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Glycerin Soap and Good Manners: A Mixed-Methods Study
about Soap and Handwashing in Barahona, Dominican Republic

By

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Master of Public Health
Global Health

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By
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Bachelor Of Science
Auburn University
2012

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An abstract of
A thesis submitted to the Faculty of the Rollins School of Public Health of Emory University
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Abstract

Glycerin Soap and Good Manners: A Mixed-Methods Study
about Soap and Handwashing in Barahona, Dominican Republic
By Emily Brennan

Background: Handwashing with soap (HWWS) is a low-cost and effective method of disease prevention, but the prevalence of HWWS globally, especially in low-income countries is low. Literature about soap preferences and influences to HWWS from Latin American countries and about men around the world are sparse. This study aims to understand both soap use and purchasing preferences and influences to HWWS among adults in Barahona, Dominican Republic.

Methods: We conducted surveys and focus group discussions in each of three focus communities: a batey, a rural community, and the city in Barahona Province, Dominican Republic in order to collect quantitative data about soap use and purchasing preferences and qualitative data about motivators and barriers to HWWS.

Results: Most survey participants preferred glycerin soap for handwashing, because of its high quality for multiple household uses. Glycerin soap was also the least expensive and most common type of soap in all communities. Motivators to HWWS included having the habit since childhood and wanting to demonstrate good upbringing, having visibly dirty or potentially contaminated hands, being afraid of illness, wanting to maintain good health, and as a part of cleaning the whole body during bathing. Barriers to HWWS included physical and economic inaccessibility to soap and water for HWWS, most serious in the batey community, and circumstances like being in a hurry or being hungry, most common among young men. A framework for predicting barriers to HWWS was developed through grounded theory analysis; it categorizes individuals into levels of intention to HWWS and predicts the barriers to HWWS to which they are vulnerable based on the intention categories.

Conclusions: Our results suggest that education to increase HWWS in Barahona, Dominican Republic should aim to overcome both community and individual-level barriers, especially among the most vulnerable groups: batey residents and young men. Practitioners can use the framework for predicting barriers to HWWS to tailor educational activities based on individuals' personal and community characteristics.

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CHAPTER 1: INTRODUCTION

Introduction

This study was conceptualized by the leadership of Global Soap, an Atlanta-based non-profit organization that recycles excess hotel soap into new bars of soap, which are then donated to partner organizations around the world. The partner organizations use the soap to improve the health of beneficiaries through a variety of public health efforts including education about sanitation and hygiene. This study was designed to help Global Soap improve program activities aimed at increasing the hygiene behavior of handwashing with soap (HWWS), specifically in one program country: the Dominican Republic.

Problem Statement

No studies about soap use and purchasing or influences to HWWS in the Dominican Republic were found in a search of both scientific journals and grey literature. Many studies have explored influences to HWWS in various countries but most of them have been conducted in Africa and Asia and most have focused on mothers. Data about influences to HWWS in Latin America as a region are sparse, as are data about men throughout the world. We hope to further understand both the context of soap use and purchasing and influences to HWWS among adults both male and female in the Barahona region of the Dominican Republic.

Goal and Specific Aims

The goal of this study is to understand preferences and practices related to soap use and purchasing and motivators to HWWS among adults in the Barahona region of the Dominican Republic. We hope to achieve this understanding through two specific project aims:

1. To understand the context of soap purchasing and use (including soap types, brands, and prices) among adults in Barahona, Dominican Republic by collecting quantitative data using a household survey;
2. To understand the motivators to HWWS in the home among adults in Barahona, Dominican Republic by collecting qualitative data using focus group discussions.

Overview of Contents

This thesis consists of five chapters. The following chapter is a comprehensive review of the existing scientific literature about HWWS and the Dominican Republic. The literature review describes the health context of HWWS, past public health efforts to increase the behavior, and current knowledge about influences to HWWS. It also covers a brief history of the Dominican Republic and its WASH conditions, including the recent cholera outbreak after the 2010 earthquake in neighboring Haiti.

The methodology section (chapter 3) includes detailed descriptions of the study population, how household surveys and focus group discussions were conducted, how data were analyzed, and ethical considerations. The results section (chapter 4) is a description of both quantitative results about soap use and purchasing and qualitative results about motivators to HWWS. Quantitative results consist of descriptive statistics from responses to survey questions about handwashing soap

preferences including other uses for handwashing soap, preferred brands and reasons for choosing specific brands, soap prices and attitudes about them, and purchasing behaviors. Qualitative results include descriptions of the influences to HWWS described by focus group participants, including motivators to HWWS and secondarily, barriers to HWWS in the home and community. Qualitative results also include a conceptual framework for predicting barriers to HWWS based on intention to HWWS, which could be used in public health practice.

The fifth and final chapter includes a discussion of the results in relation to existing literature, conclusions from the study, and recommendations for Global Soap and its partner organization in the Dominica Republic, World Water Relief.

Purpose and Significance

As the study was designed with and funded by Global Soap, the conclusions from this study will be utilized to modify program activities. Global Soap works with World Water Relief to improve access to water, sanitation, and hygiene in the Dominican Republic by installing water filtration systems in schools and conducting education about WASH concepts with students at program schools. World Water Relief commits to maintenance of the water systems, training of school staff, and educational activities with students for 10 years in each school, and Global Soap provides bars of handwashing soap for all World Water Relief program schools.

Because one intended impact of Global Soap's donations is to create lasting demand for soap for handwashing, they are interested in the current economic context surrounding soap in the countries in which they work. Soap prices, purchasing trends and preferences, and soap use vary drastically by country and can even vary by community. This study aims to understand these factors in communities in the Barahona region of the Dominican Republic. Specifically, results from the

quantitative portion of the study about soap use and purchasing will be used to understand local soap preferences to ensure their donations do not disrupt demand for local soap and to identify potential opportunity for new ways of promoting soap outside of schools.

Additionally, because World Water Relief, Global Soap's partner organization in the Dominican Republic, provides water, sanitation, and hygiene (WASH) education in schools in an effort to increase HWWS practice among children and their families, they are interested in current individual and community motivators to handwashing. Global Soap hopes to harness these motivators to improve future educational programming in Barahona. Though student education about WASH concepts at school is intended to increase HWWS throughout the community as children bring their new knowledge and practices back home, both Global Soap and World Water Relief are exploring options to expand program activities to include parents and other community members. The results of the qualitative portion of this study regarding motivators to HWWS will be used to tailor future educational messaging for adults in the broader community by emphasizing the things that motivate them to HWWS already. Qualitative results will also help the organizations identify the best ways to promote HWWS among different groups of adults across the Barahona region.

CHAPTER 2: COMPREHENSIVE REVIEW OF THE LITERATURE

Introduction

This review of the literature will discuss the WASH conditions in the study location, the Dominican Republic. It will also summarize current knowledge about the importance of HWWS, factors that influence whether or not individuals practice HWWS, and how public health has tried to increase the prevalence of HWWS in communities in the past. The broader context of HWWS around the world helps to inform the design of the portion of this study about influences to HWWS, and the history and WASH context in the Dominican Republic provides insight into the social and environmental influences to HWWS in the communities selected for this study. These factors will be essential for development of new program activities by Global Soap and World Water Relief.

Dominican Republic

The location for this study is the Barahona region of the Dominican Republic, in which World Water Relief currently conducts WASH education and Global Soap provides soap to nine schools [1]. The Dominican Republic occupies the eastern half of the Caribbean island of Hispaniola, which it shares Haiti. Barahona province is located on the southwest coast of the Dominican Republic and has a population of 232,818 people, over half of which live in the provincial capital city of Barahona [2]. The province covers 672 square miles including a large amount of agricultural land, rural towns and communities, and bateyes [2]. World Water Relief and Global Soap work in schools in Barahona City and rural communities, but their primary focus is on schools in bateyes, where the WASH infrastructure and economic conditions are poor. This study

aims to understand the influences to HWWS among adults in each type of community in Barahona province, in order to more effectively enable people in all communities to maintain better hygiene and ultimately better health.

History of the Dominican Republic

After Christopher Columbus landed on Hispaniola in 1492, it was colonized in 1496 by the Spanish and named Santo Domingo [3]. Spain ceded the western half of Hispaniola to France in the Treaty of Ryswick in 1697 [3]. After a long colonial history including being taken over by Haiti in 1822 after Haiti gained its independence from France through the first successful slave revolt in the western hemisphere, the Dominican Republic eventually declared its independence from Spain in 1865 [3]. The country struggled to maintain internal peace in the early 1900s and like many countries, was occupied by the US for a period, from 1916-1924, after which democratic government was restored [4]. In 1930, the dictator Rafael Trujillo came to power and led a violent and discriminatory regime for 30 year [5]. Trujillo's legacy includes the beginning of the recruitment of seasonal workers from neighboring Haiti to bolster the Dominican Republic's booming sugarcane industry and the 1937 Parsley Massacre, in which an estimated 20,000 Haitians living on the border were murdered by Dominican troops [5].

The Anti-Haitianism prevalent during Trujillo's regime continues to influence many aspects of Dominican-Haitian relations both politically and interpersonally. The bateyes, or barracks-style communities constructed in Trujillo's time to house migrant Haitian workers in the sugarcane industry, still exist today [6]. It is estimated that 800,000 people in the Dominican Republic originally migrated from Haiti or are descendants of Haitian immigrants [7]. Recently, tensions have been high as the Dominican government passed a law in September of 2013 removing the

right to Dominican citizenship as far back as 1929 to anyone without at least one parent who is a legal Dominican resident, including those born in the Dominican Republic to Haitian immigrants considered "in transit" [7]. This law would have left hundreds of thousands of people stateless but was rescinded in May 2014 after pressure from the international human rights community [8]. The bateyes of the Dominican Republic remain home to primarily Haitians and Dominicans of Haitian descent and are famous for having the poorest living conditions in the country [6]. This inequality is important because while the country's standard of living improves, certain communities still suffer disproportionately from infectious diseases that can be easily prevented. World Water Relief and Global Soap's work aims to combat health disparities by supporting schools and developing students' knowledge and leadership capacity primarily in the batey communities of the Barahona region.

WASH in the Dominican Republic

The Dominican Republic as a whole has experienced economic success with agriculture and tourism and is currently classified as an upper-middle-income country by the World Bank [9]. The population in 2015 is 10,652,000 people, with 77% of people living in urban areas; the average life expectancy is 77 years, slightly higher than the Americas average of 76 years, and health life expectancy is 66 years, slightly lower than the Americas average of 67 years [10]. The top five causes of death in 2013 were heart disease, stroke, road injury, diabetes, and lower respiratory infections [11]. The top five causes of death of children under age five were prematurity, congenital anomalies, acute respiratory infections, non-classified causes, and birth asphyxia, with diarrhea as the eighth leading cause [11].

