

The social and behavioral determinants of water and sanitation practices in peri-urban Antananarivo

Final Report

Water and Sanitation for the Urban Poor - Madagascar

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Table of Contents

Table of Contents	2
Executive Summary	3
Introduction.....	5
Background.....	5
Purpose.....	6
Conceptual Framework	6
Methods	7
Qualitative Results.....	9
Phase 1: Modified Free Listing/Free Association.....	9
Phase 2: In-Depth Interviews.....	11
Quantitative Assessment.....	17
Methods	17
Safe Drinking Water.....	17
Sanitation	25
Overall Findings and Implications.....	30
Water source	30
Water treatment	30
Sanitation improvement.....	30
Appendix.....	32

Executive Summary

From June – July 2009, researchers the Center for Global Safe Water at Emory University, in partnership with ATW research consultants, conducted an assessment of the social and behavioral determinants of water, sanitation, and hygiene practices among residents of the two communes of Antananarivo Madagascar where Water Supply for the Urban Poor (WSUP) has implemented pilot projects. In particular, this assessment focused on the barriers to adoption among the most disadvantaged groups of the population. The assessment was completed using a mix of qualitative and quantitative methods, including in-depth interviews, free listing and free association exercises, and a population-based survey. The main findings of this report and the implications for WSUP's future programmatic activities are summarized below.

Water Source and Water Treatment

- There is a clear awareness about the importance of drinking from a clean source. Respondents generally considered tap water to be of higher quality than water from local wells. Additional factors that influence water source selection were source proximity, source ownership, and affordability. Efforts to encourage use of piped water sources need to address these barriers rather than promote tap water use based on health messages alone.
- Although wealthier residents and residents that owned their property were somewhat more likely to use a tap or piped water source than other respondents, these differences were not found to be statistically significant. Only 5% of respondents expressed a desire to use a water source different from the one they were currently using. These factors suggest that current water distribution in the pilot communes is relatively equitable and there may be little latent demand for additional improvements.
- There is a lack of knowledge about appropriate water treatment methods. Some respondents did not believe that *Sûr'Eau* was effective because it did not kill worms or other insects in the water. Treating wells, rather than household stored water, is a common practice.
- It is a common practice among respondents to drink *ranovola* – boiled rice water which includes boiling and reheating of water. It is unknown to what extent households are subsequently encouraged to treat this water or the extent to which additional chlorine treatment is needed. However, there appears to be a generational shift and younger children are more likely to request cool drinking water. As children begin to consume more cold water during the day (as reported in the qualitative) it may be important to emphasize the need to treat this water.
- Using tap water and reported boiling of tap water were found to significantly reduce the odds of treating water with *Sûr'Eau*. The decision to treat drinking water is not made in isolation – rather it is shaped by water source selection and household boiling practices. Efforts to increase water treatment in these areas should be cognizant of the interrelationships between these behaviors.

Sanitation

- Almost all of residents in the current pilot areas report access to some form of sanitation, although sharing sanitation facilities with other households is common. There is a strong negative association between the number of people sharing a latrine and measures of latrine

quality. Efforts to improve household sanitation must recognize that it is rare for a latrine to be used and maintained by a single family.

- Approximately half of all respondents considered making improvements to existing household latrines, half of which expressed an interest in improving the quality of the latrine slab. Of equal importance, however, were improvements in latrine superstructure and/or doors and locks. Improvements in privacy, comfort, and the aesthetics of a latrine are as important – or more important – as improvements in the latrine slab for a majority of residents.
- There are a number of barriers for non-owners to improving existing latrines such as availability of land, financial resources, control of the decision and the time frame for the decision. These barriers may be even more pronounced in higher density peri-urban areas such as the CUA in Antananarivo. In such settings, land availability is likely to be worse and the landlords may be less likely to reside in the same building, making the disconnect between them even greater.
- Approximately one-third of households made improvements to their latrines over the past years; few are making plans for improvements. The timing of latrine improvement may be driven more by practical considerations of when the pit needs emptying or when existing structures require replacement, rather than invest-planning approach.
- There is a complex interaction between superstructure and slab improvements. The high cost of superstructure improvements may discourage poorer households from improving slabs or pits.
- The majority of households, especially poor households, use shared latrines. Improving these latrines require agreements about sharing cost, labor and maintenance, which may delay improvements. This barrier is likely to be greatest for poorer households who are more likely to be renters and more likely to share with a high number of other users.
- Given the challenges of improvements: land, financial resources, decision control, and time frame, other models of sanitation improvement may need to be explored. A great deal of attention has been placed on providing sanitation related services including emptying and financing of construction. In settings where renters in particular do not view sanitation as a capital good or infrastructure element that they control, it may be important to consider models that provide the use of a clean latrine as a service. This is a model being explored by in WSUP's Gatwekera project and could have relevance here as well.

Introduction

Despite significant monetary and structural investment, organizations struggle to identify the knowledge, attitudes and practices that guide hygiene and sanitation decisions in resource-poor settings. This research seeks to identify and analyze behavioral determinants of hygiene and sanitation decisions among peri-urban residents in Madagascar. Specifically, this research seeks to understand hygiene and sanitation as it relates to decisions to drink clean water, defined as water from a safe source or water which has been through secondary treatment at the household level, and decisions to use a clean and cleanable latrine, such as a latrine with a concrete slab.

This report marks the culmination of three months of formative research in Antananarivo, the capital of Madagascar. The formative research, which will be detailed below, has been conducted by Emory University's Center for Global Safe Water (CGSW) in partnership with Water and Sanitation for the Urban Poor (WSUP) and ATW Consultants, a local firm that provided support with field data collection, translation, and preliminary analysis of findings. Taken as a whole, the research process for this project has included staff training, data collection and data analysis in two peri-urban communities of Antananarivo, Ambohidrapeto and Sabotsy-Namehana, where WSUP and partners have completed implementation of pilot water, sanitation, and hygiene interventions. Working with local stakeholders, CGSW collected and analyzed qualitative and quantitative information on the water, sanitation, and hygiene (WASH) behavioral practices among mothers, the intended target of WSUP's behavior change interventions, in select fokotany, or fourth-level administrative units. The goal of this formative research is to assess implementation and inform future interventions of WSUP and its partners.

Background

In 2006, Water and Sanitation for the Urban Poor, a consortium of UK-based NGOs and private companies received funding partner with local government, municipal providers, and local stakeholders to improve urban water supply and sanitation services to over 220,000 individuals in 12 communes in Antananarivo. Pilot projects were implemented in one of the selected communes (with approximately 20,000 residents) in 2008 and will be expanded to additional communes in late 2009.

The early implementation project included the construction of stand pipes in one pilot commune, the marketing and promotion of improved sanplats for pit latrines, the construction of two community latrine banks, and limited hygiene promotion activities. Sanplats were manufactured and sold in the commune headquarter for a greatly discounted price compared with similar pre-manufactured sanplats found in local hardware stores (5,000 AR vs. 25,000 – 40,000 AR¹). However, over the first year of program activities, the project sold only 28 sanplats out of a total 300 that were manufactured. An assessment by Steven Sugden of the LSHTM in late 2008 found that community “animators” were promoting these low cost sanplats to local residents, but educational messages focused on having and using a latrine, rather than improving existing latrine conditions².

¹ 1 USD = 1,960 Ariary, two month average currency exchange rate 06/01/09 – 08/01/09. 5,000 AR = approximately \$2.50 US.

² Sugden S. _____.

Initial Monitoring and Evaluation plans for the project called for a detailed health impact assessment in the 12 intervention communes, however, WSUP, in collaboration with LSHTM and Emory University has shifted the focus of the monitoring and evaluation activities to better understanding the social and behavioral dynamics that shape water source access, sanitation access, and water quality in the intervention areas. Furthermore, the partners have identified understanding program adoption among the poorest residents of intervention communes as a key objective of the current program. The current assessment seeks to better understand the determinants and adoption of key water and sanitation with an emphasis on factors that affect the poor.

Purpose

The assessment took place in the context of early implementation multi-faceted intervention to increase access to safe water and clean latrines. Given the stage of implementation, the primary purpose of this assessment is not to evaluate the effectiveness of the intervention, but rather to assess the determinants of behavior change and uptake in two peri-urban communities in Antananarivo, Madagascar. In particular, what factors affect uptake by the poor. As a secondary purpose, the assessment was intended to determine the level of reach of the different components. The study combined qualitative and quantitative methods.

The assessment focuses on specific behavior changes that are central to the intervention in these communes: water source selection, water treatment, sanitation infrastructure improvement and sanitation maintenance. The interventions have promoted other behaviors as well, such as hand washing with soap. However the water and sanitation behaviors identified above were selected in collaboration with the project team as the focus of this assessment. These are behaviors that are likely to be central efforts to scale up water and sanitation improvements in other peri-urban areas as well (both within Madagascar and beyond).

Conceptual Framework

To guide this formative research – and to make its findings and purposes accessible to stakeholders – this project adapted the World Bank’s FOAM framework. The elements of FOAM – focus, opportunity, availability, motivation – provided the foundation from which key behavioral determinants could be identified and incorporated into the process of data collection and data analysis. An outline of the amended FOAM framework, with questions that address this particular formative research project, is included in the attached appendix.

FOCUS	OPPORTUNITY	ABILITY	MOTIVATION
Target Population Desired behaviors	Access / availability Product attributes Social norms Sanctions/ enforcement	Knowledge Skills and self-efficacy Social Support Roles and decision making Affordability	Attitudes and beliefs Values Emotional/physical/ mental drivers Competing priorities Intention Willingness-to-pay

Methods

We used a mixed methods approach in the completion of this formative research, including: open-ended interviews, semi-structured interviews, and a quantitative population-based survey.

