would solicit relevant constructs from the theory of Diffusion of Innovations, the *Health Belief Model*, the *Theories of Reasoned Action and Planned Behavior*, and *Social Cognitive Theory* (Glanz et al., 2008). Using this behavioral health theory terminology, the study guides were developed to draw out experiences and beliefs related to the following lines of inquiry: perceptions and experiences about need, benefits, barriers, subjective norms, self-efficacy, social support, education and modeling, and spousal approval related to WaterGuard and water treatment and storage practices.

Each of the seven interview and focus group guides used in this study are included in Appendices A through G, including interview guides for (A) ANC-SWHP *participants*, (B) *husbands*, (C) *family and friends*, (D) *nurses*, (E) *health surveillance workers*, (F) *WaterGuard vendors*, and focus group guides for (G) ANC-SWHP *participants*. Appendix H includes a table that identifies which questions from the interview guide for *participants* attempt to solicit

perceptions and experiences related to the constructs from behavioral theories considered most relevant for this research. The questions on all the topic guides were used as a starting and reference point in all interviews and focus groups. However, as is the case with semi-structured interviews, related questions were added as deemed appropriate by the interviewer based on the participants' responses (Esterberg, 2002).

Confidentiality, informed consent and approval to conduct research:

The Institutional Review Boards at the University of Georgia, the Centers for Disease Control and Prevention, and PATH each approved this research study.¹⁵ Additionally, the work has the explicit support of the Malawi Ministry of Health. All participation in the study was voluntary and a verbal informed consent process occurred prior to any interview or focus group taking place. The consent script described the purpose and the voluntary nature of the study and was read to each potential participant prior to study participation. A copy of the consent script used is included in Appendix I.

Information collected from participants was kept confidential. While participants' names were used initially to identify them, a unique ID number, without a name, was used on all tracking documents, field notes, recordings and transcripts. All field notes, tracking documents and digital recordings were collected at the end of each day of fieldwork and stored in a secure location with the core research team. Digital recordings were downloaded each evening during fieldwork onto my password-protected laptop and that of one other lead researcher and then erased from the digital recorders.

¹⁵ All three IRB's approved the research through each institutions exempt (administrative) review procedure. UGA's IRB approval for this research is filed under project number 2011-10835-0.

Data coding and analysis:

Once all interviews and focus groups were transcribed and translated into English, I entered the transcriptions into MAXQDA (version 10) qualitative data analysis software program. I analyzed data through multiple readings and the use of thematic coding. I developed code lists from the study's objectives, lines of inquiry, and the data itself. After coding the data, using an iterative process, I examined specific codes of interest to identify recurring themes and illustrative quotes, and based my analysis on those findings (Ryan & Bernard, 2003). I analyzed responses from each respondent category separately and then compared and contrasted responses on a particular topic across respondent categories. Also, within this strategy I considered responses from *participants, friends and relatives, and husbands* who reported current use of WaterGuard separately from those who did not.¹⁶ This process included analyzing the data for rival themes and divergent cases (Patton, 2002).

I completed transcript coding with the assistance of a research consultant, Kate Katzman, who was hired by PATH for this purpose. To ensure inter-coder agreement, we each independently coded five transcripts from *participant* interviews and then convened to make comparisons and derive consensus on the subsequent coding strategy. We then followed this process again with three subsequent transcripts from *participants* to ensure consistency of the implementation of the agreed upon coding strategy (Miles & Huberman, 1994). For each of the other respondent categories, we followed a similar process to ensure inter-coder agreement, but because we felt we were coding relatively consistently, we initially only double coded three

¹⁶ The description of the criteria I used to make the determination of current use of WaterGuard can be found on pp. 68-69 of Chapter 4.

transcripts per respondent category prior to comparing our codes and did not complete a second round of double coding per respondent category. To further facilitate the iterative process of qualitative research, I met regularly with research team members to discuss subsequent coding issues and emerging themes. My role on the research team included being the primary data coder for all transcripts with *participants, friends and relatives, and husbands* as well as the primary author of the study findings.

Addressing reliability and validity:

There has been considerable debate surrounding issues of reliability and validity in qualitative inquiry. A simplification of this debate points to two main schools of thought – those who argue that the terms validity and reliability were developed from positivist science and therefore do not apply to qualitative inquiry, and those who suggest that the terms need to be redefined or replaced in the context of qualitative inquiry (Mays & Pope, 2000). In this latter group, some researchers have called for replacing the terms validity and reliability with terms they consider more appropriate for qualitative methods, such as “quality”, “rigor” and “trustworthiness”, and subsequently identifying appropriate strategies for establishing or demonstrating rigor or trustworthiness (Golafshani, 2003; Lincoln, 1995).

The most universally applied of the strategies to assess study rigor (or validity) is triangulation (Patton, 2002). Triangulation has been described as a method to establish rigor in two different ways, first by establishing convergence among multiple and different sources of information and secondly, (through the lens of constructivism) enabling a more diverse or comprehensive construction of reality (Morse et al., 2002). Triangulation can be carried out in

terms of data sources, methods, or investigators (e.g. use of multiple data sources such as interviews, focus groups and observation; use of both qualitative and quantitative methods; use of external researchers confirming coding schema) (Patton, 2002).

In this study, we have triangulated in terms of data sources (conducting both interviews and focus groups), methods (results will be used to inform the ANC-SWHP quantitative evaluation findings), and investigators. We used investigator triangulation for coding as well as interpretation. As described in the data analysis plan description (above), two research team members independently developed thematic codes for transcripts from each participant category and then met to derive consensus on the subsequent coding strategy. Additionally, ongoing communication throughout the coding and analysis phases allowed for discussion and consensus in coding issues, identifying and synthesizing common themes and developing conceptual models. Morse and colleagues (2002) suggest that lack of investigator responsiveness during all stages of the research process “is the greatest hidden threat to validity” (p. 11). The investigator triangulation strategies just described can also be seen as an attempt to ensure a degree of investigator responsiveness by facilitating the iterative research process.

Other techniques incorporated into this study design to foster reliability and validity include attention to negative cases, and fair dealing. Negative or divergent cases were sought during the analysis phase. Patton (2002) suggests that understanding of identified patterns and trends is increased when researchers consider negative cases, such as instances where the data contradict or appear to contradict emerging themes. Seeking and explaining negative cases can help identify aspects of the analysis that are initially less than obvious, and subsequently,

negative cases might function to help clarify, broaden or cast doubt on a theme (Morse et al., 2002). Fair dealing implies that the research design explicitly incorporates perspectives of more than one group so as to avoid unfair bias (Mays & Pope, 2000). In this study we sought input from community respondents who consistently or recently treated their water with WaterGuard, as well as those who had not treated their water recently. Additionally, by interviewing ANC-SWHP program participants' husbands and identified friends and family members, as well as ANC health clinic staff and local WaterGuard vendors, our sampling strategy incorporates some degree of fair dealing.

Subjectivities:

Related to the issues of reliability and validity is the topic of subjectivities. Subjectivities can entail any quality of the investigator that effects study results. Given that in qualitative research, as Patton describes, the researcher is the instrument of analysis, identifying subjectivities is a way to establish investigator credibility (Patton, 2002). By convention, in qualitative research, identifying and reporting on subjectivities focuses on identifying the major experiences, training, perspectives and biases the researcher brings to the field. Since the field work for this study was carried out by trained Malawian qualitative researchers who speak the local language (Chichewa), and the transcripts from these interviews and focus groups were interpreted by team of U.S. based researchers, it is necessary to consider the impact of the subjectivities and standpoints of the entire research team, including how subjectivities may impacted the ways we asked questions, how team members and the questions we asked were

perceived by the study respondents, and how we perceive and interpret the respondents responses.

CHAPTER 4: RESULTS

Background on how results are presented:

The study results are presented in four sections. The first section provides descriptive data for each of the respondent groups. The second section summarizes respondents' self-reported descriptions of their household water treatment and treatment-related behaviors. The third section presents results related to respondents' attitudes, beliefs, and other motivational factors related to their water treatment practices. The fourth section describes identified barriers to treating household drinking water with WaterGuard.

The results presented in this chapter are based on transcripts from 90 interviews (36 *participants*, 15 *friends and relatives*, 16 *husbands*, 9 *health surveillance assistants*, 7 *nurses*, and 7 *vendors*) and 14 focus groups (11 with *participants* and 3 with *health surveillance assistants*). However, due to this study's focus on exploring facilitators and barriers to WaterGuard use, the findings discussed emphasize data from the 67 individual interviews with *participants*, *friends and relatives*, and *husbands*, and draw less frequently from the focus group discussions with *participants* and the interviews and focus groups with *health surveillance assistants*, *nurses* and *vendors*.¹⁷ Table 4.1 describes the numbers of interviews and focus

¹⁷ Although the experiences and perspectives of the female community respondents are the focus of this research, I draw a lot from the interviews with husbands, because their experiences and perspectives appear to be strong influences on the water treatment practices of their wives. Additionally, as described in the methods section, focus group discussions with *participants* covered topics related to WaterGuard use, but emphasized soliciting perceptions regarding the ANC-SWHP itself (e.g. *participants'* perspectives about the program requirement that to be eligible to receive the water hygiene kit, husbands must both attend the ANC clinic with their wives and obtain and HIV test, etc.). Subsequently, for this study, I draw less from these focus group discussions than from individual interviews with *participants*. Similarly, because interviews and focus groups with health workers and interviews with vendors did not exclusively focus on perceptions of barriers and influences on community water treatment practices (i.e., health worker interviews and focus groups largely emphasized programmatic questions about implementing the ANC-SWHP program and interviews with *vendors* emphasized WaterGuard sale trends and

groups initially proposed, completed, transcribed, and ultimately included in the analysis by respondent category. As noted in the Table 4.1, five interviews were not transcribed or included in the analysis because respondents did not sufficiently comprehend the questions due to language issues (2 interviews), recordings were of poor sound quality (2 interviews), or the transcription was lost (1 interview).

Throughout the presentation of results, I typically present findings about a particular topic distinguished by respondent category (e.g. *participants*). However, when illustrative to do so, I refer to *participants, friends and relatives, and husbands* together as *community respondents*; *participants and friends and relatives* together as *female community respondents*; and *health surveillance assistants and nurses* together as *health workers*.

practices), I only draw from those interviews and focus groups to the extent that I consider the findings to help answer or frame answers to my specific research questions.

Table 4.1: Number of interviews and focus groups by respondent category – proposed, actual, transcribed, and included in the analysis

| Respondent Category | Proposed Total | Actual Total | Transcribed Total | In Analysis Total |
|--|----------------|--------------|-------------------|-------------------|
| INTERVIEWS | | | | |
| ANC-SWHP Participants | 32 | 34 | 34 | 36 ^{a,b} |
| Friends and Relatives of ANC-SWHP Participants | 16 | 20 | 18 | 15 ^{b,c} |
| Husbands of ANC-SWHP Participants | 16 | 16 | 16 | 16 |
| ANC Nurses | 8 | 7 | 7 | 7 |
| ANC Health Surveillance Assistants | 8 | 9 | 9 | 9 |
| WaterGuard Vendors | 8 | 9 | 7 ^d | 7 |
| Total Interviews | 88 | 95 | 91 | 90 |
| FOCUS GROUPS | | | | |
| ANC-SWHP Participants | 8 | 11 | 11 | 11 |
| ANC Health Surveillance Assistants | 0 | 3 | 3 | 3 |
| Total Focus Groups | 8 | 14 | 14 | 14 |

^a One interview transcript from a *participant* was lost and therefore not included in the analysis.

^b Three interviews with *friends and relatives* were reclassified as interviews with *participants*, because during coding, it became clear that these women became pregnant subsequent to enrollment in the ANC-SWHP evaluation study and received the ANC-SWHP services (i.e. they became an ANC-SWHP participant and no-longer just a *friend or relative of a participant*).

^c Two interviews with *friends and relatives* were not transcribed because of language issues (i.e. the interviewer wrote on the field notes that the interviewees did not speak sufficient Chichewa [the national language of Malawi, and the language in which the interviews were carried out] to understand and/or respond to the interview questions – and interviews were cut short).

^d Two interviews with *vendors* could not be transcribed due to background noise on the recordings.

Descriptions of respondents:

Community respondents:

We recruited and interviewed all *participants, friends and relatives, and husbands* at their own homes, and every potential community respondent we approached for recruitment agreed to participate in the study. Table 4.2 summarizes key characteristics of the *participants and friends and relatives* we interviewed for the study. Some findings of note in Table 4.2 include the following: We interviewed similar numbers of *friends and relatives* whose drinking

water tested positive as negative for residual chlorine in the separate quantitative follow-up study that took place in March 2011. However, as anticipated, we had more challenges with recruitment of *participants*, and ended up interviewing more than three times as many *participants* whose drinking water tested positive as negative in the earlier study. As will be discussed in more detail in Chapter 5, this recruitment challenge is one of the factors that contributed to having only a small proportion of respondents classified as non-current users of WaterGuard in our study population. WaterGuard bottles were not observed in many homes – suggesting that those women were either not using WaterGuard or had recently run out of it.¹⁸ Many *participants* were still using the blue bucket with tap and lid that they received as part of the ANC-SWHP, and only one *participant* and one *friend and relative* report purchasing a similar type of bucket. We observed at least twelve households where drinking water was not covered as recommended. We did not collect demographic information on husbands.

¹⁸ While one might be inclined to consider a positive observation of WaterGuard in the home a good proxy for current WaterGuard use, given the high level of missing data on variables, it is difficult to interpret these results. Among the six *participants* with this data missing on this variable, water from two tested positive for chlorine residual (and therefore they likely had a WaterGuard bottle in their home), water from two tested negative for chlorine residual, and we do not have water testing data on the remaining two participants.

Table 4.2: Characteristics of individual interview respondents^{a,b}

| Characteristic | Participants | Friends and Relatives |
|--|---|---|
| Average Age | 25.9 years | 25.5 years |
| Average # of Children | 3.6 | 3.1 |
| Residual Chlorine Test Result from Quantitative Study in March 2011 | 28 Positive 8 Negative | 7 Positive 8 Negative |
| WaterGuard Bottle Observed in Home | 14 Yes 16 No 6 missing ^c | 3 Yes 6 No 6 missing ^c |
| Lid Observed on Drinking Water Container | 28 Yes 6 No 2 missing ^c | 3 Yes 6 No 6 missing ^c |
| Blue Bucket from ANC-SWHP (or similar bucket with tap) Observed | 27 Yes 7 No 2 missing ^c | 1 Yes 8 No 6 missing ^c |

^a The intent of this table is to describe characteristics of *participants* and *friends and relatives*, not to compare them: They are independent respondent types. Therefore, I did not run tests to measure statistical differences.

^b Among respondents enrolled in the quantitative evaluation study, 56% of *participants* and 54% of *friends and relatives* reported being literate, and 8% of *participants* and 4% of *friends and relatives* reported completed primary school.

^c A small portion of missing data is due to field worker negligence in completing interview cover pages, but most is due to the fact that 8 interview cover pages were lost during the transcription typing phase and subsequently data collected on the cover pages were lost.

As summarized in Table 4.3, we categorized 54 community respondents as *current users* of WaterGuard and 13 as *non-current users*. Refer to section *Past and present use of WaterGuard*, (pp. 68) for a full description of how and why we made these determinations. Throughout the analysis, I distinguish responses by WaterGuard use status as appropriate.

Table 4.3: WaterGuard use determination among community respondents

| Respondent Type | Current WaterGuard User^a | Non-Current WaterGuard User^b | TOTAL |
|------------------------|--|--|--------------|
| Participants | 29 | 7 | 36 |
| Friends and Family | 12 | 3 | 15 |
| Husbands | 13 | 3 | 16 |
| TOTAL | 54 | 13 | |

^a Respondents who self-reported using WaterGuard to treat their drinking water within the previous seven days were classified as **current users**.

^b Respondents who self-reported last using WaterGuard to treat their drinking water more than seven days prior to the interview were classified as **non-current WaterGuard users** (although some of these *non-current users* indicated that they will use WaterGuard in the future when they have funds to do so, and/or during outbreaks, or the rainy season, etc.).

Health workers:

All nurses and health surveillance assistants (HSAs) we interviewed work at one of the eight ANC clinic study sites and are responsible for disseminating messages about safe water and hygiene as a routine part of their work. Nurses work primarily in the ANC clinics while HSAs work primarily out in the communities doing home visits. We interviewed one health surveillance assistant each at six of the eight clinic study sites, three at another and none at another, and held a focus group of HSAs at three study sites, including at the one site where no interviews were conducted. Our original study design did not include holding focus groups with HSAs. However, once in the field we thought such focus groups might provide some additional insight that we were not getting from individual interviews, and scheduled these focus groups on our last three days of fieldwork. We were only able to interview one nurse at each of seven of the eight study sites, because no nurse was present during the day we did data collection at one of the sites. We did not collect any demographic information on *health workers* who participated in interviews or focus groups.

Vendors:

All *vendors* we interviewed sell WaterGuard in small shops located in commercial areas near ANC clinic study sites and were interviewed at their own shops. We interviewed one vendor in seven of the clinic communities and two vendors in another clinic community. However, we were unable to use two of the nine vendor interviews because of background noise on the recordings. Several of the vendors we initially approached for interviews declined to participate, stating that they did not want to take time away from selling products to customers. On average, vendors we interviewed reported selling WaterGuard for the past five years (range three months- nine years). Interviews with vendors focused primarily on sale trends and so are rarely referred to in this presentation of study findings. We did not collect any demographic information on vendors.

Household water treatment and treatment-related behaviors:

In order to understand behavioral influences on household water treatment, it is important to have a clear picture of how and when people do or do not treat their water. Water treatment practices vary widely across users due to a variety of factors and influences. This section describes water treatment and treatment-related behaviors of respondents. However, it is difficult to describe water-treatment related behaviors without referencing associated knowledge, attitudes and beliefs. Therefore, this section focuses on the actual behaviors as described by respondents, but contextualizes these practices through descriptions of related knowledge, attitudes and beliefs. The following topics are explored: drinking water sources; water collection, storage, and handling; past and present use of WaterGuard; seasonal

differences in source water quality, quantity and corresponding treatment practices; saving WaterGuard for specific occasions; use of stock chlorine to treat water; WaterGuard purchasing behavior; and WaterGuard experiences among program participants prior to the ANC-SWHP program.

Drinking water sources:

Approximately two thirds of program *female community respondents* report community boreholes to be their primary source of drinking water, although many of these women also indicate that when the boreholes are empty or not functioning they obtain drinking water from their own wells.¹⁹ Approximately one third of *female community respondents* describe wells as their primary source of drinking water and one *participant* reports a standing pool of water as her primary source of drinking water.

¹⁹ Boreholes are typically drilled cemented wells that use pipes and a hand pump to extract water, and are often centrally located. Wells are typically shallow hand dug watering holes that rely on a pulley system to extract the water. Wells may or may not be cemented, covered or otherwise protected. In rural Malawi, wells are located on many family compounds. Many women who use water collected from wells for washing and cooking use water from boreholes for drinking.

Figure 4.1: Woman drawing water from a well



Photo credit: J. Routh, CDC

Figure 4.2: Girls collecting water from a community borehole



Photo credit: K. Schlanger

Water collection, storage, and handling:

All *female respondents* report collecting water for drinking daily, and many report collecting it several times a day as needed. Many of these women describe washing out the container they use to collect their drinking water before they fetch it and/or washing out the container they ultimately use to store this water. It is not clear how many of these women use a separate container for water collection and storage, although many explicitly described doing so. Further, most *participants* indicate that they continue to use the blue bucket with a tap and lid that they were given as part of the ANC-SWHP to store (not collect) their water, while others (both *participants* and *friends and relatives*) describe using alternative storage containers (e.g. traditional clay pot, plastic container). Among the few *participants* who report no longer using the container they received from the ANC-SWHP program, all described doing so because either the bucket or tap broke.

The majority of *female community respondents* describe covering their stored drinking water to keep germs out, and many of the women who were not using a bucket with a tap described using separate cups for drawing the water and drinking the water, cleaning those cups daily, and/or storing that water separately from water used for cooking and cleaning, so as to avoid confusion. One *participant* and one *friend and relative* report having purchased their own bucket with a tap and lid to store their water.²⁰ The following quotes are representative of such practices:

²⁰ The buckets with taps that were given out as part of the ANC-SWHP program are reportedly not available for purchase in Michinga district outside of the commercial center in the district seat in Liwonde (where they reportedly sell for approximately US\$4.00), making them quite inaccessible for many people, even those who have the funds to purchase them.

After I collect my drinking water, I put it in the bucket and then add WaterGuard and then cover it. If we want to drink water, we use the tap. We do not open the lid.

-Participant, current user

We have a separate cup for drinking and drawing the water and it is all very hygienic.

-Participant, current user

Figure 4.3: A typical house in Machinga District, Malawi



Photo credit: K. Schlanger

Past and present use of WaterGuard:

All *community respondents* interviewed report having tried WaterGuard in the past and all but five report that they continue to treat their water daily with WaterGuard when affordable and accessible to them. Of the five who say they do not treat their water daily, three (*one participant* and two *friends and relatives*) describe themselves as no longer using WaterGuard, and two [*one participant* and one *friend and relative*] describe themselves as someone who only uses WaterGuard during the rainy season (i.e. “a seasonal user”). However, because this research is focused on understanding differences between those who use

WaterGuard routinely and those who do not, we based our categorization of respondents not on their self-identification as a current user or non-user of WaterGuard, but on their actual reported recent use of WaterGuard. For analysis purposes, we therefore consider respondents who report using WaterGuard the day of the interview, or who report running out within the past week, as *current users*, and those who report no use of WaterGuard in more than a week as *non-current users*.²¹ Using these criteria, we categorized 29 program participants as *current users* and seven as *non-current users*, twelve *friends and relatives* as *current users* and three as *non-current users*, and twelve *husbands* as *current users* and three as *non-current users*. While there are not many large differences in the ways *non-current users* and *current users* describe their water treatment use practices and motivations, I will indicate when differences were observed in the data to facilitate a better understanding of the possible differences between more consistent WaterGuard users and less consistent or lapsed users.²²

²¹ The criteria I use to categorize respondents as *current users* or *non-current users* of WaterGuard were arrived at after much deliberation among the research team. I originally framed this research to be a comparison between “users” and “non-users” of WaterGuard, however, the data clearly indicate that subjects’ use of WaterGuard is not sufficiently different to justify categorizing people according to those categories. Data from the quantitative study of the ANC-SWHP indicated that 71% of *participants* and 34% of *friends and relatives* used WaterGuard on the day their water was tested at follow-up compared to 0% and 1% at baseline respectively. But based on responses from respondents in this study, WaterGuard use is, for many, fluid and based on multiple factors. In order to get at these factors we had to come up with criteria with which to segment the population. We attempted to test people’s drinking water for residual chlorine during interviews, as a potential way to categorize respondents, but this protocol posed its own challenges. First, because water-testing was not consistently performed by field staff, we would have lost the ability to categorize a number of interviews. Second, there were occasions when this supposed objective measure was at seemingly inexplicable odds with people’s narrative of their own use. For example there were a couple of respondents who said they had not used WaterGuard in the last 24 hours whose water tested positive, including one person who said she had not treated her water in over a month. And lastly, as reported earlier, we lost cover sheets for eight respondents and therefore documentation of water testing results for these eight individuals. In the end, the research team decided that it made the most sense to categorize people based on their own narrative description of their WaterGuard use.

²² Among health workers, all but three reported treating their water daily: One of these three HSAs said s/he does not treat water when s/he thinks the water is safe; another said s/he treats water primarily during outbreaks only and one HCW said s/he treats water depending on his/her finances, but particularly during the rainy season.

When asked about when they treat their water, *participants* and *friends and relatives* all report that they treat their drinking water with WaterGuard, when they have it, immediately after collecting the water. In line with WaterGuard use instructions and the educational messages promoted in the ANC-SWHP, those women who get water from the borehole typically describe treating 20 liters of water with one capful of WaterGuard and those who get water from the well describe using 2 capfuls, particularly in the rainy season. A number of women also describe sieving their water through a cloth before treating it with WaterGuard. Overall, respondents describe the treatment process as very simple and not labor intensive and as something they feel comfortable doing on a regular basis.²³ In the words of one *current user*,

When we just draw it and put WaterGuard in it. If it's from the borehole we use only one cap, if it's from the well, two caps. –*Participant, current user*

The majority of *community respondents* describe that there are times when they cannot afford WaterGuard due to lack of funds. When people do not have WaterGuard (overwhelmingly reported as due to lack of funds, but occasionally reported due to delays in getting to the market or market stockouts), most describe boiling and/or sieving their water to remove impurities. However, several community respondents (both *current* and *non-current users*) report that they drink the water “as is” when WaterGuard is not available.²⁴ All of the respondents in this latter group report obtaining their water from a borehole, which was more

²³ Treating water with WaterGuard is a relatively simple process. Health workers are trained to instruct people to 1) wash out their storage container, 2) fill it with water, 3) pour in the recommended amount of WaterGuard—1 capful per 20 liters of clear water and two capfuls for 20 liters of cloudy water, 4) stir around the water, 5) wait 30 minutes before consuming.

²⁴ It is of interest to note that there are some women and families who report that they have boiled water in the past as a method of water treatment, but do not use it as a fallback option when they run out of WaterGuard, even if they are relatively dedicated WaterGuard users. In other words, the motivations for and barriers to boiling water as a method of decontamination appear to be somewhat distinct from those for treating water with WaterGuard (e.g. boiling water is time consuming and requires additional firewood).

consistently considered safer than well water.²⁵ One participant reports both boiling and treating her drinking water with WaterGuard daily.

When we don't have money, we boil the water. The organisms then rise to the top of the pot. Then we take a sieve and sieve the water, then put it in a bucket. We drink the sieved water and dispose of the tiny organisms. We drink like that due to the lack of money for WaterGuard purchase. –*Participant, current user*

I just use WaterGuard. When it is finished and I lack money to purchase (more WaterGuard), I just drink untreated water. –*Participant, current user*

I have never boiled water but I just heard about it...I heard that if you don't have WaterGuard, you should boil your water, let it cool for a bit then get a clean cloth and sieve the water. –*Friend and relative, current user*

Most participants describe that after WaterGuard has been sitting for more than 24 hours, they collect and treat fresh water for drinking and throw out the old treated water or use it for washing or cooking.²⁶

Seasonal differences in source water quality, quantity and corresponding treatment practices :

Female community respondents were asked about changes they observe or perceive in the quality of their source drinking water throughout the year, and any corresponding changes they may make to their water treatment practices. Many women describe the quality of the water from nearby boreholes to be consistent throughout the year, while others describe the water from the boreholes to be worse during the rainy season (October through March).

²⁵ Health workers report that they typically consider water from a shallow well to be both more contaminated and more turbid than water from a borehole, but notwithstanding that distinction, they also report that there are serious contamination issues with many local boreholes. Health workers are instructed to educate women to use 1 capful of WaterGuard per 20 liters of water when the water is clear and 2 capfuls per 20 liters with the water is cloudy (turbid).

²⁶ Health workers report that they encourage community members to replace treated water 24 hours after treatment, as they were trained to do, because the free chlorine in the water will have dissipated by that time and the water will no longer offer any protection against recontamination.

Opinions about well water were much more uniform, with most women describing well water as easily contaminated during the rainy season by both dirt and organisms.

In rainy season, water from the well is infested with things that are washed away with rainwater, but water from the borehole is always the same.

–*Friend and relative, current user*

Because of this increased perception of dirt and contamination in well water, a number of women who routinely use well water for drinking report treating this water with two capfuls of WaterGuard per 20 liters during the rainy season rather than just one capful.

If it is a season like this one, the drinking water has a lot of organisms in it... so we put two caps of WaterGuard. But if it is a season that is not like this one, we are only using one cap of WaterGuard, yes. –*Participant, current user*

The vast majority of *community respondents* describe the need and desire to treat their water year round, most often described as due to their understanding that water can be contaminated at the source anytime. However we heard from *participants* and *husbands* (but not *friends and relatives*) that their interest in treating water year round comes not necessarily from the perceived contamination of the source, but because of the potential for contamination to occur during collection, transport, and/or during storage at the home.

I use WaterGuard in both the rainy and sunny season because, like I said before, waterborne diseases and stomach diseases don't choose summer or rain, so there's no saying you should differentiate treatment regarding the season. Just treat the water the same in the rainy season and the summer and that is what I do.

–*Participant, non-current user*

I use WaterGuard all year round because diseases do not have seasons, they can attack you anytime. My seasons are in my pockets: it depends on whether I have money or not. –*Husband, current user*

Since water (safety) is not guarantee. You can tell your friend to help you put water on your head, but by mistake your friend can dip her hand in your water, and in so doing the water is dirty. But even you yourself can carry your water home and on the way

things can fly into your water. These things can be germs that cause diarrhea, because of this you cannot rely on treating water on seasons (i.e. only in specific seasons).
–Participant, current user

Despite the fact that most people report that they think it is important to use WaterGuard year round, many actually describe treating their water more consistently during the rainy season. Specifically, five out of the 29 *participants*, six out of twelve *friends and relatives*, and one of the twelve husbands classified as *current users* mention that they treat their water with WaterGuard more consistently during the rainy season because they believe that is when water is typically more contaminated, outbreaks of cholera are more likely to occur, and the risk for other diarrheal disease is greatest. Additionally, a couple of women mention that they also prioritize using WaterGuard during times of drought, when alternative, less protected, water sources are used. In other words, most respondents appear to want to treat their water with WaterGuard year round, but some describe prioritizing or doing so more during the wet season or other times when they perceive the water to be potentially contaminated.²⁷

During this season (dry), we do not treat our water often compared to wet season. In the wet season we treat our water often because diseases such as cholera and diarrhea are all over...(In the dry season), the diseases lessen up. But, if you have the WaterGuard you can be using it often because diseases don't depend on seasons.
–Participant, current user

I like putting WaterGuard in the rainy season. I am afraid because most of the things are washed away to water bodies during the rainy season, so I like putting WaterGuard during the rainy season to prevent diseases. ...Yes, in rainy season that is when we make sure that we should always use WaterGuard. –Friend and Relative, current user

²⁷ *Health workers* all report that they educate all clients to treat their water year round to prevent diarrheal illnesses from both contamination at the source as well as through storage and handling, yet similar to some of the comments from *community respondents*, three *health workers* report that they treat their own drinking water primarily during outbreaks and/or in the rainy season. While outbreaks of cholera and other waterborne diarrheal diseases are more common in the rainy season, these illnesses are not uncommon during the dry season.

We use WaterGuard the most during rainy season, and also during the time when water is scarce.... like in October, there is scarcity of water and you may not find water in boreholes or there is little. So most of us, we get water from the swamps or standing pools of water, and this water needs to be treated with WaterGuard.