The WASH infrastructure in the Dominican Republic is not fully developed and many people face challenges to accessing clean water and sanitation. In 2012, only 74% of urban households and 50% of rural households had water piped in and another 8% and 27% had water from another improved source (a water source protected from outside contamination like a public tap, borehole, rainwater, or a protected spring or well), respectively [12, 13]. A 2014 study in the Puerto Plata region of the Dominican Republic reported that even among houses with improved water sources, 47% of water sampled from these homes could be classified as unsafe for drinking after analysis of microbial water quality [13, 14]. Eighty-six percent of urban and 74% of rural residents had access to improved sanitation, or a sanitation facility that hygienically separated human excreta from human contact (including flush or composting toilets, flush, pour-flush, ventilation-improved, or slab-covered pit latrines, septic tanks, or piped sewer systems) [12, 13]. Recently, events in the WASH context in the Dominican Republic have affected the way Dominican residents think about their water and hygiene. After a January 2010 earthquake destroyed Port-au-Prince, the capital city of neighboring Haiti, Haiti experienced a severe cholera epidemic beginning in October of 2010 [15]. Cholera crossed the Haitian-Dominican border, reaching the Dominican Republic on October 31, 2010 [15]. The outbreak in the Dominican Republic continued through July 2011, with a total of 14,598 suspected cases and 256 deaths [15]. While the outbreaks in the Dominican Republic and Haiti created a sense of fear and caution on the island, educational efforts by the Dominican government and other organizations have served to raise awareness of the biology of cholera and how it can be prevented among members of communities across the Dominican Republic [15, 16].

Health Impacts of Handwashing with Soap

Handwashing with soap is considered a highly cost-effective public health intervention because of its efficacy in preventing infectious disease and its relatively low cost compared to other infectious disease interventions. Washing hands with soap and water is effective for removal of both inorganic material like dirt and dust and organic bodies like bacteria from the skin [17]. While rinsing the skin with clean water alone can get rid of some contaminants, the use of soap eliminates nearly three times the number of bacteria as just water [17].

Many important disease-causing pathogens can be transmitted from person to person on the hands, through particles from bodily excretions such as feces or phlegm and if ingested may cause diseases like diarrhea and respiratory infections [18]. Because of the fecal-oral and particle ingestion routes of transmission, the critical times to wash hands are after contact with feces (after using the bathroom or changing a baby's diaper) and before preparing or eating food [18].

Children are especially vulnerable to infection; diarrhea and respiratory illnesses are two of the leading causes of mortality in children under age five worldwide [19]. The World Health Organization (WHO) estimates that 1.5 million children under age five died in 2013 from diarrheal or acute lower respiratory diseases, both of which can be avoided by HWWS [11]. Even a child who survives a case of diarrhea or respiratory illness may suffer from the malnutrition often associated with severe childhood illness, which can irreversibly hinder growth and development if sustained during this critical growth period [20].

Many studies have documented a reduction in child risk for infectious diseases when caregivers rinse their hands with water at critical times and an even further risk reduction when they HWWS [18, 21-24]. For example, an observational study in rural Bangladesh found that the odds of child diarrhea in the one-year follow-up were 30% lower in households where the mother washed

both hands with water before preparing food and 68% lower in households where the mother washed at least one hand with soap before preparing food. In households where the mother washed both hands with water after defecation, researchers found a 23% reduction in odds of child diarrhea and a 65% reduction where mothers washed at least one hand with soap after defecation [18].

However, while the health benefits of HWWS are clear, the prevalence of the practice of HWWS in community settings worldwide is low, estimated at just 19% after contact with feces according to a 2014 systematic review [25]. The estimated prevalence of HWWS after contact with feces in high-income countries is between 42% and 49% and it is just 13%-17% in low and middle-income regions [25]. HWWS prevalence also likely varies by critical juncture, with more people practicing HWWS after defecation than before eating, preparing food, or changing a baby's diaper [25-27].

Public Health Efforts to Encourage HWWS

The public health community has made efforts to promote HWWS as a simple, low-cost disease prevention mechanism. The primary technique employed by public health interventions has been health education and promotion, based on behavioral theories that increasing knowledge will lead people to change their behavior; this approach assumes that improving knowledge of the health benefits of HWWS will lead people to practice it more because they are concerned about their health [28]. A 2014 systematic review on the health effects of HWWS found that HWWS promotion interventions yielded an overall 40% reduction in diarrhea risk, an important health outcome and proxy measure of infectious disease [25].

Unfortunately, accurate measurement of handwashing practices is difficult and expensive. Because of the potential for bias in self-report of handwashing behavior, observation of handwashing is generally considered to be the gold standard; unfortunately observation requires skilled researchers, is time and labor-intensive, and is still often biased [29-31]. A number of studies have, however, managed to utilize observation in measuring the impact of health or hygiene promotion interventions on the practice of handwashing. A 1984 study of an educational intervention about sanitation and hygiene behaviors in Bangladesh used observation and showed a significantly higher rate of HWWS before food preparation among intervention households (49%) than among control households (33%) [32]. A 2001 study of a hygiene promotion campaign in Burkina Faso in the 1990's used observation to measure HWWS among mothers after changing a child's diaper and using the latrine [33]. These researchers found that after the three-year program, HWWS after changing a diaper had risen from 13% to 31% and after using the latrine from 1% to 17% [33]. A 2009 study of the Sanitation Hygiene Education and Water Supply project in Bangladesh used structured observations and showed that this hygiene promotion campaign lead to an increase in prevalence of handwashing with soap or ash after cleaning a child's anus from 22% to 36%, but the prevalence at food-related junctures did not increase from less than 3% [34].

Because observation is so time and resource-intensive, many studies rely on self-report of HWWS practices by participants, but desirability bias can be high [25]. A 1990 study using self-report in Indonesia, conducted two years after a door-to-door HWWS promotion intervention that also gave women free soap, reported that 79% of women, of whom none used soap for handwashing at baseline, were still using hand soap at the two-year follow-up even though they had to buy it themselves [35]. A 2003 study of a national hygiene and sanitation promotion campaign in Myanmar showed an increase from 18% to 43% in HWWS after defecation over 5 years using self-

report [36]. Other studies have used proxy measures to estimate HWWS, such as presence of soap and water or handwashing facilities. A 1996 study of a hygiene promotion intervention in Thailand used bacterial contamination on the hands as a proxy for HWWS and showed a significant decrease in contamination in intervention villages as compared to control villages [37]. A 2013 study conducted in informal settlements in Pakistan showed that after an intervention including promotion of handwashing and water treatment reported that the intervention groups were both associated with higher observed handwashing infrastructure and self-reported soap purchasing, both proxy measurements for HWWS, even after 5 years [38]. While studies using observation showed smaller effects than those using self-report or other measures, each of these studies showed a positive impact on the prevalence of HWWS at one or more critical junctures through education about the health benefits of HWWS.

Recently, the WHO, along with researchers and private companies in the Global Public-Private Partnership for Handwashing partnered with country governments to conduct large-scale HWWS promotion campaigns and evaluation studies are beginning to be published from these programs [39]. One example, the "SuperAmma" intervention in India utilized emotional messaging about nurture and disgust related to motherhood to encourage HWWS; a 2014 evaluation showed a 29% increase in HWWS after one year [40]. This intervention was innovative because it relied not only on an increase in knowledge of health effects of HWWS but also appealed to mothers' emotions in order to influence behavior change, suggesting that utilizing determinants other than health-related motivators may be a more effective strategy for hygiene-related behavior change than simple health promotion. The success of recent interventions suggests that investigating and harnessing other determinants of HWWS specific to the intervention location through techniques

like psychological and consumer research can make HWWS promotion efforts even more successful.

Determinants of HWWS

The determinants of HWWS have been studied widely, primarily in healthcare settings in developed countries, and to a lesser extent in household and community settings in low- and middle-income countries. These studies have attempted to elucidate motivators and barriers to HWWS, especially among mothers of young children, as children are the primary victims of the diarrheal and respiratory illness preventable by HWWS. According to these studies, a number of environmental and psychological influences determine whether or not individuals practice HWWS and these influences vary by location and demographic factors.

A 2009 study of the effectiveness of activation of seven theoretical domains using text-based messages on HWWS practice in England showed that women were influenced most by knowledge and men were influenced most by disgust; social norms and status were effective influencers for both men and women [41]. In a review of studies of influences to HWWS from 11 low- and middle-income countries, ten of which were conducted as formative research for the aforementioned national hygiene promotion campaigns with the Global Public-Private Partnership for Handwashing, Curtis, et al found a number of factors that influence HWWS, including both environmental and personal factors [28]. The researchers in this study categorized environmental influences to HWWS into social, biological, and physical factors [28]. Social factors were community norms like whether HWWS is considered common or rare, women's economic power to purchase HWWS materials, attendance at and hygiene in schools, and the influence of mass media [28]. Physical factors included availability and cost of HWWS materials and toilet location [28].

Biological factors were constraints on mothers' time and energy and presence of and experience with bodily excretions and disease in the environment [28]. These environmental influences are important when considering how to encourage HWWS and promote hygiene; contextual factors specific to intervention location should be incorporated into program design.

According to various studies, environmental factors can be either facilitators or inhibitors to regular HWWS and their effects can depend on demographic factors and cultural context. Often barriers are most significant among the poorest groups of people, those who would benefit most from regular HWWS. For example, multiple studies in Africa have shown that media campaigns, especially after outbreaks of diseases like cholera have achieved increased HWWS rates and a study in Kenya using observation and structured interviews showed that media ownership and exposure were associated with increased HWWS [42], but the positive effect of media is dependent upon socioeconomic factors which enable ownership of media technology and access to media outlets [28, 43]. The same study also showed that structural constraints to water, sanitation, and education were associated with lower HWWS rates specifically in the most economically disadvantaged group [42]. A study in Nigeria found significant differences in HWWS and hygiene practices based on community urbanization level, with rural residents having less access to knowledge about hygiene maintenance [44]. Another study from Kenya found that those in the poorest segment of society were the least likely to have a favorable attitude toward HWWS, which influenced practices [45]. For example, many poor Kenyan parents reported hiding soap from children for fear of them wasting it, disabling children from practicing HWWS [45]. This concept is found throughout the world in many aspects of health; those with the greatest social and economic disadvantage, faced with the greatest burden of exposure to disease, are also at a systemic disadvantage to maintaining their health because of lack of access to education and resources for doing so [46]. The socio-

contextual determinants that influence health behaviors vary by community but need to be considered in intervention design in order to effectively address them.

In addition to environmental and contextual determinants of HWWS, the authors of the eleven-country review found personal psychological determinants were an important factor in influencing HWWS behavior [28]. These factors also varied by context but were assimilated into three categories: habitual (reactive), motivated, and planned (cognitive) factors [28]. Habit formation at a young age was shown to be the most significant determinant of HWWS, but other motivations and planned benefits also played a role [28]. Motivations included disgust with contamination, especially feces, physical comfort of the hands when they are clean, nurture of children, achieving or showing status within society, affiliation with other people by adhering to social norms (where HWWS is common), and to a lesser extent, sexual attraction of cleanliness and fear of disease [28]. Planned benefits included good health, religious goals, and socialization of children [28]. Fear of disease was not seen as an important motivator except where participants had experienced a disease outbreak in the recent past (in Uganda, Senegal, Kenya, and Peru) [28]. A 2010 study of psychological determinants of HWWS in Kenya using factor analysis from a survey about influences to HWWS combined with structured observations and focus group discussions found that habit was the strongest motivator of HWWS (and the strongest predictor of observed HWWS), followed by a concern with hygiene (including fear of disease, nurture, and disgust), sexual attraction, and economic factors [45]. Studies of mothers in Ghana using observation and interviews found that HWWS practice was associated with education and income, disgust at contact with one's own feces, level of child care or nurture, and concern for social acceptance [47], [48]. Utilizing these non-health-related motivators to encourage HWWS could be more effective in eliciting behavior change than purely cognitive educational efforts. This study aims to identify and

understand both the cognitive motivators and the motivations and environmental factors that influence adults to HWWS in the Dominican Republic.