A preliminary round of free listing and free associations was completed in early-to-mid June 2009. Following these activities, semi-structured in-depth interviews were completed in late-June and early-July to further explore specific determinants of behavior change. Finally, a quantitative survey informed by the qualitative results was conducted in the two pilot communities in order to determine the strength of the association for each of the behavioral determinants with the intended behavior change. Quantitative surveys were completed in mid- July and early August.

Qualitative methods allowed researchers to ask questions of different people in different ways, and to modify the questions and data collection methods to explore topics that were not initially deemed important. Concepts or issues discovered in the qualitative portion of this study were used to improve the validity of the quantitative survey instrument.

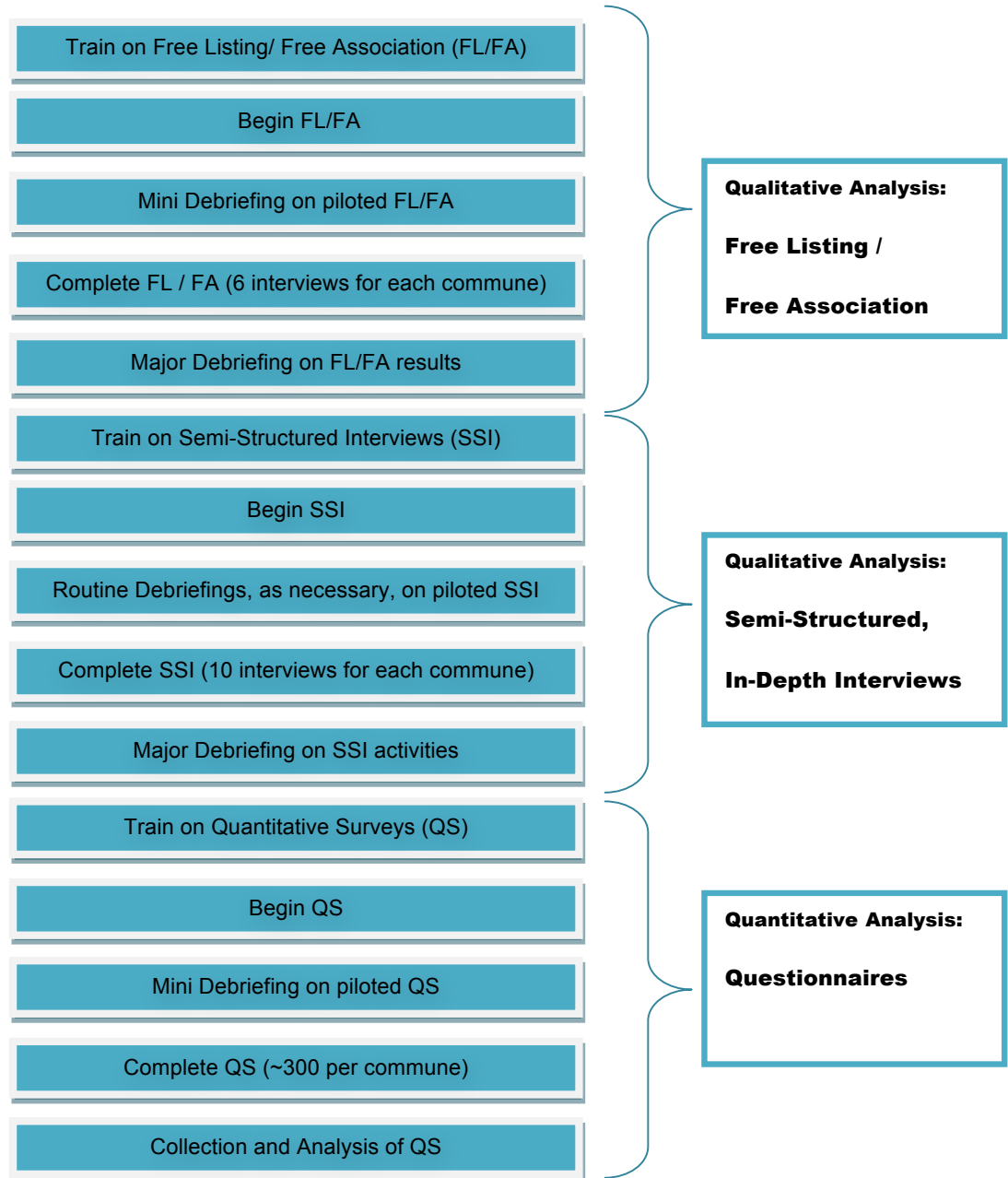
More specifically, we began with open-ended, unstructured interviews that were modified Free Listing / Free Association activities (FL/FA). This entailed an interviewer asking respondents to provide a narrative outlining a typical day as it related to the behavior or intervention of interest and relaying their thoughts on that behavior of interest. During the FL/FA, the interviewer approached the discussion with pre-determined topics – in this case, water, hygiene and sanitation – but allowed the respondent to determine the flow of the conversation. In this sense, new topics, which may not have been considered by researchers, emerged and were explored further during the interview and during later research. This phase allowed researchers to gain a local understanding of the issue of interest and to learn local terminology used in relation to the topic. These local terms were then incorporated in subsequent interview guides and questionnaires. Six interviews took place in each of the two communes in this phase. Respondents were chosen based on characteristics of the target audience of the intervention. See Appendix for the FL/FA instrument.

Next, we completed in-depth, semi-structured interviews (IDI). IDIs allowed researchers to obtain information on private issues, including current hygiene and sanitation behaviors, and on the determinants of these behaviors. IDIs employed different types of questions and different approaches for soliciting information. In this case, the interviews consisted of semi-structured questions with pre-determined themes or issues of interest. Preliminary interviews included a variety of direct questions about practices performed by respondents in the community; however, these direct questions were culturally difficult for Malagasy respondents. Subsequent interviews were modified to begin with questions about knowledge and product attributes, followed by indirect questions about practices observed in the community and, finally, followed by direct questions about one's own hygiene and sanitation practices. Ten interviews took place in each commune in this phase for a total of 20 in-depth interviews. Respondents were chosen based on characteristics of the target audience of the intervention. See Appendix for the IDI instrument.

The quantitative survey lasting approximately 30-45 minutes included questions related to WASH knowledge, attitudes and practices. Questions also sought to gather information about socio-economic status and other household characteristics. In Sabosty-Namehana every second house was selected for data collection. In Ambohidrapeto every sixth house was selected

Prior to engaging in each phase of research, Emory staff worked with local data collectors to clarify questions and pinpoint objectives of each phase. After local researchers completed pilot rounds of data collection, they convened with Emory staff to briefly discuss findings and to detail any obstacles or misunderstandings.

Flow chart of research phases:



Qualitative Results

Results of the formative research are presented according to the primary goals of the WSUP intervention – drinking “safe” water and using a clean and cleanable latrine.

A brief synopsis of findings that address the issue of consuming clean drinking water showed: a social pressure to treat water which springs from sanitation committees at the Fokotany level; an understanding that boiling is not a method for treatment but a means to make water more palatable; and a social norm in which few adults drink water and instead prefer a boiled rice drink called Ranovola while children are likely to drink cold water. Respondents also reported that: water treatment is associated with chlorination but this method is expensive and ineffective as it does not kill small insects; water cleanliness is judged by source, taste and color with red water considered dirty; water from tap stands is best and most reliable but costly, sometimes far away and with erratic hours of operation; health is a reason (usually the last) to use a tap stand; wells are considered a status symbol and source of income, and wells are treated by pouring chlorine into them once a year and/or physically scrubbing the base of the well. These findings and others – including a list of local terms or phrases – are detailed below.

A brief synopsis of findings that address the issue of purchasing and using a clean and cleanable latrine showed that: individuals feel no motivation to alter latrines until the current latrine pit is full (every 5-7 years); personal latrines are rarely considered dirty; tenants feel powerless to change latrines; landlords feel no motivation to change latrines; property inheritance disputes and the shared nature of latrines complicate latrine improvements; changes to latrines typically involve building a better structure around the slab rather than improving the slab itself; it is impossible to dig a latrine in most of the poorest areas due to a high water table; illicit latrine use is common; interest in seeing or testing a cleanable slab is high and portends behavior change but knowledge of where one can go to do this is low; in terms of a slab, it is very important that cleaning the slab requires minimal water or that water can be directed away from the hole as water speeds the filling of the pit; latrines are commonly shared by 20 people; outdoor defecation is considered less and less acceptable; health is not generally considered something that can be protected through a clean latrine; the smell from latrines is the source of illness.

Phase 1: Modified Free Listing/Free Association

In terms of constructing clean and cleanable latrines, several pertinent findings emerged in the FL/FA phase of research. There is a distinct difference in sanitation uptake based on whether an interviewee was a household owner versus a renter. Owners proved more likely to construct improved latrines, while renters feel minimal motivation to invest in property that they do not own. In either case, latrines are considered a costly investment. Another factor that emerged was the difference in behavior in more rural versus more peri-urban settings. In more rural areas, several families are likely to share a housing compound and, as such, to share one latrine. Because of the shared nature of latrines and other property in rural areas, complicated decision-making delays the purchase of products such as latrines.

Improvements to the existing latrine are not a household priority and are often considered only once an existing pit is full. Pits typically fill every 2 to 7 years. Respondents in both study sites reported that they most often use communal latrines, public latrines, open defecation or defecation in a chamber pot. The only respondent who mentioned that she would like to make her next latrine nicer than her current

latrine was a woman who had been exposed to nicer latrines at a previous residence. Various methods for cleaning a latrine were mentioned including sweeping a latrine, routinely pouring a small amount of water on the area around the pit, annually scrubbing a latrine with a scrub brush and burning anal cleansing materials in a small bucket near the latrine. In terms of infrastructure, most latrines have a dirt hole, walls of brick or mud, a corrugated tin roof, a wood floor and, oftentimes, a door.