–*Friend and Relative, current user*

These findings corroborate with comments made by *vendors* who all report that WaterGuard sales increase during the rainy season.

Among the seven *participants* classified as *non-current users*, only one describes herself as what could be called a seasonal user, reporting that she only treats her water with WaterGuard during the rainy season because that is when she believes the water to be contaminated. The six others indicate that they try to treat their water with WaterGuard whenever they have it, regardless of the season, although they might prioritize treating water with WaterGuard more during outbreaks or the rainy season. Among the three *friends and relatives* classified as *non-current users*, one describes herself as a seasonal user, and two report having only purchased and used WaterGuard once, months ago, so it is unclear if either of these later two women are likely to use WaterGuard again regardless of the season.

It (water quality) changes depending on the seasons. You have seasons where you have to use WaterGuard and others when you can drink your water without treating it. In the dry season the water is clear while in the wet season the water is not. ...because in the wet season there is an outbreak of a lot of diseases compared to dry season.

–*Participant, non-current user*

Saving WaterGuard for specific occasions:

Female respondents were asked if there were ever occasions or seasons where they have WaterGuard in the home, but choose not to use it. All but two (both *participants*) reported always using WaterGuard to treat their drinking water if they have it and remember to

use it. One women says that she occasionally chooses to boil her drinking water even when there is WaterGuard in the home, but did not give specifics regarding the circumstances under which she does this and another women said she once had WaterGuard and did not use it, because she wanted to test if she would get diarrhea if she drank untreated water. This finding further indicates that the vast majority of the study population is committed to WaterGuard use whenever available.

When WaterGuard is available, I use it. I don't just sit and look at it. If I am not using WaterGuard it means I don't have the money to go and buy it. *—Participant, current user*

Only if any bottle of WaterGuard is empty and I do not have money, that is when I use untreated water, but whenever I have it, I always use it. *—Participant, current user*

Figure 4.4: Field worker and participant during an interview



Photo credit: K. Schlanger

Use of stock chlorine to treat water:

In Malawi, the Ministry of Health distributes a stock chlorine disinfectant to local clinics for use by the clinic and periodically for free distribution to residents, primarily in the rainy season and/or during cholera outbreaks. In Machinga District, distribution to residents appears to focus on fishermen who work out on the lakes for extended periods, as a strategy to prevent cholera outbreaks. This stock chlorine can be used in a similar manner as WaterGuard to treat drinking water, although the stock chlorine has a much shorter shelf life (14 days from when it is first mixed) and a stronger scent than WaterGuard.²⁸ While the majority of *program participants* report knowing about stock chlorine, at least 25% (9/36) report they had never heard of it, and only three report having ever used it. Among *friends and relatives*, one-third (5/15) say they had never heard of stock chlorine, and only two mentioned ever using it. Based on comments from community respondents as well as health workers, stock chlorine availability for residents in Machinga district appears to be too limited to have much influence on WaterGuard use patterns.²⁹

WaterGuard purchasing behavior:

The vast majority of *participants* report purchasing WaterGuard at least once and most report doing so multiple times since they stopped receiving refills from the ANC-SWHP program. There were four *participants* classified as *current users* who said they had never purchased WaterGuard. All of them said they were currently using a bottle of WaterGuard they

²⁸ Stock chlorine is distributed to health clinics across Malawi by the Ministry of Health in powder form. Health workers mix the powder to make the chlorine solution. Once mixed, the solution has a shelf life of two weeks. WaterGuard is a more stable product and has a shelf life of one year. When used to disinfect drinking water, both stock chlorine and WaterGuard will provide residual protection for approximately 24 hours.

²⁹ It is relevant that our findings indicate that the distribution of free stock chlorine is extremely limited in Machinga because data from a study of WaterGuard use in another district in Malawi (Wood et al) were difficult to interpret because many people appeared to go back and forth between their use of WaterGuard and stock chlorine.

received from the ANC-SWHP program.³⁰ Two of the seven *participants* classified as *non-current users* reported that they never purchased WaterGuard after the samples they received from the program were depleted, while five reported that they had. Among *friends and relatives* and *husbands*, all reported that they have purchased WaterGuard. Two of the three *friends and relatives* classified as *non-current users* reported that they only purchased one bottle and have not used WaterGuard since that first bottle was used up.

People describe purchasing WaterGuard at nearby shops, although the reported distance to those shops varied widely, from a few minutes' walk to over an hour walk or even requiring a long bike ride. No one complained about or described the traveling distance required to purchase WaterGuard specifically as a barrier to use, although a few interviewees mentioned that not all shops stock WaterGuard, and prices between shops may vary.

About a third of the *participants* reported that husbands typically make the WaterGuard purchases because they are more frequently in the market areas. Women who purchase WaterGuard themselves (both *participants* and *friends and relatives*) all describe the need to ask their husbands for the money to make the purchase, although a couple of women also mention occasionally doing "piece-work" (i.e. small temporary jobs) to make money to purchase WaterGuard. Women report that their husbands typically readily provide them with money to make the purchase, if they have money available.

³⁰ It seems probable that these *current user participants* (who report never having purchased a bottle of WaterGuard) went through extended periods of time where they did not treat their water given the study enrollment period (13 months prior to qualitative data collection), the time frame of the intervention for each mother (early pregnancy to six months postpartum), the number of free WaterGuard bottles each mother is supposed to receive based on the program protocol (5). However, we did also hear from both *participants* and *health care workers* that some clinics distributed WaterGuard more frequently to participants than the protocol prescribed, so we cannot be sure about the implications of having no history of purchasing WaterGuard has for treatment consistency.

Yes, he (husband) gives me (money) to go buy. When I see that we've run out I can ask him, "Do you have 30 kwacha? I should go buy WaterGuard". So he doesn't say anything negative, because he knows that even if we don't have money to buy relish (i.e. protein or vegetables), at least we should buy for the drinking water. –*Participant, current user*

He gives me money (to purchase WaterGuard) when he has it, and sometimes we borrow from the store. –*Friend and relative, current user*

A couple of *participants*, including one *non-current user*, describe that their husbands can spend significant time away from the home (e.g. because they have a second wife and/or work for long intervals away from the home) leading to difficulty acquiring money to purchase WaterGuard.

After he bought the first bottle he bought another one. That one finished in February, and that's when he left. –*Participant, non-current user*

Respondents describe a bottle of WaterGuard lasting between one to six weeks (mostly in the three-four week range), depending on the quality or source of the untreated water and the amount of drinking water used. Most respondents describe purchasing WaterGuard after they run out, while a few *participants* and *husbands* report that they purchase more than one bottle at a time to stock up, or try to purchase a new bottle before the previous one runs out to avoid any gap in water treatment practices. No *friends and relatives* mentioned ever purchasing more than one bottle at a time.

... So when we got to the market we buy it (WaterGuard), sometimes just one bottle. If more money is available we can buy up to 4 bottles. If we're lacking then we just stay (i.e. don't buy any). –*Participant, current user*

While some *participants* indicate that they purchase WaterGuard quite consistently, many others indicate that they purchase it only when they have funds. Furthermore, it appears that while most *participants* consider WaterGuard a desired routine purchase, some appear to prioritize it more than others although they apparently have a similar financial standing.

At the end of the month, when it (WaterGuard) finishes, we go buy, and that's how we live. If you have no money that day, we can drink the untreated water, but the water is still very protected. –*Participant, current user*

He (my husband) isn't even stingy when he finds money. He even sacrifices his cigarettes for WaterGuard. –*Participant, current user*

WaterGuard experiences among program participants prior to the ANC-SWHP program:

About half of *participants* said that they heard about WaterGuard prior to the participating in the ANC-SWHP, although less than a third had any previous experience using it. Those *participants* who had heard of WaterGuard prior to their participation in the ANC-SWHP report, in relatively equal proportions, that they first heard about it on the radio, from neighbors or relatives, or at the hospital or clinic. Among those ten *participants* who describe using WaterGuard prior to the ANC-SWHP, several (both *current* and *non-current users*) say they had already been using WaterGuard relatively consistently for a while, even years, while others report only trying it or using it incorrectly (i.e. not using enough to adequately treat the water).

Ok, I chose to use WaterGuard (prior to the ANC-SWHP program). That's all because I'd heard (from the ladies at the well) that we are drinking bad water and we should buy WaterGuard and put in our water and the tiny organisms die. So I also started then to purchase, yes, before I went to Ntaja (ANC Clinic), before these visitors started coming to my home, I purchased and used it. ...Ok, I won't hide. At first, I was using it, but I was using it without proper knowledge so I was a backward person, who was not told the measurements and instructions. I was just putting...I would use one cap without knowing that swampy water needs two caps full. –*Participant, current user*

Disease such as diarrhea and this and that never left our home, so we thought that maybe it was all coming from not treating our water. So that's why we grew an interest with my husband to buy WaterGuard and start using it in the water...By the time I was going to the ANC I had already been using it for awhile. –*Participant, non-current user*

Attitudes, beliefs, and other motivational factors related to water treatment:

The results regarding attitudes, beliefs, and other motivational factors related to water treatment are presented under thematic subheadings that were developed using the theoretical constructs that guided the research as well as related themes that arose from the data. These subheadings include: awareness about the importance of treating drinking water, dissatisfaction with source water, beliefs that diarrhea can be serious and prevented, exposure to promotional messages, desire to prevent illness, economic and other perceived benefits, triggers for initial use of WaterGuard, motivations for ongoing use and purchase of WaterGuard, normative beliefs and support for treatment practices, importance of support from husbands, importance of support from HSAs, perceived community water treatment norms, diffusion, and status changes from using WaterGuard.

Awareness about the importance of treating drinking water:

Overall, *community respondents*, regardless of type or whether categorized as *current* or *non-current users* were all able to articulate at least a basic understanding that water can contain germs that cause a variety of diarrheal disease including cholera, and that adequately treating water can help prevent these diseases.

If we drink untreated water, the water might contain certain germs, and we may get these germs in us, while if the water is treated, the germs get killed. So when we drink untreated water, we drink the germs too. And when the germs get into the stomach, they cause the diseases. *–Participant, current user*

It is important because when we treat our water we reduce the number of germs present in the water, and in so doing reducing diseases. *–Participant, non-current user*

I know that all water has germs and if you don't treat that water, you might get diseases in the house. *–Friend and relative, current user*

While all *community respondents* described their belief that water can be contaminated at the source (e.g. well, borehole, river), many *participants* and a few *husbands* (but no *friends and relatives*) mentioned that germ contamination could also occur during transport and/or storage of drinking water. Safe water education at the ANC-SWHP includes all of these messages.

I use WaterGuard to prevent from some diseases because we draw it (water) far away, so I can't see all that can get in the water on the way from there to here, because there are some invisible organisms. –*Participant, current user*

It is strange; we cannot see or tell that the water has germs. Even water from the borehole may have germs. Germs may also enter our water when carrying the bucket home. When we pour WaterGuard, our water becomes protected. –*Husband, current user*

Dissatisfaction with source water:

Dissatisfaction with one's source of drinking water was described as a major motivator for treating water.

What disgusts me about drinking water without WaterGuard is that it disgusts me...because I drink along with the tiny organisms into my stomach. –*Participant, current user*

I'm satisfied (with my drinking water source) when I have money to buy WaterGuard and use in the water from the well. When I don't have it, I draw at the borehole, but I drink it with a suspicious mind, wondering if there are any germs or not. –*Participant, current user*

Some *female community respondents* however appeared to be more satisfied than others with their source water, which may influence treatment (consistency) behaviors. Only about 25% of *current users* (both *participants* and *friends and relatives*) reported that they were satisfied with the quality of their source water (at least in the dry season), while more than 2/3 of the *non-*

current users reported that they were satisfied with the quality of their source water (at least in the dry season) even without treating it. Satisfaction with one's water source appeared for many to be related to their beliefs about how good they or others take care of their source water or that the source water is treated or well protected (at the source). In fact, at least four *female community respondents*, including two *non-current users*, reported that the nearby borehole dispensed treated water, including two *non-current users*.³¹ The higher percentage of *non-current users* reporting satisfaction with their source water may indicate that satisfaction with source water functions as a disincentive to treatment.

Our water is hygienic because we take very good care of the well...We cover it and we sweep the surrounding area, and when it's late we lock it. –Participant, non-current user

We are satisfied with the water because we collect our water from a borehole that has treated water. –Participant, current user

Clearly the way participants describe satisfaction with their source water is not entirely predictive of water treatment behavior, as many women (at least all the *current users*) who describe satisfaction with their water sources also consider it important to treat their water. One might be satisfied with one's water source and still appreciate the benefits of treatment whether to treat potential contaminants from the source and/or contamination that might occur during transport or storage.

Additionally, some respondents describe being less satisfied with their source of drinking water during the rainy season (when they perceive germ contamination to be more

³¹ It is not clear what each of these four women mean when they say the borehole they use is "treated." Some might be using the word "treated" when they really mean "protected." But two women specifically report that people from the clinic treat the water at the borehole daily. I do not know if this is a misunderstanding or if health care workers actually treat some boreholes on a routine basis. Regardless, treating a borehole is not considered an effective decontamination strategy, because water from boreholes typically comes from underground streams, and therefore would require constant treatment to provide any on-going protection (R. Quick, personal communication, March 15, 2012).

likely) or if their preferred source (typically a borehole) is not functioning and they are forced to use another source (typically a well). See section above (pp. 71), *Seasonal differences in source water quality and treatment practices* for a fuller discussion of how perceptions about seasonal changes in water quality can motivate seasonally influences treatment practices. In short, the data suggest that the perceived reduction in water quality during the rainy season appears to be a strong motivator for water treatment practices or more consistent water treatment practices.

Beliefs that diarrhea can be serious and prevented:

Beliefs about diarrheal illness being something one is susceptible to and something potentially harmful enough that one would want to take steps to avoid it (rather than for example thinking that is not serious or inevitable) appear to be important motivators for practicing water treatment behaviors, as are beliefs about how a proposed action, namely using WaterGuard to treat one's drinking water, is effective at preventing diarrheal illness. In fact, these types of beliefs are core constructs of many behavioral health theories (e.g. perceived susceptibility, perceived severity, and perceived benefits in the Health Belief Model).

When *female community respondents* were asked how concerned they were about diarrhea, *current and non-current users* (both *participants and friends and relatives*) overwhelmingly described diarrhea as serious, potentially fatal, and something they are susceptible to and should try to avoid.

Diarrhea can kill. Say you been stricken by cholera here and the clinic is far and only a bit of your life is left. You can die. So I fear it a lot. –*Friend and relative, current user*

Diarrhea is bad, especially in a child. It weakens the child and the child loses appetite. A child may even die if he has the diarrhea for more than two days.

–*Participant, current user*

Because when disease strikes, you suffer and it is sad and worrying to see a child go through that, even parents, just because of not treating water, so we don't want diarrhea to reach us. –*Friend and relative, current user*

And beyond the health impacts of diarrhea, a number of women described diarrhea as important to avoid, because it disrupts one's ability to carry out routine work.

I am concerned about diarrhea because you can have diarrhea often and this may lead to a lot of problems, like you not being able to work or take care of your house or family. –*Friend and relative, current user*

If a person keeps getting sick, the person cannot manage to do his or her work. So, it is better just to drink treated water. –*Friend and relative, current user*

In addition to considering diarrhea as serious and something to avoid, almost all *participants* and *friend and relatives* described a belief that they could prevent or reduce outbreaks of diarrhea in their homes by treating their water with WaterGuard, along with other preventative strategies, such as covering drinking water, keeping the compound and cooking area clean, washing hands after using the toilet and changing a baby's diapers, eating food that is clean and not rotten, having and covering the pit toilet, etc.

...because I know when I go to the clinic they advise us that untreated water causes diarrhea to children, the husband or the mother. It is a threat that could cause death. So that is why I take interest in treating water—so that the problem of diarrhea should not come in my home. Yes. –*Participant, non-current user*

Preventing it (diarrhea) is quite easy, buying WaterGuard and using it. –*Participant, current user*

This disease of diarrhea does not affect us that much because we prevent the disease very much... When I put WaterGuard in, it means I have prevented this disease. The kids might get diarrhea because of teeth but not water. –*Participant, current user*

However, two *non-current users* (one *participant* and one *friend and relative*) said they do not think they can prevent diarrhea outbreaks in their homes and were unable to describe any strategies to try to prevent them. This lack of perceived self-efficacy to control diarrheal outbreaks, whether due to lack of knowledge, perceived control or something else, may function as a barrier to treatment.

Exposure to promotional messages:

The vast majority of *female community respondents* interviewed (both *current* and *non-current users*) reported that they had been exposed to WaterGuard promotional messages outside of the health centers, mostly through radio advertisements. A few respondents also mentioned hearing WaterGuard promoted from educational events sponsored by PSI (the maker of WaterGuard) (3), meetings organized by the local Chief (3), and television (1). It can be challenging however, to interpret the potential influence exposure to these messages may have on raising awareness about WaterGuard, changing perceptions of community norms about water treatment needs and practices, and/or motivating initial or ongoing use. Recall that about half of *participants* interviewed said that they had heard about WaterGuard from radio, neighbors or health facilities prior to the participating in the ANC-SWHP, but less than a third had any previous experience using it. And, in a recent national survey, 65% of mothers in Malawi had heard of WaterGuard, while only 7% reported current use of the product (Stockman et al., 2007), indicating that social marketing efforts to raise awareness of WaterGuard on their own may not be enough to influence trial or sustained use across a broad population.

This data does not imply that social marketing of WaterGuard is not an important influence on behavior for some individuals, alone or in combination with other factors. In fact, a number of respondents specifically describe these social marketing messages as influencing their decision to begin or continue using WaterGuard. Specifically, one *participant* and two *friends and relatives* told us they first heard about WaterGuard through radio advertisements and that hearing these promotional messages motivated them to purchase and use WaterGuard for the first time. Additionally, another two *friends and relatives* said their initial motivation to purchase WaterGuard came from a combination of radio advertisements and information they heard from HSAs. One *participant* mentioned that radio advertisements for WaterGuard help encourage her to continue using WaterGuard. Exposure to WaterGuard promotion messages, beyond from those coming from health care workers, appear to be quite common in Machinga District, and appear to have some influence on WaterGuard use, at least for some.

Whenever my family would drink untreated water we would all have diarrhea. So I had been hearing in the radio that people are selling WaterGuard, so I decided I would also join them. –*Friends and relatives*, current user

Desire to prevent illness:

The most common reason cited among *community respondents* for both trying and maintaining use of WaterGuard to treat drinking water was the desire to prevent or reduce sickness in the home.

My children were frequently getting sick. Yes, so that's what made me start using WaterGuard. –*Participant*, current user

We are able to drink our water without any doubting. We know that we are not drinking it together with the germs that cause diseases. This is why I treat my water.

–*Friend and relative*, current user

I just know that if I don't treat my water my children will have diarrhea. So, I need to treat my water. –*Participant*, current user

I just want to say this: I am so happy when I treat my water and sad when I don't because I know I can end up having diarrhea. –*Participant*, current user

My wife explained to me that we should start using WaterGuard because of the diarrhea problem, I agreed with her and then started using it. –*Husband*, current user

Most *community respondents* also said that they noticed reductions in stomach problems including diarrhea disease once they started using WaterGuard, and those experiences have kept them motivated to continue using WaterGuard when possible.

To me, I think it is very important because whenever I put WaterGuard in my water, my children do not suffer from diarrhea and I am afraid to give my children any other water apart from that with WaterGuard. –*Participant*, current user

In the past, before I started using WaterGuard, we were having diarrhea problems, but ever since we started using WaterGuard, the problem has decreased. I personally have not had diarrhea ever since I started using WaterGuard. –*Participant*, current user

When we use WaterGuard, we don't fall sick frequently. We only suffer from diarrhea when we don't use WaterGuard. –*Friend and relative*, current user

Yes, I have seen the change that the children do don't get diarrhea anymore and even us elders, we do not get diarrhea. –*Friend and relative*, current user

Because when we drink the water the children are happy because we are drinking good water. Even parents have rejoicing stomachs because we are drinking good water. So that is the benefit. –*Participant*, current user

These are the changes: At first before I started using WaterGuard, we used to get diarrhea frequently without knowing what is going on. But now that we are using WaterGuard, we don't get diarrhea because the water is protected.

–*Participant*, current user

Of particular note is that we did not observe major differences in the way *non-current users* and *current users* nor *participants* and *friends and relatives* discussed the desire to use WaterGuard to reduce diarrheal disease and perceptions about decreased diarrheal disease in

their homes when using WaterGuard. In other words, most respondents reported similar behavioral attitudes, beliefs, and experiences regarding the preventative benefits of WaterGuard. Apparently other barriers (e.g. lack of money) for ongoing use trump people's desires to treat their water, at least occasionally, among *non-current users*.

I can see the benefits. I can compare the time I used WaterGuard and the time I did not use, even my kids are happy. They referred to water with WaterGuard as "tasty water". The time we treated our water we did not have any stomach problems.

–*Participant, non-current user*

I saw that it had benefits... disease in my home is not as common as it was before I started using WaterGuard... I was drinking water without worry when I use WaterGuard. So I was interested to buy it at the market when I have money. I still make an effort to buy because I drink water with freedom together with my family in the home. Yes.

–*Participant, current user*

Economic and other perceived benefits:

As described above, the most often cited benefit of using WaterGuard to treat water was to reduce diarrheal disease. However other benefits community respondents mentioned included: being able to work more because of less illness, including not having to care for sick family members; saving time from not needing to boil water; saving money and time on diarrheal medicine and care; and general lack of worry. The fact that these other benefits were mentioned repeatedly suggests that some or all of them contribute to motivating people to continue to use WaterGuard to varying degrees. All community respondent types, regardless of their WaterGuard use status, mentioned these various benefits although only *current users* described their use of WaterGuard as a cost saving practice.

Yes, we've noticed changes (after we began using WaterGuard), because we used to have to buy pills (anti-diarrhea medicine) to give the children. But now there's a change—we're saving money. –*Participant, current user*

When the child gets ill, there is no progress in the home. Could be the gardening, since we obtain our money from farming to help our family. So if our family frequently got sick, maybe vomiting, diarrhea and the like, then we do not work freely. ...if the children or the parents don't often get sick then you can work effectively. Yes.

–*Participant, current user*

Well if I've woken up well, at 6am, I go to the well to draw water. By 7am, the water is boiled because 6am is early. Even a child can't be up looking for water to drink. So at 7am I boil it and sieve it. Because then I don't have WaterGuard right? But when I have WaterGuard, I go at 7 a.m. to the well and draw and put it in the bucket I received and cover it, and put a cup right there and go on with whatever, like going to the garden. I know that the kids will now access the water after it is already protected.

–*Participant, current user*

...because you know that your children are happy and there are no problems, everything is hygienic and useful in the home. Yes. So you are encouraged to keep living that lifestyle because it's proven helpful. ...Because when drinking water (treated with WaterGuard) you don't worry whether the water is good or not. But we know that we're drinking good water and nothing will happen to us. –*Participant, current user*

I notice a difference because I used to spend all day looking after children. But now, yes we get other illnesses like headaches, but the diarrhea ceased, so I knew that this medicine is good. –*Friend and relative, non-current user*

We used to fall sick frequently and rush to the clinic. We would all end up at the clinic instead of doing various jobs like farming. Now we rarely fall sick because we use WaterGuard. –*Husband, current user*

A couple of health workers also described savings in time caring for sick family members and medical care costs as strong motivators for women to use WaterGuard, although this was not a common theme in other interviews.

They are encouraged because most illnesses are handled by a woman. If a child falls ill, it is the woman that helps. If the husband falls ill, it is the same woman that helps. And when she also falls sick then she is in a lot trouble, so to avoid this she decides to treat water with WaterGuard. –*Nurse*

The comparison can be that a person using WaterGuard benefits more than the money they have spent because when they buy WaterGuard, they save a lot of money that could be spend on buying medicine. –*Health Surveillance Assistant*

Triggers for initial use of WaterGuard:

Respondents describe the desire to reduce diarrheal disease as the major motivation behind using WaterGuard. And, for many *participants* and *husbands*, the impetus or actual trigger to start using WaterGuard was participation in the ANC-SWHP. Many of these individuals reported that they specifically started using WaterGuard because they wanted to follow the advice given to them by health care workers, the health care workers helped them understand how to use and the importance of using WaterGuard, or through the program they now had the resources to keep their water safe. For other community respondents, including all *friends and relatives*, the trigger to actually start using WaterGuard came from factors external to the ANC-SWHP program, including diarrhea outbreaks (locally or within their family), media messages, advice from neighbors, friends or family, and/or advice from health care workers apart from the ANC-SWHP program.³²

Comments from respondents that indicate that following advice and encouragement from health workers were the primary triggers for their initial WaterGuard use include the following:

When I got home (from the ANC clinic), I decided to use WaterGuard since that was what I was told by the doctor. I decided to use it and see its outcome. When I just used it I was impressed. –*Participant, current user*

I started (using WaterGuard) when I went to the clinic when I was pregnant. When I went to the hospital (clinic) I got my blood tested, that is where they gave me a bucket. Together with my husband, they gave us a bucket and counseling on our lifestyles. They also gave me WaterGuard and handwashing soap. Yes, that's what they told me there and that's what I do here. –*Participant, current user*

³² It is a possibility that some *friends and relatives* may have initiated their use of WaterGuard after receiving a free sample of WaterGuard, however no one mentioned this being the case. Local health centers, PSI, other NGOs, USAID sponsored programs etc., have on occasion distributed free WaterGuard to the general public in parts of Malawi, but (although not asked explicitly about this) none of the respondents in this study mentioned receiving or knowing about free WaterGuard distribution campaigns other than the ANC-SWHP.

I had never used (WaterGuard) before (the ANC-SWHP program). Let's say because I only used to hear, but the HSA had not visited us to encourage us to use WaterGuard in our water, so I was not using it in my life. –*Participant*, current user

A number of health workers also reported that health workers are typically well respected in the community and consequently people are motivated to use WaterGuard specifically because they are encouraged to do so from health workers.

They are encouraged by the advice that we give them and what they observe in the villages... because they know that the clinic cannot give something that is harmful to health. –*Nurse*

For others, it appears that it was not just following advice that triggered their initial WaterGuard use, but more specifically that the education they received facilitated a better understanding of how and why to use WaterGuard, including perhaps overcoming previous barriers they may have had to using WaterGuard. As mentioned earlier, half of the *participants* and two-thirds of *husbands* mentioned that they had heard about WaterGuard prior to the ANC-SWHP, although most had no previous experience using it.

I started hearing about WaterGuard a long time ago but I wasn't interested. But, when I heard about it at the ANC, I saw its benefits... (before) I thought it was useless. I did not know that WaterGuard could help me at that time. I thought taking care of my water (e.g. covering it) was treating it, but after I went to the ANC, then I noticed WaterGuard was important. –*Participant*, non-current user

At my age, I started hearing about WaterGuard a long time ago, but you know how it is here in the village. People say stuff about WaterGuard. Others say if you drink water treated with WaterGuard you vomit. So, we ended up not having interest in it. So when we received educational messages from the health workers, I decided to try it out. Then we found out that WaterGuard is important. So when we joined the program I started using it, when it finished I would go get more, until I started buying it. –*Husband*, current user

Yes, I heard how WaterGuard is used but I was just lazy to go and buy it. That just never crossed my mind. The doctor told me the same things and I understood how it is used and decided to start using it... I would stay at home and just hear that people use WaterGuard to treat their water and I didn't know what the benefits were. I found out the benefits when I started using it and bought my own after I used up the free refills. –*Participant* (focus group)

I started hearing about WaterGuard a long time ago but I never used it until now. I could hear about it on the radio. I started using WaterGuard this year when my wife was pregnant with our youngest child. There was no one to encourage us before, but now that we have been enrolled into this program, we are able to use WaterGuard. ...We wanted to treat our water before, but we didn't know how. –*Husband*, current user

In addition to the SWHP motivating *participants* who had never tried WaterGuard to do so, a couple of women who had experience using WaterGuard prior to their participation in the ANC-SWHP mentioned they were now more committed users due to the education they received from the ANC-SWHP.

Yes, we used it (WaterGuard) (prior to the ANC-SWHP program), but we were not interested then because of the smell. A lot of people don't like it, not knowing that it is better to prevent yourself from diarrhea than mind the smell. –*Participant*, current user

Receiving the bucket with the lid and the tap, along with the free WaterGuard, also appears to be a strong motivator for some participants to treat their water with WaterGuard. Several participants describe these buckets as the most important part of the ANC-SWHP. These buckets are considered quite valuable because they reportedly sell for US\$4.00, but also because access to any type of water tap mechanism is rare in this region. Buckets with taps, similar to those distributed in the ANC-SWHP, are reportedly only available in the district seat in Liwonde. One woman specifically described that the reason she loved her bucket so much was that it made her feel like she had running water in her house. For many participants, it appears that receiving the bucket with its lid and tap, along with the WaterGuard, now made possible a

simple system that people could follow to have their water stay safe, a system that was previously not affordable.

Our water is hygienic, especially because of the taps. Children would just scoop water without washing their hands because we would be too busy to notice. But now, they just open the tap, get the water in a cup and drink it. So that is another way of keeping the water safe. It really helps me and I am used to it.

–Participant, Focus Group Discussion

I felt the hygiene kit program was important because now we are drinking safe water because of the buckets that they gave us. –Participant, current user

Yes, since I received the bucket, I do not miss using WaterGuard.

–Participant, current user

Although not well articulated in the responses from *participants*, it is also possible that an enhanced desire to keep their family healthy during their pregnancy, or a greater level of responsiveness to health promotion messages due to pregnancy, may have also contributed to motivating some *participants* to try using WaterGuard.

I'd hear about it but I wasn't interested in it. Since we live in the village, where it's (WaterGuard) scarce and people are ignorant, but we'd hear them talk on the radio that it's good in water and makes the water safe, but I wasn't interested. But when I was pregnant, when I saw that they say we should use (it) this way, that's when I decided to use it. So I saw that it's good. –Participant, current user

Participants who used WaterGuard prior to their participation in the ANC-SWHP described triggers for both purchasing and initiating WaterGuard use as including some combination of the experiences with diarrheal disease outbreaks, radio messages, and suggestions from a friend, husband, healthcare worker, or village Chief. For these women, unlike those who had knowledge of WaterGuard prior to participating in the ANC-SWHP program but had never used it, hearing about the benefits of WaterGuard from one or more

sources was a key motivator to encourage them to purchase WaterGuard on their own and start using it.