Conclusion

HWWS is an important practice in hygiene maintenance and disease prevention, but a minority of people performs it regularly, especially in low and middle-income countries [25]. The influences to HWWS are numerous and vary by context and socioeconomic status, but harnessing these influences in public health interventions aimed at increasing HWWS is likely to improve program effectiveness [28]. The Dominican Republic has a long history of social and economic inequalities and though the country is considered high-middle income because of success in agriculture and tourism, inequities persist and affect the health conditions of disadvantaged groups [6]. In efforts to improve health, public health practitioners should consider the personal, social, and contextual factors that influence decision-making and access to healthy behaviors and this study aims to understand the factors related to HWWS in the Barahona region of the Dominican Republic in order to combat health disparities by improving efforts to encourage improved hygiene behavior among adults in all communities in which they work.

CHAPTER 3: METHODOLOGY

Introduction

This study intended to assess both the soap context (use preferences and purchasing behaviors) and the motivators to HWWS among adults in Barahona, Dominican Republic. This required the design to include both quantitative and qualitative data collection tools. We chose to use a household survey conducted with adult women and focus group discussions conducted with adult men and women in three focus communities in Barahona Province.

Study Location

The location of this study was the Barahona Province of the Dominican Republic, located on the southwest coast of the country. The following maps show the location of Barahona Province within the Dominican Republic (Figure 1), followed by the general location of communities selected as study sites (Figure 2).

Figure 1: Map of Dominican Republic [49]

The box indicates Barahona Province, shown larger in the next figure.

Figure 2: Map of Barahona Province of Dominican Republic [49]

The upper left box indicates the rural region from which two focus communities were selected, and the lower right box indicates Barahona city, the location of the third study community.

Barahona province was selected because it is the primary area in which the sponsoring organization works. We chose to focus on three communities within the province in order to achieve representation in the data from a variety of geographic areas, which are characterized by different levels of income, education, and health infrastructure. The three communities included Barahona city, a rural community, and a batey community, which has historically housed migrant Haitians working in the sugarcane industry and continues to experience poor economic and health conditions. Physical, social, and WASH-related characteristics of each study community are displayed in the following table:

Table 1: Study Community Characteristics

Community	Physical	Social	WASH
BATEY:	Rural	Governed by Sugarcane Consortium Low income Low education	Lack of access to clean water and hygiene infrastructure
RURAL COMMUNITY:	Semi-rural	Democratically governed Varied income Varied education	Varied access to clean water and hygiene infrastructure
CITY:	Urban	Democratically governed Varied income Varied education	Varied access to clean water and hygiene infrastructure

All study activities were conducted in each of the three communities.

Study Population and Recruitment

The population of interest was adults aged 18 and older in each community. Household surveys were conducted with women in their homes using convenience sampling at various locations in each community. Participants were compensated for their time with bars of soap from the sponsoring organization. Participants for focus group discussions were both men and women of self-identified Haitian and Dominican descent. They were recruited through community gatekeepers identified by the host organization.

Procedures

1. Household Surveys

Household surveys were used to collect quantitative data about soap purchasing and preferences. We surveyed adult women because they are generally the household members responsible for purchasing and using soap. Seven starting points at different locations within each community were selected and five homes on the path were approached, for a total of 35 houses in each community. Houses with no adult woman present or no response were not replaced but among houses where an adult woman was home during data collection, all agreed to participate in the survey. Survey questions were asked by the research assistant and the primary researcher recorded answers on paper forms.

Survey questions included demographic information (age, household size, and income) and questions about soap use and soap purchasing regarding the soap used for washing hands. Soap use survey items were: which soap brand is used for handwashing; and for what other activities is this brand of soap used in the home. Items about soap purchasing were: where is this soap purchased; reasons for originally selecting and continuing to buy this brand; frequency of purchase; current

price; perception of acceptability of the current soap price; preferred price for a bar of soap; and price limit for a bar of soap (the highest price they would be willing to pay).

2. Focus Group Discussions

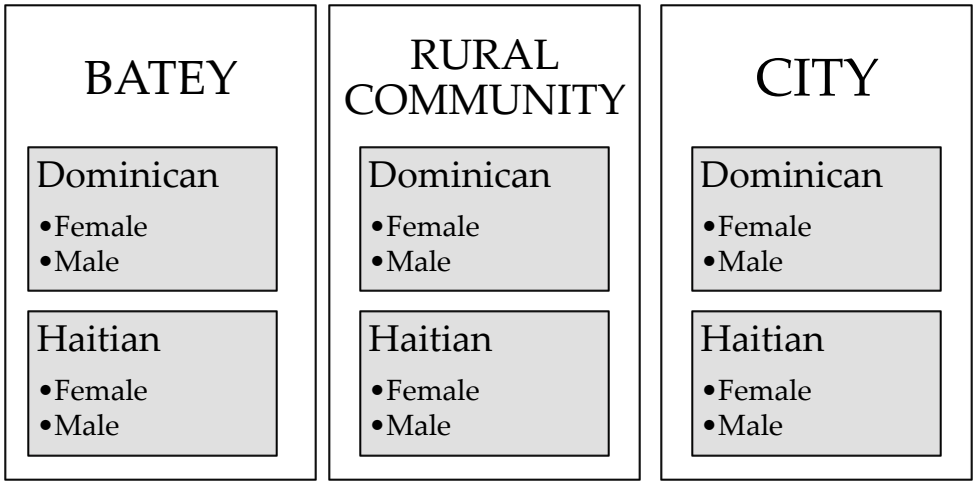
Focus group discussions were selected to collect qualitative data about motivators and for and behaviors around handwashing in each community. Though we wanted to understand motivators to HWWS inside the home, we chose to use focus group discussions in order to elicit discussions between individuals about community-level influences to HWWS and better understand social and contextual norms that may only arise when people talk about different opinions and experiences [50]. We felt that participants would be willing to discuss their individual motivators in the group because the subject of handwashing is not sensitive.

Focus groups were conducted by the primary researcher (American, English and Spanish-speaking, female) and a research assistant (Dominican of Haitian descent, Spanish and Haitian Kreyol-speaking, male). The research assistant served as discussion moderator with the primary researcher taking notes and asking follow-up questions at the end of each discussion. Because of the non-sensitive nature of the topic, we did not believe the genders or nationalities of the research team would inhibit sharing of experiences by participants; instead we felt that participants of both genders would be encouraged to explain more clearly their experiences because of the presence of researchers outside of their own gender and community groups [50]. Discussions were conducted in Spanish, in which all participants were fluent. Discussions took place outdoors in a participant's yard or patio and were audio-recorded for verbatim transcription.

We conducted 12 focus groups with three to eight participants each, of a variety of ages, employment types, and family sizes. Groups were stratified in each community by gender and by

whether they were of Dominican or Haitian descent (self-identified), as shown in the following figure:

Figure 3: Diagram of Focus Group Composition



Discussion topics included water access and use, soap access and use, and motivators and barriers to handwashing with soap in the home and community. Questions about the use of water included: What activities do you use water for? How do you get your water? Questions about soap use were: For what household activities do you use soap? Which of these activities are the most important? Handwashing questions included: In what situations during the day do you wash your hands? In which of these situations do you use soap and why? In which of these situations is soap most important and why? What benefits does using soap provide you? If you wanted to convince a neighbor who never uses soap to wash their hands regularly with soap, what would you say? What changes would you like to see in your community for it to be easier for you to wash your hands with soap? Demographic information was not collected for focus group participants, but they were asked to introduce themselves at the beginning of the discussion.

Data Analysis

1. Surveys

The two research team members entered survey data from paper forms into an Excel spreadsheet and double-checked all forms for accuracy by comparing hard copy answers to data coded in the spreadsheet, after which paper forms were destroyed. Descriptive statistics were generated using SAS 9.3 statistical software (SAS Institute Inc., Cary, NC, USA). Means and standard deviations were calculated for continuous variables like age, income, and soap price and frequencies and percentages of each response among all respondents were calculated for categorical variables like soap uses and brands and reasons for choosing soap brands. Statistical tests of association were not conducted.

2. Focus Group Discussions

Focus group discussions were recorded with participant consent and transcribed verbatim in the original Spanish by two research team members, after which original recordings were destroyed. Transcripts were de-identified, coded, and analyzed by the primary researcher in Spanish using MaxQDA11 qualitative data analysis software (VERBI Software, Berlin, Germany). Deductive codes based on motivators to HWWS in the scientific literature were considered, two of which were ultimately used, and three deductive codes based on the research questions were used. Thirty-one inductive codes were developed after initial reading of the data, yielding a total of 36 codes used for analysis. An inter-coder agreement exercise was conducted with a second researcher trained in qualitative data analysis in order to optimize the codebook. Analysis used the qualitative technique of grounded theory analysis [51].

Ethical Considerations

This study was not considered human subjects research by the Emory University Institutional Review Board (IRB) and therefore did not require IRB approval. Participants were all over age 18, were advised that their names and information would be known only by the study team and de-identified before data analysis and were asked to provide verbal consent to participation in surveys or focus group discussions before proceeding with data collection. Discussion participants verbally consented to being voice recorded. Participants in both surveys focus groups were compensated with handwashing soap provided by Global Soap, with one bar for survey participants and three bars for focus group participants.

CHAPTER 4: RESULTS

Introduction

This section will begin with a description of the sample for household surveys and of focus group discussion participants. Results will be presented in the order of the specific aims described in the introductory chapter. First, results about soap use and soap purchasing, which consist primarily of results from the quantitative analysis of household survey data, will be presented. Related data from focus group discussions will also be referenced in this section, where applicable. Second, results about motivators to HWWS in the home will be presented, followed by other findings about HWWS from focus group discussions. Finally, a framework developed through grounded theory analysis for predicting HWWS maintenance after bathing is presented.

Description of the Sample

1. Household Surveys

We surveyed women from 81 households, 24 in the batey community, 27 in the rural community, and 30 in the city of Barahona (Table 2). The average age and household size did not differ significantly at the 95% confidence level between communities, but the average household income was significantly higher in the city than in the other two communities ($p=0.0004$). The average household income among all communities, 6,212.35 Dominican pesos per month, is equivalent to approximately $145 US, with the exchange rate during data collection at 43 Dominican pesos to one US dollar.

Table 2: Household Survey Participant Demographic Information

Demographic Variable	Total Mean (SD)	Batey	Rural Community	City
Number of Observations (N)	81	24	27	30
Age (years)	34.06 (12.92)	32.52 (12.89)	34.93 (13.67)	34.47 (12.59)
Household Size	4.60 (1.99)	4.71 (1.65)	5.26 (2.36)	3.93 (1.68)
Household Income	6,212.35 (5,513.91)	4,583.33 (3,958.11)	4,262.96 (3,592.34)	9,270.00 (6,668.56)*

*Significant at the 95% confidence level

2. Focus Group Discussions

Twelve focus group discussions with 68 total participants (31 female and 37 male) over 18 years of age yielded 86 pages of qualitative data (Table 3). Participants represented a variety of occupations, ages, and family sizes but specific demographic data were not collected.