An interesting obstacle that undermines efforts to improve one's latrine was illicit latrine use. Respondents reported that neighbors will sometimes break through a lock to use another's latrine at night, specifically to empty chamber pots.

In terms of drinking safe water, researchers learned in the FL/FA phase of research that households do not consider water collection or water cleanliness a concern, and water collection is a task reserved for women and children. Every household reported that they drink a beverage called "Ranovola," a rice drink made by boiling water with the rice that burned onto the bottom of a pot after making rice. Ranovola, which is served hot, is extremely popular in Madagascar and is drunk several times a day instead of water. Ranovola has been the drink of choice for many generations and may underlie a Malagasy penchant for heated drinks. Mothers reported that children are now beginning to drink more cold drinks, including cold water and soda, while this was rarely practiced in previous generations. Mothers associated this behavior with Western influences. Many families in both sites reported that they do not treat water- even if they boiled it. Treatment was associated with pouring bleach or Sûr'Eau in water, so the need to be specific in future interviews to ask about boiling habits emerged. In Sabotsy, generally speaking, families who treat their water boil it or use Sûr'Eau. In Ambohidrapeto, families who treat pour Sûr'Eau in wells.

Commonly cited obstacles to fetching tap-stand water included convenience/distance and price.

Respondents reported that they verify the safety of water based on color, taste and the presence of insects. Because of this, the effectiveness of Sûr'Eau was called into question as it does not kill bugs. The safest water according to respondents in both communities was tap-stand water.

This research phase also offered broad insights into the differences between the two study sites. Sabotsy-Namehana proved to be more rural with more employment in the agricultural sector and more landlords. Ambohidrapeto proved to be more urban with more employment in the retail and service sectors and more tenants. Residents of Sabotsy-Namehana use wells and there are fewer tap-stand users. In Sabotsy-Namehana it is difficult to get water as wells dry up and the distance to the tap stand is typically far. Cost is typically not a problem as most houses have personal wells and tap stand prices are low. In Ambohidrapeto, there are no seasonal problems and most houses are near a tap, but the cost of tap water is high. Residents in this site reported using tap stands frequently for cooking or drinking while they used wells for cleaning and laundry.

Several terms and local understandings also emerged during this phase and were directly incorporated in the later interview instruments. Terms or phrases and their translations include:

"I buy water" – I go to a public tap stand

"sandan-drano" – a public pump, financed privately

"tatavanina" – cloth commonly used to filter water

“rano vola” – a rice drink made by boiling water with the rice that is burned onto the bottom of a rice cooker. The drink of choice among Malagasy families, it is drunk several times a day instead of water.
“sinibe” – a household barrel that is used to store water
“jug” – a household item made of plastic which is used to get water from the sinibe
“thermos” – a household water storage item in which previously-boiled water (up to ~5 liters) is stored
“simple WC” “WC gasy” – a latrine that consists of a dirt hole in the ground
“nankany amini’ny trano fisainana” – to defecate (literally, to find a quiet place or corner to ponder/philosophize/think deep thoughts)

Phase 2: In-Depth Interviews

Researchers incorporated the above findings into the following phase of research, IDIs. Most observations made during the FL/FA phase, re-emerged in this phase. Some new general observations emerged. For example, in the setting of an in-depth interview, respondents were more willing to open up about their feelings when it came to latrines- their personal comfort, their pride and the fact that the latrine is a reflection of the household. Malagasy marketing consultants who conducted these interviews were surprised by this finding, as they thought latrines would not be considered part of the household or a reflection of the household. Another cultural norm that emerged was that Malagasies do not like to complain or talk about complaining. If a neighbor steals property, if there are problems surrounding a communal latrine, a common Malagasy reaction is verbalized by the phrase “Aleo izy ho tonga saina” (literally, “to hope the other person will find their conscience”). Malagasies, particularly those of a lower class, will not directly broach the issue with the person or complain about the person to authorities. Other observations include that rumors are widely believed, that time and distance are difficult for Malagasies to estimate and they will often respond with the first time period mentioned by an interviewer, and that families do not typically make budgets or plan out their expenses or household improvements. Fiscal planning is done day-to-day.

Going into more details, researchers used the FOAM framework to guide this phase of research. Questions asked addressed the opportunities, abilities and motivations that impact a household’s decision to construct a clean and cleanable latrine and consume safe drinking water. Categories were then broken out into the following subcategories which influence behavior: product attributes, social norms, sanctions or enforcement, knowledge, skills or self-efficacy, roles and decision making, affordability, attitudes or beliefs, values and intentions.

Latrines

In terms of latrines, IDIs revealed that latrines are commonly shared by 20 people, oftentimes more. Outdoor defecation is considered less and less acceptable. Women are tasked with cleaning latrines. Dirty latrines are not a commonly reported problem. Health is not considered something that can be protected through a clean latrine, although children are most susceptible to illness from dirtiness. Moreover, the smell from latrines is the source of illness.

Attitudes

What do you think the relationship between using a clean and cleanable latrine and your health is? Is it the same for other people in your household?

- One is truly in favor of ameliorations when they have the means.

- While most people said children are most susceptible, one woman said “the health risks are equal for children and adults.” (13)
- When you think about toilets and health, you think about the smell and the flies.
- You have to keep the latrine far from the house. (4)
- Smell tells you if it’s clean or dirty
- It’s not the dirty toilet that makes you sick. It’s the smell that comes from the toilet that makes you sick. “When it’s clean it doesn’t stink and it’s healthier” (12)

Benefits

L. What are the benefits of using an improved latrine?

- Easy to clean: It’s easy to clean and moreover the dirty matter (feces) doesn’t spread everywhere. (13)
- Dry: So you don’t get wet feet (5)
- Safe: “Wood, when it gets wet and washed can wear down and then you can fall in.” (5)

Barriers

- Cost: “You have to have a lot of money to make a septic system. Maybe 200,000 or 300,000 AR. But to do the WC Gazy, you don’t spend more than 50,000 AR.” (2)
- Structure of the ground: “The earth is very wet and you can’t dig into it; it will crumble.” (3) “My brother made a WC and it crumbled.” (3)

Decision making

- Landlords- decisions on construction/ installation
- Mothers- decisions on cleaning/ maintenance

Affordability

- Building latrines- even those that are plain pit latrines- is considered costly.
- I live today. I’m not planning for tomorrow. It depends on how much money I’ll have at the moment when I want to do buy a new latrine. We’ll think about it when it arises. (several)
- You make the new latrine when you have to and you have the money.

Values

- Most people don’t have experience with something better, so they don’t want to change.
- Motivations to change are dictated by when the latrine fills (~2 - ~7 years)
- “I don’t have yet any idea of what I will build. It depends on what one presents to me when the time arises.” (2)
- From Free Listing, we learned that two people were planning to build or had built improved latrines because they had been exposed to other latrines either at work or at another residence.

Intentions with future latrines

L. When you build your next latrine, do you intend to improve it? How? Why or why not? Will you use a concrete slab? Will you build brick walls? Will you put on a sturdy roof? Will you make it bigger? If so, why? If not, why not?

- “I would like something well made with improved/enforced walls.” (12)
- “I would like something well made with a roof and everything, something that’s like the house.” (5)
- “... what there is, in the norms. To have an on-site septic system.” (2)
- “Wall enforced with cement” (4)

- Something tiled, “So it’s easy to clean, not wet” (5)
- Cement slab.
- Anything easy to clean. “Tiles, for example” (12)
- Some kind of improved pit. “walled in brick... with special rocks that prevent the pit from filling too quickly” (3)
- A bathroom that is not communal.

Sanctions

Who are the people in your community who are concerned about the quality of your latrine and others’ latrines? What would you do if you had a complaint about your latrine? What would you do if you had a complaint about your neighbor’s latrine or latrine practices?

- One doesn’t complain (Several)
- “There are fines from the Fokotany when you have a dirty garbage site, dirty kitchen, dirty latrine.” (1) (From interviewers, I learned that there is no hesitation to show the latrine to the Fokotany: “When the Fokotany says, ‘We want to see the latrine,’ you show the latrine.”)
- “The Fokotany sends a social committee to examine the cleanliness of the WC and regulate problems.” (11)
- “(The Fokotany) needs to verify that people do what was told to them in terms of cleaning the latrines. There is a lack of follow-up.” (11)

Special latrine issues

Have you ever spoken with your tenant/landlord about installing a new latrine? About fixing an old latrine? How did the conversation go? Who started the conversation? Why did the conversation start? Do you think it is important to have a clean latrine? Are you willing to invest in getting a new latrine? Why or why not? What prevents you from improving your latrine?

- “We can’t change anything because we’re renters. We can only do things that the landlord wants to do.” (4)
- “Everything depends on the landlord (in terms of latrines).” (5)
- When the landlord lives on-site, he concerns himself with the latrine. “It’s ours so we have to be responsible for what happens with the WC here.” (11, a landlord)
- When renter and owner live together, renters often say they clean more/create a cleaning system. Owners often say that when they live with tenants, they clean more.
- (In Freelisting Association)- In Ambohidrapeto, the owner wanted to buy an improved latrine, so did renters. But renters did not have money. The owner refused to loan money or create a payment plan. They instead built a latrine of the same quality.
- A woman wanted to buy a new latrine. She went to a Fokotany-led discussion and signed up for more information about latrines. She hasn’t heard anything back yet, she couldn’t remember when she signed up. She said it doesn’t really matter what the Fokotany says; at the end of the day the landlord will be the one to make the final decision.
- In Madagascar generally, in our target population especially, there are no tenant contracts. Renters don’t feel that they can repair or change their houses- especially as they don’t own it and don’t have many rights as renters.
- Many in this group move around every few (~2) years. There seems to be an attitude of Why care about latrines? Why fix things up? You’re only helping the landlord.