There was someone who encouraged me to treat my drinking water. Back then, when diarrhea was very frequent in my home, my friend encouraged me and said if I start using WaterGuard in my home, I will decrease the number of sicknesses. So that is when I started using WaterGuard. *Participant, non-current user*

When the HSA told us about WaterGuard, the time there was an outbreak of cholera and diarrhea, we thought it was wise to use WaterGuard. Then it was 35 Kwacha. It was cheap to prevent from diarrhea the whole month. *Participant, current user*

I started using it because I heard about it in radios and because my husband is a fisherman and he stays at the lake, so he uses WaterGuard. *Participant, current user*

Many *friends and relatives* described similar influences or motivations for initial WaterGuard use (e.g. advice from friends, husbands, healthcare workers, radio, etc.). And three *friend and relatives* specifically mentioned that they were educated about and motivated to purchase and use WaterGuard by a program participant.

I saw a certain family use WaterGuard and their children rarely suffered from diarrhea... So, I thought of doing the same to stay healthy too. *–Friend and relative, current user*

I was convinced of what I heard from the hospital because they said that when you use WaterGuard, you do not suffer from diarrhea frequently, so I thought of following that way to see if it can help. *–Friend and relative, current user*

Mostly it's because of what I said, that I heard it from the radio and I wanted to try. So when I tried, I saw the goodness of it. *–Friend and relative, current user*

She (my friend) was pregnant, then she joined the program (ANC-SWHP), then was asked to bring in a friend, so she introduced me to them, then she started explaining to me what WaterGuard was all about. *–Friend and relative, current user*

Health workers similarly described that in addition to following advice from health workers, people are motivated to start using WaterGuard because of encouragement from other community members.

I remember this other meeting that took place ...and when it came a time for some Chiefs to speak, X (a Chief) talked about WaterGuard and told everybody about the goodness of WaterGuard. And that is why I know that people do encourage one another. –*Health Surveillance Assistant*

Motivations for ongoing use and purchase of WaterGuard:

The ANC-SWHP program was designed to allow recipients to experience the benefits of WaterGuard (via free bottles of WaterGuard) before having to purchasing it themselves. Based on responses from *participants* and *husbands*, it appears that people's experiences with decreased diarrhea from using the free bottles and a desire to continue to prevent diarrheal disease do in fact serve as a strong motivator for continuing to use and purchase WaterGuard.

When we received the free refills, we saw its importance, so me and my husband decided to go buy it. –*Participant, current user*

We will keep using WaterGuard in this home because in this home, the children don't get stomach illnesses, no, we're just living. So when we run out of WaterGuard, we will go buy some more. –*Participant, current user*

The reason that has encouraged me (to purchase WaterGuard) is because diarrhea has become uncommon in my home so I saw that stopping this practice of treating my water would bring back illness to my children such as frequent diarrhea.

–*Participant, current user*

I saw that it had benefits. I was drinking water without worry when I use WaterGuard. So I was interested to buy it at the market when I have money. I still make an effort to buy because I drink water with freedom together with my family in the home. Yes.

–*Participant, current user*

I will always use WaterGuard. I will never go back to my old ways of not using WaterGuard, even if they stop giving us free refills. I will still try to buy one.

–*Husband, current user*

A couple of *participants* mentioned not only that they experienced decreased diarrheal illnesses when using WaterGuard, but that they experienced a resurgence of diarrhea when they stopped using WaterGuard that further motivated them to purchase and continue using it.

Yes, the time that I stopped after I ran out of WaterGuard there were several cases of diarrhea in my house so that is what I remembered. –*Participant*, current user

Not entirely unrelated to the desire to keep diarrheal illness at bay, other reasons *participants* and *husbands* mention as motivating them to purchase and continue using WaterGuard include advice from the health care workers, particularly from the HSA home visits (see also *Importance of support from HSAs*, pp. 103), support from others (see *Normative beliefs and support for treatment practices*, below), growing accustomed to WaterGuard's taste and smell, keeping kids happy, reduced worry, and being encouraged to do so through radio advertisements.

Because I was told by the HSA to buy after the free refills were done. –*Participant*, current user

Treating my drinking water is very essential to my life... We just got used to it. Drinking water that wasn't treated with WaterGuard just didn't feel right. –*Participant*, non-current user

Because my children's faces look happy when they are drinking treated water. They do not have diarrhea, so they are always happy children. –*Participant*, current user

Friends and relatives similarly overwhelmingly described their motivation to continue using WaterGuard as coming from positive experiences from using it, along with a continued desire to prevent diarrheal diseases. And a few *friends and relatives* also mentioned motivation to continue using WaterGuard coming from support from others, including husbands, friends, relatives, healthcare workers, and on-going radio advertisements.

I am now used to WaterGuard. If the water does not have WaterGuard, I do not drink, and if it is not boiled I do not drink as well. I am scared of the diseases –*Friend and relative*, current user

We hear messages from the radio that WaterGuard is good. We hear about it on the radio and we tell ourselves that the people telling us to use this are not stupid, so we should continue using it. –*Friend and relative*, current user

Normative beliefs and support for treatment practices:

Other potentially influential motivators on sustained water treatment practices come from normative beliefs related to WaterGuard use, that is, perceptions of whether individuals important to the person using WaterGuard approve or disapprove of their WaterGuard use. These normative beliefs overlap in many ways with perceived or actual support or encouragement from others for treating water. To get at these normative beliefs we asked women if there are people in their family or community who encourage or discourage their use of WaterGuard and to describe how, if at all, their use of WaterGuard has changed community members' perceptions of them. Both *current* and *non-current users* (both *participants* and *friends and relatives*) overwhelmingly reported encouragement from others for treating their water, including husbands, relatives, friends, HSAs, and a couple also mentioned children and village Chiefs. There were also a handful of respondents who mentioned that they have friends, neighbors, and/or family members who discourage them from treating their water, because of the smell and taste of water treated with WaterGuard. Interestingly, this lack of support from friends, neighbors, or family members did not appear to trump positive support from husbands, HSAs or other friends and family members. Overall, *non-current users* were not more likely to report discouragement (or less encouragement) from relatives, friends and neighbors.

Mention of support and encouragement for WaterGuard use was quite common and most *community respondents* did not mention anyone who discouraged them from using it.

Some comments about support or encouragement for WaterGuard use from husbands, other family members and neighbors include the following:

Yes, my husband always encourages me to treat my water. He says water must be treated. He tells me that I should look at the children as an example that WaterGuard is working because the children no longer get sick. *–Participant, current user*

My mother, she tells me to treat my water with WaterGuard especially because of the children; she tells me that if I do not want my children to have diarrhea then I have to treat my water. *–Participant, current user*

You know the children (used to) shout by complaining about the smell of WaterGuard, but then they get used to it and if you do not put WaterGuard in the water, they ask, “Why you did not put WaterGuard”. *–Participant, current user*

My husband encourages me, since he was used to drinking treated water from where he stays at the lake (when fishing). *–Participant, current user*

Yes, my husband, he tells me we are meant to use WaterGuard. He encourages me by giving me the money. *–Participant, current user*

Health workers also mentioned ongoing encouragement from family members and neighbors as important influences for on going treatment.

The men in my catchment area encourage women to always use WaterGuard because many of them move around a lot, as they always go to the lake and back, and know that there are often outbreaks of cholera in the lakeshore areas, and they don’t want to see that at their house. *–Health Surveillance Assistant, Focus Group Discussion*

They (husbands) encourage (their wives) by helping with the treatment process, reading the instruction if the woman is unable to read, reminding if she has forgotten to treat the water, buying WaterGuard when it has finished. Buying in itself is an encouragement. *–Nurse*

A substantial number of respondents (7 participants and 5 friends and relatives) mentioned that they have friends and/or family members who discourage them from treating their water. This discouragement was always described as due to a dislike of the smell or taste of water treated with WaterGuard. No one described this discouragement as influencing their

decision to use or not use WaterGuard, although it is possible that the two *non-current users* (both *participants*) who mentioned having friends who discourage them from using WaterGuard because of the smell were potentially negatively influenced by these normative beliefs. Of note, is that a few *female community respondents* specifically described how they do not pay attention to negative perceptions or comments about WaterGuard and that their behavior is more influenced by their own opinions and those of their husbands.

Some people don't know the importance of WaterGuard, that's why they insult us. We just need to clearly tell them the importance of WaterGuard.

–Participant, Focus Group Discussion

There are people who say, "WaterGuard stinks," but I do not listen to them. Most of these people are my friends. They say that your water stinks and they refuse to drink it.

–Participant, current user

For example my older sister on that side says she doesn't like WaterGuard treated water. My friends also say WaterGuard stinks and it's not good... (But, my husband) says WaterGuard treated water is very important, and that I shouldn't stop using WaterGuard in the water. –Participant, non-current user

Others say a lot about it, concerning the smell. But, we do not listen to them because we know its benefits. –Participant, current user

Others tell me to stop, saying my water smells very bad. So I encourage them to stop thinking like that because WaterGuard helps. Although it smells, we still need to prevent diseases. –Friend and relative, current user

They say we are just wasting our money, that there are no benefits of using WaterGuard. They say anyone can still suffer from diarrhea. We don't know if the people telling us to use WaterGuard use it themselves.

–Participant, Focus Group Participant

Related to normative beliefs about what respected community members think about a specific behavior are individuals' perceptions of what is normal or appropriate. In other words, people who think it is normal or within the realm of normal or appropriate behavior to treat their water will be more likely to do so. *Community respondents* did not specifically mention

norms about water treatment as influencing their decisions to treat their water, although the fact that they all have treated their water implies that they consider it normal or at least appropriate to do so. On a few occasions, however, health workers mentioned that some people are resistant to treat their water because they don't think it is normal or necessary. (For further discussion see *Satisfied with untreated water*, pp. 119)

Some say that they just want to feel the natural smell and taste of the water.
–Participant, Focus Group Discussion

Because they are born to this environment, they think it's normal. So you try to make them understand that you need safe water, you need your water to be treated, you need to have safe water for you to see that this is what will lead to good health. So we try to help them have the informed choice of, okay, I can use this water just for washing, but for drinking water I should use this water. So that's what we are doing. –Nurse

Importance of support from husbands:

Comments from many women (both *participants* and *friends and relatives*) indicate that the support from their husbands regarding WaterGuard may be an important influence on water treatment practices. This is not surprising given cultural norms about household decision making in Malawi, combined with the fact that women report that husbands typically must provide them with the money to purchase WaterGuard or the husbands purchase it themselves. In Malawian marriages, men are typically considered the ultimate authority, particularly as related to finances, although women appear to have limited control over certain aspects of household life, such as food preparation, water collection and child rearing. Based on some comments, water treatment practices appear to be in the realm of wives' responsibilities, however for others decisions regarding water treatment or purchasing of WaterGuard appear to be more in the realm of husbands' responsibilities. Most women interviewed mentioned

spousal support for the use of WaterGuard although a few women reported that they had to overcome some initial resistance from their husbands, and one woman acknowledged that if she did not have support from her husband, she likely would not keep using WaterGuard.

If I don't use WaterGuard on that day, he reminds me to keep the water treated. Yes, but also, if it is finished, I tell him and he goes to buy it. Maybe if he would say he doesn't want to buy it then I wouldn't have been using it, but he's the one who encourages me. *–Participant, current user*

I didn't know what to do at first since he is the head of the family (laughter). The good thing is he accompanied me to the ANC clinic where we got the hygiene kit. We were told that we wouldn't get one if we come alone. So he was able to listen to the advice that we received. I would then remind him of what we were told when he refused to drink treated water. I tell him to go complain to the doctor, not me. I tell him that we received the hygiene kit so that we can use it, and that includes using WaterGuard. He would eventually give in and drink treated water. We should not always give in to what they say and always say, "Yes boss". When he falls sick, I will be the one running up and down trying to take care of him. *–Participant, Focus Group Discussion*

(At first) My husband told me not to use WaterGuard, but I refused. I told him he will have to drink such water whether he likes it or not. I poured WaterGuard in one bucket and put the other bucket with water for cooking out in the sun. Now he is used to drinking treated water. I told him that we now rarely fall sick because of WaterGuard. When I tell him that we have run out of WaterGuard, he goes to buy another bottle because he now knows and has seen the benefits. *–Participant, Focus Group Discussion*

The near unanimity of reported husband support may in part be related to the fact that husbands of *participants* received safe water education at the ANC clinic. In fact, a number of *participants* mentioned that one of the reasons they liked having their husbands go with them to the ANC clinic was that they then felt more supported by their husbands in following the recommendations from health care workers. Many husbands also mentioned they were very supportive of their wives use of WaterGuard.

I was very happy (that my husband came with me to the ANC clinic) because we heard the messages together. If I heard it alone, he wouldn't have believed me. He would have said I thought it all up by myself. That's what I was happy about.

–Participant, current user

Well, we heard them preach about the same things: That we need to store what we received in a safe place and have safe water, wash hands everyday, no shortcuts. And, because he understands and till this day, he is free (of diarrhea), he isn't even stingy when he finds money. He even sacrifices his cigarettes for WaterGuard.

–Participant, current user

Husband support for WaterGuard use however also appeared quite strong among *friends and relatives*, whose husbands have not necessarily received any education about WaterGuard, and so the long-term impact of educating husbands about safe water practices at ANC visits on long-term water treatment practices is not completely clear. Most *friends and relatives* mentioned that they had explicit support from their husbands for using WaterGuard and a few others described more implicit support.

He encourages me to use it (WaterGuard) every day... He says I prevent different diseases. –Friend and relative, current user

He doesn't say anything about it (my use of WaterGuard). I think he likes it.
–Friend and relative, current user

He does not say anything, because he knows that whatever the woman has planned, that is what will be happening because when I treat the water, that means we are all safe. –Friend and relative, current user

Among *participants* and *friends and relatives*, we did not observe reports of husband support for treating water to be less common among *non-current users* than *current users*. So while it seems likely that lack of husband support for water treatment could negatively impact treatment behaviors, we have no data from community respondents to support this hypothesis. On the other hand a couple of health workers mentioned that they perceive lack of husband support to negatively influence water treatment practices.

Some women stop using WaterGuard due to lack of interest from their families,

especially the husband. If the husband does not show interest or does not give money for buying WaterGuard. So most women fail because of their husbands influence.
–*Health Surveillance Assistant*

Importance of support from HSAs:

As mentioned under *Motivations for ongoing use and purchase of WaterGuard* (pp. 95) *participants* expressed strong sentiments about HSAs and the role HSAs play in encouraging them to purchase and use WaterGuard (as well as implement a variety of hygiene practices). Many *participants* expressed gratitude for those visits from HSAs and some considered it the most important part of the ANC-SWHP program. Further some *participants* also mentioned that the support they received from the HSAs facilitated their ability to withstand discouragement about water treatment from friends or relatives.

Some of my friends come here and see the water I'm drinking and they dislike it but I follow counsel from the clinic and those who visit me (HSAs) and encourage me of its benefits. –*Participant, current user*

My neighbors may say bad things about me treating my water, but HSAs come and compliment me on my treated water. They (HSAs) tell me that it is important to treat water that my children will not get sick. –*Participant, current user*

Husbands also often reported that HSAs provided a strong influence on their decisions to purchase and use WaterGuard.

The HSAs told me to buy WaterGuard. My family is now healthy. That is why I do as they told me and buy WaterGuard... When I saw that we are no longer suffering from diarrhea, I decided to continue using WaterGuard. –*Husband, current user*

We prevent diarrhea. We don't want to fall sick frequently and we want the same for our children. They should be healthy...As I said, it was quite difficult for me to drink the water. I even contemplated to stop using WaterGuard because of the bad smell but the messages on the radio and at the clinic still told us that there are a lot of benefits of using WaterGuard. That is when we decided to continue using WaterGuard and hope that we get used to the smell. ...The HSAs, they played a huge role. They always advise

us to use WaterGuard. I also hear about the importance of using WaterGuard on the radio. –*Husband, current user*

Many *friends and relatives* also described their WaterGuard practices as influenced by HSAs, but these sentiments were not as uniform nor typically as strongly expressed as those from *participants and husbands*. Most *friends and relatives* described being visited by HSAs on multiple occasions to discuss a variety of sanitation and hygiene practices including safe water, with about half of these women specifically mentioning that HSAs encouraged them to use or influenced their decision to try or continue to use WaterGuard.³³ Overall, support from HSAs for treating household drinking water with WaterGuard was mentioned with a little more frequency among *current users* than *non-current users*, but the difference was not dramatic.

Perceived community water treatment norms:

Related to normative beliefs and acceptability of water treatment practices are respondents' perceptions about what others in the community actually practice with respect to water treatment. More than half of *female community respondents* report that at least some of their neighbors treat their water with WaterGuard. But while some women thought many people in their community treated their water with WaterGuard, others mentioned knowing only of a few others who treated their water. There were no noticeable differences in

³³ Apart from the ANC-SWHP program, HSA responsibilities include educating people in their catchment area about a variety of sanitation and hygiene topics. And all but two *friends and family* reported that HSAs had visited them in their homes. It is unclear to what degree or frequency these visits would have occurred apart from the ANC-SWHP program evaluation study. It is possible *friends and relatives* were visited by HSAs in the course of their routine community visits, but it is also possible that at least some HSAs chose to visit them more frequently than they otherwise would have because of these *friends and relatives* inclusion in the ANC-SWHP quantitative program evaluation protocol. Thus, the design of the study may have led to some contamination (i.e. HSAs educating friends and family members who they otherwise would not about WaterGuard because of their enrollment in the evaluation study).

perceptions about the water treatment practices of neighbors between *current users* and *non-current users*.

Status changes from using WaterGuard:

The majority of *participants* reported that their use of WaterGuard did not impact their status, or they did not know if it had changed how people in their community view them. However, a substantial number of *participants* said that since they started using WaterGuard, they were now viewed as more knowledgeable, up-to-date (modern), with healthier and happier children, or that they were envied.³⁴ Some *participants* mentioned there are some people who have discouraged them from using WaterGuard or who were incredulous they could live with the smell and taste of WaterGuard. And a small number of participants reported that people insulted them because they used WaterGuard. We did not ask *friends and relatives* about any perceived change in status due to their WaterGuard use, while *husbands* reported similar findings to *participants*.

Others wouldn't congratulate you face to face, others would, maybe those that see notice that we don't have problems with the children and are healthy.
–*Participant, current user*

In my case, they talk about my use of WaterGuard in a sarcastic manner. They say I am hygienic and smart, but they say it in a nasty way. I don't really mind because at least things are working out for me. –*Participant, Focus Group Discussion*

They envy us because I have managed to stand WaterGuard, because others cannot stand WaterGuard, they vomit. Others have stomach pains. –*Husband, current user*

³⁴ It was not always clear why some *participants* thought they were envied (i.e. was it because they had a blue bucket, had access to free WaterGuard, could handle the taste or smell of WaterGuard, were able to afford WaterGuard, or had healthy children).

They talk. Most of them say that our water does not taste nice. Most of them insult us because very few people use WaterGuard here. I tell them to use WaterGuard, but they don't. –*Husband, current user*

It is good to use WaterGuard because our children live happily and we offer our friends water too when they visit us. They notice the difference. We don't fall sick frequently and our friends compliment us. ...We sometimes talk about as friends when we meet. We encourage our friends to use WaterGuard. ... My friends just compliment me, that I am doing the right thing. I then ask them why they don't do likewise. I tell them that my wife may tell them how to use WaterGuard. –*Husband, current user*

Diffusion:

Closely related to concepts of motivations for initial use of, social support for and community norms related to WaterGuard use is the concept of diffusion. Diffusion can be defined as the process by which an innovation spreads across a population. Part of the program theory or rationale driving the design of the ANC-SWHP program is that messages about safe water would be diffused from ANC-SWHP participants to others in the community, most notably close friends and relatives. This qualitative study explore if and how diffusion of safe water practices takes place among program participants and their friends and relatives by asking both *participants* and *friends and relatives* about experiences talking to and with other women about safe water practices. *Husbands* were not uniformly asked about diffusion, but the topic came up during a number of those interviews as well.

As reported earlier, among *participants*, at least two reported that they were initially educated about and motivated to use WaterGuard by friends who already used WaterGuard, suggesting that their initial WaterGuard use was at least in part a result of diffusion.

Additionally, more than half of program *participants* (both *current* and *non-current users*) reported that they encouraged others to use WaterGuard to treat their drinking water and

prevent diarrheal illness, and eight of these women explicitly reported that at least some of those they spoke with about WaterGuard began using WaterGuard subsequent to these conversations.

Among *friends and relatives*, three describe that ANC-SWHP program participants initially motivated them to start using WaterGuard and another four say they were initially motivated to start using WaterGuard at least in part by other friends, neighbors and/or relatives. Additionally 9 of the 15 *friends and relatives* mention that they have encouraged others to use WaterGuard, with five explicitly reporting that at least some of those whom they spoke to subsequently began using WaterGuard. None of the three *friends and relatives* classified as lapsed users reported talking with others about their WaterGuard use. A handful of *husbands* mentioned talking to others about the importance of using WaterGuard, and a couple of them reported that their conversations influenced others to begin using WaterGuard.

My friend. I tell her about WaterGuard...that WaterGuard is very important—it prevents germs and disease becomes rare in the home. So when I told my friend she took interest, bought some and started using. —*Friend and relative, current user*

Some of those that I told appreciate because their families are also happy now. They rarely get diarrhea... Some of them thought it was difficult, but when they did it, they noticed it was beneficial. —*Participant, current user*

They (relatives) said that they suffer from diarrhea frequently so I told her that it's because she doesn't use WaterGuard. When she started using WaterGuard, she came to thank me for giving her the advice. —*Participant, Focus Group Discussion*

Although not a common theme, at least two *participants* mentioned that as part of their participation in the ANC-SWHP study, they were told to educate others about what they learned about safe water practices. One of these *participants* described herself as very

dedicated to spreading the word about the value of WaterGuard, and successful in influencing many others to start using WaterGuard.

When they visited me the first time, they told me to tell my neighbors that they need to use WaterGuard. *–Participant, current user*

Others can say they'll join me - those who can find the money try to do so. I could count up to 20 who do so in the area, but most still can't afford. Yes. But these who understand are on the road to knowing that it's the right way. ...Sometimes they even ask how things are with me, so we encourage each other that these things are good and then to another and the news spreads around like that. So much that in a year from now, I am sure those who won't be using it will not be more than three. Because I tell them frequently... The ones I meet and ask me, I tell them. That when they have money and they want to buy relish, they should not regard that, but try WaterGuard first, so that their bodies are healthy. So those that understand take the advice.

–Participant, current user

While many women described success with sharing information about WaterGuard and safe water practices with others, there was also acknowledgement that for some, these discussions were not sufficient to change practices or they did not know if their conversations had an impact on practices. Respondents who talked to friends, neighbors, and relatives about using WaterGuard reported money and the taste and smell of WaterGuard to be the biggest barriers to diffusion.

I can talk to my friends, telling them that treating water is good but money in our village is difficult to find. So, a person may have interest to use WaterGuard but not be able to afford it. ...They agreed with me but continued saying money was the problem.

–Participant, non-current user

Yes, I discussed (with friends at the borehole). But just that the people do not put what we discussed into practice, so they do not use WaterGuard. *–Participant, current user*
So when I explained to my friends, some of them still don't use it till this day because of the smell, they say. *–Participant, current user*

They compliment us because we rarely suffer from diseases. Sometime they want to buy WaterGuard, but there are a lot things that they do with their money, so they don't buy

WaterGuard. They are used to untreated water anyway. I have started using WaterGuard because of this program. –*Husband, current user*

Identified barriers to treating household drinking water with WaterGuard:

The following identified barriers to using WaterGuard to treat household drinking water are discussed: affordability and perceived value, smell and taste, lack of access, satisfaction with untreated water, and lack of awareness regarding the need to treat water and how to treat water.

Affordability and perceived value:

Affordability was by far the most consistently reported barrier to sustained WaterGuard use. We asked respondents about the price, value, and affordability of WaterGuard. The most common price respondents report paying for WaterGuard is 30 Malawian kwacha (MK) (US\$.20), although some individuals report paying as low as MK25 and as high as MK60. WaterGuard is distributed by PSI and subsidized by USAID. Assessments of the affordability and value of WaterGuard varied dramatically among respondents. While many respondents described the price of WaterGuard as reasonable, using such terms as “fair”, “not a problem”, “cheap”, “good”, and “not-expensive” (including many *non-current users*), many others described the price as “expensive” or “too high”. Further, assessments of the fairness of the price were quite distinct from descriptions of affordability. In fact, many of the people who described WaterGuard as having a fair price, described similar challenges to affording WaterGuard as those who said the price was too high. Clearly for some, MK30 for a bottle of WaterGuard is easier to access than for others. The majority of community respondents (both

current and non-current users) report that there are times when they cannot afford WaterGuard due to lack of funds. Only a few respondents said that they could consistently afford to purchase it.

I think it is expensive, but when I have the money I go and buy because I am used to it.
–Participant, current user

It is cheap...It's cheaper than the price of soap... we do not struggle to find 25 kwacha.
–Participant, current user

Yes, even with poverty, 30 kwacha is not a lot of money. –Participant, current user

When I have money, I am able to buy WaterGuard, but sometimes I can't afford it... I rarely have money. –Friend and relative, current user

It (the price) is good. We save the amount of WaterGuard and use it for a whole month. Its importance is more than its price. –Husband, current user

Some participants commented specifically on the value of WaterGuard, noting that for what WaterGuard does, its price is very worth it. Some individuals even articulated WaterGuard's value in cost-benefit terms, describing it a good value because they believe they save more money on medical bills or medications than they spend on the product.

Because when you buy it, you keep your life safe, and you also use it for many days.
–Participant, current user

They don't make it expensive, but the money to buy WaterGuard is what is hard to find.... it is good, so it is worthy. Because giving 30 kwacha to a person there (at a shop), we are able to live. We buy life at 30 kwacha. –Participant, current user

The price is good because it is as if we are using one kwacha a day, but it is not good for everyone. –Participant, current user

Yes, because we protect life, so it's affordable. –Friend and relative, current user
I think it's better I pay the money (for WaterGuard), because if I didn't, I would pay more money (to treat diarrhea) and have more problems. –Participant, current user

I think it can be expensive but we do not consider that because we want to protect our lives. I do not take it as a burden because it is something that helps.

–*Friend and relative, current user*

It is good, because we waste a lot of money going to the hospital or paying African doctors, so WaterGuard's price is cheap. –*Husband, current user*

Some individuals describe valuing WaterGuard more during outbreaks or the rainy season when cholera and diarrheal illnesses are more common, tipping the cost-benefit ratio for them during these times to further encourage them to purchase it.

I treat my water according to my pocket. If we have money, we buy WaterGuard. Sometimes it depends on the situation. If there is an outbreak of cholera or diarrhea, then I have to treat my water, so buying WaterGuard is a must.

–*Participant, non-current user*

Regardless of people's responses to questions about the affordability and value of WaterGuard, most respondents said that there were times when they could not buy WaterGuard due to lack of funds. This was true for *current users* as well as *non-current users*. There was only one *non-current user* who did not mention lack of funds as the reason for not continuing to use WaterGuard: She was someone who had never tried to purchase WaterGuard. So while some *community respondents* indicate that they purchase WaterGuard quite consistently, others indicate that they purchase it only when they have funds, which can be influenced by multiple factors including: general poverty, harvest times, drought, husbands working and/or living far away, etc. A number of *community respondents* mentioned that they would likely use WaterGuard more consistently if the price were reduced.

There is nothing I do not like about treating my water, but it is just lack of other things like money to get WaterGuard... My husband has gone away, so for me to find money to take care of the kids and buy WaterGuard has been a problem. ...Just because of the money problem I have stopped, but if I had the money I would have continued, because it was helping me. –*Participant, non-current user*

Ok, it can take a month without finding the money to buy WaterGuard so I boil the water and drink. But what captures my heart is WaterGuard. –*Participant, current user*

When I have money, even if I don't buy relish for the home, I make sure that I should at least buy WaterGuard. –*Participant, current user*

Being that we are from the village we do not have enough money to be buying WaterGuard, though we are interested in it. –*Friend and relative, non-current user*

People want to use WaterGuard, but because of having little, to find money for these things, it is not easy. –*Participant, current user*

Since we need WaterGuard, we still have to buy it. But, we just wait upon the land. If we find the money we buy it, but we would be happy if it was lesser.
–*Husband, non-current user*

A small number of *participants* also mentioned that price variability among shops impacts affordability and sustained use of WaterGuard. It was not possible to assess from these comments if the price variability stemmed from variable wholesale prices, different price mark-ups or price gouging when stock is out in other nearby shops.

The problem is what I told you, that prices vary from shop to shop. Others sell at 35 kwacha, others at 60 kwacha, and then the 35 kwacha shop runs out and all the money you took for WaterGuard is 35 kwacha, then you hear the vendor saying mine at 60 kwacha and you don't have that money, you just return home. That's why I said we might want to buy WaterGuard, but there's so many different prices.
–*Participant, non-current user*

A few HSAs also mentioned price variability between shops as a barrier to purchasing and using WaterGuard. These HSA comments however specifically described that prices tend to be more expensive in the rural areas, subsequently limiting access to safe water for more rural residents.

On the part of WaterGuard, it is a problem here because many shops do not stock much WaterGuard, and for those who stock it, they sell it at a very high price. Hence, buying WaterGuard here is way different from buying it at other areas such as in town, to the extent that the price might differ by 50%. And this also makes the people not able to

afford purchasing WaterGuard, hence increasing the problem of unsafe drinking water.
–*Health Surveillance Assistant*

A few participants also noted that they find it difficult to spend money on WaterGuard, because they got used to obtaining it free from the ANC clinic. This sort of challenge is common with public health interventions, where it can be difficult to facilitate sustained behavior change through the provision of free items, because people can get accustomed to the free item(s) and perhaps do not value the purchase of these items, or at least do not integrate the costs of such items into their budget (Schlanger, 2010). One person specifically said she has not yet considered purchasing WaterGuard, because “We’ve gotten used to receiving it from the clinic...Free stuff!” – *Participant, current user*

A handful of *health workers* also mentioned that they thought a barrier to more widespread or consistent use of WaterGuard use is that some people do not prioritize or value purchasing WaterGuard because they are used to receiving it or stock chlorine for free.

I think they are just used to getting free things because even in shops it is not that expensive. They can afford to buy...The problem is that, as I have said, people think it is a loss to buy with their own money because they are used to getting free things. – *Nurse*

Many people are used to free things, so they feel that WaterGuard is expensive, since we have been giving them the chlorine for free for them to use to treat and make their drinking water safe. –*Health Surveillance Assistant*

As you know, a thing that someone is getting for free others find it a loss to buy it, so they just drink unprotected water. –*Nurse*

Aesthetics: smell and taste:

Previous studies have identified the chlorine smell and taste of WaterGuard as a key barrier to the trial and regular use of WaterGuard and other chlorine-based water treatment products (Loharikar et al., 2010; Sheth et al., 2010; Stockman et al., 2007; DuBois et al., 2010).