Table 3: Participation in Focus Groups

Group Number	Community	Sex	Nationality	Number of Participants
1	City	Female	Haitian	6
2	City	Female	Dominican	5
3	City	Male	Haitian	5
4	City	Male	Dominican	6
5	Community	Female	Haitian	5
6	Community	Female	Dominican	6
7	Community	Male	Haitian	8
8	Community	Male	Dominican	6
9	Batey	Female	Haitian	6
10	Batey	Female	Dominican	3
11	Batey	Male	Haitian	6
12	Batey	Male	Dominican	6
			Total	68

Soap Use

Participants were asked which brand of soap they used for handwashing at home, and subsequent questions pertained to the brand they named as their primary handwashing brand. The vast majority of participants (100% of both batey and rural community participants and 88.89% of participants overall) reported using *jabón de cuaba*, or glycerin soap for handwashing. Other preferred brands for handwashing were Protex antibacterial soap (overall 7.41%), Limpior dishwashing soap (1.23%), Kinder honey soap (1.23%), and Olivo oatmeal soap (1.23%).

Table 4: Preferred Handwashing Soap Brand

	Cuaba	**Protex**	**Limpior**	**Kinder**	**Olivo**
Preferred Soap Brand					
Total N (%)	72 (88.89)	6 (7.41)	1 (1.23)	1 (1.23)	1 (1.23)
Batey	24 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
Rural Community	27 (100.00)	0 (0.00)	0 (0.00)	0 (0.00)	0 (0.00)
City	21 (70.00)	6 (20.00)	1 (3.33)	1 (3.33)	1 (3.33)
Soap Price (pesos)	18-20	40-50	10 or 20	40-50	40-50

The same handwashing soap was reportedly used for bathing as well as washing clothes in the majority of households (85.19%). Other less frequent uses for handwashing soap were washing dishes and cleaning the home or floor. Focus group discussion participants also reported using specifically glycerin soap to clean wounds and even to brush their teeth in the absence of toothpaste.

Table 5: Other Uses for Preferred Handwashing Soap

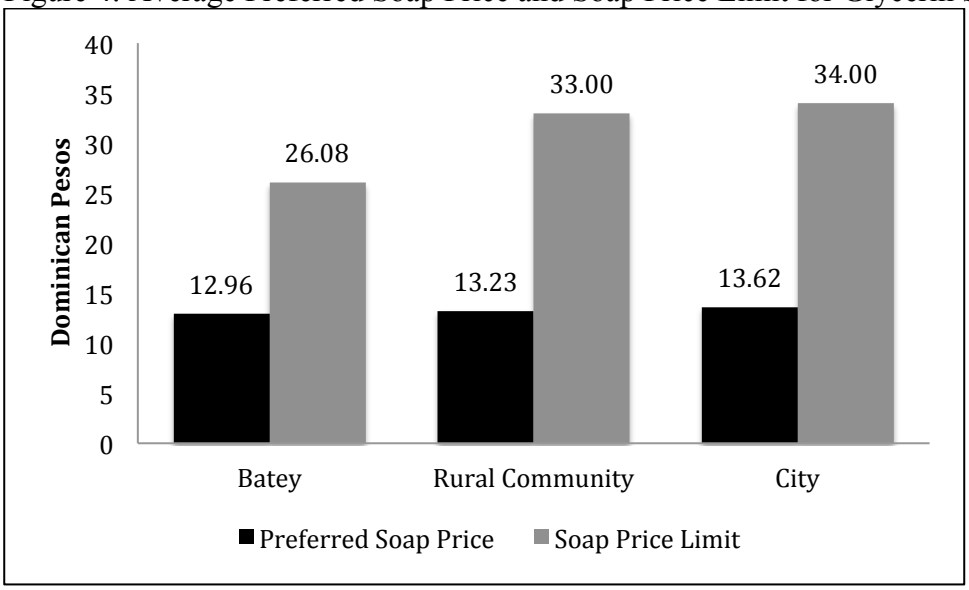
Uses: All Brands	Total N (%)	Batey	Rural Community	City
Bathing	81 (100.00)	24 (100.00)	27 (100.00)	30 (100.00)
Washing clothes	69 (85.19)	22 (91.67)	25 (92.59)	22 (73.33)
Washing dishes	5 (6.17)	3 (12.50)	0 (0.00)	2 (6.67)
Cleaning home or floor	2 (2.47)	0 (0.00)	2 (7.41)	0 (0.00)
Uses: Glycerin Soap Only				
Bathing	72 (100.00)	24 (100.00)	27 (100.00)	21 (100.00)
Washing clothes	67 (93.06)	22 (91.67)	25 (92.59)	20 (95.24)
Washing dishes	2 (2.78)	3 (4.17)	0 (0.00)	1 (4.76)
Cleaning home or floor	2 (2.47)	0 (0.00)	2 (7.41)	0 (0.00)

Soap Purchasing

Soap prices (Table 4) did not vary between communities, with most glycerin soaps priced at 20 Dominican pesos (about 47 US cents) per bar, and one brand of glycerin soap, Lavador, at 22 pesos. The dishwashing soap Limpior was sold in packets at 10 and 20 pesos. Protex antibacterial soap and Kinder and Olivo sensitive skin brands were priced at 40 to 50 pesos per bar, depending on purchasing location.

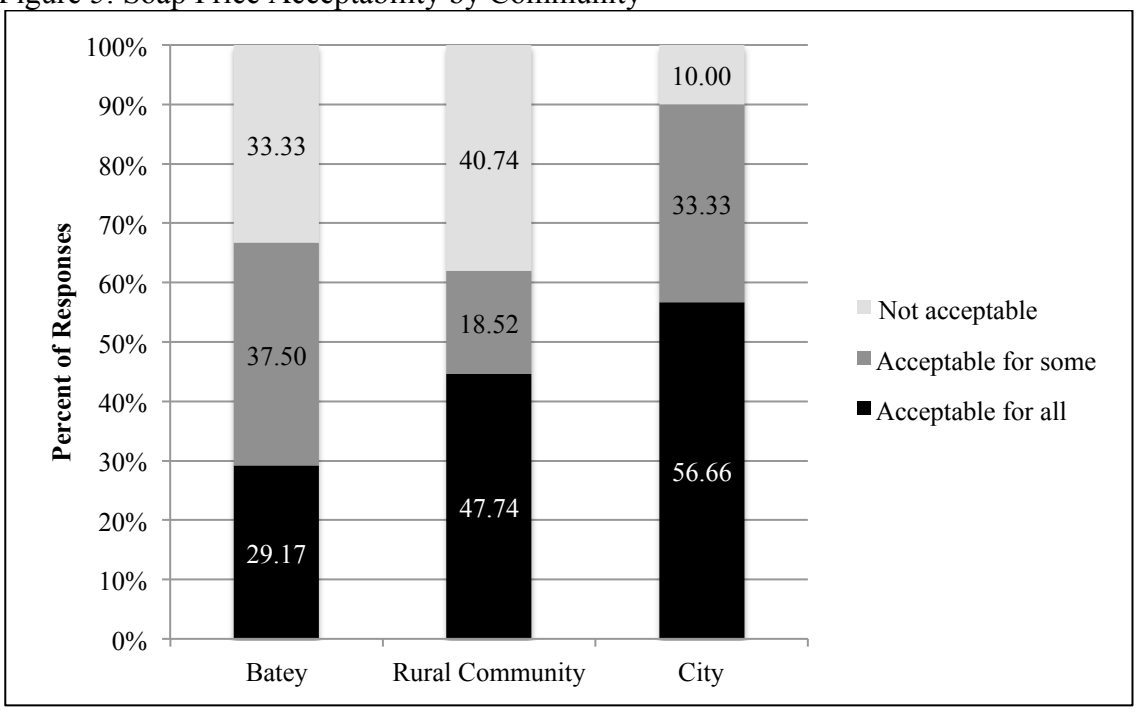
Participants were then asked at what price they would like their preferred handwashing soap to be sold and the highest price they would be willing to pay for this soap. Figure 4 shows preferred soap prices and the highest price participants were willing to pay, among those who preferred glycerin soap.

Figure 4: Average Preferred Soap Price and Soap Price Limit for Glycerin Soap by Community



Participants were also asked about whether they felt the price of soap in their community was acceptable. Results are shown in Figure 5. The proportion of respondents who felt the price of soap was acceptable for all was lowest in the batey, higher in the rural community, and highest in the city, where the majority (56.66%) of respondents felt it was acceptable for all community members. Opinions in the batey were divided almost evenly between the three options (acceptable for all, acceptable for some, and not acceptable) while opinions in the rural community were nearly split evenly between the two most extreme options.

Figure 5: Soap Price Acceptability by Community



Most participants (85.19%) reported buying their handwashing soap in *colmados*, or neighborhood stores although some purchased soap at supermarkets or community markets with individual vendors. Most participants (73.33%) reported buying their soap at least once per week.

Table 6: Soap Purchasing Location and Frequency*

Purchasing Location	Total N (%)	Batey	Rural Community	City
Neighborhood store	69 (85.19)	23 (95.83)	24 (88.89)	22 (73.33)
Supermarket	18 (22.22)	2 (8.33)	5 (18.52)	11 (36.67)
Market	5 (6.17)	1 (4.17)	1 (3.70)	3 (10.00)
Purchasing Frequency				
Once per week	55 (73.33)	20 (83.33)	20 (74.07)	15 (62.50)
Twice per month	11 (14.67)	2 (8.33)	4 (14.81)	5 (20.83)
Once per month	9 (12.00)	2 (8.33)	3 (11.11)	4 (16.67)

*Participants were allowed to choose more than one location, but only one frequency.
6 missing from frequency data

Participants were also asked about why they first chose to purchase the brand of soap they use for handwashing and why they continue to buy that brand (Table 7) and cited many reasons for each. The most popular among just those who preferred glycerin soap were its price and its good quality for multiple purposes.