Drinking Water

In terms of drinking safe water, IDis helped researchers learn that water is generally regarded as clean, specifically if it is from a tap stand, but tap stand water can be expensive. Water is considered dirty if it is discolored or tastes bad. Chlorinated water tastes bad. Tap stand water tastes good and is convenient if you are thirsty and want to drink immediately without boiling. Health is not typically mentioned as a reason to drink clean water. Sanitation committees at the Fokotany level compel individuals to clean their water.

Characteristics

What are most of the water sources in your community like? Are they safe, clean, etc?

- Water in our community is generally good and not a concern. Water is bad for you if it tastes bad, looks “mavomavo” (literally means “yellow” but does not reference the color yellow) or has bugs. Water is generally not treated. The safest water is water from a tap (due to JIRAMA technology which consists of pipes, bleach and other “medicines” put in the water). Wells are generally regarded as safe. There is a consensus that you don’t judge water safety by looking at the water, you judge it based on where it came from.

Water Treatment

- Most people who treat, treat by boiling. Even if they get water from the pump, many people boil because there is “dust that gets in the bucket on the way from the pump.”
- Sûr’Eau is used very rarely. When it is used, it is poured in wells.
 - Not a habit
 - It leads to sterility, nausea
 - Time
 - Budget

Social norms:

- Pressure from authorities: “We worry more about cleanliness than we did in the past because the sanitation committees from the Fokotany puts more pressure on us to maintain cleanliness.” (1)
- Change in habits: “In the past, people would take water with just a bucket from the pond. Now with the wells, we use a chord to get the water.” Chord here refers to using a bucket with a rope to collect water from a well. (1)
- Change in habits: Children today are beginning to drink water even when it’s not in the middle of a meal (which is the only time most adults drink water). Children also drink more cold water rather than Ranovola. This is why mothers are nowadays more in the habit of having water available during the day. (Several interviewees said this)
- Women get water: “It’s my mom who is in charge of getting water. Even when my father is angry (that we don’t have water), he won’t go get any water (because it’s the woman’s role).” (5)
- Don’t complain or point fingers: “If there is a problem with the pump, you can go to the Fokotany but you must never critique someone else in the community (even if it’s his fault and you know it is his fault).” (11)
- Pumps are only for drinking.

Knowledge

W. Is it important to drink clean drinking water?

- You drink clean water because you don't want to get sick.
- "Dirty water gives belly aches and bilharzias." (citation to come)
- "Even people who are not instructed can feel that you have to drink clean water." (2)

What do you do to make sure your water is clean? Why?

- "I boil water... From the Fokotany I learned about the free Malagasy methods to clean things like filtering water with sand." (1) But she doesn't do any of methods that the Fokotany taught. Why? It's not part of her habit. She continues to boil water. (1)
- "The Fokon'olona (the community committee) told me to empty the well and scrub it. The community committee then came and cleaned it for me." (There is a collective cleaning that is systematic and performed yearly.) (11)
- "On television I learned about clean water" (12)
- "On the radio I heard commercials about Sûr'Eau." (11)

Attitudes

W. What do you think the relationship between clean drinking water and your health is? Is it the same for other people in your household?

- "We are used to drinking cold water. We only use hot water when we're sick." (11)
- Wells are covered, protected, and people can't put their feet in them, so they're cleaner. For these reasons, many Malagasies use them instead of open water.
- "Sick people drink a lot more water than people who are not sick." (12)
- Tap water is the best because of technology.

Perceived Benefits

W. What are the benefits to using an improved water source?

- JIRAMA supplies water steadily. It never gets cut.
- Tap water is the best because of technology
- It's easier to get the water from the tap stand compared to wells where you have to have a chord and pull the water up.
- JIRAMA water is clean all day.
- Health is a reason (usually the last) to use a tap stand.

Perceived Barriers

W. What are the perceived barriers to using a tap stand?

- Distance
- Restrictive hours
- Not dependable tap stand employees
- Cuts in the water supply (when JIRAMA pipes break)
- Roles and decision making

W. Who in your household makes the decisions about drinking water?

- Mothers* make all decisions. (*Not mothers in law)

Affordability

W. Is it expensive to drink clean drinking water? Why or why not?

- At first, people say cost is not a problem (1,2,11). Later, interviewers observed that price is a problem.
- One doesn't use pump water for everything because it costs a lot.
- "The price is affordable. The proof is that many people go (to the tap stand) to get water." (11)
- "Water shouldn't cost anything. But, fine, the price is acceptable." (2)
- "It's expensive, but I have to buy it anyway." (5) The ideal price for her is 15 AR (less than \$0.01 USD).

Values

W. Do you see any value in using water from the JIRAMA pipes / tap stands? Why or why not? Do you see any value in doing something at home to make your water safe for drinking?

- NO:
 - I know about XXX treatment, but I'm not used to using it so I don't. (Several)
 - There is a general conviction that the habit currently practiced (whether that involves treating or not treating) is the best practice.
 - As long as this method works, we're not going to change our habits. Until we see that someone has definitely gotten sick because of water, nothing will change. (Several)
- YES:
 - Cleaning water guarantees safety for children. (Several)
 - "To drink water without having to heat it, like when you get home from work (reason cited for drinking JIRAMA)." (12)
 - My mother has always done it this way (boiling water), so I do it this way.
 - One woman (12) drinks an ORS sachet every day because her mother did this (her mother had heard about ORS in a commercial). "This allows me to drink water without heating it." (12)

Sanctions/Enforcement

W. Who are the people in your community who are concerned about the quality of the water that you (as in the respondent) drink? What would you do if you had a complaint about the quality of your drinking water? Why?

- With tap stands, you either speak with the Fokotany or the pump employee.
- "One could speak with someone at Jirama if there was a problem. I don't know of any problems that have happened with the pump yet." (12)

Researchers used these qualitative findings to inform development of the quantitative survey. In this case, qualitative research helped in the revision of scales and led to modified wording that could improve comprehension among informants. The final survey also incorporated information that was culturally sensitive and age appropriate. Cultural sensitivity proved especially important in this context due to the sensitive nature of the interviews.

Quantitative Assessment

A quantitative assessment was conducted as a follow up to the qualitative assessment. The main purpose was to quantify the behavioral drivers of key behaviors and to understand the social and economic determinants of these behaviors. The analysis focuses on three key behaviors promoted through the WSUP partner interventions: selection of an improved water source, water treatment, and latrine quality improvements. In addition the analysis addresses the extent of exposure to the different elements of the intervention.

Methods

A household survey was conducted to quantitatively address these questions regarding drivers of household decision-making and social and economic determinants of uptake. The survey was carried out in the same two peri-urban areas as the qualitative assessment: Sabotsy-Namehana and Ambohidrapeto. Systematic random sampling of all households in the catchment area was completed by trained enumerators. In Sabotsy-Namehana every second house was selected for data collection. In Ambohidrapeto every sixth house was selected.

Enumerators collected information on current water, sanitation, and hygiene practices within each household. In addition, a variety of questions were included on the determinants of specific water, sanitation, and hygiene behaviors.

Data were entered in SPSS and analyzed using SAS 9.2. Principle Components Analysis was used to combine a number of indicators of household goods into a single index and this index used as a proxy measure for household wealth. The index was divided into quintiles of equal size, ranging from the Wealthiest 20% of the population to the poorest 20% of the population. All analyses were weighted to account for the differing probability of selection in each of the two communes. All regression modeling (linear and logistic) were further adjusted for clustering of data in the two communes. Details on the analysis for each of the indicators of interest are provided with the results.

Safe Drinking Water

One objective of the WSUP program is to improve access to safe drinking water among the target population. There are two important aspects that each influence individual access to clean drinking water – the water source itself and household storage and treatment behaviors. For the purposes of this analysis we have analyzed the water source information and water treatment behaviors separately.

Water Sources

Water sources available to respondents included private household taps, municipal taps, public wells, private wells, and surface water sources. For the purposes of this analysis, use of JIWARMA water – either from a public or private tap – was the main outcome of interest.

Water Source Selection

Little variation was found in access to a municipal water source during the rainy season (54.8%), the dry season (55.4%), and the last water source used before data collection (54.5%). However, differences in access to a municipal water source were noted between SES quintiles. Weighted percentages of

respondents that access the municipal water supply for drinking water are presented in Table 1. The poorest SES quintile, the group with the least education, and renters were used as the reference groups for the calculation of all odds ratios. Odds ratios calculated for this portion of analysis refer to the odds of using a piped water source among the group of interest when compared to the odds of using a piped water source among the reference group. In addition to the odds ratios, 95% confidence intervals for each odds ratio were calculated. Confidence intervals of odds ratios that are statistically significant will not overlap with 1.00. Respondents from wealthier socio-economic quintiles, primarily those respondents from the three least poor quintiles, consistently demonstrated higher odds of using a municipal water source compared to the odds of using a municipal water source among respondents from the two poorest wealth quintiles. For example, respondents from the wealthiest quintile had higher odds of using a piped water source when compared to respondents from the poorest wealth quintile during the rainy season (OR 1.38, 95% CI: 1.33 – 1.43), during the dry season (OR: 1.29, 95% CI: 1.18 – 1.39), and as the last water source used prior to data collection (OR: 1.41, 95% CI: 1.27 – 1.57). Property owners had lower odds of using a piped water source when compared to renters (rainy season OR: 0.77, dry season OR: 0.76, current water source OR: 0.78). All of these ORs related to land tenure were statistically significant. There was no clear relationship between level of education and use of a piped water source, and difference were not statistically significant.