Among respondents in this trial however, the vast majority of both *current* and *non-current users* describe liking the smell and/or taste of WaterGuard treated water, although many also mentioned that it was something they had to get used to. In fact, while many respondents report that they know other people who dislike the smell and/or taste of water treated with WaterGuard, only a few said they themselves dislike the smell or taste of it. *Health workers* also mentioned that they believe people's dislike of the smell and to a lesser extent the taste of WaterGuard is a barrier to WaterGuard use for some, but many also noted that people who stick with using WaterGuard typically get accustomed to the smell and taste, and/or that people prefer WaterGuard over stock chlorine, because it has a less intense chlorine smell.

Many participants described liking the smell and some even referred to water treated with WaterGuard using positive descriptors such as "tasty water". Clearly for some, however, the chlorinated smell of WaterGuard treated water took some getting used to.

WaterGuard treated water has a nice smell. When you don't use WaterGuard, the water has no smell and is not very tasty. *–Friend and relative, non-current user*

Water without WaterGuard has no smell, but WaterGuard treated water has a pleasant little smell. *–Participant, current user*

I saw a change in the taste. Now I am used to water with WaterGuard, and when I drink water without WaterGuard, I do not feel good. Water with *WaterGuard* tastes good and smells nice. *–Participant, current user*

Water with WaterGuard has a different smell from untreated water and it tastes different...I liked it, even my children liked it...It smells like medicine from the hospital, so I found it interesting. *–Participant, current user*

Yes, when I drink, the water, it wasn't good, but I'm now used to it. Other people also don't like it. When they come and they taste it, they say, "It's not good, it smells," so yes. But my family and I got used to using WaterGuard and when we run out of it, we see it as a big problem. *–Participant, current user*

Water from the well has a bad smell. So when we use WaterGuard, the smell becomes better. *–Friend and relative, current user*

The change is that water with WaterGuard does not quench thirst, it has a strong smell and we just drink because we do not have a choice but to drink (laughing)...Of course, I can say that I like it, its not like I have a choice. Even if I don't like it, what can I do, I still have to protect the diseases. *–Friend and relative, current user*

I didn't like my water the first time I used WaterGuard. I was used to untreated water. So I used to drink it unwillingly. The first bottle actually lasted for quite some time... I didn't like the water at first. It had a bad smell but I guess I just wasn't used to the water. After some time, I got used to it and still use it up to now. *–Husband, current user*

We cannot say anything bad about the smell, because we do not mind it. What we want is to prevent ourselves from diarrhea...When you just treat your water the smell is strange, but with time it loses the smell. *–Husband, current user*

A few people described disliking the smell or taste of WaterGuard, with some mentioning that the smell or taste of WaterGuard can even lead to nausea and vomiting.

It's just the smell. Something really has to be done about it. If you are pregnant you really have problems drinking water that has WaterGuard.
–Participant, non-current user

I have two children who vomit when they drink WaterGuard treated water, but the rest are okay. *–Participant, current user*

The smell is bad. At first I had problems with the smell; I used to throw the water away... But my husband encouraged me, since he was used to drinking treated water from where he stays at the lake...Now, I am used to the smell, so when I have WaterGuard, I use it. *–Participant, current user*

I did not like the taste because of the smell. When I drink I could still smell it. Others even vomit because of WaterGuard. *–Friend and relative, current user*

I was not used to the smell so I didn't like it. It would make me nauseous. I didn't like the taste either. *–Husband, current user*

Pregnant women have a problem. When I was pregnant, I vomited even through my nose the first time I drank water treated with WaterGuard. But, I just forced myself. After two or three days, I felt ok. Some people may stop using WaterGuard if they vomit once or twice. If you know that you really have problems with diarrhea in your family you will go ahead and use WaterGuard, but if you don't encounter such problems then don't use WaterGuard. They eventually end up using WaterGuard. There is nothing you

can't get used to. People drink beer little by little and eventually discover that they are addicted. So WaterGuard is like medicine and it helps us. We no longer suffer from diarrhea. *–Participant, Focus Group Discussion*

For some, part of the appeal or appreciation of the chlorinated smell and taste of the WaterGuard treated water seemed to come from an understanding that the component of the product that makes the water smell is the component that kills the germs in the water. In fact, a number of respondents referred to WaterGuard as medicine.

Oh, well the first time, I noticed a certain smell. Then we said we won't regard the smell, we'll just continue drinking. But now we don't smell it anymore because we got used to it together with the children. So we just drink. Yes. Since the goodness of the smell is the treatment, it's the chemicals that are killing the tiny organisms. It is that chemical that's the smell... I like the smell because this smell is for killing the organisms so that we should drink good water. *–Participant, current user*

We wouldn't allow for it to change because that smell is the medicine that's killing the tiny organisms. *–Participant, current user*

I do not think anything about the smell, because I know that every medicine is bound to have a smell. *–Friend and relative, current user*

I like the smell because that's what is protecting us from disease. *–Participant, current user*

WaterGuard treated water tastes different from untreated water. So when drinking it, the water is smelly like WaterGuard. And it feels good when drinking it, because you know it is safe water. *–Friend and relative, current user*

What is needed is for us to ignore the smell. We may never know that it is the smell that treats the water. *–Husband, non-current user*

Although there were not many respondents who described disliking the smell of WaterGuard, particularly after they got used to it, a number of respondents mentioned that they know of others who don't like the smell or taste of it and that that is what keeps more people from using it. Further, some people mentioned that in addition to having a reputation

for having a bad smell and taste, as eluded to above, WaterGuard may lead to nausea and vomiting, making some people reluctant to try it.

Those who despise it say that the water has a smell, that WaterGuard smells. But I am happy in my family because we drink water that is protected by WaterGuard.

–Participant, current user

Yes, (I like the smell), but not a lot of people do. Most of them complain that WaterGuard smells, but it's not everyone who complains. *–Participant, current user*

Most people do not treat their water, mainly because of the smell of WaterGuard.

–Friend and relative, current user

I started hearing about WaterGuard a long time ago, but you know how it is here in the village, people say stuff about WaterGuard. Others say if you drink water treated with WaterGuard you vomit, so we ended up not having interest in it... They envy us because I have managed to stand WaterGuard, because others cannot stand WaterGuard, they vomit. Others have stomach pains. *–Husband, current user*

When asked if there was anything the participant would like to change about the WaterGuard product, a few people mentioned that they would like the smell to change, to be less strong or flavored.

I would change the smell. When you are drinking treated water, you close your nose because the smell is not good (laughing). Maybe it should have a pineapple smell or it should have another smell because the smell is not that good and I think it is the reason why not a lot of people use it. *–Participant, non-current user*

Some participants described being discouraged from using WaterGuard by others who do not like the smell or taste of WaterGuard. The chlorine smell and taste of WaterGuard is a barrier to use for some, but certainly not an insurmountable one for many.

My friends come here and if they ask us for drinking water and we give them treated water they refuse to drink it, saying that they don't drink WaterGuard treated water and then ask for untreated water. We tell them that our house only contains WaterGuard treated water—we don't have untreated water... They think we are not up to date. They also ask me how I stand the smell. They actually say that they wouldn't let their wives use WaterGuard. *–Husband, current user*

We liked the change because we knew that that was the medicine (laughs). Others laugh at us. They say, “Can you smell this water?” (laughs) We say, “To us, it is alright”.

–Participant, current user

Others say a lot about it concerning the smell, but we do not listen to them because we know its benefits. –Participant, current user

Others tell me to stop, saying my water smells very bad. So I encourage them to stop thinking like that because WaterGuard helps. Although it smells, but we still need to prevent diseases. –Friend and relative, current user

They say thing like “we can’t use that smelly stuff, let her use it.” That’s what they say.

–Friend and relative, current user

Lack of access:

Only a few community respondents mentioned lack of access to WaterGuard in the shops as a barrier to WaterGuard use. Two focus group *participants* describe that on occasion WaterGuard is not available in the local stores, and three *participants* mentioned that they had had at least one experience where only expired WaterGuard available in the local stores. And although respondents often describe traveling long distances to purchase WaterGuard, distance was never mentioned as something that kept them from having WaterGuard to use when they could afford it. Respondents however describe WaterGuard as more available in the commercial centers than in rural village shops.

Health workers, particularly HSAs were much more likely than *community respondents* to mention availability as a barrier to WaterGuard use. Five HSAs (from interviews and focus groups) specifically mentioned that WaterGuard is not always available in the more rural areas, limiting access to the product, and for some adding a transportation cost to purchasing WaterGuard. And as mentioned under *Affordability and perceived value* (pp. 109), a handful of

HSA also mentioned that pricing varies from shop to shop, and that prices tend to be more expensive in the rural areas, again impacting access.

We encourage them to be purchasing WaterGuard, but there is a problem since WaterGuard is mostly available in big trading centers and not in the typical village where there is really a need to protect their water. It would tremendously help if WaterGuard could be found everywhere, even in the small shops in the villages, so that the people would be able to treat their drinking water. *–Participant, Focus Group Discussion*

Satisfied with untreated water:

While most *community respondents* described the disease prevention benefits of treating their drinking water a few mentioned that for them or others, resistance to treating their drinking water can come from not fully appreciating the benefit of such treatment, including impressions that they have grown up on untreated water without major problems and so there is no need to change that practice. A few health workers also mentioned similar sentiments.

They are told what to do but they choose not to do as they are told. They say that they have grown up and now have babies without drinking treated water, so why start now. Life would be much better if they listened to the messages and do as they are told. They don't realize that their child has diarrhea frequently because of drinking untreated water. *–Participant, Focus Group Discussion*

Sometimes, I just want to drink untreated water to differentiate the water with WaterGuard from the water without. People just say that untreated water many cause diarrhea, so I just want to try and see if I may really suffer from diarrhea. So I discovered that I don't suffer from diarrhea. *–Participant, Focus Group Discussion*

So some can plainly say that their ancestors have been drinking the same water but did not get ill or die. If they were getting ill, it was because of weather and not water. So it is difficult to make them understand. But with time, others do start using water treating solutions. *–Nurse*

Some are just used to not using WaterGuard since they have grown up taking water not treated with WaterGuard and they are used to that.
Health Surveillance Assistant, Focus Group Discussion

Lack of awareness regarding the need to treat water and how to treat water:

A number of health workers suggested that more community education and promotion could increase levels of WaterGuard use. Many specifically talked about the need to continue educating people in ways they currently do, including health talks at the clinic and home visits. Other suggestions made regarding how to increase awareness included using local Chiefs to promote WaterGuard use, educating people through community meetings and gatherings, emphasizing the value of WaterGuard over the costs of treating diarrhea, more frequent radio messages, putting educational posters up in the health facilities and in the trading centers, and providing on-going training to health workers on how to best explain and promote WaterGuard use to community members. *Community respondents* were not specifically asked about ways to increase community members' use of WaterGuard.

So we can use Chiefs, because if the Chiefs have the right information, even at a funeral they will say, "we have seen this, but remember to drink safe water and use WaterGuard". And when it is at a wedding ceremony, at the end of the day, the Chief will still say something about that. So it will help. –*Nurse*

As I have said that understanding in this area is a challenge, they usually believe a thing if it is through the traditional leaders. If a traditional leader has been told something and believes it, if he tells it to his or her people they obey and do it, as they regard it as part of their culture. I have talked about men escorting their wives to ANC visits because the traditional leaders accepted it we do not have problems with them, over 90% escort their wives because their leaders understood and accepted this thing. –*Nurse*

And related to the issue of lack of awareness are the issues of illiteracy and lack of education among community members. A handful of *health workers* mentioned that illiteracy and general low education levels are a challenge to having people understand the importance of and methods for water treatment and other safe water practices.

The main issue you should know in this area is that understanding is difficult as the number of literate people is very small, and it takes a lot of repetition for them to understand a thing. That is the major problem. So for those who are literate, they more easily understand and accept things. –*Nurse*

Other barriers mentioned:

Other potential barriers to WaterGuard use that were each mentioned by one or two respondents include perceptions that some people will not use WaterGuard because they believe it is a form contraception, they regard WaterGuard as a medicine, or because they are a member of a religion that forbids the use of medicine.

...So some reach the point of saying “your solution that you got from the clinic should not be used. There might be a contraceptive in it”. Most people confuse things, that whatever is given from the hospital has a purpose to control their reproduction, so they choose not to use them. –*Nurse*

The first one (i.e. biggest barrier to WaterGuard use) is poverty, which they claim to be in. Secondly, it is negligence. And the third one is the belief that they do not take drugs and they regard WaterGuard as a drug, so they cannot use it. –*Health Surveillance Assistant*

CHAPTER 5: DISCUSSION

The ANC-SWHP is a behavioral intervention implemented in the Machinga District of Malawi to increase the use of WaterGuard, a chlorine-based water treatment product, to disinfect household drinking water as a strategy for decreasing diarrheal illnesses. Because social marketing of WaterGuard and other chlorine-based water treatment products alone has not had an adequate impact on usage in Malawi or elsewhere where diarrheal illnesses are endemic, it is important to identify behavioral interventions that are effective at initiating and sustaining safe water practices. The ANC-SWHP targets both pregnant women receiving antenatal services and their husbands. Quantitative and qualitative evaluations looked at the impact of the program on participants and some of their friends and relatives in order to assess both direct and indirect program impacts on community water treatment practices.

The qualitative program evaluation, presented in this dissertation, explores similarities and differences in the factors, experiences, attitudes and beliefs that influence the use of WaterGuard to treat household drinking water among ANC-SWHP *participants* and their *friends and relatives* and identifies how these factors, experiences, attitudes and beliefs differ between those who currently use WaterGuard and those who are not currently using WaterGuard. Findings from this study will help interpret results from the separate quantitative evaluation of the same program. More broadly, it will also help us to better understand the factors and motivations that influence water treatment practices, so as to develop more effective safe water behavioral interventions and promote diffusion of desired behaviors in similar settings, and to identify effective strategies for evaluating similar types of programs. Because qualitative

research is not intended for widespread generalization, the findings from this study are best interpreted in combination with results from the quantitative evaluation study of the same program, and findings from other studies of similar programs.

Based on previous research and program experience, the ANC-SWHP was designed to promote the uptake and ongoing use of household water treatment using several strategies. It integrates a water treatment intervention into ANC visits, to leverage existing healthcare resources and to reach a broad range of families with small children who could benefit. In addition, health workers provide education about safe water treatment, storage and handling procedures to participants *and* their husbands, in the clinics *and* through on-going support for promoted behaviors during home visits. The program provides participants with a free hygiene kit that includes a 20-liter safe storage water container with a lid and tap and a bottle of WaterGuard, and allows participants to receive up to four additional bottles of WaterGuard on subsequent antenatal and postnatal visits. Participants are also encouraged to share their knowledge and positive experiences with WaterGuard and safe storage practices with their friends and relatives.

Preliminary findings from the quantitative evaluation of the ANC-SWHP:³⁵

Preliminary data analysis from the quantitative study is presented in Table 5.1. This data suggests that the intervention was very effective at promoting WaterGuard use among *participants* and to a lesser extent among *friends and relatives*. Additionally, preliminary

³⁵ Results from the quantitative evaluation of the ANC-SWHP are presented in the discussion section rather than the results section because they are not results from the study that is presented in this dissertation, but are useful for framing the discussion of the qualitative results. It should be noted that these quantitative results are only preliminary.

analysis from the quantitative study suggests that the intervention had positive impact on increasing the percent of pregnant women who start prenatal services in the first trimester, increasing the percent of women delivering in a health facility, increasing the percent of pregnant women and their husbands who access HIV testing, and increasing the percent of HIV-exposed infants who receive antiretroviral prophylaxis (data not shown, Janell Routh, personal communication, March 19, 2012). As results from the quantitative study are finalized, findings from this qualitative study should be particularly useful in gaining a fuller understanding of the motivations for use and disuse of WaterGuard among both *participants* and *friends and relatives*. In the mean time, these findings provide useful information for interpreting the results of the qualitative study presented here.

Table 5.1: Water and WaterGuard treatment knowledge and practices, ANC-SWHP quantitative evaluation study, Machinga District, Malawi^a

| Knowledge and Practices ^b | Participants | | Friends and Relatives | |
|---|------------------|------------------|-----------------------|------------------|
| | Baseline (N=106) | Follow-Up (N=97) | Baseline (N=105) | Follow-Up (N=91) |
| Treat drinking water (boiling or chlorine product) | 40% | 98%* | 33% | 70%* |
| Heard of WaterGuard | 93% | 100% | 94% | 97% |
| Ever used WaterGuard | 38% | 100%* | 40% | 78%* |
| Report correct WaterGuard procedure ^c | 23% | 81%* | 23% | 56%* |
| Used WaterGuard in last 2 days | 10% | 92%* | 10% | 43%* |
| WaterGuard bottle observed | 3% | 77%* | 2% | 32%* |
| Purchased WaterGuard (at least once) | 14% | 45%* | 17% | 57%* |
| Residual chlorine present | 0% | 71%* | 1% | 34%* |
| Residual chlorine present + WaterGuard bottle observed + purchased WaterGuard | 0% | 36%* | 1% | 16%* |
| Heard about WaterGuard from SWHP participant | --- | --- | --- | 56% |

* Indicates difference between baseline and follow-up is statistically significant.

^a All data presented in this table was obtained from Janell Routh via personal communication on March 18, 2012.

^b All knowledge and practices are self-reported except for WaterGuard bottle observed and chlorine residual.

^c Percent of respondents who report the correct number of caps of WaterGuard to use to treat drinking water and the amount of time necessary to wait after treating water with WaterGuard prior to consuming the water.

Summary of qualitative study results across respondent types and user classification:

Overall, findings from this study support the preliminary findings from the quantitative evaluation, and suggest that the program was highly successful. The program appears well liked, and overall was described as impacting community water treatment practices in very positive ways. The promoted behaviors also appear highly acceptable by most *participants* and all *health workers* (at least in the short term, while supplies of WaterGuard are provided for free). All *community respondents* report having tried WaterGuard, with the majority of them saying they tried it for the first time only after the program begun, motivated at least in part by the free bottles of WaterGuard *participants* received and/or education from health workers, friends or relatives. And most *community respondents* describe WaterGuard as very easy to use, appear aware of its potential to decrease diarrheal illnesses, believe their family experiences less diarrhea when using it, and report continuing to purchase it and use it when resources are available. Most respondents also report that they think it is important to treat their water year-round because of contamination at the source and many also consider it important because of potential contamination during transport and storage. However, many respondents clearly prioritize treating their water during times when they perceive their water source to be more contaminated (e.g. during the rainy season and outbreaks of diarrheal illness).

Many respondents report that they have encouraged others to use WaterGuard, while others report that they started using WaterGuard at least in part due to advice from neighbors and relatives, suggesting that diffusion of the intervention is in effect. Most *participants* also report great appreciation for the education they have received, particularly HSA home visits

and the blue bucket they received as part of the SWHP to help them keep their water safe, with all *participants* reporting that they continue to use the bucket unless it broke. And while many *community respondents* reported that the smell and taste of WaterGuard take some getting used to, most report that for their families it is not a barrier to on-going use.

Methodological challenges with user categories that impact interpretation of results:

One of the key findings of the qualitative study that is essential for interpreting the results of both the quantitative and qualitative studies is that, for many people, WaterGuard use appears to be a somewhat fluid practice and one that is particularly dependent on access to cash to purchase WaterGuard. Many studies of chlorine-based water treatment products have found that use decreases over time after an intervention has ended (Arnold & Colford, 2007; Hunter, 2009; Schmidt & Cairncross, 2009; Waddington et al., 2009). While decreased use of WaterGuard over time likely occurs in Machinga as well, the findings from this study suggest that at an individual level, use also appears to fluctuate for many, due at least in part to different access to cash at different times of the year.

This finding has a number of implications. First, it suggests that our original study design, which included comparing current WaterGuard users to lapsed WaterGuard users, set up a false dichotomy. It was assumed that after people begin using WaterGuard, they either continue to use it or stop entirely. Once it was identified, we tried to mitigate this incorrect assumption by considering people to be *current users* if they reported WaterGuard use in the last seven days, and classified other users as *non-current users* and not necessarily lapsed users. However, this strategy clearly did not solve the false dichotomy problem entirely because we

found a number of respondents classified as *non-current users* who appeared to be very dedicated to using WaterGuard when funds were available, and many respondents classified as *current users* who said there are times when they cannot afford WaterGuard. In other words, other than access to cash to purchase WaterGuard around the time of the study, there is a large overlap between the water treatment related beliefs, attitudes, behaviors and experiences of participants who were categorized as *current users* vs. *non-current users*, and this overlap likely prevented us from identifying or isolating some of the key factors that discourage sustained WaterGuard use other than financial barriers. Given such overlap, it is difficult to make definitive statements about either strong positive or negative behavioral influences.

As outlined in Table 5.2, our findings suggest that *current users* and *non-current users* appear to fall into one or more of five somewhat overlapping categories of user type. However, because we did not foresee this issue, we did not systematically collect data that was detailed enough to delineate more nuanced categories of users. For future studies, it could be useful to design the study to capture more categories of users (e.g. very consistent users, less consistent users, seasonal-only users, truly lapsed users, etc) to allow a more fine-tuned understanding of motivations for use and disuse.

Table 5.2: Possible user categories that fall under “current users” and “non-current users”

| Category ^{a,b} | Definition | Current User | Non-Current User |
|--|--|--------------|------------------|
| Consistent user | Someone who uses WaterGuard to treat their drinking water on most days | X | |
| Resource dependent user | Someone who expresses commitment to treating their drinking water daily, but for whom affordability presents a barrier to consistent use | X | X |
| Seasonally- or situationally-influenced user | Someone who express commitment to treating their drinking water daily, but who is more consistent with their use of WaterGuard during certain situations (e.g. rainy season, cholera outbreaks, when using well water, etc.) | X | X |
| Seasonal or situational user | Someone who uses WaterGuard only during certain seasons or situation (e.g. rainy season, disease outbreaks, etc.) | | X |
| Lapsed user | Someone who tried using WaterGuard, but is no longer using it | | X |

^a These categories are not necessarily mutually exclusive. For example, someone could be both a *resource dependent user* and a *seasonal or situational user*. Despite this potential overlap, these categories are more nuanced than the use of two categories such as *current user* and *non-current user*.

^b People in any of these categories may boil their water as a form of treatment, but boiling water as a form of water treatment has not been found to be a very common practice in this region and does not provide any residual protection. Data from the quantitative study indicated that approximately 15% and 16% of program participants reported boiling their water at least occasionally at baseline and follow-up respectively (Janell Routh, personal communication, March 19, 2012).

The second implication of the finding that user categories are not mutually exclusive relates to how quantitative studies are interpreted. This data suggests that it may not be accurate to interpret current-use from a follow-up study as a measure of sustained use (i.e. intervention effectiveness), but rather that it is a measure of use at one moment in time. This finding has further implications for the appropriateness of using data on current use of a chlorine-based water treatment product to model diarrhea-related morbidity and mortality averted due to an intervention or the cost effectiveness of the intervention (i.e. one cannot necessarily assume that use of water treatment at one moment in time implies either consistent use or non-use over time). Impact studies of safe water interventions might benefit

from longitudinal designs with multiple measurement points to better understand use over time.

The third implication of the finding that user categories are not mutually exclusive suggests that to more fully understand water treatment decisions and how interventions might be improved, it might be useful to more fully explore how people's access to cash differs over the course of a year, and how individuals rationalize purchasing or forgoing water treatment products when their resources are extremely limited.

Similarities and difference among current and non-current WaterGuard users:

Methodological weaknesses with our recruitment strategy led us to interview many more community respondents who we classified as *current WaterGuard users* than *non-current users* (54 vs. 13). Specifically, as described in detail on pages 44-45, we attempted to recruit people based on water testing results from the former quantitative program evaluation study rather than their current use, but using that strategy we were not ultimately successful at recruiting similar numbers of people whose water previously tested positive as negative. Additionally, as described above, because classification of current use or non-current use may be less an indicator of year-round or sustained use or non-use of WaterGuard overtime, and more of an indication of current access to money to purchase WaterGuard, caution must be used in interpreting our findings regarding both similarities and differences between *current* and *non-current users*.

Despite or perhaps because of the study's methodological shortfalls, we found that in various ways many *current users* are very similar to many of the *non-current users* in terms of

self-described treatment motivations, experiences with the ANC-SWHP, normative beliefs about and social support for water treatment, etc., although we were able to identify a few key differences between *current* and *non-current users*. Some of these differences in terms of knowledge, beliefs and motivating factors might describe true differences in the way these factors influence individual behavior and perhaps point to possible program modifications that could be useful to further motivate behavior change across a wider spectrum of community members.

Not being able to afford WaterGuard was by far the most consistently reported barrier to sustained WaterGuard use, and this finding is consistent with results from previous studies of chlorine-based water treatment (Olembo et al., 2004; Stockman et al., 2007; Loharikar et al., 2010). In this study we found the most common reason cited for non-use among *non-current users* was lack of money to purchase WaterGuard. However, we also found that the majority of *community respondents* (regardless of whether categorized as *current* or *non-current users*) describe that there are times when they cannot afford WaterGuard due to lack of funds.

Access to cash is clearly a necessary component to consistent water treatment, and within the context of endemic poverty, it is possible that lack of resources is the sole barrier to ongoing use for many. However, even within the context of extreme poverty, it is possible that some individuals prioritize purchasing and using WaterGuard more than others, and that by understanding these motivations, we can identify improved strategies for promoting water treatment behaviors, even in the context of such poverty. Our interview questions and findings were not nuanced enough to make such distinctions, although some respondents' comments about how essential they now consider WaterGuard (e.g. on a similar level of necessity as food)

suggest that some people do prioritize purchasing WaterGuard and treating their water more than others, even within the context of extreme poverty. Regardless of these possible distinctions, many *non-current users* who report lack of funds as the reason they are currently not using WaterGuard appear in many ways to be equally committed to using WaterGuard as many *current users*, in terms of their reported desire to prevent diarrheal illness, valuing of WaterGuard to increase work efficiency, etc.

One related factor that the data suggests might distinguish some *current users* from *non-current users* is the way people think about the economic benefits of using WaterGuard. While both *current users* and *non-current users* report economic and related benefits of WaterGuard use (e.g. using WaterGuard increases time available to work because of less illness and less time caring for sick family members) only *current users* explicitly described their use of WaterGuard as a cost saving practice (i.e. buying WaterGuard is cheaper than paying for clinic visits or medications for diarrhea). This finding may help explain a contradiction found in the literature: that cost is the most common given reason for not continuing to use chlorine water treatment products across the developing world, yet four of the five studies that looked at the relationship between wealth and product use did not find a correlation (Dubois et al., 2010; Freeman et al., 2009; Luby et al., 2008; Ram et al. 2007; Sheth et al., 2010). Perceived value (in terms of cost savings) of chlorine based water treatment products might be a more influential motivator than product cost alone (Wood et al., 2011). If in fact such an explicit consideration of potential cost-savings is a motivating factor for on-going or consistent use of WaterGuard, it may be useful for future programs to make that calculation explicit to community members during education on the importance and benefits of using WaterGuard.

According to Rogers' model of diffusion, there are five types of individuals that influence behavior: innovators, early adopters, early majority adopters, late majority adopters (skeptics), and laggards (Rogers, 2003). Comments from respondents in this study suggest that most respondents likely fall into one of the first three categories, including those who are hygiene conscious and willing to try a new innovation just from hearing about it, as well as those who needed more direct encouragement (from friends or health care workers) or to experience the benefit of the innovation before adopting it (via free samples of WaterGuard). However other factors appear to influence behavior change, particularly in developing countries, including poverty, culture and customs, low education levels and poor infrastructure (Quick, 2003). In our study it appears that poverty, which limits access to a supply of WaterGuard, is the primary factor influencing both the adoption and maintenance of WaterGuard use.

Unfortunately, at the beginning of 2012, USAID stopped subsidizing WaterGuard in Malawi, which has led to a doubling of its retail price. The fact that the price of WaterGuard is consistently reported to be the biggest barrier to the sustained use of WaterGuard to treat drinking water suggests that water treatment is a price elastic behavior. It is therefore likely that the recent doubling of the price of WaterGuard will have a dramatic negative impact on sustained use and any further diffusion of WaterGuard.³⁶

Another difference identified between *current* and *non-current WaterGuard users* is related to people's perceptions of the need to treat water, and their susceptibilities to diarrheal illnesses. While *current* and *non-current users* appear equally able to articulate at least a basic

³⁶ I am unaware of USAID's stated rationale for discontinuing subsidies of WaterGuard, but it appears short sighted given the effectiveness of the product for reducing diarrheal illness and the direct and indirect impact reducing diarrheal illness has on morbidity, mortality, and economic and social development.

understanding about how water can contain germs that cause diarrheal illnesses, when asked about their satisfaction with their source water they use for drinking water, many more (female) *non-current users* than *current users* (two-thirds vs. one quarter) reported being satisfied with their source water (at least in the dry season), even without treating it. The higher percentage of *non-current users* reporting satisfaction with their source water may indicate that satisfaction with source water functions as a disincentive to treatment, although alternately it could indicate that people who do not treat their water or do not do so consistently rationalize that behavior by describing satisfaction with the water they do drink. Despite this distinction between *current users* and *non-current users* however, *non-current users* did not generally describe their non-use to be related to their satisfaction with their source water, or beliefs that they were not susceptible to diarrheal illness, or did not need to treat their water. In fact, only two *non-current users* described not using WaterGuard specifically because they were satisfied with their source water in the dry season and felt they would not get sick from drinking untreated water, i.e. describing themselves as seasonal users.

A few health care workers and community respondents expressed a similar sentiment about how lack of perceived need to treat water or perceived susceptibility to diarrheal illness are barriers to safe water practices when they reported that they believe that some people are resistant to treating their water because they have a hard time understanding why one would need to start treating water after years and generations of drinking untreated water. Given that all people in this region are at risk for diarrheal illness from contaminated water, additional or repeated educational messages to increase perceptions of need to treat all drinking water, and appreciation of universal susceptibility to diarrheal illness, might be useful.

Our data clearly suggest that despite the fact that all *current users* and many *non-current users* report that they think it is important to and try to use WaterGuard year round, many actually describe treating their water more consistently during the rainy season or during other times when they consider risk for diarrheal disease greatest (e.g. during cholera outbreaks, when a borehole is not functioning, when they see organisms in the water, etc.). So while a number of other studies promoting the use of WaterGuard or other chlorine-based water treatment products have reported that some people treat their water only during rainy seasons or outbreaks, in this study we found “seasonally or situationally-influenced users” were much more common—“seasonally or situationally-influenced users” being people who try to treat their water year-round based on available resources, but prioritize doing so during times they consider diarrheal risks to be greatest. For many “seasonally or situationally-influenced users” it appears that their individual calculations of the costs vs. the benefits of treating drinking water change during these times—whereby the higher perceived risk during certain seasons or situations outweighs the costs of purchasing WaterGuard even during times of low access to cash. Given the limited resources of most rural Malawians, this type of individual calculation appears quite rational and is another demonstration of how resource dependent sustained WaterGuard use is.