Table 7: Reasons for Originally Choosing and Continuing to Buy Glycerin Soap*

Reason for Originally Choosing Glycerin Soap	Total N (%)	Batey	Rural Community	City
Price	18 (22.22)	10 (41.67)	4 (14.81)	4 (13.33)
Good quality for multiple uses	13 (16.05)	6 (25.00)	3 (11.11)	5 (16.67)
Good for washing clothes	9 (11.11)	1 (4.17)	8 (29.63)	0 (0.00)
Habit	8 (9.88)	1 (4.17)	0 (0.00)	7 (23.33)
How hands feel after washing	8 (9.88)	1 (4.17)	5 (18.52)	2 (6.67)
Stores don't sell other brand	8 (9.88)	6 (25.00)	1 (3.70)	1 (3.33)
Fragrance	4 (4.94)	1 (4.17)	3 (11.11)	0 (0.00)
Removes the most dirt	4 (4.94)	0 (0.00)	1 (3.70)	3 (10.00)
Lasts a long time/quantity	3 (3.70)	1 (4.17)	2 (7.41)	0 (0.00)
Not damaging	3 (3.70)	1 (4.17)	0 (0.00)	2 (6.67)
Kills bacteria	2 (2.47)	0 (0.00)	1 (3.70)	1 (3.33)
Most popular brand	2 (2.47)	0 (0.00)	1 (3.70)	1 (3.33)
Good for bathing	1 (1.23)	0 (0.00)	1 (3.70)	0 (0.00)
Packaging	1 (1.23)	1 (4.17)	0 (0.00)	0 (0.00)
Reason for Continuing to Buy Glycerin Soap				
Good quality for multiple uses	25 (30.86)	5 (20.83)	11 (40.74)	9 (30.00)
Price	24 (29.63)	11 (45.83)	7 (25.93)	6 (20.00)
How hands feel after washing	9 (11.11)	1 (4.17)	8 (29.63)	0 (0.00)
Stores don't sell other brand	6 (7.41)	6 (25.00)	0 (0.00)	0 (0.00)
Good for washing clothes	4 (4.94)	1 (4.17)	3 (11.11)	0 (0.00)
Lasts a long time/quantity	4 (4.94)	1 (4.17)	3 (11.11)	0 (0.00)
Not damaging	5 (6.17)	3 (12.50)	0 (0.00)	2 (6.67)
Fragrance	3 (3.70)	2 (8.33)	1 (3.70)	0 (0.00)
Habit	3 (3.70)	0 (0.00)	0 (0.00)	3 (10.00)
Good for bathing	3 (3.70)	0 (0.00)	3 (11.11)	0 (0.00)
Can buy quickly	1 (1.23)	0 (0.00)	0 (0.00)	1 (3.33)
Most popular brand	1 (1.23)	0 (0.00)	0 (0.00)	1 (3.33)
Packaging	1 (1.23)	0 (0.00)	1 (3.70)	0 (0.00)
Removes the most dirt	1 (1.23)	1 (4.17)	0 (0.00)	0 (0.00)

*Participants were allowed to choose more than one reason.

Among those who preferred Protex for handwashing, the most important reasons for choosing it originally were its fragrance and the fact that it is antibacterial, while their reasons for continuing to buy it were fragrance, how it made their hands feel, and its antibacterial nature. Among those who preferred other brands of soap, fragrance, how the hands feel after washing them, and the fact that the soap is not damaging to the skin were each cited once as reasons for buying these brands originally, and fragrance was the most frequently cited reason for continuing to buy them.

Table 8: Reasons for Originally Choosing and Continuing to Buy Non-glycerin Soap Brands*

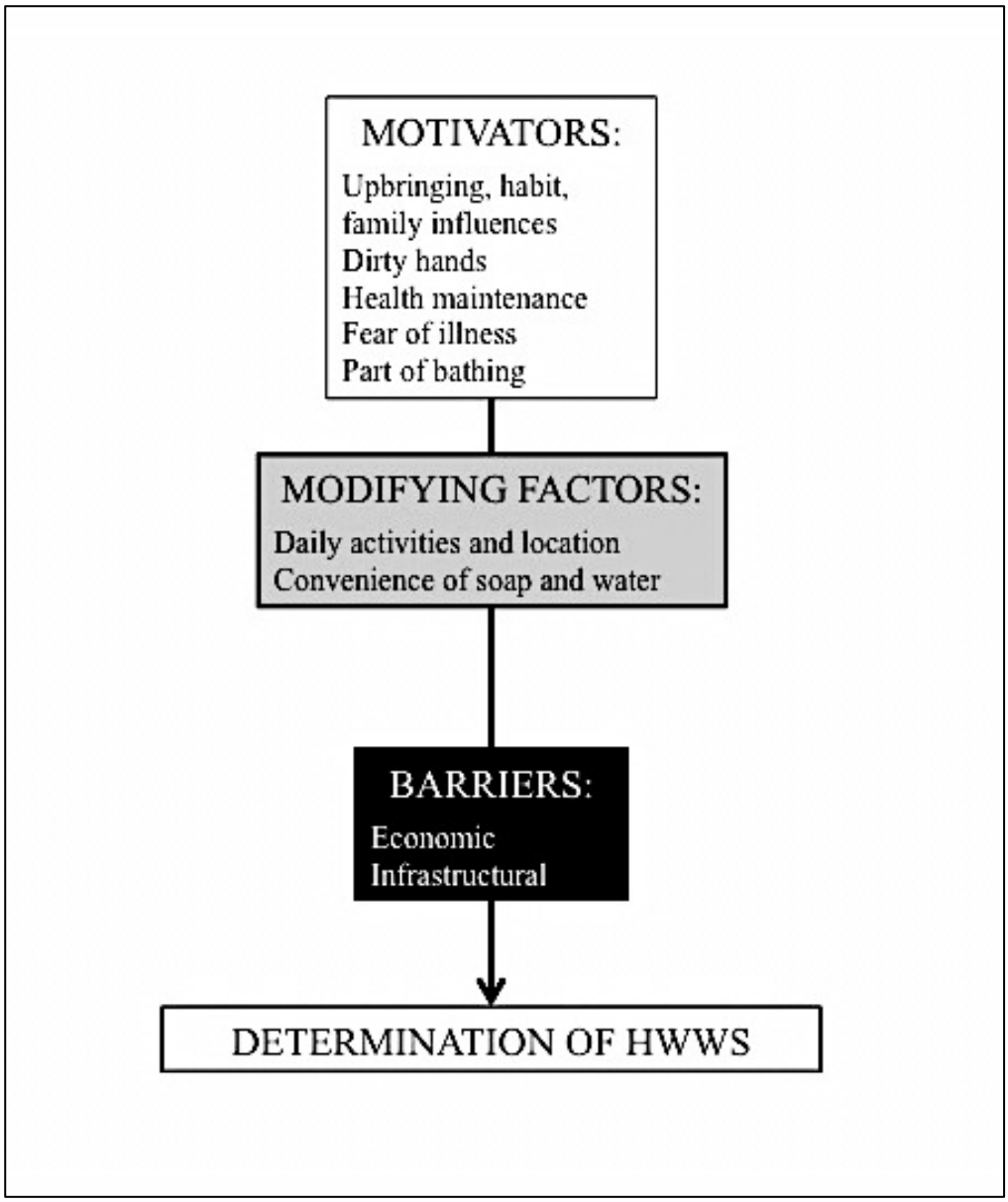
Reason for Originally Choosing Protex	**N (%)**
Fragrance	3 (50.00)
Antibacterial	3 (50.00)
Reason for Originally Choosing Other Brand	
Fragrance	1 (33.33)
How hands feel after washing	1 (33.33)
Not damaging	1 (33.33)
Reason for Continuing to Buy Protex	
Fragrance	4 (66.67)
How hands feel after washing	2 (33.33)
Antibacterial	1 (16.67)
Reason for Continuing to Buy Other Brand	
Fragrance	2 (66.67)
Stores don't sell other brands	1 (33.33)

*Participants were allowed to choose more than one reason, but only one brand.

Motivators to HWWS in the Home

In focus group discussions, participants discussed being motivated to HWWS by a variety of influences (Figure 6). These included habit and wanting to show good manners or upbringing, having dirty hands, either visible or imagined, wanting to maintain health, being afraid of getting sick, and as part of regular bathing.

Figure 6: Influences to Determination of HWWS Behavior



1. Upbringing, Habit, and Family Influence

A major theme in nearly every group was the idea of manners or good upbringing (*educación* in Spanish). This theme arose when participants were asked about why they wash their hands, to which many responded with: "It's just part of good upbringing." These statements often developed into discussions of habit formation, which participants generally agreed begins in the home, with the parents. Many participants expressed that the only way for one to develop the habit of HWWS is to be taught and consistently made to do it as a child; if not, they would not have the habit as an adult. Those who felt that HWWS was a habit for them used words like *hábito* (habit) and *costumbre* (custom) to describe the practice. When asked about the difference between members of the community who do and do not HWWS, the primary response was that those who do not practice HWWS were not raised with good habits.

> *Participant 1: But there's a difference in the upbringing. Here for the most part you don't see the children playing like crazy people but you're not going to permit a child to eat on the ground?*
>
> *Participant 2: No.*
>
> *Participant 1: You see. But down there you see houses, one, two, three, four doing that. Therefore, is there not a difference? You put soap to more use and you give better conditions to your kids. But down there they don't have this and if they give them the information, they don't apply it.*
>
> *–Dominican men, batey, speaking about Haitian part of batey*

It was also noted in multiple groups that some parents try to raise their children properly with good habits, but the children are disobedient or careless and therefore do not maintain the habit of HWWS as adults.

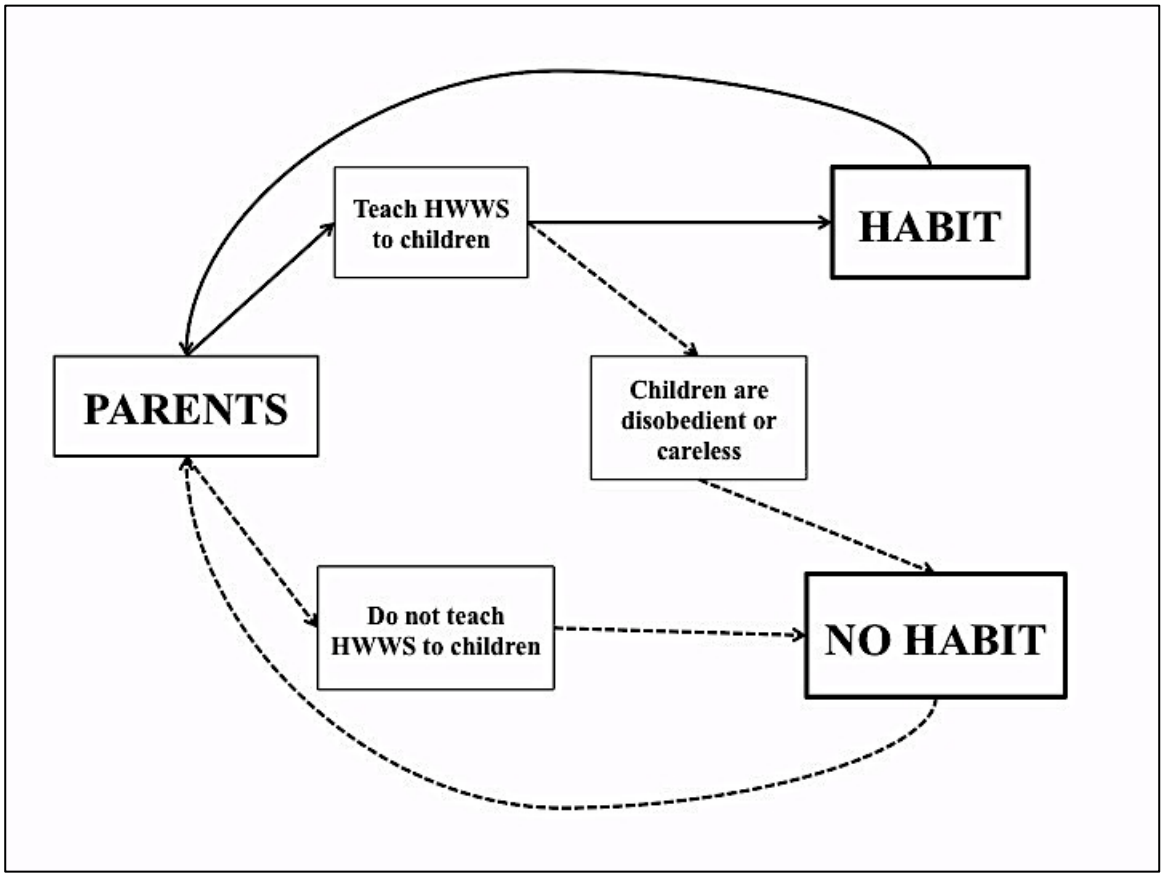
"At times the parents want to give a good upbringing to their kids but the kids are disobedient. They believe that they can live their lives by their own strength and they don't listen to advice."