	Rainy Season			Dry Season			Current Water Source		
	%	OR	95% CI	%	OR	95% CI	%	OR	95% CI
Total	54.8			55.4			54.5		
<i>Wealth</i>									
Poorest	51.9	Ref		53.7	Ref		51.2	Ref	
Poorer	50.6	0.95	0.64 – 1.40	50.0	0.86	0.58 – 1.98	49.4	0.93	0.49 – 1.76
Middle	58.2	1.29	1.19 – 1.40	60.1	1.30	1.24 – 1.36	57.6	1.29	1.17 – 1.43
Wealthier	53.7	1.08	0.91 – 1.27	53.7	1.00	0.81 – 1.24	54.9	1.16	1.08 – 1.24
Wealthiest	59.7	1.38	1.33 – 1.43	59.7	1.29	1.18 – 1.39	59.7	1.41	1.27 – 1.57
<i>Land Tenure</i>									
Renter	59.0	Ref		59.7	Ref		58.3	Ref	
Owner	52.2	0.77	0.62 – 0.93	52.8	0.76	0.70 – 0.82	52.2	0.78	0.76 – 0.80
<i>Level of education</i>									
Primary or less	53.0	Ref		53.8	Ref		53.0	Ref	
Some secondary	47.0	0.79	0.55 – 1.12	48.1	0.80	0.54 – 1.17	48.1	0.82	0.59 – 1.13
Finished secondary	63.1	1.52	0.80 – 2.96	63.1	1.47	0.81 – 2.67	61.4	1.41	0.81 – 2.48

Determinants of Water Source Selection

Respondents were asked a series of questions on the determinants of water source selection. These included questions on social norms regarding source selection, taste, ease of use, and which source authorities promoted. Results of these determinants by current water source are outlined in Table 2. Odds ratios were calculated based on the odds that a current tap or piped water user would identify the closest tap/pipe to their home as meeting one of the potential behavioral determinants (i.e.: this source is closer, taste better, etc.) compared to the odds that a well users would select the piped water source. Respondents were also asked to rank the importance of each question on a scale of 1 to 4 – with a score of 1 corresponding to very important and a score of 4 corresponding to very unimportant. Respondent rankings of the individual determinants by current water source are also presented in Table 2 (“Mean

import.”). One-way ANOVA³ was used to assess statistical significance in differences of mean ranking by current water source users.

Of the behavioral determinants of interest, issues related to source access and source availability were found to be significant different between well users and piped water source users. Current tap or piped water users were more likely to nominate the tap or pipe closest to their dwelling as closer, more reliable, and more often available than the nearest well. Tap users were less likely to identify a tap as taking more time to collect drinking water and busier during the day, but these differences were not significant once adjusted for all other behavioral determinants.

In general, determinants that had the least association with current water source selection were those related to social norms regarding water source selection and use. Specifically, explicit encouragement to use a specific source by authorities or friends and neighbors was not found to be associated with current water source selection. While these explicit norms were not found to be statistically significant, the descriptive norms - the social norm based on the perceived behaviors of other – were significantly associated with use of a tap stand. Current tap users had 81% higher odds of identifying the tap stand as the water source used by friends when compared to current well users (Adjusted OR: 1.81, 95% CI: 1.48 – 2.24)

Source attributes, such as the amount of water available and ease of hauling collected drinking water also differed between well and tap users. Specific attributes of the provided water itself were also markedly different between well and tap users. Tap users were more likely to identify tap water as tasting better than wells and safer than well water, although the difference in perceived safety was not significant upon final adjustment. Larger differences were identified in the proportion of respondents who identified tap water as safer than well water. The odds of a tap user identifying the tap water source as safer were almost 6 times the odds of a well user.

Perceived affordability was significant associated with source selection when respondent were directly asked about the affordability of the sources. However, when specific costs of collecting water from the water source, the differences between the two groups was not significant – although over 90% of both well and tap users identified the tap water source as more expensive than the nearest well. Control and ownership of the water source was found to differ significantly between the two groups. The odds of a tap user identifying the tap as a source they controlled or own was over 12 times that of a well user (Adjusted OR: 12.2, 95% CI: 2.98 – 49.94).

³ ANOVA (Analysis of Variance) is a statistical test for measuring the difference in mean values between multiple groups of respondents. ANOVA compares the mean value and the distribution of values within each group the difference in mean values between groups in order to determine if group-specific means represent a true difference in mean values.

Table 2: Determinants of Water Source Selection

<i>Domain</i>	Current source	% choosing tap	Unadjusted OR	Adjusted OR	Mean Import.	P-Value
<i>Access</i>						
Which source is closer	Well	6.3	29.14	4.12	3.74	0.3115
	Tap	66.3	(18.22 – 46.60)	(3.38 - 5.03)	3.65	
Which source is more reliable?	Well	20.3	9.97	1.47	3.62	0.0935
	Tap	71.8	(4.12 – 24.12)	(1.28 - 1.71)	3.64	
Which source is often available when you need it.	Well	8.5	20.07	1.51	3.78	0.1454
	Tap	65.1	(8.85 – 45.50)	(1.27 - 1.79)	3.67	
Which source takes more time to collect drinking water from?	Well	76.9	0.31	0.97	3.04	0.48
	Tap	50.4	(0.20 – 0.46)	(0.17 - 5.50)	2.91	
Which source is busier during the day?	Well	89.6	0.39	0.74	2.77	0.9978
	Tap	70.1	(0.20 – 0.73)	(0.53 - 1.02)	2.78	
<i>Norms</i>						
Which source do most of your friends use	Well	28	7.25	1.81	3.52	0.7621
	Tap	74	(4.09 – 12.87)	(1.48 - 2.24)	3.58	
Which source do friends tell you to use?	Well	22.3	1.06	1.33	2.27	0.6121
	Tap	22.4	(0.52 – 2.17)	(0.54 - 3.30)	2.14	
Which source has promoters or authorities told you to use?	Well	18.4	0.87	1.17	2.01	0.8205
	Tap	16.5	(0.37 – 2.03)	(0.58 - 2.38)	1.97	
<i>Source Attributes</i>						
Which source has more water available?	Well	20.6	11.85	1.49	3.51	0.2733
	Tap	75.5	(6.86 – 20.47)	(1.26 - 1.69)		
Which source is easier to haul?	Well	30	12.03	1.98	3.6	0.1377
	Tap	80.7	(10.46 – 13.91)	(1.48 - 2.66)	3.69	
Which source taste better?	Well	46.2	11.87	2.96	3.72	0.1144
	Tap	91.1	(9.19 – 15.83)	(1.67 - 5.22)	3.88	
Which source is safer?	Well	72.3	16.34	1.04	3.59	0.2539
	Tap	92.7	(14.7 – 18.19)	(0.49 - 2.12)	3.58	
Which source is cleaner?	Well	65.8	44.52	5.46	3.68	0.2584
	Tap	98.8	(14.35 – 138.01)	(1.17 - 25.41)	3.96	
<i>Affordability</i>						
Which source is more affordable	Well	1.9	16.83	1.52	3.75	0.822
	Tap	24.3	(8.44 – 31.78)	(1.39 - 1.67)	3.35	
Which source costs more money?	Well	93.7	3.61	6.4	3.04	0.0548
	Tap	98.2	(2.99 – 4.36)	(0.82 - 49.91)	3.2	
<i>Control / Ownership</i>						
Which source is your or one that you can control?	Well	0.6	65.61	12.2	3.21	0.0474
	Tap	26.6	(27.65 – 155.68)	(2.98 - 49.94)	2.64	

Disparities and Determinants of Source Selection

In order to measure the extent to which both the behavioral determinants and the distribution of water sources access within the population influence final source selection, a final logistic regression model was developed that included both the individual behavioral determinants, wealth quintile, level of education, and land tenure (Results not shown). Once adjusted for the behavioral determinants, no significant differences in source access were identified according to wealth quintile, owners vs. renters, or education groups. Further analysis is needed to assess potential interaction between behavioral determinants and respondents characteristics.

Alternative Source Selection

Only 5.3% respondents reported a desire to use a different water source than the one they are currently using, 59% of which were non-tap water users. Among these individuals, 82.4% cited the alternative source as safer than their current water source while 17.6% reported that the desired source taste better than their current water source. Reasons for not using the desired source included distance (70.6%) and sufficient satisfaction with the current water source (23.5%). Desire to use a different source was significantly associated with property ownership (OR owners vs. renters: 0.85, 95% CI: 0.76 – 0.92) while significant associations were not identified with SES, current water source, or level of education.

Key Finding on Water Source Selection

- Most households have access to a piped water source, with poorer households being somewhat less likely to have it and home renters were somewhat less likely. These differences within the population were not found to be significant once responses were adjusted for the specific behavioral determinants associated with water source selection.
- Tap users were more likely to find tap water sources more accessible than well users, report that their neighbors also used tap water for drinking and more likely to associate tap water and tap water stands with positive attributes, such as improved taste and smell. Importantly, tap water users were significantly more likely to have direct control over their tap water resources.
- There is relatively little interest in changing water sources (5.3% of users), with the main desire coming from well users wanting to use safer tap water.

Water Storage and Water Treatment

Water storage and water treatment practices are the second component of drinking clean drinking water. Respondents provided information on both water handling and storage practices and water treatment methods commonly used and used the day before data collection.

Water Storage Practices

Over 90% of respondents reported storing drinking water in the home (90.75%). A significant variety of storage containers were identified in the community. Water storage containers are outlined in Table 3.