Most respondents reported having strong beliefs that diarrheal illness is something potentially harmful enough that they should take steps to prevent it, and that treating their drinking water with WaterGuard is an effective way to prevent diarrheal incidence. In fact, most community respondents reported that they experience less incidence of diarrhea in their homes when using WaterGuard. Only two *non-current users* said they do not think they can

prevent diarrhea outbreaks in their homes and were unable to describe any strategies to try to prevent them. Although these two women may have strong beliefs that diarrheal disease is serious and something to avoid, their statements indicate that they may not believe diarrheal illness is avoidable through the use of WaterGuard or other means, or they do not have high enough levels of self-efficacy or control to take effective preventative measures. It appears likely that these beliefs are an influence on their lapsed or inconsistent WaterGuard use. A number of healthcare workers mentioned that due to the low education level of many rural people, educational messaging is a challenge and repetition is necessary. It may be the case that more repeated messaging or on-going support from health workers for safe water practices would be useful for increasing levels of use, but these findings could also indicate that factors not addressed by the current intervention (e.g. perceived control) are at work. This is a topic for further study.

We found no major differences and little variability in the ways *current users* and *non-current users* described their husbands' support for WaterGuard use. Most female respondents report that their husbands are very supportive of treating drinking water with WaterGuard, although a few said had to overcome some initial resistance from them. All women report that husbands typically provide them with the money to purchase WaterGuard or purchase it themselves and several women mentioned other types of explicit support from their husbands, such as husbands saying they are happy to drink treated water or reminding them to treat the water. However, despite this lack of difference found between user types, it seems likely that husband support is necessary for most women to sustain on-going WaterGuard particularly because, when men control family finances, husbands have to be supportive enough of

WaterGuard use to pay for it. The fact that a couple of *participants*, including one *non-current user*, reported that their husbands spend significant time away from the home (e.g. because they have a second wife and/or work long intervals away from the home) which leads to their not having access to money to purchase WaterGuard, and a number of health workers mentioned that they perceive lack of husband support to negatively influence water treatment practices, further supports this interpretation.

Given the overlap in the types of people classified as *users* and *non-current users* combined with the fact that ANC-SWHP patients could only become study participants if they attended the ANC clinic with their husbands, it is not surprising that we did not find a difference in husband support by user status. The ANC-SWHP program was designed to engage husbands in education about the importance of and methods for treating household drinking water, and many participants and husbands alike described benefiting from this coupled education. However, the lack of variability in the way *current users* and *non-current users* describe husband support for household water treatment, combined with the similar lack of variability we found in the way *participants* and *friends and relatives* describe husband support for water treatment, make it difficult to say anything definitive about the role of husband support or the potential benefit of providing safe water education to husbands in terms of actual safe water practices.

Similar to findings about husband support, we found no major differences and little variability in the ways *current users* and *non-current users* described support they received from nurses and HSAs. However, the fact that so many respondents, particularly participants, said their primary motivation (or at least a major motivator) for trying WaterGuard, and purchasing

it once their samples were used up, came from health workers (particularly HSAs), suggests this type of personal communication is an important influence on water treatment practices. Wood and colleagues (2011) similarly found that on-going social support from a trusted source, such as a health worker, is an important motivator for sustained water treatment behaviors.

Next to affordability, dislike of the chlorine smell and taste is one of the most commonly identified barriers to trial and sustained use of WaterGuard and other chlorine-based water treatment products in Malawi and elsewhere (Loharikar et al., 2010; Sheth et al., 2008; Stockman et al., 2007; DuBois et al., 2010). Among respondents in this study however, the vast majority of both *current* and *non-current users* describe tolerating or even liking the smell and taste of WaterGuard treated water, although many respondents also mentioned that the smell and taste was something they had to get used to. And when asked if there was anything they would like to change about the WaterGuard product, only a handful of respondents mentioned that they would like the smell to be made less strong or masked by adding flavoring. Despite the limited number of respondents who reported disliking the smell of WaterGuard, particularly after they got used to it, the majority mentioned that they know of others who do not like treated water or who will not try it because of its reputed bad smell, taste and to a lesser extent its reputation for causing nausea and vomiting. *Health workers* also mentioned that they believe people's dislike of the smell and to a lesser extent the taste of WaterGuard is a barrier to WaterGuard use for some, although they describe encouraging people to continue using WaterGuard until they get accustomed to the scent. Again, because we did not have many truly non- or lapsed WaterGuard users in our *non-current users* group, it is possible that smell and taste are bigger barriers to on-going use than is evident in our findings.

By design, the ANC-SWHP provided up to five free bottles of WaterGuard, to allow participants an opportunity to become used to the chlorine smell and taste of water treated with WaterGuard and experience its anti-diarrheal benefits before having to purchase it on their own. Given the relative lack of complaints about the smell and or taste of WaterGuard among respondents (compared to other studies), and the relatively high rates of WaterGuard use found in the corresponding quantitative study, it appears that this strategy was likely effective and that the chlorine taste and smell of WaterGuard are not insurmountable barriers to its use in this region, particularly if people are encouraged to use it until they grow accustomed to the smell. Results from a study of the program upon which the ANC-SWHP is based also found that the extended free trial of facilitated adoption and sustained use of WaterGuard by allowing people to get used to the taste of WaterGuard treated water (Wood, et al., 2011). Other studies have found low rates of use of chlorine-based water treatment products driven primarily by the lack of acceptability of the chlorine smell and taste of water (Figueroa & Kincaid, 2010; McLennan, 1998; McLennan, 2000; Olembo et al., 2004). Our data suggest that chlorine-based POU water treatment is highly acceptable in this region, particularly if promoted through the use of free samples, and given its potential to reduce diarrheal morbidity and mortality, it should continue to be promoted.

Availability and access are two other oft-cited barriers to trial and sustained use of WaterGuard and other chlorine-based water treatment products, although data in this study did not support this conclusion. Respondents did not complain about the distance to stores that carry WaterGuard and only a couple respondents mentioned difficulty finding WaterGuard or only finding expired WaterGuard in nearby stores. We did not interview people from the most

remote areas of the region however, and so it is possible that availability and access are in fact bigger barriers to use than we found. Health workers were much more likely than *community respondents* to mention lack of availability and higher prices, particularly in the more rural areas, as a barrier to WaterGuard use.³⁷ As part of the build-up for the ANC-SWHP, PSI did a lot of outreach and distribution to increase the number of stores that carry WaterGuard. It appears that they may have done a sufficient job of distributing WaterGuard to vendors, although additional outreach may be needed in the more remote areas and additional education provided to vendors to remove expired WaterGuard from the shelves.

Similarities and differences in water treatment influences between participants and friends and relatives:

The question of how water treatment technologies and associated behaviors diffuse across a community is difficult to answer, and so it may not be surprising that it is an understudied question in the POU water treatment intervention literature. This study was designed to explore not just how particular messages and behaviors are diffused to direct recipients of an intervention, but also whether and how diffusion of water treatment messages and behaviors occurs more generally within a community. By comparing the treatment motivations and behavioral influences of program participants to those of their close friends and family, to whom educational messages and practices may have been diffused, we get a fuller sense of whether and how diffusion of innovation works in this context, and can identify possible ways WaterGuard use can be better promoted across a community.

³⁷ As described in Chapter 3 under *Recruitment* (pp. 46), we did not interview people from the remotest of villages (more than 45 minute drive from the health clinic) due to logistical and time constraints.

As described in Table 5.1, the results from the quantitative ANC-SWHP evaluation indicate that among *friends and relatives*, more reported using and purchasing WaterGuard and were found to have residual chlorine detected in their drinking water at follow-up than baseline. Further, this study found that 56% of *friends and relatives* reported at follow-up that they had heard information about WaterGuard from an ANC-SWHP participant. The quantitative study however, was not a controlled study, and therefore we cannot say with any certainty if or to what degree the observed changes were a direct result of diffusion of messages, norms, values, etc. from ANC-SWHP participants and health workers. However we are not aware of any other WaterGuard related promotional or free distribution campaigns that occurred in this region apart from the ANC-SWHP and the social marketing efforts of PSI (primarily radio advertisements and increased distribution to vendors) since the ANC-SWHP began. In this qualitative study, comparing comments of *participants* to those of *friends and relatives* regarding water treatment behavioral influences allowed us to gain further insight into if and how diffusion works in this community, and in particular what educational messages get disseminated and resonate with non-participants, regardless of their source.

In many ways *participants* and *friends and relatives* described the acceptability of and motivations for treating their drinking water with WaterGuard in very similar ways. Overall, most *participants* and *friends and relatives* describe it as easy to use, are aware of its potential to decrease diarrhea, and are motivated to use it because of a desire to prevent such illnesses. They believe their families experience less diarrhea when using it, report continuing to purchase and use it when resources are available, and say others support them in their use.

There are however a number of particularities in the ways *friends and family* describe their water treatment behaviors and influences.

The most obvious difference between *participants* and *friends and relatives* is that most, but not all, *participants* describe participation in the ANC-SWHP as the actual trigger for them to start using WaterGuard, many doing so using very complementary and appreciative terms. Among *friends and relatives*, triggers came exclusively from factors external to the ANC-SWHP, including diarrhea outbreaks (locally or within their family), media messages, and advice from neighbors, friends, family, or health care workers. While the higher rates of WaterGuard use documented among *participants* in the quantitative evaluation provide evidence that the ANC-SWHP was successful, likely due to some combination of the distribution of the free samples of WaterGuard and water storage bucket, education, home visits to reinforce messages and provide social support for desired behaviors, and inclusion of husbands, the influences reported by *friends and family* suggest that other factors can be influential both to initiate and support ongoing WaterGuard use.

For *participants*, all five characteristics of innovations that Rogers (2003) suggests are key to the adoption of new practices were present: 1) Advantage over alternatives – using WaterGuard is easier and less time consuming than boiling; 2) Compatibility – using WaterGuard appears to be compatible with residents' values, experiences and perceived needs (although perhaps not compatible with many people's financial status); 3) Low complexity – WaterGuard is easy to use; 4) Trialability – Participants could try using WaterGuard before deciding to purchase it themselves; 5) Observability – Participants could potentially observe decreased diarrheal illness among family members after using their free sample WaterGuard.

However, among *friends and relatives*, only the first three characteristics were present. This difference might help explain why rates of WaterGuard use were lower among *friends and relatives*. However, having only three of the five hypothesized characteristics of innovation present also suggests that the finding that the ANC-SWHP influenced use among *friends and relatives* is particularly noteworthy, because use among *friends and relatives* required the purchase of WaterGuard solution at the initial stage of adopting the practice.

Comments from both *participants* and *friends and relatives* suggest that diffusion of educational messages from neighbors about safe water and WaterGuard are an important influence for people to start and continue to use WaterGuard. Several respondents, not just *friends and relatives*, specifically mentioned that they were educated about and ultimately motivated to purchase and use WaterGuard by someone who was already using WaterGuard, whether a program *participant* or not. Additionally, all categories of community respondents reported that they encouraged others to use WaterGuard to treat their drinking water to prevent diarrheal illness, and at least some of the people they spoke with began using WaterGuard subsequent to those conversations. These findings suggest that the beneficial impact of the ANC-SWHP extend beyond participant households and corroborate with findings from other studies that social networks influence hygiene related knowledge, beliefs and behaviors (Goldman et al., 2001; Wood et al., 2011). Further, the fact that the results from the ANC-SWHP quantitative study found the rate of WaterGuard use among *friends and relatives* to be higher at follow-up than what has been observed previously in the country with exposure to social marketing alone, suggests that WaterGuard use among *friends and relatives* is influenced

by changes in social norms and diffused messages that are a result of the ANC-SWHP (Stockman et al., 2007).

Another identified difference between *participants* and *friends and relatives* is that *friends and relatives* were more likely than *participants* (~half vs. one-third) to report that they prioritize using WaterGuard in the rainy season, as opposed to using it with similar consistency year round, because of perceptions that risk for diarrheal disease is greatest during the rainy season. *Friends and relatives* were able to describe the need to treat water because germs in water can cause disease, however, overall their descriptions were less detailed than those of *participants*. Further *friends and relatives* only described treatment as necessary because of potential source contamination, whereas several *participants* also described their desire to treat water as stemming from the potential for contamination during collection, transport and storage. It is not possible to assess from our data the degree to which the less consistent WaterGuard use reported among *friends and relatives* is a reflection of the types, emphasis or degree of repetition of the diffused water treatment-related messages from community members or the media. However, the findings suggest that future intervention, education or media campaigns might have greater impact if they include more comprehensive or nuanced educational messages that emphasize the importance of year round treatment of drinking water and the potential for water contamination to occur during transport and storage.

Recommended next steps:

As has been previously described or alluded to, the results from this study suggest a number of changes, improvements, or shifts in emphasis in how safe water interventions are

designed and evaluated that might improve the rates of adoption and sustained use of WaterGuard to treat household drinking water and our ability to understand the impact of such programs. These changes, improvements, or shifts include: 1) having interventions and social marketing activities further emphasize educational messages regarding the importance of year-round treatment, and 2) emphasizing the potential for contamination to occur during transport and storage in addition to contamination from source water, 3) having interventions focus on interpersonal communication and social support even more than the ANC-SWHP does, adding structural or environmental components to such interventions that facilitate 4) increasing community access to WaterGuard and 5) broadening access to safe storage containers, 6) designing studies in ways that allow for a more nuanced understanding of people's treatment practices by perhaps including more user categories than just "user" or "non-user", and 7) employing longitudinal designs with repeated measures, particularly across different seasons, to better enable tracking treatment patterns over time instead of using pre/post type designs. Details of each of these suggestions are described below:

1. Findings from this study suggest that many people's water treatment practices are driven more by perceptions of source water contamination (which are perceived as varying throughout the year) than by the risk of water contamination during transport and storage of water. Given that water contamination (from the source, during transport or storage) is common in this region regardless of the season, I recommend that educational messages, including social marketing messages, emphasize treating drinking water throughout the year, particularly in relation to the potential for contamination to occur during transport and storage.

2. We also found that for some, perceptions about the price of WaterGuard being a good value in relation to the costs of medicine and medical care to treat diarrhea appears to be an important motivating factor for treatment. I therefore also recommend that educational and social marketing messages emphasize the value of *WaterGuard* in relation to costs for treating diarrhea.
3. The study findings that on-going interpersonal communication and social reinforcements from family, neighbors, and health workers are particularly important influences on the adoption and sustained use of water treatment practices suggests that future programs might benefit from emphasizing such influences. So, for example, beyond the model of having health surveillance workers provide on-going safe water education and social support, future interventions might be enhanced through community mobilization efforts that engage Chiefs, other community leaders, women's groups, etc., in promoting WaterGuard use at community meetings, funerals, weddings, etc. Additionally, these findings suggest that it may be useful to provide additional training to health surveillance workers (or other similar types of safe water educators) to enhance their skill level around encouraging community members, across a broad spectrum of user types or stages of readiness, to treat their water, and also to provide on-going social support of such behaviors. Additionally, building health worker capacity, for example, using motivational interviewing techniques, a counseling style that encourages behavior change by helping clients explore and resolve ambivalence in ways that are consistent with their values, beliefs or wishes, may be a useful program

enhancement for promoting safe water practices among community members (Quick, 2003). In fact, a few health workers suggested that health workers receive additional training on how to encourage individuals to use WaterGuard.

4. Given that lack of affordability of WaterGuard was the most commonly reported barrier to sustained use, it seems likely that efforts to reduce the cost of WaterGuard or keep the price as low as possible will also increase use. While such structural or environmental changes may be difficult to manifest, I would be remiss to not suggest that encouraging international or even domestic subsidies of WaterGuard could be an important and potentially very effective safe water promotional strategy, particularly in conjunction with other safe water interventions.
5. We found that the provision of the free water storage container with a tap and lid was particularly valued by program participants, because it both facilitated safe water practices and created a semblance of running water in people's homes, and this appeared to be an important motivator for WaterGuard use. This finding suggests that provision of such a storage container in future interventions is warranted. Unfortunately similar containers were not available in local markets (nor affordable in distant markets) and so the value of such containers as a motivator for safe water treatment is inaccessible for non-program participants who want it, including women who attended the clinic without a husband and were therefore

ineligible to receive the hygiene kit.³⁸ The benefit and value of such containers suggests that diffusion of safe water behaviors to non-program participants might be enhanced through making a similar or similarly functioning product available in local markets at a price that is affordable to a broad spectrum of the population. It may be useful to include such a structural component to future safe water system interventions (i.e. establishing a production and/or local distribution system for an affordable safe water storage container with a tap and a lid).

6. The study findings suggest that WaterGuard use is for many is a more or less fluid practice, and one that is particularly dependent on access to cash throughout the year to purchase WaterGuard. Given such findings, it could be particularly useful for program developers to be cognizant of such practice variability when designing future interventions and evaluation studies. Regarding program design, designers should be aware of the range of user types clients may fall into (e.g. very consistent users, resource dependent users, seasonally- or situationally-influenced users,

³⁸ The fact that women who attend their first ANC visit without a husband are not eligible to receive the hygiene kit, and further, that a major component of that kit, the storage container with a lid and tap, is not otherwise assessable to these women, highlights a major ethical concern I have with this program. The way the ANC-SWHP is implemented keeps a potentially life saving intervention from some pregnant women due to their marriage status. Anecdotally, about 15-20% of women do not attend their first ANC visit with their husband. Women who do not have husbands, or whose husbands cannot or refuse to attend the clinic (anecdotally typically because they do not want to be tested for HIV) bear the harmful consequence of a policy that is intended to incentivize men to get HIV tested and to promote family centered care. As mentioned earlier, the original study protocol as developed by CHAI included a provision to allow women who do not have husbands or whose husbands are unable to attend the ANC with them for legitimate reasons to obtain a letter from their village Chief, as a precondition for receiving the hygiene kit. Anecdotally, however most if not all of the clinics did not implement this aspect of the protocol, and any women who attend these clinics without a husband are thus not eligible to receive the hygiene kit. While requiring husbands to attend the first ANC visit with women does appear to have a very positive impact on HIV have HIV counseling, testing and treatment rates among men in the region, it is not a policy that I believe should be supported elsewhere because of the potential harm it causes to women who are not able to attend their first ANC visit with a husband. To address such concerns, program developers should avoid using an incentive system that functions to exclude a portion of a high-risk population from a potentially life saving intervention.

seasonal-only users, truly lapsed users, non-users, etc), both to assure that different user types are assessed for, and that on-going educational messages are tailored accordingly. And regarding evaluation research designs, researchers should be aware of such potential user type variability to facilitate designing evaluations that identify and quantify such variability over time (e.g. including multiple user type categories, using a longitudinal design that tracks use over an extended period of time and across seasons). If designing a study specifically to understand influences on the use and non-use of WaterGuard over time, it may be useful to assure that all categories of user types are recruited in sufficient quantity to enable comparisons.

Study limitations and challenges:

There are a number of limitations to this study.

1. Qualitative research is not typically intended to generate generalizations across populations, but rather is intended to produce a more in-depth understanding of what is going on in a specific setting. While findings presented here, particularly considered in conjunction with the results for the corresponding quantitative study, likely reflect a reality for ANC-SWHP participants, their husbands, and their friends and family, given how contextually and culturally specific water treatment behaviors are, they may not represent reality for people outside of the Machinga District in Malawi.
2. Our study was originally designed to compare users of WaterGuard to non-users. However, we found that this distinction was not as clear-cut or as mutually exclusive

as anticipated, and many people's use of WaterGuard appears to fluctuate over time due to the season, lack of resources and other factors. Consequently we did not have two distinct groups to compare and contrast responses between, but rather two somewhat overlapping groups. As pointed out earlier, we nonetheless believe that the finding that current users overlap in many ways with non-current users in terms of behaviors and influences is a key finding and one that is important in terms of how other safe water interventions are designed, evaluated and results interpreted. Further, we believe that by segmenting the respondent population as we did into *current users* (reported use within the past seven days) and *non-current users* (reported use more than seven days prior), we were able to identify some of the key factors that distinguish those who are likely to be more consistent users of WaterGuard from those who are likely to be less consistent users or even lapsed users. In order to get at some of the more nuanced differences between user types, future studies may benefit from asking more specific questions of respondents than we did, to categorize them into one of a broader range of user types (e.g. consistent user, resource dependent user, seasonal user, seasonally influenced user, lapsed user), although user types will likely always overlap to some degree. Additionally, having a larger sample of respondents who are truly lapsed users may help elucidate some of the key factors that influence such behavior.

3. On a related note, our findings are based on respondents' self-reported recent use of WaterGuard. As has been documented in other safe water studies, it is possible that there was courtesy bias among some respondents (Luby et al., 2008). We

- considered and even attempted to collect data to categorize respondents by a more objective measure, testing household water for residual chlorine. However, as reported earlier, due to inconsistencies in implementing the field protocol, combined with losing data for a number of respondents, we did not use this data to categorize our respondent population for the analysis.³⁹ However, given the challenges we encountered with *current users* overlapping in many ways with many *non-current users*, applying this more objective measure would have led to a different version of blurring between respondent types.
4. It is likely that some additional degree of bias exists in many aspects of this research, including social desirability bias among respondents, researcher bias from how we composed questions, how field staff asked questions and responded to answers, and how researchers interpreted responses. We attempted to minimize such biases using several strategies. For example, field staff explained to respondents that there were no correct responses, that we were interested in their experiences and perspectives, and that any researcher who might be present was only there to observe and could not speak the local language. We reviewed and revised each field guide with the entire field team to assure that the field staff understood the intent of the questions, that the translation of questions were accurate, and that the question made sense given the cultural context. We also provided training to field

³⁹ Although one might be inclined to consider a positive test of residual chlorine to be a more accurate assessment of true use of WaterGuard than self-report, it has been suggested that this objective test is likely an underestimate of true use because residual chlorine will not be present once all free-chlorine reacts with organic matter. In a recent study by Luoto and colleagues (2011) in Bangladesh, self-reported users of chlorine-based treatment products had no detectable chlorine 57% of the time, yet even without the detectable chlorine they were nearly three times more likely than controls to have no detectable E. coli in their stored water (47% vs. 17%) suggesting that many of these self-reported users of a chlorine-based treatment product were truthfully reporting their use.

staff on interviewing techniques, including how to avoid asking leading questions and other behaviors that can subtly or not so subtly influence responses.

5. Changes in the water treatment behaviors of some study respondents may be due to the Hawthorne effect (i.e. due to the fact that they are being studied). In this study, the Hawthorne effect is more likely to have impacted the behaviors of *friends and relatives* rather than *participants*. Participating in the ANC-SWHP quantitative evaluation study involved questions and observations about safe water practices, including testing of drinking water. For *participants*, the attention to safe water practices in the surveys was not particularly different from the education they received as part of the ANC-SWHP, but for *friends and relatives*, this evaluation may have served in some ways as an intervention in and of itself. The fact that the quantitative surveys were a year apart and all visits, including visits for the qualitative study were unannounced likely diminished the Hawthorne effect.
6. Having field staff lead the actual interviews rather than members of the core research team impacted the level of descriptive detail obtained from respondents, perhaps in negative ways. In this study, as evidenced by review of the transcripts, the field staff typically stuck very closely to the questions and probes developed by the core research team. While one could see this as a benefit (i.e. all respondents were asked similar questions), it also limited the level of probing and investigation of new lines of inquiry not originally conceived by the core research team. We spent a significant amount of time during the five day training with field staff making sure they understood the research questions, overarching lines of inquiry and the intent

of the specific questions on the question guides. While this training appeared sufficient in accomplishing these goals, it did not appear to either empower field staff, or provide them with the skills, to probe on their own for fuller descriptions of people's thought processes and rationalizations, or unanticipated but potentially relevant lines of inquiry. Using local field staff clearly facilitated interviewing a greater number of respondents during our limited time for fieldwork. It also allowed us to do the fieldwork without translators, thus avoiding additional respondent bias that may have occurred from being interviewed by a foreign researcher. However, the detail and complexity of the data may have suffered. While it is often assumed that "local researchers" will lead to better results, our experience suggests that use of less skilled local researchers may decrease the quality of the data in some respects.

Conclusions:

This qualitative study contributes to our understanding of factors that promote and impede adoption and sustained use of WaterGuard to treat household drinking water. First, we found that use WaterGuard at one point in time is likely a poor indicator of sustained use and that access to cash and perceptions about risk at different times of the year are strong influences on use over time. Our findings also suggest that while distribution of the water hygiene kit, particularly the free WaterGuard and bucket with lid and tap, promoted water treatment behaviors among ANC clients, on-going interpersonal communication and social reinforcements from health workers, family, friends, neighbors, and health workers also appear

to be critical. And beyond social support, we found that financial support from husbands was necessary for women to sustain their use of WaterGuard. The finding that many *current* and *non-current* users of WaterGuard had similar attitudes, beliefs and even practices related to household water treatment suggests that poverty and perceptions about the value of WaterGuard are key influences for sustained use. We did not find that the chlorine smell and taste of WaterGuard was a much of a barrier to use as has been reported in other studies of chlorine-based water treatment products. Among ANC-SWHP *participants*, the provision of up to five free bottles of WaterGuard may have enabled people to experience the benefits of WaterGuard without being turned off by its' smell or taste before committing to purchasing their own supply.

Improvements in the water treatment behaviors among the *friends and relatives* of hygiene kit recipients suggests that the ANC-SWHP has impact beyond those direct recipients of services, further emphasizing the influence that interpersonal relationships, social networks and community norms can have on water treatment knowledge, beliefs and behaviors. However, the *friends and relatives* of program *participants* were less likely than *participants* to express commitment to and consistency with year-round treatment, suggesting that diffused messages may be less comprehensive and thus lack some of the information (e.g. perceived need for year-round treatment) that motivates more consistent behavior change.

Access to clean drinking water is critical for reducing diarrheal morbidity and mortality in Malawi and elsewhere in the developing world. Until major infrastructural improvements to water sources and distribution mechanisms occur, POU water treatment devices can provide access to clean water in impoverished regions of the world. This study helps us understand

influences on POU water treatment practices in Malawi and how behavior change related to such practices occurs both among direct recipients of hygiene programs and their social networks in ways that can be used to improve future programming.

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APPENDICES

Understanding the Motivations for Use and Non-Use of WaterGuard among Mothers in an Antenatal Clinic Water Treatment and Hygiene Program in Malawi

PATH, CDC, and MOH with support from CHAI

**Individual Interview Topic Guide for
(1) Program Participants (Mothers)**

1. Introduce yourself AND note taker.
2. Read the Informed Consent Form.
3. Ensure that the participant understands the information on the consent form.
4. Explain interview objectives, and begin interview.

START TIME: _____

Introduction

Establish rapport/Use of WaterGuard

1. What is your main source of drinking water?
Kodi madzi anu akumwa mumawatunga kuti nthawi zambiri?
 - PROBE: Other sources?
Kodi mumatunga madzi anu akumwa kuchokera malo ena kupatula amene mwawatchulawa?
 - PROBE: How frequently do you collect drinking water?
Kodi mumatunga madzi akumwa kumene mwatchulawa kowirikiza bwanji?
2. How satisfied are you with the quality of your household drinking water?
Kodi ndinu okhutitsidwa bwanji ndi madzi anu akumwa amene mumamwa kunyumba kwanu?
 - PROBE: Why are you satisfied or not satisfied with the drinking water?
Chifukwa chani muli okhutitsidwa kapena osakhutitsidwa?
 - PROBE: In what ways does the quality of water change during different seasons of the year?
Kodi ubwino wa madzi anu akumwa umasintha bwanji ndikusintha kwa nyengo pa chaka?
3. How important do you think it is to treat your drinking water?
Kodi kuteteza madzi anu akaumwa ndikofunika bwanji?
4. What do you do to your drinking water to make it safe?
Kodi mumapanga chani kuti madzi anu akhale otetezedwa?

- PROBE: What other methods do you use to make it safe?
Kodi ndi njira zina ziti zimene mumagwiritsa ntchito poteteza madzi anu akumwa?
- PROBE (if treating water): How often do you treat your drinking water with... (ask for each treatment type mentioned)?
Kodi mumateteza madzi anu kowirikiza bwanji ndi njira imeneyi?
- PROBE: Do you treat your drinking water differently depending on the seasons of the year?
Why or why not?
Kodi mumateteza madzi anu akumwa mosiyana kutengera nyengo ya pa chaka?
Ngati eya, chifukwa chani? Ngati ayi, chifukwa chani?
- PROBE: What do other people in your community do?
Kodi anthu a mdela lanu nawonso amateteza madziawo akumwa kutengera nyengo ya pa chaka?

5. What reminds you to treat your drinking water?

Kodi chimakukumbutsani ndi chani kuti muteteza madzi anu akumwa?

- PROBE: What would be an ideal reminder for you to use WaterGuard daily?
Kodi ndi chani kwenikweni chimene chingamakukumbutseni kuteteza madzi anu akumwa tsiku ndi tsiku?

6. What do you like about treating your water?

Ndi chani chimene chimakusangalatsani pa zakuteteza madzi akumwa?

- PROBE: What do you dislike about treating your water?
Ndi chani chimene sichimakusangalatsani pa zakuteteza madzi akumwa?

7. What kinds of problems does unsafe water cause?

Ndi mavuto anji amene amabwera chifukwa chakuteteza madzi anu akumwa?

- PROBE: How concerned are you about diarrhea in your family? (Frequency, severity)
Kodi mumakhudzidwa bwanji ndi matenda otsegula m'mimba m'banja lanu?

- PROBE: If so, do you feel you can prevent diarrhea? If so, how do you prevent diarrhea?

Ngati ndi choncho, kodi mumaganiza kuti mungathe kupewa matenda otsegula m'mimba?

Ngati ndi choncho, kodi mumapewa bwanji matenda otsegula m'mimba?

Classification: Type of User: consistent, intermittent, seasonal, discontinued

8. When was the last time you used WaterGuard to treat your drinking water? What does it look like?
Kodi ndi liti lomaliza limene munagwiritsa ntchito WaterGuard kuteteza madzi anu akumwa?

9. How frequently do you use WaterGuard?

Kodi Waterguard mumamugwiritsa ntchito mowirikiza bwanji?

10. (Apart from wet vs. dry season) Are there times when you are more likely to use WaterGuard than others (i.e., you save it for these times)?