-Dominican man, city

Multiple women discussed the difficulty of making children understand that HWWS is important and that children are naturally careless with their bodies, telling stories of having to fight with their children to get them to HWWS before eating or bathe after playing outside.

The following diagram illustrates participants' view that parents are central to the formation of the HWWS habit. Solid lines represent pathways to habit formation and continuation of the habit-building upbringing cycle. Dashed lines represent pathways by which children avoid forming the habit of HWWS. Participants stated that adults who do not have the HWWS habit are less likely to teach their children to HWWS.

Figure 7: The Role of Upbringing in the Formation of HWWS Habits



A nuance to the family's influence on the practice of HWWS is that two women in different groups said that they had influenced their husbands to regularly practice HWWS before eating. One woman described consistently requiring her husband to wash his hands before eating upon getting home from work and said that he had begun doing it even without her asking. The other said her husband had begun consistently washing his hands before meals because of years of her encouragement and an education campaign about cholera prevention. These women did not say that their husbands had fully developed the habit of HWWS or that they practiced it unconsciously, but they felt that members of a family could effectively influence one another to practice HWWS if they encouraged it consistently enough. A few women reported children influencing their parents or other adults to HWWS because they had learned it in school.

2. Dirty Hands

When asked about activities that make them want to HWWS, many participants made comments like "you have to wash your hands after any little thing you do," then listed things that they felt got their hands dirty. Participants always mentioned using the bathroom, but some said things like grabbing sticks or plants off the ground, refilling the dog's water bowl, touching a tree, or shaking hands with someone. Sometimes visible filth or the feeling of dirt on their skin made them want to HWWS, but sometimes it was the mere belief that the hands were contaminated. Participants discussed enjoying seeing the dirt of the environment come off their hands upon HWWS and one said "you can feel the weight of the dirt on your hands," when they are physically dirty. In the city and rural community groups, participants told stories about the poor hygiene of others and expressed that this made them believe their hands were dirty or contaminated after any type of contact with others. Examples of these stories were seeing someone wipe their nose on their hands or on a tree, people returning from defecating in a field and wanting to shake hands without having washed them, and vendors selling food in the street with dirty hands or fingernails. These experiences with other people made them feel they needed to HWWS after almost anything they did with their hands because of uncertainty about contamination in the environment.

This sensitivity to potential contamination was common in women and working men.

> *"And the man needs to use soap more than the woman because you know that the man does the work that goes outside of the household norms."*
>
> *-Haitian man, rural community*

One young man who worked with cattle in the batey said he would never eat without HWWS after handling the cattle or touching the reins, and another who worked in a factory reported always taking five or ten minutes to HWWS before eating lunch at work. An older man in the city group

who worked in a storage facility for school food reported periodically rinsing and washing his hands throughout the day because of the residue and dust in which he works. Women in every group provided stories about seeing others do things at which they felt disgusted which caused them to try to avoid contact with them and warn others to do the same.

On the other hand, a unique group, younger men who participated in sports, said eating with dirty hands after a game or practice without HWWS did not bother them; HWWS or even rinsing their hands with water before eating a snack was usually not even an option because they were hungry and it was inconvenient to do so. Many men agreed that they would sometimes eat without HWWS if they were in a rush to eat, whether because of hunger or limited time to get back to work. Even men who were concerned about contamination said they often forgot to HWWS before meals if they were in a hurry or if water and soap were not easily accessible, a common problem among men who worked in agriculture.

3. Health Maintenance

Many participants who reported that they practice HWWS regularly discussed doing it for the purpose of maintaining their health. People generally agreed that knowledge about the benefits of HWWS was high in their communities, saying that everyone knows they should wash their hands after using the bathroom and before eating to remove germs that can make them sick. Participants from nearly every group expressed that preventing disease through good hygiene, including HWWS at critical junctures was favorable compared to the alternative of not maintaining good hygiene and becoming vulnerable to illness.

In the city, both male and female participants felt able to maintain good hygiene as a community and felt they could avoid illnesses like cholera by keeping their environment and

themselves clean. They did not feel afraid that they might become ill by not practicing HWWS, but that it was just one part of the good hygiene that keeps them healthy. They felt their communities were healthier than more rural ones and told stories about people they know from rural areas who had gotten sick by not practicing good hygiene but did not report experience with WASH-related illness themselves. Similarly, the men and women from the Dominican side of the batey were much more confident in their ability to prevent disease through good hygiene than those in the Haitian side, citing their effective plumbing and drainage infrastructure and economic mobilization through collaborating as a group to improve conditions.

In the batey and rural communities, being motivated to HWWS for health maintenance was most common among females, especially women with children. One batey woman noted that she can tell a difference between her children's rate of illness when they do and do not practice HWWS. Women in both the Dominican and Haitian batey groups stated that it is less expensive and easier to maintain their children's health than not to do so. For example, one Haitian woman from the batey group said:

> *"One doesn't like to be going to the doctor all the time. You deworming your child on one side and later putting them more at risk where there are more parasites, it's not good because sometimes it scares you to buy the medicine. For myself, I make sure that I have the hygiene I can because it's not easy."*

Men in the batey and rural community groups were also concerned about avoiding disease but only men in the city expressed being motivated to HWWS purely because of health maintenance. The majority of young, non-working men across all groups felt invincible to illness, and they were not motivated to HWWS for health maintenance.

4. Fear of Illness

Participants in the Haitian women's batey group and in the rural community groups cited the recent cholera outbreak in the Dominican Republic and Haiti as a motivator to HWWS at all critical times. Participants reported learning about the importance of HWWS through door-to-door education campaigns sponsored by the Dominican government and non-profit organizations at the beginning of the outbreak. Instead of feeling empowered to HWWS maintain their good health like those in the city and Dominican side of the batey, these participants reported thinking of a personal experience with cholera and actively choosing to HWWS in order to avoid it.

> *"Now, when someone got sick because he didn't wash his hands when he went to the bathroom and came back with his hands infected and ate and it made him sick, diarrhea because it landed in his stomach, the rest of us what we do is take care of ourselves so that doesn't happen to us. Now that it happened to him, we try to avoid that happening to the rest of us. We wash our hands to avoid that."*
>
> *–Dominican man, rural community*

A few participants traveled regularly to Haiti and discussed in depth the effect their experiences with the cholera epidemic in the neighboring country had on their practice of HWWS, especially when traveling to Haiti, but also at home. Many participants in the batey and rural community also said that though HWWS was popular during the outbreak and for a period of time after, but most people had gone back to their previous poor hygiene habits.

Cholera was not the only illness of which people are afraid; participants also discussed trying to avoid parasitic infections, other diarrheal illnesses, and general indigestion. Multiple older women said that if they do not HWWS before eating, the germs from their hands will make their stomachs hurt, so they HWWS because they have previous experience with illness.

Again, fear of disease was not a motivator for all communities or groups; in the city and the Dominican side of the batey, participants said they were unafraid of cholera and felt they could effectively prevent illnesses by practicing good hygiene as a community. Young men were not motivated to HWWS by risk of illness, even in the communities in which other participants felt vulnerable to disease.

5. Part of Bathing

When asked about how they use soap, every participant brought up bathing. Participants in every group reported feeling that bathing without soap did not get their skin clean and that they desired the feeling of clean, smooth skin after bathing. Most participants reported bathing multiple times (even three or four times) per day because of the hot, humid, and dusty environment. They generally spoke of full baths during which they wash their whole bodies with soap with water from a hose, tap water in a bucket, or in the irrigation canals which are ubiquitous in areas outside of Dominican cities. Men often reported bathing right before leaving work or immediately upon returning home from work and discussed the importance of being clean before or immediately upon arriving home, with comments like: "You're not going to arrive home dirty from work" and:

> *"You have to take soap because when you're halfway home you have to bathe so you don't arrive at the house dirty. What do you think about working out there and when you come back arriving dirty to the village. You know one has to arrive in a different way."*
>
> *-Haitian man, rural community*

Many male participants considered bathing time to be their primary opportunity for HWWS. While young men reported not caring about their hand hygiene, many older men with jobs were more conscious of their hand hygiene and used bathing as an opportunity to clean their hands.

Working men in every community reported bathing upon leaving work or arriving home, during which time they would wash their hands, making it safe to eat shortly afterward. One female participant in the rural community said her husband told her that he didn't need to HWWS before eating dinner because he had bathed right before leaving work to come home; she reminded him, however, that he had come home riding the motorcycle, which could have re-contaminated his hands. In the batey Haitian men's group, a participant explained his daily routine: After getting home from his night shift at work at 6 a.m., he does not bathe until his family calls him to eat, at which time he bathes then eats. After resting, he bathes then eats again before the next night's work. This participant felt his hands and body were cleaned well right before eating because he placed his baths strategically before meals. Though women discussed bathing during discussions of soap use, they did not mention bathing as a specific time for HWWS.

Barriers to HWWS in the Home

Though not part of the specific research aims, barriers to HWWS in the home emerged as a major theme in focus group discussion data. Barriers discussed were poor economic access to soap and water and infrastructural barriers to clean water and sanitation. Haitian women in the batey spoke most about these barriers, followed by Dominican men and women in the batey, then the rural community and city residents, who both felt they had relatively good economic and infrastructural access to what they needed for proper hygiene.

The economic barriers to HWWS are intuitive: rising prices of soap and water (in addition to food) make it difficult to continue to buy the same amounts of these necessities for large families on low wages. High unemployment and low income are problems across the Dominican Republic,

especially in the bateyes, where work is extremely scarce during the off-season of sugarcane harvest and where even during the harvest, wages are low.

> *"You see a little bit of high spirits right now because it's harvest season. Here, when there's no harvest you can see the poverty, look, and one cannot even go to the market to do anything... You don't see when the harvest ends there's a saying that people go around even yelling these days, 'the harvest has ended, the daily grind has ended. The people of the batey we won't be able to do it.' Because now there is nothing."*
>
> *-Dominican woman, batey*

Participants in the batey said that there are times where they do not have enough money to buy both sufficient food *and* soap for washing clothes or handwashing. Even in the city, participants said they have to make an effort to make ends meet, but that they do what they can to keep a bar of soap in the house. When answering soap price questions, survey participants often commented on how the price of soap has doubled over the past few years due to rising gasoline and material costs. Even in communities with indoor plumbing and good infrastructural access to water, water outages, where officials turn off water to parts of communities, are common. During water outages, people are forced to purchase water for handwashing from water trucks that fill tanks in their homes or in five-gallon jugs of purified water usually used for drinking, both of which are considered expensive by many. Children also play a role in the cost of HWWS materials. Many participants talked about how their children waste water by playing in it and soap by leaving it in the water after using it to bathe or wash their hands.

Infrastructural barriers to HWWS include damaged water systems, lack of sanitary facilities in homes, and power and water outages. Most Dominican homes have latrines in the yard and some have bathrooms with indoor plumbing, where they may have a place for HWWS after defecation.