Container	%
Barrel / drum	41.9%
Can	10.1%
Thermos	4.4%
Bucket (w/ lid)	23.3%

Over 75% of respondents reported treating water stored at home in order to make it safe for drinking. Approximately 66.8% of respondents reported boiling drinking water and 19.5% reported using Sûr'Eau (home-based sodium hypochlorite solution)⁴. The day before data collection, 66.4% of respondents reported treating household stored drinking water with 62.3% of respondents reporting boiling and 12.9% of respondents reporting using Sûr'Eau.

Disparities in Water Treatment Practices

Current reported water treatment practices (respondent reported using Sûr'Eau the day before data collection) by household wealth, land tenure, and level of education are presented in Table 4.

	Percent treating with Sûr'Eau	OR	95% CI
<i>Wealth</i>			
Poorest	9.9	Ref	
Poorer	13.6	1.43	0.86 – 2.39
Middle	16.5	1.80	1.77 – 1.83
Wealthier	11.6	1.20	0.72 – 2.80
Wealthiest	13.0	1.36	1.06 – 1.75
<i>Land Tenure</i>			
Renter	8.3	Ref	
Owner	15.6	2.03	1.23 – 3.36
<i>Level of education</i>			
Primary or less	12.3	Ref	
Some secondary	15.8	1.34	1.07 – 1.68
Finished secondary	10.7	0.86	0.83 – 0.89

Determinants of Water Treatment Practices

Respondents were asked a series of questions regarding individual motivation for treating drinking water with a water treatment product. For ease of interpretation, these have been divided into four separate scales – knowledge of water treatment practices, availability of water treatment products, affordability of water treatment products, and motivation for treating drinking water. Each of the scales corresponds to between two and four leichert scale questions ranging from 1 to 4 related to the primary domain of interest. During analysis, scales were coded so that higher values were associated with the estimated higher likelihood of using water treatment products, i.e.: all knowledge questions were coded such that “4” was associated with more knowledge of water treatment while 1 with less knowledge of water treatment practices. To allow for comparable measures across all domains, scores were summed for questions in each of the four categories and averaged. This resulted in four scales, ranging from 1 – 4 for each of the domains outlined above. These behavioral determinants were then assessed against the reported recent water treatment with a chlorine based product. Logistic regression models were used to determine the extent to which differences in scale score was associated with recent treatment.

⁴ Respondents asked to list all methods of treating drinking water, and sums will exceed 100% due to respondents that employ multiple water treatment methods.

Odds ratios represent the increase in the odds of treating drinking water for every one unit increase in the respective 4 point scale. Results are presented in Table 5. After adjustment for other behavioral determinants, only an increase in perceived availability was associated with increased odds of treating water. For every one-unit increase in the 4-point affordability scale, the odds of reporting treating drinking water more than doubled. There is some evidence that an increase in reported motivation is associated with increased odds of treating drinking water, but this association was not statistically significant at the 0.05-level.

	Mean Scale Score				Adjusted	
	Did not treat	Treated	OR	95% CI	OR	95% CI
Knowledge	1.33	1.29	0.68	0.41 – 1.52	0.84	0.55 – 1.30
Availability	1.09	0.98	0.78	0.51 – 1.19	0.86	0.66 – 1.33
Affordability	1.41	1.69	2.39	1.86 – 3.08	2.31	1.79 – 2.97
Motivation	1.37	1.56	1.36	1.00 – 1.85	1.30	0.94 – 1.81

Note: Mean scores for each behavioral determinant are for a multi-item scale. Higher numbers reflect stronger characteristics.

In addition to the behavioral determinants, the act of treating drinking water is influenced by other water-related behaviors, such as reliance on boiling or use of what is assumed to be a safer drinking water source. Table 6 presents water treatment behaviors and their association with other water source selection, water handling, and water treatment behaviors of interest. The odds of an individual using a municipal tap for current household drinking water reporting treating water with Sûr'Eau is only half of the odds of an individual that does not use the municipal tap. Similar patterns were identified for boiling.

	Percent	OR	95% CI
Current Water Source			
Well or non-improved	17.0		
Municipal tap	9.4	0.51	0.34 - 0.76
Water Treatment in the Home			
No boiling	18.5		
Boiling	9.4	0.46	0.32 – 0.66

Disparities in Determinants of Water Treatment Practices

In order to assess the ways in which the determinants of water treatment practices differ within the target population, mean values for the four behavioral scales were compared for each of the three primary respondent characteristics of interest. One-way ANOVA (see Footnote 2) was used to determine if at least one of the individual group means was statistically different from other group means. Results of the analysis are presented in Table 7. For household wealth, statistically significant differences in mean motivation value (p-value < 0.05) were found for motivation and the two least poor

quintiles have lower mean motivation scores than other wealth groups. Property owners, however, had a higher mean motivation score than renters. This difference was found to be statistically significant. Level of education was found to have a significant association with all of the scales with the exception of motivation.

	Knowledge		Availability		Affordability		Motivation	
	Mean	Anova	Mean	Anova	Mean	Anova	Mean	Anova
<i>Wealth</i>								
Poorest	1.32	F = 1.45	1.18	F = 0.79	1.32	F = 1.77	1.41	F = 2.53
Poorer	1.35	p = 0.2164	1.08	p = 0.5332	1.48	p = 0.1324	1.45	p = 0.0396
Middle	1.35		1.11		1.46		1.53	
Wealthier	1.33		1.08		1.49		1.35	
Wealthiest	1.26		0.98		1.51		1.25	
<i>Land Tenure</i>								
Renter	1.34	F = 3.39	1.08	F = 0.00	1.45	F = 0.02	1.31	F = 4.37
Owner	1.34	p = 0.0610	1.09	p = 0.9814	1.45	p = 0.8850	1.45	p = 0.0369
<i>Level of education</i>								
Primary or less	1.38	F = 4.50	1.32	F = 10.43	1.30	F = 12.20	1.39	F = 0.12
Some secondary	1.28	p = 0.0115	1.00	p < 0.0001	1.51	p < 0.0001	1.43	p = 0.8895
Finished secondary	1.31		0.99		1.51		1.38	
Note: Mean scores for each behavioral determinant are for a multi-item scale. Higher numbers reflect stronger characteristics.								

A final regression model of water treatment practices was constructed that included both the behavioral determinants of interest and the distribution of water treatment practices among respondents. Results from this final model are presented in Table 8. Wealth remained significantly associated with water treatment practices, with all wealth quintiles having higher odds of reporting household water treatment when compared with the poorest wealth quintile. The relationship between level of education and water treatment was less straightforward – the odds ratio for water treatment comparing respondents with secondary education to those with primary education or less was not statistically significant, while there was a marked reduction in the odds of water treatment among those respondents that had completed secondary. Owners were over two times as likely to report recent water treatment as renters. Boiling or using a tap significantly reduced the odds of water treatment. Higher motivation and increase in perceived affordability of water treatment practices were significantly associated with treatment practices while availability and knowledge did not have a statistically significant relationship.

Table 8: Adjusted Odds Ratios for current water treatment practices by socio-economic and other factors		
	Odds Ratio	95% CI
<i>Wealth</i>		
Poorest (reference)	Ref	
Poorer	1.38	1.18 - 1.61
Middle	2.01	1.93 - 2.08
Wealthier	1.41	1.00 - 1.95
Wealthiest	1.41	1.07 - 1.85
<i>Education</i>		
Primary or less (ref)	Ref	
Some secondary	0.98	0.76 - 1.26
Completed secondary	0.71	0.50 - 0.99
<i>Land tenure</i>		
Owner vs. renter	2.11	1.28 - 3.47
<i>Water-related behaviors</i>		
Tap water source (compared to other source)	0.42	0.40 - 0.42
Boiling water (compared to non-boilers)	0.38	0.24 - 0.61
<i>Behavioral drivers (high compared to low)</i>		
Motivation	1.36	1.01 - 1.84
Affordability	2.26	1.85 - 2.75
Availability	0.83	0.67 - 1.04
Knowledge	1.10	0.98 - 1.23
Note: The table shows the odds-ratio for water treatment for each household characteristic, compared to a reference.		

Key Findings on water treatment and storage

- Water treatment is a common practice, with boiling being the most frequently used
- Only 12.9% of users reported using Sûr'Eau for treating that day's water, with better off households and land owners being significantly more likely to do so.
- Knowledge and availability of Sûr'Eau were not significant determinants of use.
- Affordability and motivation were significantly higher among users.
- Tap users and boilers are approximately half as likely to treat with Sûr'Eau

Sanitation

Exactly 99% of all respondents have access to a latrine at their current residence. For the purposes of this report, all future references to sanitation will be limited to these 99% of respondents unless otherwise noted. Shared sanitation was very common among respondents. Respondents shared

facilities with an average of 3.6 families (SD: 4.8) and 13.8 individual (SD: 17.8). Private and sanitation access are presented in Table 9.