(Kupatula nthawi ya dzija ndi yachilimwe) Kodi pali nthawi ina imene mungagwiritse ntchito waterguard kowirikiza kwambiri kuposa nthawi ina?

- PROBE: If so, describe when you are most likely to use WaterGuard.

Ngati ndi choncho, ndi nthawi ina iti imene mungagwiritse WaterGuard kowirikiza?

- PROBE: Are there times when you have WaterGuard in your house, but choose not to use it? If so, describe the circumstances (when, why)?

Kodi zimatha kutheka kuti nthawi zina mumatha kukhala ndi WaterGuard m'nyumba koma inu kusankha kusamugwiritsa ntchito?

11. How many free refills did you obtain from the ANC clinic program?

Kodi munalandira mabotolo angati a WaterGuard aulele ku sikelo pa nthawi yomwe munali oyemebekezera?

- PROBE: How long ago did you get your last refill?

Kodi papita nthawi yaitali bwanji chilandilireni Waterguard waulele?

12. Have you used up your free refills?

Kodi mwagwiritsa kale ntchito WaterGuard amene munalandila waulele?

- PROBE: If NO, What do you plan to do after you finish your last refill?
Ngati sanathe afunsemi kuti ;kodi mukuganiza zodzatani WaterGuard waulele akakutherani?
- PROBE: If YES, What did you do when you ran out of WaterGuard/finished the last refill?
Ngati anatha afunse kuti; Kodi munatani WaterGuard waulele atakutherani?
- PROBE: Why did you buy new bottles of WaterGuard or why didn't you buy new bottles of WaterGuard?
Chifukwa chani simunagulepo kapena chifukwa chani munagulapo WaterGuard wina waulele atakutherani?

13. (If they continued to use WaterGuard, ask): Why did you decide to continue using WaterGuard?

Ngati amagwiritsabe ntchito WaterGuard afunsemi): Nchifukwa chiyani munaganiza zogwiritsabe ntchito WaterGuard?

- PROBE: What has encouraged you to continue using WaterGuard?
Ndi chain chomwe chakulimbikitsani kupitiliza kugwiritsa ntchito WaterGuard?

14. (If they didn't continue using WaterGuard, ask): Why have you decided to stop using WaterGuard?

Ndi chani chomwe chinakupangitsani kusiya kugwiritsa ntchito WaterGuard?

- PROBE: Tell me more about the reasons you stopped using WaterGuard? (barriers such as cost, availability, taste/smell)
Mundifotokozereko zifukwa zimene inuyo munasiya kugwiritsa ntchito WaterGuard(kodi ndi chifukwa cha kusowa ndalama?kusapezeka kwa WaterGuard?kusakangalatsidwa ndi fungo kapena kakomedwe ka WaterGuard?)

If stopped using Waterguard, skip to Question 19

15. Where did you purchase it? What do you feel about the distance you travel to purchase it? (probe for too far or close enough?)

Kodi WaterGuardyu munamugula kuti? ,Kodi munayenga mtunda wautali bwanji kukagula WaterGuard?

- PROBE: Who made the purchase (you, your husband, etc.)?
Kodi ndi ndani amene anakagula Waterguardyu?(Inuyo?, amuna anu?)

16. How often do you purchase WaterGuard?

Kodi mumagula WaterGuardyi kowirikiza bwanji?

17. When did you last purchase WaterGuard?

Kodi ndi liti limene munagula WaterGuard komaliza?

Motivations for adoption/initial use (prior to or during ANC program)

18. When did you first hear about WaterGuard?

Kodi munamva liti koyamba za WaterGuard?

- PROBE: How did you hear about it? (From whom; did you hear in the media?)

Kodi za WaterGuard munamva bwanji kapena munamva kwa ndani olo kuti?

19. What messages or materials have you seen or heard promoting WaterGuard?

Kodi ndi mauthenga ati kapena zoulutsira mauthenga ziti zimene munamvapo kapena kuziwona zopititsa patsogolo WaterGuard?

20. Had you ever used WaterGuard prior to the ANC program?

Kodi munali mutayambapo mwagwiritsa ntchito WaterGuard musanalandile WaterGuard waulele ku sikelo?

- If YES, why did you decide to try WaterGuard?

Ngati ndi choncho, chifukwa chani munaganiza zogwiritsa ntchito WaterGuard?

- If NO, why not?

Ngati munali musanayambapo mwagwiritsa ntchito WaterGuard, nchifukwa chani munali musanagwiritsepo WaterGuard?

21. What were your first impressions when you began using WaterGuard?

Kodi maganizo anu anali otani panthawi yoyamba imene munagwiritsa ntchito WaterGuard?

- PROBE: Were there any changes to your drinking water?

Kodi munawona kusintha kwina kulikonse ku madzi anu akumwa?

- PROBE: What did you think of these changes (likes/dislikes)?

Kodi kusintha kumene munawona ku madzi anu akumwa kunakusangalatsani kapena sikunakusanglatseni bwanji?

22. How have your opinions about WaterGuard changed since you started using it?

Kodi maganizo anu asintha bwanji za mmene mumamuwonela WaterGuard chiyambireni kumugwiritsa nctchito WaterGuardyu?

23. Have you noticed any changes in your health or the health of your family members since you began using WaterGuard?

Kodi mwaonako kusintha kwina kulikonse makamaka kumbali ya umoyo wabwino wa inu ndi baja lanu chiyambireni kugwiritsa ntchito WaterGuard?

- PROBE: What benefits does it have?

Kodi ndi phindu/ubwino wanji umene WaterGuard amapereka kwa inu ndi banja lanu?

- PROBE: What disadvantages does it have?

Kodi ndi zovuta zANJI zimene WaterGuard akubweretsa kwa inu ndi banja lanu?

Social reinforcements for current use/non-use

24. Is there anyone in your family or community that encourages you to use WaterGuard?

Kodi pali munthu wina aliyense m'banja mwanu kapena mdela lanu amene chingakulimbikitseni kuteteza madzi anu akumwa?

25. Is there anyone in your family or community that discourages you from using WaterGuard (husband, friends or relatives)?

Kodi pali munthu wina aliyense m'banja mwanu kapena mdela lanu amene samakulimbikitsani kuteteza madzi anu akumwa?

26. What kind of feedback do you get from family members or friends when you treat your water?

Kodi anzanu abale kapenso anznu amati chain mukamateteza madzi anu akumwa?

- PROBE: What does your husband think about your use of WaterGuard?

Kodi amuna anu amatipo chain kapena kuti amaganiza bwanji zakugwiritsa nctchito kwanu kwa WaterGuard?

- PROBE: Has your use of WaterGuard changed how people in your community view you? If so, how?

Kodi kagwiritsidwe ntchito kanu ka WaterGuard kasintha mmene anthu amakuwonerani? Ngati ndi choncho, zasintha bwanji?

27. Who else in your community treats water?

Kodi ndi ndaninso wina mdela lanu lino amene amateteza madzi ake akumwa?

- PROBE: Do you think most of your neighbors treat their water?

Kodi mumawona ngati anthu ambiriamene mwayandikana nawo amateteza madzi awo akumwa?

- PROBE: Among those that treat their water, how frequently do you think they treat it?

Kwa amene amateteza madzi awo akumwa, kodi amawateteza madziwo kowirikiza bwanji?

28. Have you spoken with anyone about treating or not treating drinking water or about using WaterGuard?

Kodi munayamba mwakambiranapo ndi munthu wina aliyense zakatetezewe ka madzi pogwiritsa ntchito WaterGuard?

- PROBE: Who have you spoken with?

Kodi munayamba mwakambiranapo ndi ndani?

- PROBE: What do you say?

Kodi munakambirana nawo zotanii?

- What do they do or say to you about it?

Kodi iwowa anachitapo kapena ananenapo chani mutakambirana nawo?

ANC Program Questions

29. Where and when did you first hear about the hygiene kit program at the ANC clinic?

Kodi ndikuti komanso ndi liti limene munamva koyamba za pologalamu yakuteteza ndi kusunga bwino madzi anu akumwa yomwe imachitika ku chipatala/sikelo?

30. How did you feel about your husband coming in for services with you?

Kodi munamva bwanji pamene amuna anu anabwera nanu limodzi kuchipatala kudzaldira nanu limodzi chithandizo chosiyanasiyana?

31. What educational messages have you received from health workers or HSA regarding safe water and hygiene in your home?

Kodi ndi amuthenga anji kapena uphungu wanji umene munalandira kuchokera kwa alangizi azaumoyo wokhudza kasamalilidwe kamadzi komanso ukhondo pakhomo panu?

- PROBE: How many times did an HSA come to visit?

Kodi alangizi azaumoyo anakuyenderaripo kokwana kangati kunyumba kwanu?

32. What part of the program do you think was most valuable to you and why?

Kodi ndi mbali iti ya pologalamu imene inuyo munayiwona kuti ndi yaphindu kwa inu? Chifukwa chiyani?

Purchase decisions & value

33. What do you think about the value of WaterGuard?

Kodi mtengo wa WaterGuard mumawuwona bwanji?

- PROBE: How much did you pay? Do you think it's a fair price?

Munalipira ndalama zingati? Kodi mumawona kuti Waterguard ali pemtengo wotsika bwino?

- PROBE: Is it affordable for you?

Kodi mumawona kuti WaterGuard ndi wogulika kwa inu?

- PROBE: Is it worth that for you and your family? Why?

Kodi mtengo wa WaterGuayu ndi woyenera kwa inu ndi banja lanu? Chifukwa chani?

34. Did anyone influence your decision to purchase WaterGuard?

Kodi alipo munthu amene anakuthandizani maganizo kuti mugule WaterGuard?

- If yes, who influenced you to purchase the product?

Ngati ndi choncho, ndi ndani amene anakupatsani maganizo amenewa?

- What did they say or do to encourage you to purchase the product?

Ndi chani chimene anakuuzani kapena kuchita chimene chinakulimbikitsani kuti inu mugule WaterGuard?

35. Do you need to ask your husband for money to purchase WaterGuard?

Kodi mumayenera kuwapempha amuna anu ndalama zogulira waterguard?

- PROBE: What is his reaction?

Kodi mukawapempha amuna anu ndalama zogulira Waterguard, iwo amatani/amakuthandizani bwanji/amakuvomerani motani?

Other water treatment products

36. Have you ever tried using stock chlorine? What does it look like?

Kodi munayamba mwagwiritsapo ntchito Chlorine?

- If YES, how frequently do you use it?

Ngati ndi choncho kodi mumamugwiritsa ntchito mowirikiza bwanji?

- If YES, where do you get stock chlorine?

Kodi mumampeza kuti Chloriniyu?

- If YES, can you get stock chlorine whenever you need it? PROBE for details

Kodi mumatha kupeza Chlorine nthawi inaliyonse imene inu mukumufuna?

- If YES, in what way is it different from Waterguard?

Kodi Chlorine ndi Waterguard amasiyana bwanji?

- If YES, in what ways is it similar to WaterGuard?

Kodi Chlorine ndi Waterguard amafanana bwanji?

37. Have you ever boiled your drinking water to make it safe to drink?

Kodi munaphitsapo kapena munawiritsapo madzi anu akumwa ngati njira yoteteza madzi anu akumwa?

- If YES, when would you boil it (on what occasion)?

Kodi ndi nthawi iti imene mumaphitsa kapen mumawiritsa madzi anu akumwa kuti muwateteze?

38. Do you still boil your drinking water?

Kodi mumaphitsabe kapena mumawiritsabe madzi anu akumwa?

- If YES, why? Ngati eya, chifukwa chani?

- If NO, why not? Ngati iyi, chifukwa chani?

If respondent reports more than one method, please ask about when they use one method and when they would use another method.

Closing

39. If you could change something about Waterguard, what would you change?

Mutapatsidwa mwayi osintha chinachilichonse cha waterguard, mungasinthe chani?

40. [ASK NOTETAKER, are there any additional questions?]

[FUNSENI MZANU MUKAPANGA NAYE KAFUKUFUKU, pali china chimene mungafune kuonjezera?]

41. Is there anything else you would like to tell us about WaterGuard or is there anything that we have forgotten to ask?

Kodi muli ndi china chilichonse chimene mungafune kutiuza chkhuzana ndi WaterGuard kapena chimene taiwala kukufunsani?

Thank the participant

ATHOKOZENI AMENE AMATENGA MBALI MUKAFUKUFUKUYI

END TIME: _____

REMEMBER TO TEST THE WATER FOR CHLORINE AND LOOK AT WATER STORAGE

Understanding the Motivations for Use and Non-Use of WaterGuard among Mothers in an Antenatal Clinic Water Treatment and Hygiene Program in Malawi

PATH, CDC, and MOH with support from CHAI

**Individual Interview Topic Guide for
(02) Friends/Relatives**

1. Introduce yourself AND notetaker.
2. Read the Informed Consent Form.
3. Ensure that the participant understands the information on the consent form.
4. Explain interview objectives, and begin interview.

START TIME: _____

Introduction

Establish rapport/Use of WaterGuard

1. What is your main source of drinking water?

Kodi madzi anu akumwa mumawatunga kuti nthawi zambiri?

- PROBE: Other sources?

Kodi mumatunga madzi anu akumwa kuchokera malo ena kupatula amene mwawatchulawa?

- PROBE: How frequently do you collect drinking water?

Kodi mumatunga madzi akumwa kumene mwatchulawa kowirikiza bwanji?

2. How satisfied are you with the quality of your household drinking water?

Kodi ndinu okhutitsidwa bwanji ndi madzi anu akumwa amene mumamwa kunyumba kwanu?

- PROBE: Why are you satisfied or not satisfied with the drinking water?

Chifukwa chani muli okhutitsidwa kapena osakhutitsidwa?

- PROBE: In what ways does the quality of water change during different seasons of the year?

Kodi ubwino wa madzi anu akumwa umasintha bwanji ndikusintha kwa nyengo pa chaka?

3. How important do you think it is to treat your drinking water?

Kodi mumaganiza kuti kuteteza madzi anu akumwa ndikofunika bwanji?

4. What do you do to your drinking water to make it safe?

Kodi mumapanga chani kuti madzi anu akhale otetezedwa?

- PROBE: What other methods do you use to make it safe?

Kodi ndi njira ziti zimene mumagwiritsa ntchito poteteza madzi anu akumwa?

- PROBE (if treating water): How often do you treat your drinking water with...
(ask for each treatment type mentioned)?

Kodi mamateteza madzi anu kowirikiza bwanji?

- PROBE: Do you treat your drinking water differently depending on the seasons of the year?

Why or why not?

Kodi mumateteza madzi anu akumwa mosiyana kutengera nyengo ya pa chaka?

Ngati eya, chifukwa chani? Ngati ayi, chifukwa chani?

- PROBE: What do other people in your community do?

Kodi anthu a mdela lanu nawonso amateteza madziawo akumwa kutengera nyengo ya pa chaka?

5. What reminds you to treat your drinking water?

Kodi mumakumbukira bwanji za kuteteza madzi anu akumwa?

- PROBE: What would be an ideal reminder for you to use WaterGuard daily?

Kodi ndi chani chimene chingamakukumbutseni kuteteza madzi anu madzi anu akumwa tsiku ndi tsiku?

6. What do you like or dislike about treating your water?

Ndi chani chime chimakusangalatsani kapena sichimakusangalatsani pa zakuteteza madzi akumwa?

7. What kinds of problems does unsafe water cause?

Kodi madzi osatetezedwa ambweretsa mavuto anji?

- PROBE: How concerned are you about diarrhea in your family? (Frequency, severity)

Kodi mumawopa matenda otsegula m'mimba m'banja lanu?

- PROBE: If so, do you feel you can prevent diarrhea? If so, how do you prevent diarrhea?

Ngati ndi choncho, kodi mumaganiza kuti mungathe kupewa matenda otsegula m'mimba?

Ngati ndi choncho, kodi mumapewa bwanji matenda otsegula m'mimba?

Classification: Current user (consistent, seasonal) or Current non-user (discontinued)

8. Do you ever use WaterGuard?

Kodi mumagwiritsa ntchito WaterGuard?

- IF YES, PROBE: How frequently do you use WaterGuard?
- Ngati ndi choncho, Kodi Waterguard mumamugwiritsa ntchito mowirikiza bwanji?

9. When was the last time you used WaterGuard to treat your drinking water?

- Kodi ndi liti lomaliza limene munagwiritsa ntchito WaterGuard kuteteza madzi anu akumwa?

10. Have you bought WaterGuard to treat your drinking water?

Kodi mwagulako WaterGuard kuti muteteze madzi anu akumwa?

IF RESPONDENT HAS USED WATERGUARD FREQUENTLY (weekly) OR RECENTLY (in the past 2 days) => GO TO SECTION A FOR "CURRENT USER"

IF RESPONDENT HAS NOT USED WATERGUARD FREQUENTLY (weekly) AND RECENTLY (in the past 2 days) => GO TO SECTION B FOR "CURRENT NON-USER"

SECTION A (for Current Users)

A.1 Motivations for adoption or sustained use

11. What influenced you to try using WaterGuard?

Ndi chani chimene chinakukopani kuti muyese kugwiritsa ntchito WaterGuard?

12. When did you first hear about WaterGuard?

Kodi munamva kuti koyamba za WaterGuard?

- PROBE: How did you hear about it? (From whom; did you hear in the media?)

Kodi za waterguard munamva bwanji?

13. What messages or materials have you seen or heard promoting WaterGuard in the community?

Kodi ndi mauthenga ati kapena zoulutsira mauthenga ziti zimene munamvapo kapena kuziwona zopititsa patsogolo WaterGuard?

14. Why did you decide to try WaterGuard?

Chifukwa chani munaganiza zogwiritsa ntchito WaterGuard?

15. What were your first impressions when you began using WaterGuard?

Kodi maganizo anu anali otani panthawi yoyamba imene munagwiritsa ntchito WaterGuard?

- PROBE: Where there any changes to your drinking water?
Kodi munawona kusintha kwina kulikonse ku madzi anu akumwa?
- PROBE: What did you think of these changes (likes/dislikes)?
Kodi kusintha kumene munawona ku madzi anu akumwa kunakusangalatsani kapena sikunakusanglatseni bwanji?
- PROBE: Why doesn't smell or taste keep you from using Waterguard?
Chifukwa chani fungo komanso kakomedwe kamne kamabwera kamba kothira WaterGuard mmadzi sikamakubwenzerani m'mbuyo kugwiritsa Waterguard?

16. How have your opinions about WaterGuard changed since you started using it?

Kodi maganizo anu asintha bwanji za mmene mumamuwonela WaterGuard chiyambireni kumugwiritsa nctchito WaterGuardyu?

17. Have you noticed any changes in your health or the health of your family members since you began using WaterGuard?

Kodi mwaonako kusintha kwina kulikonse makamaka kumbali ya umoyo wabwino wa inu ndi baja lanu chiyambireni kugwiritsa ntchito WaterGuard?

- PROBE: What benefits does it have?
Kodi ndi phindu/ubwino wanji umene WaterGuard amapereka kwa inu ndi banja lanu?
- PROBE: What disadvantages does it have?
Kodi kuyipa kwa WaterGuard ndikotani?

18. Why did you decide to continue using WaterGuard?

Ndi chifukwa chani munaganiza zopitiliza kugwiritsa ntchito WatterGuard?

- PROBE: What has encouraged you to continue using WaterGuard?
Ndi chani chimene chakulimbikitsani kupitiliza kugwiritsa ntchito WaterGuard?

A.2 Social reinforcements for current users

19. How have relatives and friends influenced your use of WaterGuard?

Kodi abale anu komanso anzanu atengapo mbali yanji kukagwiritsidwe kanu ntchito ka Waterguard?

- PROBE: What kind of feedback do you get from family members or friends when you treat your water?
Kodi anzanu abale kapenso anznu amati chain mukamateteza madzi anu akumwa?
- PROBE: What does your husband think about your use of WaterGuard?
Kodi amuna anu amatipo chain kapena kuti amaganiza bwanji zakugwiritsa ntcihito kwanu kwa WaterGuard?

- PROBE: Is there anyone in your family or community that encourages you to treating your water?
Kodi pali munthu wina aliyense m'banja mwanu kapena mdela lanu amene chingakulimbikitseni kuteteza madzi anu akumwa?
- PROBE: Is there anyone in your family or community that discourages you from treating your water (husband, friends or relatives)?
Kodi pali munthu wina aliyense m'banja mwanu kapena mdela lanu amene samakulimbikitsani kuteteza madzi anu akumwa?
- PROBE: Has your use of WaterGuard changed how people in your community view you? If so, how?
- Kodi kagwiritsidwe ntchito kanu ka WaterGuard kasintha mmene anthu amakuwonerani? Ngati ndi choncho, zasintha bwanji?

20. Who else in your community treats water?

- Kodi ndi ndaninso wina mdela lanu lino amene amateteza madzi ake akumwa?
- PROBE: Do you think most of your neighbors treat their water?
Kodi mumawona ngati anthu ambiriamene mwayandikana nawo amateteza madzi awo akumwa?
 - PROBE: Among those that treat their water, how frequently do you think they treat it?
Kwa amene amateteza madzi awo akumwa, kodi amawateteza madziwo kowirikiza bwanji?

21. Have you spoken with anyone about treating or not treating drinking water or about using WaterGuard?

Kodi munayamba mwakambiranapo ndi munthu wina aliyense zakatetezewe ka madzi pogwiritsa ntchito WaterGuard?

- PROBE: Who have you spoken with?
Kodi munayamba mwakambiranapo ndi ndani?
- PROBE: What do you say?
Kodi munakambirana nawo zotanii?
- What do they do or say to you about it?
Kodi iwowa anachitapo kapena ananenapo chani mutakambirana nawo?

22. (Apart from wet vs. dry season) Are there times when you are more likely to use WaterGuard than others (i.e., you save it for these times)?
(Kupatula nthawi ya dzija ndi yachilimwe) Kodi pali nthawi ina imene mungagwiritse ntchito waterguard kowirikiza kwambiri kuposa nthawi ina?

- PROBE: If so, describe when you are most likely to use WaterGuard.

Ngati ndi choncho, ndi nthawi ina iti imene mungagwiritse WaterGuard kowirikiza?

- PROBE: Are there times when you have WaterGuard in your house, but choose not to use it? If so, describe the circumstances (when, why)?

Kodi zimatha kutheka kuti nthawi zina mumatha kukhala ndi WaterGuard m'nyumba koma inu kusankha kusamugwiritsa ntchito?

- PROBE: If YES, what if anything would encourage you to treat your water more consistently?

Ngati ndi choncho, ndi chani chimene chingakulimbikitseni kuti muzigwiritsa ntchito WaterGuard nthawi zonse?

A.4 Purchase decisions and value

23. Have you ever purchased WaterGuard? If yes, Where did you purchase it? What do you feel about the distance you travel to purchase it? (probe for too far or close enough?)

Kodi munagulapo WaterGuard? Ngati eya, kodi WaterGuardyu munamugula kuti? ,Mganizo anu ndi wotani pa mtunda omwe munayenda kukagula WaterGuard?

- PROBE: Who made the purchase (you, your husband, etc.)?

Kodi ndi ndani amene anakagula Waterguardyu?(Inuyo?, amuna anu?)

24. How often do you purchase WaterGuard?

Kodi mumagula WaterGuardyi kowirikiza bwanji?

25. When did you last purchase WaterGuard?

Kodi ndi liti limene munagula Waterguard komaliza?

26. What do you think about the value of WaterGuard?

Kodi mtengo wa WaterGuard mumawuna bwanji?

- PROBE: How much did you pay? Do you think it's a fair price?

Mulipira ndalama zingati? Kodi mumawona kuti Waterguard ali pemtengo wotsika bwino?

- PROBE: Is it affordable for you?

Kodi mumawona kuti WaterGuard ndi wogulika kwa inu?

- PROBE: Is it worth that for you and your family? Why?

Kodi mtengo wa WaterGuayu ndi woyenera kwa inu ndi banja lanu? Chifukwa chani?

27. Did anyone influence your decision to purchase WaterGuard?

Kodi alipo munthu amene anakuthandizani maganizo kuti mugule WaterGuard?

- If yes, who influenced you to purchase the product?

Ngati ndi choncho, ndi ndani amene anakupatsani maganizo amenewa?

- What did they say or do to encourage you to purchase the product?

Ndi chani chimene anakuuzani kapena kuchita chimene chinakulimbikitsani kuti inu mugule WaterGuard?

29. Do you need to ask your husband for money to purchase WaterGuard?

Kodi mumayenera kuwapempha amuna anu ndalama zogulira waterguard?

- PROBE: What is his reaction?

Kodi mukawapempha amuna anu ndalama zogulira Waterguard, iwo amatani/amakuthandizani bwanjis?

END SECTION A (for Current Users)

SKIP TO SECTION C

SECTION B (for Current Non-Users)

Barriers to adoption or sustained use

30. When did you first hear about WaterGuard?

Kodi munamva kuti koyamba za WaterGuard?

- PROBE: How did you hear about it? (From whom; did you hear in the media?)

Kodi za waterguard munamva bwanji?(Kodi munamva pa wailesi?)

31. What messages or materials have you seen or heard promoting WaterGuard in the community?

Kodi ndi mauthenga ati kapena zoulutsira mauthenga ziti zimene munamvapo kapena kuziwona zopititsa patsogolo WaterGuard?

32. Have you ever used WaterGuard?

Kodi munayamba mwagwiritsapo ntchito WaterGuard?

- PROBE: If not, why have you not used it?

Ngati sanagwiritsepo, chifukwa chani simunagwiritsepo ntchito WaterGuard?

- **PROBE: Depending on the answer given, probe about barriers to use.**

Kutengera ndi mayankho amene akupatsa pamwambapa, afunsitseni za zomwe zimawalepheretsa kapena kuwakanikitsa kugwiritsa ntchito WaterGuard.

- Why can't you afford it? Is there a price that you could afford Waterguard? What do you spend your money on?

- Ndi chifukwa chani simungakwanitse kugula WaterGuard? Kodi pali mtengo umene inu mungamakwanitse WaterGuard atafika pamenepo? Kodi ndalama

zanu mumazigwiritsa ntchito bwanji?

- Why do you think your water is safe to drink?

Ndi chifukwa chani mumaganiza kuti madzi osatetezedwa ndi abwinobwino kuwamwa?

33. If you have tried WaterGuard, why did you decide to stop using WaterGuard?

Ngati anagwiritsapo WaterGuard afunzeni; Ndi chifukwa chani munaganiza zosiya kugwiritsa ntchito WaterGuard?

- PROBE: How have relatives and friends influenced your decision?

Kodi abale anu kapena anzanu anakupangitsani kuti mupange chiganizo chosiya kugwiritsa ntchito WaterGuard?

- PROBE: What kind of feedback did you get from family members or friends when you treated your water?

Kodi abale anu komanso anzanu anatipo chani kapena anachilandira bwanji pamene inu mumateteza madzi anu akumwa?

- PROBE: What did your husband think about WaterGuard?

Kodi amuna anu anatipo chani za WaterGuard?

- PROBE: Is there anyone in your family or community that discourages you from treating your water (husband, friends or relatives)?

Kodi pali munthu wina aliyense m'banja mwanu kapena mdela lanu amene samakulimbikitsani kuteteza madzi anu akumwa?kodi munthuyu ndi amuna anu, anzanu kapena abale anu?

34. What do you think about the value of WaterGuard?

Kodi mtengo wa WaterGuard mumawuna bwanji?

- PROBE: How much did you pay? Do you think it's a fair price?

Mumapatsa ndalama zingati? Kodi mumawona kuti Waterguard ali pemtengo wotsika bwino?

- PROBE: Is it affordable for you?

Kodi mumawuwosna kuti WaterGuard ndi wogulika kwa inu?

- PROBE: Is it worth that for you and your family? Why?

Kodi mtengo wa WaterGuayu ndi woyenera kwa inu ndi banja lanu? Chifukwa chani?

35. Who else in your community treats water?

Kodi ndi ndaninso wina mdela lanu lino amene amateteza madzi ake akumwa?

- PROBE: Do you think most of your neighbors treat their water?

Kodi mumawona ngati anthu ambiriamene mwayandikana nawo amateteza madzi awo akumwa?

- PROBE: Among those that treat their water, how frequently do you think they treat it?

Kwa amene amateteza madzi awo akumwa, kodi amawateteza madziwo kowirikiza bwanji?

36. Have you spoken with anyone about treating or not treating drinking water or about using WaterGuard?

Kodi munayamba mwakambiranapo ndi munthu wina aliyense zakasamaliridwe ka madzi kopgwiritsa ntchito WaterGuard?

- PROBE: Who have you spoken with?

Kodi munayamba mwakambiranapo ndi ndani?

- PROBE: What do you say?

Kodi mukuwuzza chiyani?

- What do they do or say to you about it?

Kodi iwowa anachitapo kapena ananenapo chani mutakambirana nawo?

END SECTION B (Current non-users)

SECTION C

ANC Program Questions

37. What have you heard about the safe water and hygiene kit (WHK) program at the ANC clinic?

Kodi munamva zotani zapologalamu ya kasamalidwe kamdzi ndi phukusi la ukhondo imene imachitika kuchipatala?

- PROBE: From whom have you heard about this program?

Kodi munamva kuchokera kwa ndani za pologalamuyi?

- PROBE: When did you first learn of it?

Kodi koyamba kamene munamva za Pologamuyi ndi lit?

- PROBE: What are the community members saying about the program?

Kodi anthu amdela lino akutipo chani za pologamu imeneyi yakasamalidwe kamadzi komanso phukusi la ukhondo?

38. Have you yourself gone to the ANC clinic for services?

Kodi inuyo munapitako kuchipatala kukalandira chithandizo chinachilichonse pamene munali oyembekezera?

- PROBE: If yes, on what occasion?

Kodi munapita kuchipatalaku pa nthawi iti?

- PROBE: What is your opinion about the ANC services you received in terms of

quality of care, crowding, confidentiality?

Kodi maganizo anu ndi otani pachithandizo chimene munalandira kuchipatala panthawi imene munali oyembekezera makamaka kumbali ya chisamaliro chabwino, kudzadza kwa anthu komanso kusungiridwa chinsinsi?

39. What educational messages have you received from health workers or HSA regarding safe water and hygiene in your home?

Kodi ndi mauthenga kapena uphungu wanji umene munalandira kuchokera kwa anthu akuchipatala kapena alangizi a zaumoyo okhudzana ndi katetezedwe ka madzi komanso ukhondo kunyumba kwanu?

- PROBE: Has an HSA come to visit you at your home? If so, how many times?

Kodi alangizi azaumoyo anakuyenderaniko kunyumba kwanu? Ngati anakuyenderani, anakuyenderaniko ka ngati?