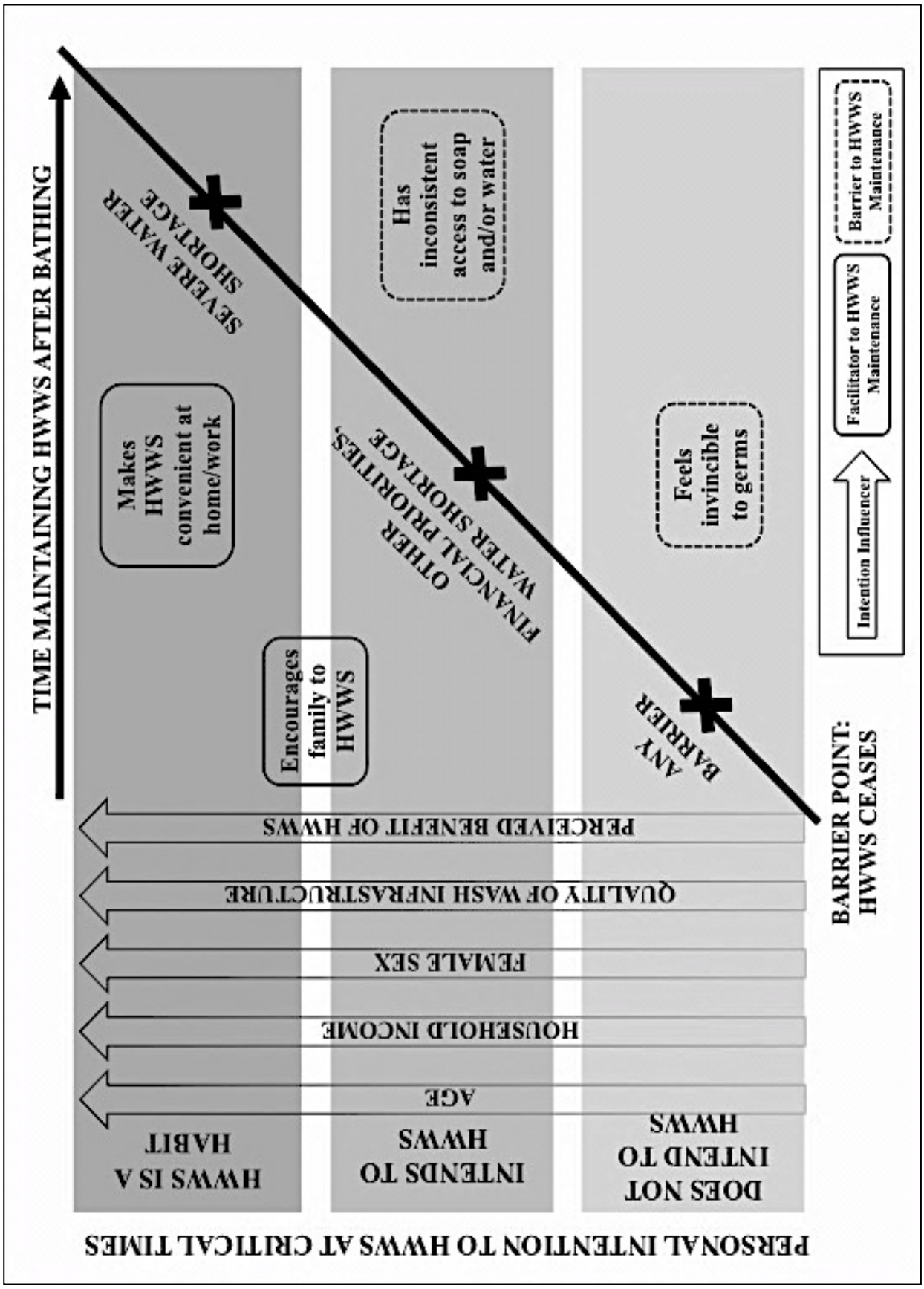
However, in the bateyes, out-of-date infrastructure means that many homes do not even have latrines and that people must go to a nearby field to defecate, making it difficult to perform HWWS afterward. Though the batey in which we conducted our discussions had recently had a new plumbing system installed, the majority of residents had not invested in installing toilets indoors or connecting their bathrooms to the water system and it is unclear whether this is for economic, legal, or other reasons. The men and women in the Dominican part of the batey discussed that they had put their resources together to repair the drainage system on their end of the batey and that all of their houses have indoor toilets connected to the new plumbing system. The batey Haitian women's group, on the other hand, complained about the water system being plugged or damaged because there are places in the community where tap water cannot reach the homes. Water and power outages affect nearly every community in the Dominican Republic and both lead to periods of hours or even full days during which homes go without water. Participants reported finding it difficult to dedicate even a small quantity of clean water to handwashing when it is needed for so many other activities during long periods without water.

These barriers all make it difficult to consistently practice HWWS at home as they limit individuals' and families' access to the two key HWWS materials: soap and water. Some barriers like rising prices, low income, and water and power outages were reported by participants in all communities, while others, like unemployment during non-harvest season, lack of home sanitation facilities, and damaged plumbing and water systems were discussed more commonly among batey residents, or only among the batey Haitian women.

Framework for Predicting HWWS Barriers

Through grounded theory analysis of focus group discussion data, a framework was developed for use in educational programming. The motivators and barriers described in this chapter, along with demographic characteristics and personal belief of the risk of disease and benefit of HWWS can be used to characterize individuals' intention to HWWS (Figure 8).

Figure 8: Framework for Determining Intention to HWWS and Maintenance of HWWS Behavior



The framework is read from left to right and bottom to top and has two sections. In the left section of the diagram (before the black diagonal line) individuals are placed into one of three categories from bottom to top, based on their intention to practice HWWS at critical junctures: 1. Does not intend to HWWS, 2. Intends to HWWS, or 3. HWWS is a habit. The arrows pointing upwards represent characteristics that influence individuals' intention to HWWS and will help place them into one of the three categories if their intention is unclear. The arrows are for age, household income, female sex, and perceived benefit of HWWS. An increase in an arrow characteristic influences an individual to have more intention to HWWS and be placed into a higher category in the framework. For example, increasing age (being older) moves a person up in intention category as well as having higher household income, being female, and having a higher perceived benefit of HWWS for their health. The four arrows work together in determining a persons' intention category, so even though one arrow says that being a female increases intention to HWWS, a male could be in the habit category if he is also older, has a higher income, or perceives the benefit of HWWS to be high.

Once an individual is categorized by their intention to HWWS, the right side of the diagram will help practitioners determine the barriers to HWWS facing individuals in each category. The thick black arrow at the top of the diagram represents time after a bath (where hands are generally washed by all individuals) increasing from left to right. The thick black diagonal line represents the point at which HWWS is no longer practiced at a critical juncture. Where this black line meets each category's rectangle (marked by X's) is the Barrier Point and is labeled by the typical barriers that cause individuals in each category to not practice HWWS at a given critical juncture. Finally, the rounded rectangles are facilitators and barriers to HWWS for

each category; facilitators have solid borders and are on the left side of the Barrier Point line and barriers have dashed borders and are on the right side of the Barrier Point line. For example, a person in the bottom intention category reaches the Barrier Point line before individuals in the other two categories, meaning that after bathing, they will not HWWS at critical junctures if they encounter any barrier at all (not having soap or water available, being too hungry to HWWS before eating, not feeling like practicing HWWS) because they did not intend to HWWS in the first place. The major barrier for this category is that they feel invincible to germs and therefore do not feel HWWS is necessary. This logic can be applied to individuals who intend to HWWS at critical junctures (whose Barrier Point is when there are other financial priorities that prevent them from buying soap or water for handwashing or if there is a shortage of water) and to those for whom HWWS is a habit (whose Barrier Point comes later if at all, and generally only when water is unavailable).

Improving Global Soap and World Water Relief Program Activities

At the end of discussions, participants were asked about how World Water Relief can be more effective in encouraging people to practice HWWS. Each time this questions was asked, participants suggested that program staff conduct home visits in order to understand better the individual issues related to HWWS that adult community members face. Many participants said that this would encourage adults to share about their barriers more honestly than they would in a group setting and to take recommendations more seriously, a sentiment that was expressed in all communities. The Dominican men's batey group suggested training women who do not work as a team of volunteers to help with programming by educating their neighbors. Many participants

said that although students learned hygiene in school, they could not maintain the practice of HWWS or teach their families if the parents do not see it as a priority.

CHAPTER 5: DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

DISCUSSION

Soap Use and Purchasing

Results about soap use and purchasing behavior show a lot of homogeneity among the communities of Barahona. The vast majority of households uses glycerin soap for handwashing and do so because of its high quality for bathing and washing clothes. A few participants living in the city prefer other types of soap (antibacterial, honey, or oatmeal soaps) which are advertised on television as antibacterial or good for sensitive skin, but most participants are unaffected by this advertisement, preferring the natural, popular glycerin soap. Though not captured in the results, while answering survey questions, many participants made comments like "I use glycerin soap, like a good Dominican," further supporting the quantitative data that the use of this soap is a social norm. Most *colmados*, or neighborhood stores, where the majority of participants reported buying their soap sell only glycerin soap and though they sell multiple brands of it, most participants did not have a preference of brands and could not report specifically which brand of glycerin soap they used. Most participants value soap for its quality for multiple purposes and for its strength and durability, because money is a concern.

Soap prices were consistent across all communities and the perception of the acceptability of this price differed slightly by community, with acceptability being lowest in the batey, followed by the rural community and city. Similarly, preferred soap price and soap price limit were lowest in the batey, followed by the rural community and city, but differences were

small. These results likely mean that city residents have more disposable income than those in the other two communities, an idea supported by demographic data; these results also potentially suggest that those in the city truly place a higher value on soap than others. Most participants bought their soap in their neighborhood stores, but while some reported traveling to the market or supermarket to buy their soap in bulk, making it slightly cheaper, this option was only available to those with economic and physical access to transportation. Demand for soap is high in the communities in this study, suggesting that donating soap in schools will not significantly increase demand for it, but results about price acceptability and reports of having to choose between soap and food during the non-harvest season in the bateyes suggest that efforts to increase economic access to soap would be beneficial, especially in economically disadvantaged communities, a suggestion many researchers have made in discussing future directions for work in hygiene promotion [28, 42, 52].

Influences to HWWS

Our results about influences of HWWS in the home are generally similar to those in the existing literature, with a few exceptions. Our results show that individuals in Barahona are also influenced by both environmental and psychological factors. Environmental factors include economic and physical access to HWWS materials and infrastructure, all influenced by their demographic characteristics; the psychological factors include habit and both motivated and planned factors.

A number of the environmental influences to HWWS present in the literature also influence adults in Barahona. Community access to soap and water is an influence commonly referenced in the literature about HWWS [28, 36, 42, 52, 53]. Many of our participants reported

practicing HWWS when soap and water are physically convenient in their home and community but not having access to soap and water when they are outside their homes or communities. Batey residents face a unique physical barrier to HWWS in that many of them must practice open defecation in a location far from their house, where they do not have access to soap and water at the appropriate time for HWWS. Batey residents also experience infrastructural barriers to HWWS through poor plumbing system function and the inability to afford soap and water during the non-harvest season. These contextual factors are important considerations in evaluating the success of current programs by Global Soap and World Water Relief as well as in assessing potential expansion into new activities. Program activities should seek to address the disproportionate burden of economic and physical barriers to HWWS among batey residents in order to create an environment more conducive to hygiene maintenance.