	Private Sanitation			Families shared		Persons shared	
	% w/ Private latrine	OR	95% CI	Mean	Parameter estimate	Mean	Parameter estimate
Total				3.6 (4.8)			
<i>Wealth</i>							
Poorest	8.9			4.5 (5.2)	-0.440	16.6 (19.3)	-1.412
Poorer	20.0	2.57	1.73 – 3.38	3.6 (4.7)	(0.0872)	14.1 (18.0)	(0.1624)
Middle	7.7	0.86	0.77 – 0.95	4.1 (4.6)		15.2 (17.4)	
Wealthier	27.4	3.89	2.22 – 6.80	3.2 (4.7)		12.7 (16.6)	
Wealthiest	48.7	9.77	7.82 – 12.19	2.5 (3.8)		10.2 (14.7)	
<i>Land Tenure</i>					-0.763		-2.772
Renter	14.7			4.1 (5.3)	(0.1757)	15.5 (19.2)	(0.1232)
Owner	27.0	2.14	1.66 – 2.76	3.3 (4.4)		12.7(16.5)	
<i>Level of education</i>					-0.5662		-2.291
Primary or less	15.7			4.1 (4.9)	(0.0738)	16.0 (18.8)	(0.1431)
Some secondary	20.8	1.41	0.88 – 2.28	3.7 (5.0)		14.4 (18.4)	
Finished secondary	29.2	2.22	1.22 – 4.05	3.0 (4.3)		11.6 (15.1)	

Latrine Improvements: Past and Future

Respondents provided information on sanitation improvements in the previous year. Approximately one-third of respondents (33.5%) reported latrine improvements in the previous year. Among this 33.5%, approximately 4.9% reported adding an additional latrine; 47.9% reported building a new latrine in replacement of an older latrine; 26.0% improved the latrine slab; 26.8% improved the latrine superstructure (specifically walls or roof); 14.0% improved the latrine door; and 3.4% emptied the latrine pit. Household wealth and level of education were not associated with the odds of having improved a household latrine within the last year; however, land tenure was statistically significant. The odds of an owner reporting latrine improvements in the past year were 1.41 times the odds of a renter (95% CI: 1.27 – 1.55). No difference in recent improvements was identified for individuals with and without a private latrine.

Responsibility for the specific improvements was distributed among both owners, renters, and other families that share the properties. Details are provided in Table 10.

Who was primarily responsible for...	Paying for improvements	Providing labor for improvements	The decision to make the improvements
Self / own family	52.5	52.5	52.5
Together with other families (on same property)	24.5	25.6	24.5
Together with other families from multiple properties)	0.4	0.4	0.4
Landowner / Landlord	21.5	21.5	22.6

Almost half of respondents had considered making improvements to their household latrines (44.9%). Among this 44.9%, improving the slab was the most commonly considered improvement. The specific improvements considered by respondents are outlined in Table 11:

Latrine Feature	%
Superstructure	48.8
Slab	54.0
Door / Lock	32.7
Cleanliness / Maintenance	19.8
Emptying the pit	6.3
Building a private latrine	23.3

In addition to contemplated/considered improvements, respondents provided information related to the intention and personal commitment to making these improvements. Among the 44.9% of respondents that had considered improving their household sanitation, only 44.1% - or less than half of those considering improvements – had actually discussed these improvements with another individual, household, or the landowner. Only 16.2% of those considering improvements had saved money or otherwise started financially preparing to make these improvements.

Barriers to considered improvements include sufficient space for new/improved latrine structures, permission from landlords/landowners, access to the necessary materials, and sufficient resources to purchase material and/or labor. Among the respondents that had considered improving their latrine, 84.8% had sufficient space for improvements and 90.1% knew where to purchase necessary materials. Only 65.8% said they could afford to purchase these materials. Approximately one-quarter (22.2%) of those considering improving their household's sanitation would require permission from the landlord or landowner. However, this figure includes individuals for whom issues of land tenure do not apply – mostly due to the fact that these individuals own the property on which they live. If these individuals are excluded, then 83.5% of respondents would require permission from the landlord/landowner before making any improvements to household sanitation.

Latrine Quality

Latrine quality was assessed through the use of Principle Components Analysis (PCA) of multiple indicators of latrine quality, include: quality of the slab, presence of visible feces, structural integrity of the walls and roofs, latrine smells, and presence and quality of the latrine door. Despite the fact that these individual variables reflect both structural quality and maintenance quality, all of the individual variables had high loading value on the first factor (Eigenvalue of first factor: 3.36)⁵. This component was extracted as an overall representation of household latrine quality and dichotomized into high and low latrine quality. The distribution of this measure of latrine quality among respondents and measured against specific population characteristics of interest is presented in Table 12. Access to a higher quality latrine was associated with increases in wealth and education. There was a measured improvement in latrine quality among land owners when compared to renters, but this improvement was not statistically significant.

Table 12: Presence of higher quality latrines by population characteristics			
	%	OR	95% CI
Total	48.4		
<i>Wealth</i>			
Poorest	24.4	Ref	
Poorer	33.1	1.54	0.50 – 4.76
Middle	49.6	3.06	1.96 – 4.78
Wealthier	60.9	4.84	4.23 – 5.54
Wealthiest	76.2	9.94	1.76 – 56.09
<i>Land tenure</i>			
Renter	45.7	Ref	
Owner	54.3	1.19	0.74 – 1.90
<i>Level of Education</i>			
Primary or less	31.0	Ref	
Some secondary	44.8	1.80	1.50 – 2.15
Finished secondary	64.9	4.11	3.37 – 5.03
Note: Latrine quality is based on a score that combines slab quality, wall quality, doors, smell, and presence of feces. The combined score is used to categorize latrines into higher and lower quality, based on the median value. The table describes the likelihood of having a higher quality latrine.			

⁵ Principle Components Analysis is a data reduction technique used to combine multiple indicators into a multiple linear scales or indices, referred to as the principle components. Each component is assigned an *Eigenvalue*, a measure of the degree of variability in the indicator variables explained by that component. An *Eigenvalue* of 3.36 would indicate that of the seven variables used to measure latrine quality, the first factor accounted for the variability in 3.36 of the variables (approximately 48% of the total variation in latrine quality measures). *Eigenvalues* > 1.0 are considered significant.

Predictors of Latrine Quality

Multiple logistic regression modeling was used to develop a model for latrine quality among respondents. Terms included in the model were: household wealth, land tenure, level of education, improvements to household latrines with the past year, and the number of individuals that share the latrine. Final results of the model are presented below in Table 13. Wealth remained significantly associated with access to an improved latrine as did improvements in level of education. Recent improvements were not associated with improved latrine quality. However, the number of individuals sharing a latrine was significantly associated with decreased odds of having access to a high quality latrine. For every additional individual sharing a latrine, the odds of having access to a high quality latrine decreased by 4%.

Table 13: Predictors of having a higher quality latrine		
	OR	95% CI
<i>Wealth</i>		
Poorest	Ref.	
Poorer	1.13	0.56 – 2.27
Middle	2.59	1.30 – 5.14
Wealthier	3.44	3.06 – 3.85
Wealthiest	5.77	1.17 – 28.49
<i>Land tenure</i>		
Renter	Ref.	
Owner	1.03	0.56
<i>Level of Education</i>		
Primary or less	Ref.	
Some secondary	1.51	1.37 – 1.67
Finished secondary	2.47	1.72 – 3.54
<i>Current Latrine Status</i>		
Recent improvements	0.82	0.38 – 1.77
Number of individuals sharing the latrine	0.96	0.95 – 0.99
Note: Latrine quality is based on a score that combines slab quality, wall quality, doors, smell, and presence of feces. The combined score is used to categorize latrines into higher and lower quality, based on the median value. The table describes the likelihood of having a higher quality latrine.		

Behavioral Determinants of Sanitation

A series of questions were included on the potential behavioral determinants of sanitation quality among respondents. These included questions on pressure from others in the community, safety of children, concerns about privacy, health, and personal pride. Respondents were asked to rate each of these potential determinants on a scale of very unimportant to very important in influencing their sanitation practices and improvements. There was insufficient variability in responses to allow for further analysis. However, it should be noted that the majority of respondents ranked the majority of these determinants as “important” or “very important”.

Key Findings on Sanitation

- Almost all household have access to a latrine (99%), primarily shared with others
- Better off households are more likely to have private latrines and likely to share with fewer households if they do share.
- Homeowners and better-educated respondents are also more likely to have private latrines.
- Approximately one third of all respondents reported improving their latrine in the past year. While wealth was not a predictor of latrine improvement, homeowners were significantly more likely to have made improvements.
- Almost half of respondents reported plans to make latrine improvements, however most had not begun saving, nor did they have the required permission from landlords.
- Poor households were much more likely to have latrines in poor condition. Better-educated households were significantly less likely to have a latrine in poor condition.
- Despite differences in access to resources and land ownership, motivating factors for improved sanitation practices were very high among respondents.

Overall Findings and Implications

Water source

- There is a clear awareness about the importance of drinking from a clean source. However distance to taps creates a clear barrier for many households. Only a small fraction of households choose a more distant well over a closer, cleaner tap stand.
- Both wells and taps are generally considered to be safe. However the quantitative assessment suggests that taps are considered safer

Water treatment

- There is a lack of knowledge about appropriate treatment of including. This results in inappropriate behaviors like treating wells with Sûr'Eau.
- It is a common practice among respondents to drink *ranovola* – boiled rice water which includes boiling and reheating of water. It is unknown to what extent households are subsequently encouraged to treat this water or the extent to which additional chlorine treatment is needed..
- As children begin to consume more cold water during the day (as reported in the qualitative) it may be important to emphasize the need to treat this water.

Sanitation improvement

- There is a high demand for clean and cleanable latrines. Approximately half of all respondents considered making improvements to existing household latrines, half of which expressed an interest in improving the quality of the latrine slab. Of equal importance, however, were improvements in latrine superstructure and/or doors and locks.
- There are a number of barriers for non-owners to improving existing latrines such as availability of land, financial resources, control of the decision and the time frame for the decision. These barriers may be even more pronounced in higher density peri-urban areas such as the CUA in Antananarivo. In such settings, land availability is likely to be worse and the landlords may be less likely to reside in the same building, making the disconnect between them even greater.

- Approximately one-third of households made improvements to their latrines over the past years; few are making plans for improvements. The timing of latrine improvement may be driven more by practical considerations of when the pit needs emptying or when existing structures require replacement, rather than invest-planning approach.
- There is a complex interaction between superstructure and slab improvements. The high cost of superstructure improvements may discourage poorer households from improving slabs or pits.
- The majority of households, especially poor households, use shared latrines. Improving these latrines require agreements about sharing cost, labor and maintenance, which may delay improvements. This barrier is likely to be greatest for poorer households who are more likely to be renters and more likely to share with a high number of other users.
- Given the challenges of improvements: land, financial resources, decision control, and time frame, other models of sanitation improvement may need to be explored. A great deal of attention has been placed on providing sanitation related services including emptying and financing of construction. In settings where renters in particular do not view sanitation as a capital good or infrastructure element that they control, it may be important to consider models that provide the use of a clean latrine as a service. This is a model being explored by in WSUP's Gatwekera project and could have relevance here as well.