- PROBE: What messages did they give you at the visit(s)?

Kodi alangiziwa anakupatsani maphunziro kapena uphungu wanji panthawi imene anabwera kunyumba kwanu?

Other water treatment products

40. Have you ever tried using stock chlorine?

Kodi munayamba mwagwiritsapo ntchito Chlorine?

- If YES, how frequently do you use it?

Ngati ndi choncho kodi mumamugwiritsa ntchito mowirikiza bwanji?

- If YES, where do you get stock chlorine?

Kodi mumampeza kuti Chloriniyu?

- If YES, can you get stock chlorine whenever you need it? PROBE for details

Kodi mumatha kupeza Chlorine nthawi inaliyonse imene inu mukumufuna?

- If YES, in what way is it different from Waterguard?

Kodi Chlorine ndi Waterguard amasiyana bwanji?

- If YES, in what ways is it similar to WaterGuard?

Kodi Chlorine ndi Waterguard amafanana bwanji?

41. Have you ever boiled your drinking water to make it safe to drink?

Kodi munaphitsapo kapena munawiritsapo madzi anu akumwa ngati njira yoteteza madzi anu akumwa?

- If YES, when would you boil it (on what occasion)?

Kodi ndi nthawi iti imene mumaphitsa kapen mumawiritsa madzi anu akumwa kuti muwateteze?

42. Do you still boil your drinking water?

Kodi mumaphitsabe kapena mumawiritsabemadzi anu akumwa tsopano?

Closing

43. If you could change something about Waterguard, what would you change?

Mutapatsidwa mwayi osintha chinachilichonse cha waterguard, mungasinthe chani?

[ASK NOTETAKER, are there any additional questions?]

[FUNSENI MZANU MUKAPANGA NAYE KAFUKUFUKU, pali china chimene mungafune kuonjezera?]

44. Is there anything else you would like to tell us about WaterGuard or is there anything that we have forgotten to ask?

Kodi muli ndi china chilichonse chimene mungafune kutiuza chkhuzana ndi WaterGuard kapena chimene taiwala kukufunsani?

Thank the participant

ATHOKOZENI AMENE AMATENGA MBALI MUKAFUKUFUKUYI

END TIME: _____

REMEMBER TO TEST THE WATER FOR CHLORINE AND OBSERVE WATER STORAGE

APPENDIX C: INTERVIEW GUIDE FOR HUSBANDS

Understanding the Motivations for Use and Non-Use of WaterGuard among Mothers in an Antenatal Clinic Water Treatment and Hygiene Program in Malawi

PATH, CDC, and MOH with support from CHAI

**Individual Interview Topic Guide for
(3) Husbands**

1. Introduce yourself.
2. Read the Informed Consent Form.
3. Ensure that the respondent understands the information on the consent form.
4. Explain interview objectives, and begin interview.

START TIME: _____

Introduction

1. How satisfied are you with the quality of your household drinking water?
Kodi ndinu okhutitsidwa bwanji ndi madzi amene mumamwa kunyumba kwanu?
 - PROBE: Why or why not?
Chifukwa chani muli okhutitsidwa kapena osakhutitsidwa?
2. What do you (or your family members)do to your drinking water to make it safe?
Kodi inu ndi banja lanu mumapanga chani kuti madzi anu akhale otetezedwa?
 - PROBE: What other methods have you used to make your drinking water safe?
Kodi ndi njira zina ziti zimene mumagwiritsa ntchito poteteza madzi anu akumwa?
3. What educational messages have you received from health workers or HSA regarding drinking water and safe handwashing in your home?
Kodi ndi uphungu wanji umene munalandira kuchokera kwa alangizi azaumoyo pazakatetezedwe ka madzi komanso kusamba m'manja kunyumba kwanu?

Motivations for adoption

4. When did you first hear about WaterGuard?
Kodi munamva liti koyamba za WaterGuard?

- PROBE: How did you hear about it?

Kodi za waterguard munamva bwanji?

- Where did you hear about WaterGuard from?

Kodi munamva kuti za WaterGuard?

5. Has your family ever used WaterGuard to treat your drinking water?

Kodi banja lanu linayamba lagwiritsapo ntchito WaterGuard?

- PROBE: Why or why not?
- Ngati Linagwiritsapo, chifukwa chani? Ngati Banja lanu silinagwiritsepo, chifukwa chani?

If NO, SKIP to question 19

6. Tell me about your family's decision to start using WaterGuard?

Ndi chifukwa chani inu ndi banja lanu munaganiza zoyesa kugwiritsa ntchito WaterGuard?

- PROBE: who made the decision?
Kodi ndindani anabweretsa amaganizo amenewa?
- PROBE: What benefits did you think it offered you or your family?
Kodi ndi phindu/ubwino wanji umene WaterGuard amapereka kwa inu ndi banja lanu?

7. What did you first think about WaterGuard when you began using it or what were your first impressions about WaterGuard when you began using WaterGuard?

Maganizo anu anali otani panthawi yoyamba imene munagwiritsa ntchito WaterGuard?

8. What changes did WaterGuard make in your drinking water?

Kodi munawona kusintha kwanji pa madzi anu akumwa mutagwiritsa ntchito Waterguard?

- PROBE: What did you think of these changes (PROBE for likes/dislikes)?
Kodi kusintha kumene munakuwonaku mutathira WaterGuard mmadzi mwanu munakulandira bwanji? (Kodi kunakusangalatsani kapena kunakuipirani?)

9. Did you notice any changes in the health of your family members when you were using WaterGuard?

Kodi munaonako kusintha kulikonse pa umoyo wa banja lanu chiyambireni kugwiritsa ntchito WaterGuard?

- PROBE: If so, please describe the changes.
- PROBE: Ngati eya, mundiwuza kusintha.

10. If you could change something about WaterGuard, what would you change?

Mutapatsidwa mwayi osintha chinachilichonse cha WaterGuard, mungasinthe chani?

Purchase decisions

11. Does your family still use WaterGuard?

Kodi m'banja mwanu mumagwiritsabe ntchito WaterGuard?

- PROBE: If YES, tell me about your decision to continue using WaterGuard?
Ngati ndi choncho, tandiuzeni chifukwa chimene mumagwiritsabe ntchito WaterGuard?
- PROBE: If NO, tell me about your decision to stop? Why did you stop?
Ngati sichoncho, tandiuzeni chifukwa munaganiza zosiya kugwiritsa ntchito WaterGuard?
- PROBE: Do you treat your drinking water differently depending on the seasons of the year?
Why or why not?
Kodi mumateteza madzi anu akumwa mosiyana kutengera nyengo ya pa chaka? Ngati eya, chifukwa chani? Ngati iyi, chifukwa chani?
- When was the last time you used WaterGuard to treat your drinking water?
Kodi ndi liti lomaliza limene munagwiritsa ntchito WaterGuard kuteteza madzi anu akumwa?

12. Do you purchase WaterGuard?

Kodi mumagula WaterGuard?

- PROBE: If yes, how often do you purchase WaterGuard liquid?
- PROBE: Ngati mumagula, Kodi mumagula WaterGuardyi kowirikiza bwanji?

If NO, then SKIP to question 19

13. How far do you have to travel to buy WaterGuard?

Kodi mumayenda mtunda wautali bwanji kukagula WaterGuard?

14. How much do you pay for a bottle of WaterGuard?

Kodi WaterGuard mumagula ndalama zingati?

15. What do you think about the price of WaterGuard?

Kodi maganizo anu ndi wotani paza mtengo wa WaterGuard?

16. Did anyone influence your decision to purchase WaterGuard?

Kodi alipo muntu amene anakuthandizani maganizo kuti mugule WaterGuard?

- PROBE: If yes, who influenced you to purchase the product?

Ngati ndi choncho, ndi ndani amene anakupatsani maganizo amenewa?

- PROBE: What did they say or do encouraged you to purchase the product?

Ndi chani chimene anakuuzani kapena kuchita chimene chinakulimbikitsani kuti inu mugule WaterGuard?

17. Have members of your community commented on your use of WaterGuard?

Anthu ena amadera mwanu muno anakambako chinachitichonse chokhudzana ndi kugwiritsa ntchito kwanu kwa Waterguard?

- PROBE: What feedback do you get from family and friends when you treat your water?

Mumawuzidwa zotani kuchokera kwa banja lanu ndi anzanu mukateteza madzi anu?

- PROBE: How does your family remember to treat your drinking water?

Banja lanu limakumbikira bwanji kuti liteteze madzi anu akumwa?

Other water treatment products

18. Has your family ever used Stock Chlorine?

Kodi banja lanu linayamba lagwiritsapo ntchito Chlorine?

- PROBE: If YES, where do you get stock chlorine?

Kodi munampeza bwanji kapena munampeza kuti?

PROBE: Mumagwiritsapo ntchito Chlorine nthawi yanji?

19. In what ways is Stock chlorine the same as or different from WaterGuard?

Kodi Chlorine amasiyana bwanji ndi Waterguard?

- PROBE for differences in taste, smell, quality, price, etc...

Funsanipo zambiri kusiyana makomedwe, fungo, mtundu, mtengo

20. In your opinion, what would help women continue to use and purchase waterguard?

Mumaganizo anu, ndi chani chomwe chingawathandize anthu kuti apitirize kugwiritsa ndi kugula Waterguard?

Experience with ANC visits

21. Did you attend any antenatal clinic visits with your wife? Why or why not?

Munapitako limodzi ndi akazi anu ku sikelo? Chifukwa chani munapita, kapena chifukwa chiyani simunapiteko?

- PROBE: If yes: Why did you decide to go with her?
Ngati eya, chifukwa chani munaganiza kuti mupite nawo?
- PROBE: Please describe a typical visit—what did you do or experience there?
Ndifotokezeleni ulendo umodzi omwe munapitako, munapanga kapena kukumana ndi zotani?
- PROBE: What did you like or not like about these visits?
Ndi chani chomwe munakonda kapena chomwe simunakonde pa maulendo amenewa?
- PROBE: How are men viewed at the ANC clinic? (is it acceptable for men to attend?)
Anthu amawaganizila chani azibambo operekeza akazi awo kusikelo?

22. Were you counseled about HIV when you went to the first antenatal clinic visit?

Munapatsidwa uphungu wokhudzana ndi HIV mutapita ku sikelo koyamba?

- PROBE: What messages did you get about HIV?
Munapatsidwa mauthenga anji okhudzana ndi HIV?
- PROBE: How did you feel about getting tested for HIV?
Munamva bwanji ndi zoti akuyezeni HIV?
- PROBE: How has the HIV test changed the way you live your life?
Kuyezetsa magazi kwasintha bwanji m'mene inu mumakhalira m' moyo wanu?

23. Where was your child born? If at health facility, what encouraged you to deliver there?

Mwana wanu anabadwira kuti? Ngati anabadwira ku chipatala, ndi chani chomwe chinakulimbikitsani kuti mwana wanu akabadwire ku chipatalako?

Closing

24. [ASK NOTETAKER, are there any additional questions?]

Funseni mzanu mukupanga naye kafukufuku, pali china chimene mungafune kuonjezera?

25. Is there anything else you would like to tell us about WaterGuard or is there anything that we have forgotten to ask?

Kodi muli ndi china chilichonse chimene mungafune kuti uza chokhuzana ndi WaterGuard kapena chimene taiwala kukufunsani?

Thank the participant

ATHOKOZENI AMENE AMATENGA MBALI MUKAFUKUFUKUYI.

END TIME: _____

APPENDIX D: INTERVIEW GUIDE FOR NURSES

Understanding the Motivations for Use and Non-Use of WaterGuard among Mothers in an Antenatal Clinic Water Treatment and Hygiene Program in Malawi

PATH, CDC and MOH with support from CHAI

**Individual Interview Topic Guide for
(04) Health Care Workers (clinic-based)**

1. Introduce yourself
2. Read the Informed Consent Form
3. Ensure that the participant understands the information on the consent form
4. **Ensure that the participant is an HCW who was active in 2010 during the original program intervention.**
5. Explain interview objectives, and begin interview.

TIME START: _____

Introduction

First I'd like to ask you some questions about your impressions of the quality of drinking water in this community, and then we'll discuss your role at the ANC clinic and supporting mothers who were given the *WaterGuard* product and education from your health center in 2010.

1. What do you think of the quality of drinking water in this community?
Mukuganiza bwanji za ubwino wa madzi akumwa mu dera lino?
 - a. PROBE: Why is it good/poor?
 - o Ndi abwino kapena oyipa chifukwa chani?
2. In your opinion, is it necessary for people in this community to treat their drinking water?
Mumaganizo anu kodi ndikofunika kapena koyenera kwa anthu mu mdela lino kuteteza madzi anu akumwa?
 - a. PROBE: Why or why not?
 - b. PROBE: Chifukwa chani?
3. In what ways does the quality of the source water change during different seasons of the year?
Kodi ndi munjira ziti zimene ukhondo wamadzi akumwa umatha kusintha pamalo otunga madzi pachaka?
 - a. PROBE: Do people treat their drinking water differently depending on the season or time of year?

- b. PROBE: Kodi anthu amateteza madzi awo akumwa munjira zosiyana malingana ndi nyengo ya pa chaka?
4. What health challenges do women face in this community?
Ndizovuta zANJI zokhudzana ndi za umoyo zomwe azimayi amakumana nazo mudera lanu lino?
5. How does water safety compare to other challenges faced? Do women complain about diarrheal illness for themselves or their families?
Katetezedwe ka madzi kamafanizidwa bwanji ndi zovuta zina zomwe amakumana nazo? Kodi azimayi amadandaula za kutsegula m'mimba kwa iwowo kapena za anthu amu banja lawo?

Experiences with WaterGuard

6. When did you first hear about *WaterGuard*?
Kodi ndi liti limene munamva za waterguard koyamba?
 - PROBE: How/Where did you hear about WaterGuard?
 - PROBE: kodi munamva bwanji komanso kuti za waterguard?
7. Tell me about your experience with WaterGuard in your work as Health Care Worker.
Tandiwuzeni za zomwe muma kumana nazo zokhudzana ndi waterguard pogwira ntchito yanu monga HCW.
 - a. PROBE: What do you tell clinic clients or mothers about the product?
Kodi mumawauza anthu obwera kuchipatala komanso amayi amdela lino chani zokuzana ndi waterguard?
 - b. PROBE: Do you interact with the husbands/partners of the women and what do you tell them about Waterguard?
Kodi mumacheza ndi amuna awo a azimayiwa? Mumawawuza chani zokhudzana ndi waterguard?
8. In your opinion, what motivates women to use Waterguard?
Mumaganizo anu, ndi chani chomwe chimawalimbikitsa azimayi kuti azigwiritsa ntchito waterguard?
 - a. PROBE: family, community, illness, water quality, availability of money
Mabanja, dera, matenda, ubwino wa madzi, kupezeka kwa ndalama
9. What would better help you make clinic clients and mothers in the community aware of *WaterGuard* or make it more attractive for them to buy?
Kodi mungathandizike bwanji kuti anthu obwera kuchipatala kuno adziwe za WaterGuard kapena kuthandizika kuti azigula?
10. In your opinion, what would help women continue to use and purchase waterguard?

Mumaganizo anu, ndi chani chomwe chingawathandize azimayi kuti apitirize kugwiritsa ndi kugula waterguard?

Implementation of the ANC Hygiene Kit Program

11. How is the hygiene kit program implemented at your Health Facility?

Kodi program ya WHK yimayendetsedwa bwanji ku chipatala chanu chino?

- PROBE: Talk me through a typical visit of for a pregnant woman enrolled in this program.
- PROBE: Mungansdifotokozereko za zomwe zimachitika kukabwera mzimayi oyembekezera amene ali mu program yimeneyi.
- PROBE: How were you trained to implement the program? Was the training sufficient?
- Munaphunzitsidwa bwanji za kayendetsedwe kwa program yimeneyi? Maphunziro amenewa anali okwanira?

12. How has your work changed since this program was started at your health facility?

Ntchito yanu yasintha bwanji chiyambireni program imeneyi ku chipatala chanu?

- PROBE: How does it change your workload?
Ntchito yanu yasinta bwanji?
- PROBE: How do you feel about these changes?
Maganizo anu ndi wotani pazakusinthaku?

13. What are the challenges in implementing this program at your health facility?

Ndi zophinja zANJI zomwe mumakumana nazo pakayendetsedwe ka program imeneyi ku chipatala chino?

14. What differences have you noticed at the health facility since the program started?

Mwawonako zosintha zANJI kuchipatala chino chiyambireni program yimeneyi?

- PROBE: Are there differences in attendance for women/men (increase or decrease), changes in quality of care at the health facility, space/storage issues (for program supplies).
Pali kusiyana mu kabweredwe ka azimayi/ azibambo (kukwera kapena kutsika), kusintha kwa chisamaliro ku chipatala, nkhani zokhuzana ndi malo ndi kasungidwe kwa katundu wa program?
- PROBE: How do you feel about men coming to ANC visits?
Kodi maganizo anu ndi wotani pa azibambo kumabwera kusikelo?
- PROBE: What do ANC clients tell you about the program?
Kodi anthu obwera ku sikelo amakuwuzani chani za program imeneyi?
- PROBE: How have women benefitted from this program?
Azimayi apindula bwanji kudzera mu program imeneyi?

- PROBE: How do their husbands benefit? Families benefit?
Azimuna awo amapindula bwanji? Nanga mabanja awo?

15. If you could begin the program over again in your health facility, what would you do differently?

Zitakhala zotheka kuti muyambilenso program imeneyi kuchipatala chanu, ndi chani chomwe munga pange mosiyana?

- PROBE: How would you improve it? Probe about improvements for both clients and at the health facility level.

Mungapange chani kuti muchipititse patsogolo? Funsani zambiri za mene anga chipititsire patsogolo kuti chithandize makasitomala ndi chipatala

16. Does your health facility distribute stock chlorine solution?

Kodi chipatala chanu chino chimapereka chlorine solution?

- If Yes, PROBE for more information-when, seasonal availability
- Ngati amapereka chlorine solution, funsani zambiri zokhudzana ndi kapezekedwe kake, amapereka liti?

Perceived value of HWTS & Social influences

17. What motivates women to come to ANC visits and to use the health facility services?

Ndi chani chomwe chimawalimbikitsa azimayi kuti azibwela ku sikelo ndi kugwiritsa ntchito chithandizo cha ku chipatala?

- PROBE: HIV services? Free services? Free programs like WHK? Family or husband influence?
- PROBE: chithandizo cha HIV? Chithandizo cha ulere? Ma program a ulere ngati WHK? Kulimbikitsidwa ndi ma banja kapena azimuna awo?

18. What do you hear about the WHK program in the community?

Mumamva zotani zokhudzana ndi program ya WHK mudera lino?

- PROBE: Other health care workers; from women who are not participating in the program; from men?

Kuchokera kwa HCW? Kuchokera kwa azimayi omwe sakutenga mbali mu program yimeneyi? Kuchokera kwa azibambo?

19. In your opinion, who in this community uses Waterguard and why do people use it?

Mumaganizo anu , mudera lino, ndi ndani amagwiritsa ntchito WaterGuard?
Chifukwa chani?

20. What factors encourage people to use Waterguard?

Ndi zinthu ziti zimene zimalimbikitsa anthu kugwiritsa ntchito WaterGuard?

- a. PROBE: In your opinion, how do husbands influence this decision?

Mumaganizo anu, kodi abambo amalimbikitsa bwanji akazi awo kugwiritsa ntchito WaterGuard?

21. Do community members encourage each other to treat their water or use Waterguard?

Kodi anthu okhala mu dera lino amalimbikitsana kugwiritsa ntchito Waterguard kapena kuteteza madzi awo?

- o PROBE: Why or why not?
- o Chifukwa chani amalimbikitsana kapena salimbikitsana?

22. What are the barriers to using Waterguard in this community?

Kodi ndi ziphinjo zANJI zimene zimalepheretsa anthu mdela lino kugwiritsa ntchito WaterGuard?

- a. Why do you think that some women have discontinued their use of WaterGuard?

Mumawona bwanji nchifukwa chani amayi ena anasiya kugwiritsa ntchito WaterGuard?

Personal use experiences

23. Have you personally ever used WaterGuard to treat your drinking water?

Kodi pa inu nokha munayamba mwagwiritsapo ntchito waterguard kuti muteteze madzi anu akumwa?

- o If 'YES', why did you decide to try *WaterGuard*? If 'NO', why not?

Ndichifukwa chiyani munaganiza zoyamba kugwiritsa nthcito waterguard?

- o How frequently do you use *WaterGuard*?

Kodi mumagwiritsa ntchito waterguard mowirikiza bwanji?

- o What benefits did you think WaterGuard offers you or your family?

Ndi ubwino wanji umene waterguard anabweretsa kwa inu ndi banja lanu?

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24. Do you still use WaterGuard to treat your drinking water?

Kodi mumagwiritsabe ntchito waterguard kuteteza madzi anu akumwa?

- o PROBE: Why or why not?

Ndichifukwa chani mwati ndikoyenera kapena kosayenera?

Closing

25. [ASK NOTETAKER, are there any additional questions?]

26. Is there anything else you would like to tell us about WaterGuard or is there anything that we have forgotten to ask?

Kodi pali china chilichonse chimene mungafune kutiwuza chokhudzana ndi waterguard kapena pali china chimene taiwala kukufunsa?

Thank the participant

ATHOKOZENI AMENE AMATENGA MBALI MUKAFUKUFUKUYI

END TIME: _____

Understanding the Motivations for Use and Non-Use of WaterGuard among Mothers in an Antenatal Clinic Water Treatment and Hygiene Program in Malawi

PATH, CDC, and MOH with support from CHAI

**Individual Interview Topic Guide for
(5) Health Surveillance Assistant**

1. Introduce yourself.
2. Read the Informed Consent Form.
3. Ensure that the participant understands the information on the consent form.
4. **Ensure that the participant is an HSA who was active in 2010–2011 during the Machinga program intervention.**
5. Explain interview objectives, and begin interview.

START TIME: _____

Introduction

First I'd like to ask you some questions about your impressions of the quality of drinking water in your community, and then we'll discuss your role in supporting mothers who were given the *WaterGuard* product and education from your health center in 2010.

1. What is the main source of drinking water in your catchment area?
Kodiku catchment area kwanu anthu amatunga kuti madzi awo akumwa nthawi zambiri?
 - PROBE: Do people use different water sources depending on the time of year?
Kodi anthu amatunga madzi m'malo osiana malingana ndi nyengo?
2. What do you think of the quality of drinking water in your catchment area?
Kodi ndinu okhutitsidwa bwanji ndi madzi amene mumamwa kunyumba kwanu?
 - a. PROBE: Why is it good/poor?
Ndi abwino kampena oyipa chifukwa chani?
3. What are health problems that people in your catchment area/community?
Ndimavuto anji okhudzana ndi za umoyo omwe anthu amakumana nawo m'dela mwanu muno?
4. In your opinion, is it necessary to treat drinking water in this area?

Mumaganizo anu kodi ndikofunika kapena koyenera kuteteza madzi anu akumwa mdela lino?

a. PROBE: Why or why not?

Ndichifukwa chani mwati ndikoyenera kapena kosayenera?

5. In what ways does the quality of the water change during different seasons of the year?

Kodi ndi munjira ziti zimene ukhondo wamadzi akumwa umatha kusintha pamalo otunga madzimalingana ndi nyengo pachaka?

a. PROBE: Do people treat their drinking water differently depending on the season or time of year?

Kodi anthu amateteza madzi awo akumwa mosiyana malingana ndi nyengo pachaka? / Kodi anthu amasintha njira zotetezera madzi awo akumwa malingana ndi nyengo ya pachaka?

6. What are the challenges you hear from women in keeping their drinking water safe?

Kodi mumamva za mavuto anji kuchokera kwa azimayi omwe amakumana nawo poteteza madzi awo akumwa?

Experiences with WaterGuard

7. When did you first hear about WaterGuard?

Kodi munamva liti koyamba za WaterGuard?

o PROBE: How did you hear about it?

Kodi za waterguard munamva bwanji?

o Where did you hear about WaterGuard from?

Kodi munamva kuti za WaterGuard?

8. Tell me about your experience with WaterGuard in your work as Health Surveillance Assistant.

Tandifotokozereni za mmene mukumudziwira waterguard inu ngati HSA?

o PROBE: Who do you speak with regarding WaterGuard?

Funsani zambiri: ndi ndani amene mumakambirana naye zokhuza Waterguard?

o PROBE: Where do you get your information/training?

Kodi maphunziro anu mumalandira kuti?

o PROBE: What do you tell mothers in the community about the product?

Kodi mumawauza amayi amdela lino chani zokuzana ndi waterguard?

- PROBE: What do you tell mothers about safety and hygiene? What messages do you give?
Kodi mumawauza chani azimayi zokhudzana ndi chitetezo ndi ukhondo?
Mumawapatsa mauthenga anji?

9. Based on what you know about this product and your experience with it, if you could change something about this product, what would you change and why?

Kutengera ndi mmene inu mumamudziwira waterguard, mutapatsidwa mwayi woti musinthe chinthu chimodzi pa waterguardyu, mungasintheho chani?

10. What do you think about the price of WaterGuard?

Kodi mtengo wa *Waterguard* mumauwona bwanji?

- PROBE: How fair do you think the price is?
Mukuganiza bwanji pa zaubwino wa mtengowu?
- PROBE: How affordable is the product for women in your community?
Mtengowu ndiwoti azimayi amudera muno akhonza kukwanitsa kugula *Waterguard*?
- PROBE: What do you think about the value of the product compared to what you pay for it?
Kodi mukuganiza bwanji za ubwino wa *Waterguard* pofanizila ndi mtengo wake?

11. What messages or materials have you seen or heard promoting the *WaterGuard* product?

Kodi ndi mauthenga ati kapena zipangizo ziti zimene munaziwona kapena kumva zopititsa patsogolo *Waterguard*?

- PROBE: What materials do you have to help you promote the use of *WaterGuard*?
Funsani zambiri pa zamauthenga kapena uthenga wapawailesi(zikwangwani zamunsewu, mapostala, etc)
- PROBE: What would help you make clinic clients and mothers in the community more aware of *WaterGuard* or make it more attractive for them to buy?

Kodi mungathandizike bwanji kuti anthu obwera kuchipatala kom anso anthu a m'dela lanu adziwe za *WaterGuard* kapena kukuthandizani kuti azigula?

Implementation of ANC Hygiene Kit Program

12. How is the WHK program implemented at your Health Facility?

Kodi program ya WHK imayendesedwa bwanji ku chipatala chanu chino?

- PROBE: Talk me through a typical home visit you make to a woman in the program.
Mundifotokozereko za zomwe zimachitika mukamu yendera mzimayi oyembekezera amene ali mu program yimeneyi.

- PROBE: What do you do/say during the visit? How often do you conduct these visits?
Mumapanga kapena kunena chani mukamuyendera? Mumawayendera kangati?

13. What messages do you give to family members during the home visits?

Mumapereka mauthenga anji kwa anthu ambanjamo mukapanga maulendo amenewa?

- PROBE: How if at all is the message you give about treating water in the dry season different from the message you give about treating water in the wet season?

Kodi mauthenga omwe mumapereka zokhudzana ndi kuteteza madzi amasiyana bwanji munyengo yothentha ndi nyengo ya dzinja? (ngati amasiyana)

- PROBE: What questions do mothers have for you during your visits?

Azimayi amakhala ndi mafunso otani mukawayendetsa?

- PROBE: What questions do husbands ask?

Azimuna awo amafunsa mafunso otani?

14. Please tell me about the training that you received to participate in the program.

Mundiwuzeko za maphunziro omwe munalandila kuti mutenge gawo mu program yimeneyi.

- PROBE: What topics were covered?

Kodi munawuzidwa za zintu zANJI?

- PROBE: Was the training sufficient?

Maphunziro amenewa anali okwanira?

15. How has your work changed since this program was started at your health facility?

Kodi ntchito yanu yinasintha bwanji kuchokera nthawi yomwe program yimeneyi yinayambitsidwa ku chipatala chanu?

- PROBE: What are your responsibilities as an HSA? What other activities do you lead?

Kodi maudio anu ndi otani monga HSA? Mumatsogoleranso zintchito zANJI?

- PROBE: How have women benefitted from the hygiene kit program?

Azimayi apindula bwanji kudzera mu program ya WHK?

- PROBE: How do their husbands benefit? Families benefit?

Kodi azimuna awo ndi mabanja awo apindula bwanji?

16. In your opinion, what are the challenges in implementing this program?

M'maganizo anu ndi zovuta zANJI zomwe zilipo poyendetsa program imeneyi?

- PROBE: What differences have you noticed at the health facility since the program started?

Ndi zosintha zANJI zomwe mwawonapo pachipatala chanuchi chiyambileni program imeneyi?

17. How has the program affected your workload? If it increased your work, how do you feel about this?

Ntchito zomwe numawira zakhudzidwa bwanji ndi program yimeneyi? Ngati yawonjezera ntchito zomwe mumagwira, mukumva bwanji zokhudzana zimenezi?

- a. PROBE: How has the program affected the way you feel about your job?

Nanga kukhutitsidwa kwanu ndi ntchito yanu kwakhudzidwa bwanji ndi program yimeneyi?

- b. PROBE: Do any other activities or work suffer as a result?

Pali zochitika zina kapena ntchito zina zomwe sizichitika chifukwa cha zimenezi?

18. If you could begin your participation in the program over again, what would you do differently?

Mutayambitlanso kutengapo mbali mu program imeneyi, ndichani chomwe mungapange mosiyana (ndi momwe munapangira poyamba)?

- o PROBE: How would you improve it? Probe about improvements for both clients and at the health facility level.

Mungapange chani kuti muyipititse pologalamu imeneyi patsogolo? Funsani zambiri zamene angachi pititsire patsogolo kuti chithandize anthu aku catchment area kwawo komanso anthu obwera chipatala.

19. What are the changes you have seen in womens' homes as a result of the hygiene kit program?

Ndi zosintha zANJI zomwe mwawonapo mumanyumba mwa azimayi kifukwa cha program ya WHK?

- a. PROBE: What do women in your catchment area tell you about the program?

Azimayi amudera mwanu amakuwuzani zotani okudzana ndi program yimeneyi?

20. Does your health facility distribute stock chlorine solution?

Kodi chipatala chani chimapereka chlorine solution?

- o If Yes, PROBE for more information-availability, acceptability to women.

Ngati amapereka chlorine solution, funsani zambiri zokhudzana ndi kapezekedwe kake, kavomeredwe ka azimayi.

Perceived value of HWTS & Social influences

21. Have you spoken with anyone other than clinic clients or mothers in the community about treating drinking water or about using WaterGuard?