As in other studies, our participants also reported being influenced by biological factors, like when the environment is dirty, when they have had contact with bodily excretions or during a disease outbreak [28]. While female participants did not mention being too busy or too tired to practice HWWS as women in other studies have done [28], male participants did cite this as a barrier before eating. Similarly to two studies from Ghana and Kenya, [42, 43] participants in Barahona reported being influenced by social factors and media. Specifically after the education campaign about cholera, which was presented through home visits, radio, and television, people talked to one another about practicing HWWS and it was socially normalized because everyone expected others to do it. As in other studies [28], participants expressed that the practice of HWWS had subsided after the fear of the outbreak died down. Women in Barahona did not discuss a lack of power within the family to spend money on soap and water, as has been reported in multiple Asian and African countries [28], only that the family as a whole at times

does not have enough money to afford them. School attendance and hygiene is a factor in the practice of HWWS from the literature [28] and though our study focused on adults, some participants reported children being motivated to practice HWWS after learning to do so in school. It is also clear from our results that the socially and economically disadvantaged groups face the most barriers to HWWS and likely practice HWWS the least frequently, even though they have the most to gain in terms of disease prevention.

Psychological influences reported by our participants are also similar to those in the literature, and include habit, motivators like comfort or relief from contamination on the hands, showing good manners, fear of disease, and the planned benefit of health maintenance [28, 45]. In regard to HWWS habit formation, our results are similar to the literature [28, 45] in that participants discussed forming the habit as a child and that learning HWWS is a part of good upbringing. Participants in Barahona are also motivated to practice HWWS by having dirty hands and seeking comfort in cleaning them and at times also by the idea that HWWS after using the bathroom or before preparing or eating food is part of demonstrating good manners, results that were also shown in studies from multiple countries [28]. The fear of disease motivator was also cited as it appears in the literature from Peru, Senegal, Kenya, and Uganda [28] in that only those in communities with recent cholera outbreaks were motivated by fear and that the influence of fear died down over time after the outbreak. The motivator of health maintenance, described as planned prevention of illness in the literature [28] is also represented similarly in our data. Participants in our study did not mention religious motivations to HWWS, as in studies from Senegal, Uganda, and Madagascar, where HWWS was reported as a religious ritual [28] or the cleanliness of hands as a factor in sexual attraction unlike studies from a number of countries [28]. Another difference from the literature in our results was the discussion of bathing time as a

time for HWWS among men, potentially not in the literature because most studies have focused on women, who did not discuss bathing as a chance to HWWS in our study.

Many of these influences are experienced differently by different groups of people, and this study enables us to further understand the varied influences by nationality, community, and gender. These and other personal characteristics should be considered when designing HWWS promotion activities. For example, young men who feel invincible to disease will not respond to hygiene promotion campaigns unless their perceived risk of not HWWS is increased. A woman with children will likely respond differently to a campaign promoting the social norm of raising children with "good upbringing" and teaching them to HWWS than a woman with no children. Someone living in the city will have a different capacity to maintain hygiene materials in their home than someone renting a home in a batey. Community mobilization activities will be different in mixed Haitian-Dominican areas than in more homogenous ones. As other studies have suggested, the traditional health promotion method of encouraging HWWS may not be the best approach, as health is not a main concern for many people and even among those for whom it is a concern, it's influence is likely on the decline as this community's experience with cholera moves further into the past. Potentially encouraging HWWS through other motivators like the experience of dirt in the environment or the social norm of showing good upbringing would be more effective.

Efforts in the recent past have tried to integrate all possible contextual factors as well as personal factors into understanding of HWWS behavior [28, 39]. The framework for predicting barriers to HWWS among different intention groups is an effort to incorporate both personal factors and contextual factors at the interpersonal, household, and community levels to help

practitioners in Barahona to tailor their activities aimed at increasing HWWS to each individual or group of individuals with which they work.

Strengths and Limitations

This study has a number of strengths and limitations. It fills a critical knowledge gap for Global Soap because very little research exists about the soap context or motivators to HWWS in the Dominican Republic. The use of mixed methods was effective because of the nature of our research questions, which required quantitative data about soap use and purchasing and qualitative data about motivators to HWWS in the home. For the program improvement purpose for which the research was conducted, the study had sufficient sample sizes and qualitative data quality. Use of surveys to ask about soap use and purchasing preferences enables us to assess the distribution of responses in the focus communities and captured a spectrum of attitudes and practices related to soap. Use of focus groups enabled us to understand the emic perspective in Barahona about the many influences to HWWS. Because the primary researcher has spent years in the Dominican Republic, worked with a local assistant during data collection to improve validity and thoroughness, and confirmed the accuracy of interpretations during data analysis with Dominican collaborators, the data were collected and analyzed with a high degree of sensitivity to cultural norms and nuance.

Unfortunately, time, money, and personnel constraints limited this study's scope. We were unable to conduct a study that would be generalizable to other communities or to the rest of the Dominican Republic, and the quantitative portion could have been more representative given more resources. Because of lack of access to community maps or lists of residents, we utilized convenience sampling for the surveys and therefore cannot compare the communities with

statistical tests for which random samples are assumed. Surveys relied on self-reporting, meaning there is risk of bias due to poor ability to recall past events, not understanding the questions, or providing untrue responses because the respondent wants to give the "right" answer. Desirability bias, or giving untrue answers because the respondent knows what the research wants to hear is a common issue in handwashing studies but we felt that for our purposes, self-reporting was sufficiently rigorous as we were not trying to measure frequency of the practice of HWWS. Focus group data may be biased because participants wanted to seem like they practiced HWWS more often than they really do, but attempts were made both in the discussion guide and in personal interactions during data collection to minimize participant dishonesty. Because many participants freely discussed forgetting to HWWS or not intending to do so and because we discussed motivators and did not ask participants to report actual HWWS behavior, we feel this bias was limited. Finally, the local assistant moderating focus group discussions was only briefly trained in qualitative data collection and did not always ask appropriate probing questions or follow the discussion guide consistently with each group. For this reason, the primary researcher was present for all discussions and filled in gaps where the assistant did not follow up in an attempt to limit loss of data quality. The local assistant's Haitian descent may have influenced Dominican participants' perception of the value of the focus group value or willingness to share opinions and experiences regarding race, given the anti-Haitian sentiment in the DR. The assistant was recommended by the host organization and was well respected in the study communities because of his experience working for health organizations. The fact that Dominican participants in the batey community brought up issues related to race on their own suggests that they felt comfortable enough to discuss these topics regardless of the moderator's descent.

CONCLUSION

The results of this study paint a picture of the landscape of soap use and purchasing as well as the contextual and personal factors that influence individuals' HWWS practices in Barahona, Dominican Republic. Barahona residents generally prefer glycerin soap for handwashing, as well as for washing clothes and bathing and they prefer it for just that reason: they can use it for multiple household needs. Most participants buy their glycerin soap in the neighborhood stores at 20 Dominican pesos per bar, a price they find moderately acceptable. Price acceptability differs by community, with batey residents finding it the least acceptable, followed by the rural community, then city residents.

Motivators to HWWS included having the habit since childhood, which participants generally saw as a sign of good upbringing, having physically dirty or potentially contaminated hands, being afraid of getting sick, wanting to maintain good health, or even just doing it as a part of cleaning the whole body during bathing. Participants also described barriers to HWWS, including both physical and economic access to soap and water for HWWS, which were the most serious in the batey, and certain circumstances like being in a hurry or being hungry, most common among young men.

These results suggest that education should be targeted to overcoming individual barriers to HWWS, especially among the groups most vulnerable to these barriers: young men and batey residents. The framework for predicting barriers to HWWS, developed through grounded theory analysis, categorizes individuals based on their personal characteristics into categories of intention to HWWS and will enable practitioners to tailor education about HWWS to individuals in each category and help people overcome their barriers and improve their personal hygiene to

ultimately achieve better health outcomes. Further studies are needed to understand how these results apply to other communities in the Dominican Republic and elsewhere.

PUBLIC HEALTH RECOMMENDATIONS

There are direct applications of the results of this study to Global Soap's public health work in the Dominican Republic. These recommendations are intended for both Global Soap and for their in-country partner, World Water Relief.

Handwashing with Soap

The main purpose for this study was to enable Global Soap and World Water Relief to improve their interventions to increase HWWS in Barahona. The first recommendation is for program staff to expand the scope of their educational programming. Staff in the Dominican Republic currently work only with children in participating schools, and while educating children is important and effective, using this approach is leaving important vulnerable groups out.

Conversations about improving educational programming among focus group participants almost always lead to suggestions to increase education through home visits because of the belief that habits and manners begin with the parents and cannot be taught in school. Participants from multiple groups mentioned that they knew of children who had been taught to HWWS in school and who were encouraging others both at home and in the community to do so, but they felt these children's parents needed to be empowered and educated about making HWWS a priority in their homes as well, because if kids did not HWWS at home, they would not develop the habit, no matter how much they did it at school. Participants also expressed that if program staff were to visit them in their houses, they would better understand the individual issues they face in trying to maintain good hygiene at home. These reasons, which are prevalent

throughout the data from this study, demonstrate that the community would welcome expanded WASH education at the household level and feel this will help them address their individual barriers to good hygiene practices.

In trying to address and overcome individual barriers to HWWS among adults in the greater community, program staff can use the framework for predicting barriers to HWWS to tailor education based on individual characteristics. The framework will help guide program staff in first assessing individuals' intention to HWWS, then helping them identify their personal and community-level barriers to HWWS. Staff will be able to target individuals in the groups most vulnerable to barriers to HWWS, like young men with no intention to HWWS or the poorest families in the bateyes, where infrastructural and economic barriers to HWWS are abundant. Once a person's barriers are identified, educators can help them find ways to overcome these barriers. For example, one individual may need more information or emotional messaging to lead them to change their intention to HWWS through increased perceived risk of illness and benefit of HWWS. Others may need advice about how and why to maintain a supply of soap and water specifically for HWWS in convenient locations in their home. These additions to the current provision of WASH education in schools could help both adults and the children who rely on them practice HWWS more regularly and protect them from illness.

Liquid Soap Businesses

Demand for soap is very high in Barahona but many families cannot afford to allocate soap specifically to HWWS. This is especially true in poorer communities in times of financial insecurity. There is potential for introducing liquid soap making as a small business, especially in communities where employment opportunities are scarce. Making liquid soap is simple and

inexpensive and could become a successful business quickly with a small start-up investment. If liquid soap were promoted specifically for use in handwashing, it would encourage people to dedicate it to just that, which would eliminate the problem of soap being used up in other activities (washing clothes and bathing). If the soap could be made cheaper than the glycerin soap participants currently use, smelled good, and left the skin feeling soft and smooth, people would be interested in using it for their hands. Job creation and income generation for participating families would be a major benefit in addition to the potential community health impact. Because the issue of financial power between men and women was not discussed as a problem among participants in this study, participation could be open to both men and women, but further research into gender dynamics would be useful. Women are more often unemployed with extra time to dedicate to a project like this. Small businesses dedicated to handwashing soap might also stimulate conversations about hygiene among neighbors, a topic that is currently rarely discussed. This change would require dedication of additional planning and human resources to women's training and monitoring of the businesses, as well as the financial capital for start-up by either by Global Soap or World Water Relief, or both, but could have a significant impact on communities where hygiene is poor.

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