Kodi munayamba mwakambiranapo ndi anthu obwera kuchipatala kapena amayi a mdela lanu za katetezedwe kamadzi kapena zakagwiritsidwe ntchito ka waterguard?

- PROBE: Who have you spoken with? What has been their reaction?

Ndi ndani amene munakambiranapo naye? Anzanu, abale ?

Ngati ndi choncho, kodi anachitapo chani mutawauza?

- PROBE: Do other members in your community use WaterGuard?

Kodi anthu ena am'dela lanu amagwiritsa ntchito waterguard?

22. What effect have you noticed has the use of Waterguard by program participants had on their friends and neighbors?

Kodi mukuwona ngati kugwiritsa ntchito kwa Waterguard kwa anthu amu program imeneyi kwakhudza bwanji azinzawo ndi anthu okhala nawo dera limodzi?

23. In your opinion, what kind of person uses WaterGuard?

Mumaganizo anu kodi gulu liti la anthu limene limagwiritsa waterguard?

24. What factors encourage people to use Waterguard?

Ndi zinthu ziti zimene zimalimbikitsa anthu kugwiritsa ntchito WaterGuard?

- PROBE: In your opinion, how do husbands influence this decision?

Mumaganizo anu, kodi abambo amatenga mbali yanji polimbikitsa akazi awo kugwiritsa ntchito WaterGuard?

25. Do community members encourage each other to treat their water or use Waterguard?

Kodi anthu okhala mu dera lino amalimbikitsana kugwiritsa ntchito waterguard kapena kuteteza madzi awo?

- PROBE: Why or why not?

Chifukwa chani amalimbikitsana kapena salimbikitsana?

26. What do you think are the barriers to using Waterguard in this community?

Kodi mukuganiza kuti ndi zinthu ziti zimene zimalepheletsana anthu kugwiritsa ntchito WaterGuard mdela lanu lino?

- PROBE: Why have some women discontinued their use of WaterGuard?

Ndi chifukwa chani amayi ena amasiya kugwiritsa ntchito WaterGuard?

- PROBE: What do women report are the barriers to using WaterGuard?

Kodi mayi ena amati ndi chani chimene chimawalepheretsa kugwiritsa ntchito WaterGuard?

Personal use experiences

27. Have you personally ever used *WaterGuard* to treat your drinking water?

Kodi pa inu nokha munayamba wagwiritsapo ntchito waterguard kuti muteteze madzi anu akumwa?

- PROBE: If 'YES', why did you decide to try WaterGuard? If 'NO'. why not?
Ndichifukwa chiyani munaganiza zoyamamba kugwiritsa nthcito waterguard?
Ngati NO, chifukwa chiyani?
- PROBE: How frequently do you use WaterGuard?
Kodi mumagwiritsa ntchito waterguard mowirikiza bwanji?
- PROBE: What benefits did you think WaterGuard offers you or your family?
Ndi ubwino wanji umene waterguard anabweretsa kwa inu ndi banja lanu?

28. Do you still use *WaterGuard* to treat your drinking water?

Kodi mumagwiritsabe ntchito waterguard kuteteza madzi anu akumwa?

- PROBE: Why or why not?
Ndichifukwa chani mwati ndikoyenera kapena kosayenera?
- PROBE: Where do you obtain Waterguard?
Kodi mumagula Watergard kuti?

Closing

29. [ASK NOTETAKER, are there any additional questions?]

30. Is there anything else you would like to tell us about WaterGuard or is there anything that we have forgotten to ask?

Kodi pali chinachilichonse chimene mungafune kutiuza chokhuzana ndi Waterguard kapena pali china chimene taiwala kukufunsani

Thank the participant-ZIKOMO KWAMBIRI! END TIME: _____

APPENDIX F: INTERVIEW GUIDE FOR WATERGUARD VENDORS

Understanding the Motivations for Use and Non-Use of WaterGuard among Mothers in an Antenatal Clinic Water Treatment and Hygiene Program in Malawi

PATH, CDC, and MOH with support from CHAI

**Individual Interview Topic Guide for
(5) WaterGuard Vendors**

1. Introduce yourself AND notetaker.
2. Read the Informed Consent Form.
3. Ensure that the participant understands the information on the consent form.
4. Ensure that the participant has WaterGuard liquid in stock currently and is a regular vendor and is therefore eligible for the interview.
5. Explain interview objectives, and begin interview.

START TIME: _____

Vending experiences (sales and promotion)

1. When did you first hear about WaterGuard liquid?
Kodi ndi liti limene munamva za WaterGuard koyamba?
 - PROBE: How did you hear about it?
Kodi munamva bwanji za WaterGuard?
2. Why did you decide to start selling WaterGuard liquid?
Ndichifukwa chani munaganiza zoyamba kugulitsa WaterGuard?
3. How long have you been selling WaterGuard liquid?
Kodi mwakhala mukugulitsa WaterGuard kwa nthawi yaitali bwanji?
4. Where do you get your supply of WaterGuard liquid from?
Tandifotokozereni za mmene mumapezera /mumugulira WaterGuard?
 - PROBE: How frequently do you need to purchase new stock of WaterGuard liquid?
Kodi mumagula Waterguard wina kowirikiza bwanji?
5. On average, how many bottles of WaterGuard liquid do you sell in one week's time?

Mongoyerekeza, mumagulitsa mabotolo angati aWaterGuard pa sabata imodzi?

6. Do you sell more or less WaterGuard nowadays than you did one year ago?

Mumagulitsa WaterGuard wochulukilapo kapena wochepeleko masiku ano pofanizira ndi chaka chimodzi chapitacho?

- PROBE: Have sales of WaterGuard increased or decreased in the past three months?

Malonda a WaterGuard achulukirapo kapena achepeleko mumiyezi yitatu yadutsayi?

- PROBE: Are sales of WaterGuard about the same all year round, or do you sell more during a specific season/period?

Malonda a WaterGuard amakhala ofananako chaka chonse? Kapena mumagulitsa wochulukirapo ntawi zina?

7. Who are the most usual customers for WaterGuard?

Kodi amagula kawirikawiri WaterGuard ndi anthu otani?

- PROBE: How frequently do they purchase WaterGuard?

Kodi anthu amenewa amagula WaterGuard mowirikiza bwanji?

- PROBE: On what occasion do they purchase WaterGuard?

Kodi anthu amenewa amagula WaterGuard pakachitika china chakes?

- PROBE: Who in your opinion should use Waterguard?

Mumaganizo anu, WaterGuard uziwiritsidwa ntchito ndi ndani?

8. In your opinion, is treating drinking water important for everyone or is it only important for certain people?

Mumaganizo ano, kuteteza madzi akumwa ndikofunikira kwa wina aliyense kapena ndiko funikira kwa kagulu kena kake ka anthu? Ngati zili choncho, ndizofunikira kwambiri kwa ndani?

9. What questions do customers have about WaterGuard?

Kodi ndi mafunso anji amene makasitomala anu amafunsa zokhuzana ndi WaterGuard?

10. As a vendor of this product, if you could change something about this product, what would you change and why?

Ngati ogulitsa WaterGuard, mutapatsidwa mwayi osintha chinthu china chake cha Waterguard, mungasinthe chani ndipo chani?

11. What is the price of WaterGuard in your shop?

WaterGuard mumagulitsa pamtengo wanji mu shopu yanu?

- How much do you pay for the product wholesale?

Mumalipira zingati kuti mugule WaterGuard pa wholesale?

- How much quantity do you order and how frequently do you order it?

Mumaka order waterguard wochuluka bwanji?

Mumaka order waterguard mowirikiza bwanji?

12. What do you think about the price of the product?

Kodi mumawona bwanji mtengo wa WaterGuard?

13. What messages or materials have you seen or heard promoting the WaterGuard product?

Kodi ndi mauthenga ati kapena zipangizo ziti zimene munaziwona kapena kumva zopititsa patsogolo Waterguard?

- PROBE for messages or media (road sign/billboards, posters, radio spots).

Funsani zambiri pa zamauthenga kapena uthenga wapawailesi(zikwangwani zamunsewu?mapostala, etc)

14. Do you actively promote WaterGuard or encourage customers to buy it? Why or why not?

kodi mumalimbikitsa makasitomala anu kuti azigula WaterGuard?

- PROBE: What do you tell customers about the product?

Kodi mumawauza chani makasitomala anu za WaterGuard?

15. What promotional materials do you have to help you sell WaterGuard?

Kodi muli ndi zipangizo zANJI zimene zimakuthandizani kuti mugulitse Waterguard?

- PROBE for other materials (flyers, posters, shop danglers, etc.)

Funsani zambiri (mapostala, etc)

- PROBE: Are there specific promotional materials that you don't have that you would like to have?

Kodi pali zipangizo zapadera zopititsa patsogolo WaterGuard zomwe inu mulibe koma mukufuna mutakhala nazo?

- PROBE: what are these?

Ngati zili choncho, ndi zipangizo zANJI?

- PROBE: why do you feel these would be useful?

Chifukwa chani mukowona ngati zingakhale zofunika?

16. What would help you make customers aware of WaterGuard or make it more attractive for them to buy?

Kodi mungathandizike bwanji kuti makositomala anu adziwe za WaterGuard kapena chomwe chingakope makasitomala anu kuti agule ndi chani?

17. How do you think most of your customers hear about WaterGuard?

Mukuganiza kuti makasitomala anu amamva bwanji za WaterGuard?

- PROBE for exposure to radio spots or billboard, interaction with health care workers?

Kupezeka pa malo pomwe pali wayilesi, kapena zikwangani, kucheza ndi ma HCW?

18. Have you heard about a program in Machinga District that distributes WaterGuard and hygiene kits to pregnant women in clinics?

Munamvako za program ku Machinga yomwe yima perekera WaterGuard ndi phukusi la ukhondo kwa azimayi oyembekezera mu zipatala?

If respondent has heard of program, PROBE:

Ngati anamvako za program yimeneyi, funsani zambiri:

- PROBE: If so, what have you heard about it?

Ngati munamva, munamvapo chani zokhudzana ndi zimenezi?

- PROBE: How has the hygiene kit program made selling WaterGuard easier or more difficult?

Phukusi la ukhondoli lapangitse bwanji malonda a WaterGuard kuti akhale ophwekako kapena ovutilapo?

- PROBE: What are the improvements you have seen in women's homes as a result of the program?

Ndzosintha zANJI zomwe mwawonapo mu manyumba a azimayi kudzera mwa program yimeneyi?

- PROBE: What are the challenges you think women face in keeping their drinking water safe?

Ndi zovuta zANJI zomwe mukuwona ngati azimayi amakumana nazo powonetsetsa kuti madzi awo akumwa ndi wotetezedwa?

- PROBE: What improvements can you suggest to the water and hygiene kit distribution program to make it better?

Mungapereke maganizo otani kwa program yopereka phukusi la ukhondo kuti ayipititse patsogolo?

Personal use experiences

19. Have you ever personally used WaterGuard liquid to treat your drinking water?

Kodi pa inu nokha munayamba wagwiritsapo ntchito Waterguard kuteteza madzi anu akumwa?

- PROBE: If 'YES', why did you decide to try WaterGuard?

Ngati yankho lake ndi eya , ndichifukwa chani munaganiza zoyesa kugwiritsa Waterguard?

- PROBE: If no, why not?

Ngati iyi, chifukwa chani?

If no, move to Closing

20. What were your first impressions when you first used WaterGuard?

Maganizo anu anali otani nthawi yoyamba imene munagwiritsa ntchito Waterguard?

21. What benefits did you think WaterGuard offered you or your family?

Kodi WaterGaurdyu ali ndi ubwino wanji kwa inu andi banja lanu?

22. Do you still use WaterGuard to treat your drinking water?

Kodi mumagwiritsabe ntchito waterguard kuteteza madzi anu akumwa

- PROBE: If "NO", why not?

Ngati anasiya kugwiritsa ntchito afunsemi chifukwa chani?

23. How frequently do you use WaterGuard nowadays?

Kodi WaterGuardyu mumamugwiritsa ntchito mowirikiza bwanji masakwanos?

Closing

24. [ASK NOTETAKER, are there any additional questions?]

[FUNSENI MZANU MUKAPANGA NAYE KAFUKUFUKU, pali china chimene mungafune kuonjezera?]

25. Is there anything else you would like to tell us about WaterGuard or is there anything that we have forgotten to ask?

Kodi muli ndi china chilichonse chimene mungafune kutiuza chikhuzana ndi WaterGuard kapena chimene taiwala kukufunsani?

[comprehensive summary]

Thank the participant

ATHOKOZENI AMENE AMATENGA MBALI MUKAFUKUFUKUYI

END TIME: _____

APPENDIX G: FOCUS GROUP TOPIC GUIDE FOR PARTICIPANTS

Understanding the Motivations for Use and Non-Use of WaterGuard among Mothers in an ANC Water Treatment and Hygiene Program in Malawi

PATH, CDC, and MOH with support from CHAI
Qualitative research

**Focus Group Discussion Topic Guide for
(7) Program Participants (Mothers)**

Selection Criteria: Program Participant, Child: 6 months-1 year

1. Introduce yourself AND note taker.
2. Read the Informed Consent Form.
3. Ensure that the participants understand the information on the consent form.
4. Explain the focus group objectives, and emphasize that you would like to have participation from each and every person present.
5. Emphasize that there are no right or wrong answers and that you are interested in their experiences and opinions, and please respect opinions.
6. Emphasize that the information shared in the group should remain private and not be shared with anyone outside this group.
7. Begin the discussion.

START TIME: _____

Introduction

1. What do you do to your drinking water to make it safe?

Kodi mumapanga chani kuti madzi anu akumwa akhale otetezedwa?

- PROBE: How frequently do you use each of these methods?

Kodi mumateteza madzi anu kowirikiza bwanji?

2. For those of you who use WaterGuard, are there occasions when you are more likely to use WaterGuard than others?

Kwa amayi amene mumagwiritsa ntchito WaterGuard, Kodi pali nthawi ina imene mungagwiritse ntchito waterguard kowirikiza kwambiri kuposa nthawi ina?

- PROBE: If so, describe when you are most likely to use WaterGuard.

Ngati ndi choncho, ndi nthawi ina iti imene mungagwiritse WaterGuard kowirikiza?

- PROBE: Are there times when you have WaterGuard in your house, but choose not to use it? If so, describe the circumstances (when, why)?

Kodi zimatha kutheka kuti nthawi zina mumatha kukhala ndi WaterGuard m'nyumba koma inu kusankha kusamugwiritsa ntchito?

3. Have you used up your free refills?

Kodi mwagwiritsa kale ntchito WaterGuard amene munalandila waulele?

- PROBE: If anyone says YES, What did you do when you ran out of WaterGuard/finished the last refill?

Ngati anatha afunsi kuti; Kodi munatani WaterGuard waulele atakutherani?

4. For those of you who decided to stop using WaterGuard, why have you decided to stop using WaterGuard?

Kwa amayi amene munasiya kugwiritsa ntchito WaterGuard, Ndi chani chomwe sichinakulimbikitseni kupitiliza kugwiritsa ntchito WaterGuard?

- PROBE: Tell me more about the reasons you stopped using WaterGuard?

Mundifotokozereko zifukwa zimene inuyo munasiya kugwiritsa ntchito WaterGuard

- PROBE: (barriers such as cost, availability, taste/smell)

(kodi ndi chifukwa cha kusowa ndalama? kusapezeka kwa WaterGuard? kusasangalatsidwa ndi fungo kapena kakomedwe ka WaterGuard?)

5. For those of you who continued using WaterGuard after your free refills ran out, why did you decide to continue using WaterGuard?

Ngati mumagwiritsabe ntchito WaterGuard afunsi: Nchifukwa chiyani munaganiza zogwiritsabe ntchito WaterGuard?

- PROBE: What has encouraged you to continue using WaterGuard?

Ndi chani chomwe chakulimbikitsani kupitiliza kugwiritsa ntchito WaterGuard?

- PROBE: Frequency of use (consistent or intermittent user)

Kodi mumagwiritsa ntchito WaterGuard kowirikiza bwanji?

6. Is there anyone in your family or community that encourages you to use WaterGuard?

Kodi pali munthu wina aliyense m'banja mwanu kapena mdela lanu amene amakulimbikitsani kugwiritsa ntchito WaterGuard?

7. Is there anyone in your family or community that discourages you from using WaterGuard (husband, friends or relatives)?

Kodi pali munthu wina aliyense m'banja mwanu kapena mdela lanu amene samakulimbikitsani kuteteza madzi anu akumwa?

8. What kind of feedback do you get from family members or friends when you treat your water?

Kodi abale kapenanso anzanu amati chani mukamateteza madzi anu akumwa?

- PROBE: What does your husband think about your use of WaterGuard?

Kodi amuna anu amatipo chani kapena kuti amaganiza bwanji zakugwiritsa ntchito kwanu kwa WaterGuard?

- PROBE: Has your use of WaterGuard changed how people in your community view you? If so, how?

Kodi kagwiritsidwe ntchito kanu ka WaterGuard kasintha mmene anthu amakuwonerani? Ngati ndi choncho, zasintha bwanji?

9. Who else in your community treats water?

Ndi ndaninso wina mdela lanu amene amateteza madzi awo akumwa?

- Probe: Do you think most of your neighbors treat their water and if so, how frequently?

Kodi mukuganiza kuti ambiri mwa maneba anu amateteza madzi awo akumwa?

10. Have you spoken with anyone about treating drinking water or about using WaterGuard?

Kodi munayamba mwakambiranapo ndi munthu wina aliyense zakasamalidwe ka madzi kogwiritsa ntchito WaterGuard?

- PROBE: Who have you spoken with?

Kodi munayamba mwakambiranapo ndi ndani?

- PROBE: What has been their feedback?

Kodi iwowa anachitapo kapena ananenapo chani mutakambirana nawo?

11. If you heard about WaterGuard before you received it from the ANC clinic, but never used it, why did you decide to use WaterGuard after you received it from the clinic?

Ngati munamvako za WaterGuard musalandirepo kuchipatala phukusi la ukhondo koma munali musanamwiritsepo, nchifukwa chani munaganiza zomugwiritsa ntchito WaterGuard mutamaulandira kuchipatala?

12. If I asked you to tell a pregnant friend about health and hygiene, what would you say?

Kodi nditakupemphani kuti mumfotokozere mzanu amene ali woyembekezera za umoyo komanso ukhondo, kodi mumfotokozere zotani?

- PROBE: And about water treatment?

Nanga kumbali yakuteteza madzi akumwa?

13. What, if anything, encourages you to treat your drinking water consistently?

Ndi chani kwenikweni chimene chimakulimbikitsani kuteteza madzi anu akumwa nthawi zonse?

- PROBE: What else might encourage you to treat your drinking water consistently?

Ndi chani china chimene chingakulimbikitseni kuteteza madzi anu akumwa nthawi zonse?

ANC Program Questions

- 14 . Where and when did you first hear about the household water treatment and safe storage program at the ANC clinic?

Kodi ndikuti komanso ndi liti limene munamva koyamba za pologalamu yakuteteza ndi kusunga bwino madzi anu akumwa yomwe imachitika ku chipatala?

- PROBE: Who accompanied you to the clinic? (Was it your husband, cousin, brother or someone else?)

Ndi ndani amene anakuperekezani ku chipatalaku?

- PROBE: Did you know you were supposed to bring your husband to the ANC visit to get these services before you came to the clinic or did you first hear about the program at the clinic?

Kodi munadziwa kuti mumayenera kubwera limodzi ndi amuna anu kudzalandira chithandizo chosiyanasiyana kusikeloku musanabwere kapena munachita kuwuzidwa mutafika kale kuchipatalaku?

- PROBE: Did anyone here go to the clinic with someone other than their husband?

Kodi alipo wina wake pano amene anapita ndi munthu wina kuchipatala kuja osati amuna awo?

- 15 . What was your husband's response when you asked him to come to the clinic with you?

Kodi amuna anu anailandira bwanji nkhani yoti mupite nawo limodzi kuchipata mutawauza?

- PROBE: Why was he supportive or resistant?
- Nchifukwa chiyani iwowa anailandira bwino nkhanayi pokumvetsani kapena Nchifukwa chiyani iwowa sanakondwere nayo nkhanayi pokanakana?

- 16 . When your husband (or other man) came with you, what services did he receive?

Kodi mutapita kuchipatala ndi amuna anu , ndichithandizo china chiti chimene analandira kuchipatalaku?

- PROBE: Did he receive any education on safe water and/or hygiene?
- Kodi amuna anuwa analandira maphunziro kapena uphungu wina uliwonse wokhudza kasamlidwe kamadzi komanso ukhondo?

- 17 . How did you feel about your husband coming in for services with you?

Kodi munamva bwanji pamene amuna anu anabwera nanu limodzi kuchipatala kudzalandira nanu limodzi chithandizo chosiyanasiyana?

- PROBE: Do you think it benefited you in some way? Why or why not? Kodi mukuganiza kuti zinakupindulirani inuyo munjira ina iliyonse?
- PROBE: Did it benefit him in any way? Nanga zinawapindulira amuna anu munjira ina iliyose?

18 . How was your experience with the safe water and hygiene services you received?

Kodi munaliwona bwanji thandizo limene munalandira la uphungu kapena maphunziro azakasamalidwe ka madzi komanso ukhondo?

- PROBE: Were there any problems getting your hygiene kit (with the container) or your refills of WaterGuard and soap?

Kodi munakumana ndi mavuto ena aliwonse polandira phukusi la ukhondo kapena waterGuard waulele ndi sopo?

- PROBE: Where there any problems with long wait time or crowding?

Kodi munakumana ndi mavuto akudzadza kwa anthu kapena kudikira pa mzere nthawi yaitali?

- PROBE: Were the refills always available?

Kodi waterGuard waulele amapezeka nthawi ina iliyonse mukapita kukatenga?

19 . What did you think about the HIV testing offered to you and your husband during ANC visits?

Kodi munawuwona bwanji uphungu ndi kuyezetsa magazi kumene munlandira inu ndi amuna anu kuchipatala pa nthawi imene mumayendera sikelo?

20 . Where did you deliver your most recent child and why?

Kodi mwana wanu womaliza munakaberekera kuti ndipo chifukwa chiyani munakaberekera kumeneko?

- PROBE: How did the program have an impact on your decision (place of delivery, frequency of visits)?

Kodi pologalamuyi inakuthandizani kupanga chisankho chokaberekera kumalo amene munaberekarawo koma kabweredwe kanu kakusikelo?

- PROBE: What other services might encourage women to get consistent antenatal care or deliver in the health facility?

Kodi ndi thandizo lina liti limene lingalimbikitse azimayi kuyendera sikelo kapenanso kukaberekera kuchipatala?

21 . What educational messages have you received from HSA's regarding safe water and hygiene in your home?

Kodi ndi amuthenga anji kapena uphungu wanji umene munalandira kuchokera kwa alangizi azaumoyo wokhudza kasamalilidwe kamadzi komanso ukhondo pakhomu panu?

- PROBE: Was the message about what to do in the wet versus the dry season different in any way? If YES, how so?

Kodi uphunguwu kapena uthengawu unali wokhudza zakasamalilidwe ka madzi nthawi ya dzinja komaso nthawi ya chilimwe? Ngati ndi choncho, tafotokozani zambiri pamenepo.

- PROBE: What other messages did the HSA give you?

Kodi panthawi imene amakuyenderaniyi, Alangizi azaumoyowa anakupatsaninso mauthenga ena anji?

22. What part of the WHK storage program do you think was most valuable to you and why?

Kodi ndi mbali iti ya pologalamu imene inuyo munayiwona kuti ndi yaphindu kwa inu?

- PROBE: Clinic education, HSA's coming to your home, storage container, free WaterGuard,

Kodi inali pa nthawi imene munalandira uphungu kuchipala? Kapena pamene alangizi azaumoyo amakuyenderani kunyumba kwanu? Kapena pamene munalandira bigili? Kapena WaterGuard waulele amene munalandira?

23. If you have more than one child, how did the ANC services with your youngest infant compare to services you may have received with previous pregnancies?

Kodi thandizo lime munalandira pa nthawi imene mumabereka mwana wanu womaliza mu pologalamuyi zikusiyana bwanji ndi zithandizo zina zonse zimene mwakhala mukulandira pologalamuyi isanayambike?

- PROBE: Regarding quality of care, wait time and crowding, confidentiality, privacy, and comprehensive care.

Mutiwuzepo zambiri makamaka kumbali ya chisamaliro chimene munalandira, kudikra komanso kudzadza kwa anthu, kusungilidwa chinsinsi, kupatsidwa ulemu komanso kupatsidwa chisamaliro chodalilika ndi champhamvu.

24. (For everyone) What is your opinion about the antenatal services you received in terms of quality of care, crowding, and confidentiality?

(Funso ili lifunsidwe kwa wonse) Kodi maganizo anu ndi otani pa chisamaliro chimene munalandira, kudikra komanso kudzadza kwa anthu, ndi kusungilidwa chinsinsi, pa nthawi imene pologalamuyi inali mkati?

Closing

25. [ASK NOTETAKER, are there any additional questions?] [FUNSENI MZANU MUKAPANGA NAYE KAFUKUFUKU, pali china chimene mungafune kuonjezera?]

26. Is there anything else you would like to tell us about WaterGuard or is there anything that we have forgotten to ask?

Kodi muli ndi china chilichonse chimene mungafune kuti uza chokhuzana ndi WaterGuard kapena chimene taiwala kukufunsani?

THANK THE GROUP! ZIKOMO KWAMBIRI AMAYI!

APPENDIX H: PARTICIPANT INTERVIEW QUESTIONS BY BEHAVIORAL THEORY CONSTRUCT

Note: Due to the significant overlap in constructs across theories, there is a corresponding overlap in the questions that address constructs across these different theories

| Constructs | Theory | Question number (probe number) |
|---|---|---|
| Perceived susceptibility | Health Belief Model (HBM) | 2, 3, 4(3), 10 |
| Perceived severity | HBM | 3, 7(1), 10 |
| Perceived benefits | HBM | 6, 10, 13, 21, 22, 24 |
| Perceived barriers | HBM | 6(1), 12(3), 14, 15, 21, 22, 24, 26, 34, 36, 40 |
| Self-efficacy | HBM, Social Cognitive Theory | 7(2), 20, 21 |
| Cues to action | HBM | 5, 20, 29, 33, 35 |
| Attitudes: Behavioral beliefs and evaluation of behavioral outcomes | Theories of Reasoned Action and Planned Behavior (TRAPB) | 2, 3, 7, 10, 21, 22, 23, 24, 34 |
| Subjective Norms: Normative beliefs and motivation to comply with those beliefs | TRAPB | 4(4), 6, 13, 25, 26, 27, 28, 35 |
| Perceived behavioral control: Control beliefs and perceived power | TRAPB | 7(2), 12(3), 13(1), 14, 20, 36 |
| Observational learning via social modeling and verbal persuasion | Social Cognitive Theory (SCT) | 19, 20, 25, 29 |
| Social support | Social Cognitive Theory | 13(1), 15(1), 25, 26, 27, 29, 35 |
| Outcome expectations | SCT: captured under Perceived severity, susceptibility, and benefits of HBM | |
| Free samples | Social marketing | 11, 12 |
| Media messages | Social marketing | 18, 19 |
| Product access | Social marketing | 15 |
| Champion | Diffusion of innovations (DOI) | 25 |
| Relative advantage and compatibility | DOI | 6, 24, 34, 37, 38, 39 |
| Perceived need | DOI | 2, 3, 4, 6, 10, 13 |
| Observability | DOI | 20, 24 |
| Social influences | DOI | 13(1), 14, 18, 25, 26, 27, 29 |
| Diffusion (general) | DOI | 25, 29 |

APPENDIX I: VERBAL INFORMED CONSENT SCRIPT

Motivations for Use and Non-Use of WaterGuard among Mothers in Malawi

Informed Consent

We are gathering information about how and why families use, or do not use, the WaterGuard chlorine-based water treatment product sold by PSI (Population Services International), an international nonprofit organization. WaterGuard is available for sale in local markets in Malawi. We are interested in speaking with you (in a group or individually) to find out about your experiences and opinions regarding the ANC program and/or water treatment practices. This is a voluntary discussion and you may choose not to participate if you wish. This is not a test and there are no right or wrong answers – your honest ideas are the most valuable information we seek.

Tikupanga kafukufuku okhuzana ndi za mmene mabanja amagwiritsira ntchito waterguard, Komanso zifukwa zimene sagwiritsa ntchito waterguard. Waterguard amapangidwa ndi a Poulation Services international. Waterguard amapezeka ku misika yambiri yosiyanasiyana muno mu Malawi. Ife ndiwokondweretsedwa kucheza ndi inu (nokha, kepena ndi anthu ena) pofuna kudziwa zimene mwakhala mukumana nazo komanso maganizo anu pazakasamalidwe kamadzi komanso kusamba mmanja. Kucheza kwathu ndikozisankhira nokha, muli ndi ufulu otenga mbali kapena ayi. Awa simayeso, palaibe yankho lolondola kapaena lolakwa.-mayankho anau achilungamo adzathandiza koposa.

We, the field team declare that;

Ife ogwira ntchito tikulonjeza kuti

- 1. We expect this interview to last about 60 to 90 minutes.*
Tikuyembekezereka kucheza nanu kosapitilira mphindi 60-90.
- 2. You participate in this study freely and you have the right to stop participating at any time.*
Mutenge mbali pakafukufukuyi mosakakamizidwa ndipo muli ndi ufulu wosiya kuyankha mafunso nthawi ina iliyonse.
- 3. Your participation will help us understand how to make water treatment more available to people like yourselves.*
Kutenga kwanu mbali kutithandiza kumvetsa bwino za momwe tingapititsire patsogolo kapezedwe ka madzi otetezedwa kwa anthu onse ngati inu.
- 4. Your name will not be used in any material without your agreement.*
Dzina lanu silidzagwiritsidwa ntchito penapaliponse kopanda chilolezo chanu.
- 5. You can contact Philip Mkandawire, Research Manager at PSI in Blantyre at: (265) 0 999-260-930 at any time with questions or concerns regarding the study.*
Ngati mungakhale ndi mafunso kapena madandaulo komanso mwina kufuna kudziwa zambiri za kafukufukuyi mutha kuimba phone kwa Phillip Mkandawire amene ndi mkulu woyang'anira kafukufukuyi ku Bungwe la PSI ku Blantyre.
- 6. We will be recording this interview.*
Thikhala tikutepa mawu anu pazokambiranazi.
- 7. Do you have any questions?*
Kodi muli ndi funso lina lilionse?
- 8. Do you agree to participate in the interview?*
Kodi mukuvomera kucheza ndi ine?

ONLY FOR FOCUS GROUP PARTICIPANTS:

- 9. You will be provided MK100 as compensation for transport. Tikupatsani ndalama yatransport.*