Appendix

Interview guide, Free Listing/ Free Association Activities

Debriefing following FL/FA activities

Interview guide, Semi-Structured Interview

Debriefing following SSI, English

Quantitative Survey

APPENDIX. I

Free Listing/Free Association Instrument

The following are examples of the free listing and free associations. For each of the communities, we will need to decide which questions make the most sense to ask given the status of program implementations and what has actually changed in the community. In general, there will be one or two free lists and one or two free associations.

Free Listing:

Please name all of the water sources people use in your community.

Please name all of the places where people in this community go to (insert phrase for defecation here – ie: In Kenya, one would say, “Please name all of the places where people in this community go to take a long call.”)

Please name all of the methods you can think of for making water safe for drinking.

Free Association:

Please tell me about your experiences with water collection.

Probes:

Walk me through a typical day regarding water collection.

Is it the same in the rainy season and the dry season?

What do you use the water you collect for?

Please tell me about sanitation in your community and your household.

Probes:

What types of latrines do people use in your community?

Who decides to purchase or improve a household latrine?

Would you like to improve your own household’s sanitation?

Please tell me what you know and what you practice regarding water treatment?

Probes:

What are the methods for water treatment that you have used?

What do you like and/or dislike about (specific methods of water treatment – from those listed above)?

What factors make you decide to treat your water or not?

APPENDIX. II

Debriefing Session #1

Report from Free Listing/Free Association Activities

General Observations

Compared to Ambohidrapeto (AM), Sabotsy Namehana (SN) is more rural, less developed, has weaker water infrastructure (particularly concerning public tap stands), and more residents are renters (rather than owners). As a more rural area, there is more shared / communal property in SN than in AM - there are more shared latrines, more sharing of private water sources.

In terms of water sources, in SN wells are used for most everything and there are many communal wells. In SN there are few tap-stand users. In AM, tap stands are used most often (especially for eating and drinking) and wells are used for activities such as laundry washing and watering plants.

In terms of water collection and use, in SN it is difficult to get water as wells dry up and the distance to the tap stand is typically far. Cost is typically not a problem as most houses have personal wells and tap stand prices are low. In AM there are no seasonal problems and most houses are near a tap, but the cost of tap water is high.

In terms of treatment, many families do not treat water. If they do, in SN, most families boil water or treat household stored water with Sûr'Eau. In AM, families treat wells with Sûr'Eau.. Tap stand water is considered drinkable. "Heating" water before drinking is common. If it is heated, this is in response to a cultural preference for warm water. The topic of hot versus cold arose several times during the debriefing. In short, cold water is dirty and it gives diarrhea/ belly aches. Hot water (though not necessarily boiled) is better for one's health. This has implications for water treatment.

Perceived safety of water is based on (1) color, (2) taste, (3) presence of bugs/insects. Of note: SurEau's effectiveness was called into question as it did not kill bugs. The safest water is tap-stand water or any water that comes from a tap.

Obstacles to fetching tap-stand water include (1) convenience/distance and (2) price. Wells are considered extremely convenient.

In regards to latrines: an interesting problem mentioned was illicit use of one's latrine. Neighbors will sometimes break through a lock to use another's latrine at night, specifically to empty chamber pots. It seems that a fokotany within AM is offering free latrines (all parts included- buyers must only purchase sand and rocks to put in the latrine). We were not able to confirm this.

Latrine improvements are often considered / completed when a new latrine is constructed after the existing pit is full. Improvements to the existing latrine are not a priority. Pits typically fill every 2 to 3 years.

Topics

Water Access

Sources of water used listed by community members:

Public Pump (such as those seen)

Private Pump (financed privately by another NGO "Sandam-Drano")

Private Wells

Community Wells

Natural water sources

Sacred water sources (found only in SN)

JIRAMA taps (which are in private houses that then sell the water to community. Not sure of legality of this)

JIRAMA in-home piping (this is very rare)

Sources of water used by most households

SN –Wells (Sometimes private, sometimes shared among a family, sometimes shared with people who are non-family but live nearby)

AM – Public Pumps

Different sources for different uses: Safest water is for cooking/drinking then laundry then toilet cleaning or feeding plants.

Collection of water from pumps

A task exclusively reserved for women and children

Always done several times a day (to varying amounts according to household)

SN- Pump Water is inexpensive (15 AR p/bucket)

AM – Pump Water is expensive (50 Ar p/bucket)

Hours of operation are not uniform across different tap stands. Strict operating hours are a hassle.

Difficulties in terms of water access

Few reported problems. Water is a minor concern compared with other household difficulties (ie electricity)

It's difficult and takes a long time to carry the water far, it's difficult to pull water from the well, it's hard when the well or the pump dries out, the cost of water is expensive (in AM), opening hours are restrictive, neighbors don't respect the rules of community wells (they dirty it by dunking their laundry or dirty buckets in it), pump lines are long on the weekend, on some land you can't dig a well because the water is dirty (it has a red color), well water is terrible for washing clothes (it's hard water) and you have to use a lot of soap.

Reasons for using one source of water as opposed to another

Proximity

Cleanliness of the Water (anything that comes from a tap is considered clean and drinkable)

Price

Satisfaction with whatever the current water source is (ie "Our family's well is clean")

Water Treatment and Storage

Known methods for accessing cleaning water

Using water than came from a tap

Using Sûr'Eau

Boiling Water

(lesser used/known where bleaching water, filtering it with cloth, using clean buckets, using rain water, emptying and cleaning a well with a shovel, using a natural water source)

Methods actually used to treat water- if there are children in the household it is more likely that the family will treat

Most often, NO TREATMENT

Because I use water from a tap.

Because Sûr'Eau doesn't kill the bugs- I can see them swimming after I used Sûr'Eau

Because I use my water to make "Rano Vola" and I drink "Rano Vola" water ("Rano Vola" is made by taking burnt rice during daily meal preparation, filling the empty pot with water, and then bringing the water to a boil).

Because I don't drink much water (aside from my Rano Vola water)

Sur Eau

In AM, usually poured directly in the well; one bottle p/week

Sometimes poured in a bucket (no consistency on how much to pour in bucket)

Boiling

Can leave the water tasting salty, so there is a dispute on effectiveness

Cultural Note: Malagaseys do not like drinking cold water. "It gives diarrhea and belly aches."

Oftentimes, water that is purchased from a tap stand or from a natural source may be heated, but it is not necessarily heated to the point where it will boil.

Water Storage

Water is most often stored in drum; almost all houses have a drum ("sinibe"). Drums are covered and washed regularly.

Water is oftentimes not stored when there are children in the household as they play with it

Boiled water is not stored in a barrel. It is put in large "thermos" which holds up to 5 liters or in reusable plastic bottles

Reasons to Treat Water

Health of Infant/Children

To Prevent Diarrhea (and cold water gives diarrhea)

Well water is not always clean

Buckets used to fetch water may be dirty

Reasons to Not Treat Water

I don't treat water because I never have

Treating water is unnecessary (my kids are healthy anyway)

Water treatment is costly

Latrines

Locations for defecation (respondents said everyone had a latrine or shared a latrine - despite evidence to the contrary)

Shared latrines (very common in Sabotsy)

Public latrines (used primarily by market-goers)

In nature (although this is a very difficult thing to admit; only one man admitted that some people in his community do this)

In a chamber pot which is brought to the latrine

Nearly never a private latrine

Latrine characteristics

Always outside

Often simply a dirt hole in the ground

Walls of brick

Corrugated iron as a roof

Sometimes a cement floor, but oftentimes a wood floor (just two wood planks), very rarely a dirt floor

Door is sometimes missing

Cleaning of latrines

Consists primarily of burning soiled paper and sweeping

Cleaning with water is not systematic- only done when latrine is very dirty and sometimes with laundry water

Very rarely, one throws charcoal powder in the latrine to clean it of smelly odors

With shared latrines, cleaning is done in turns (family 1, week 1/ family 2, week 2)

Problems encountered with latrine parts

Difficult to modify latrine when you're not the owner/ when the land division is uncertain among owners (ie if a group of siblings recently inherited land)

Illicit use of latrines (neighbors breaking into one's latrine to dump their chamber pots)

Neighbors use your latrine and miss the hole and leave a mess that they refuse to clean

Changes one would like to make to one's latrine (often based on how much one has been exposed to improved toilets- at work or in previous residences)

None

Fix the structure around a latrine (the roof, floor, door, walls, making it all higher)

Put in a slab made of cement

Get a septic tank (but this is regarded as very very expensive)

Terms/Phrases which emerged

"I buy water" – I go to a public tap stand

"sandan-drano" – a public pump, financed privately

"tatavanina" – cloth used to filter water

"rano vola" – a rice drink made by boiling water with the rice that is burned onto the bottom of a rice cooker

"sinibe" – a household barrel that is used to store water

"jug" – a household item made of plastic which is used to get water from the sinibe

"thermos" – a household water storage item in which previously-boiled water (up to ~5 liters) is stored

"simple WC" "WC gasy" – a latrine that consists of a dirt hole in the ground

APPENDIX. III
Semi-Structured In-Depth Interview
Interview Instrument

FOCUS	OPPORTUNITY	ABILITY	MOTIVATION
<p>Target Population Mothers in Sab-Nam and Ambo.</p> <p>Desired behaviors W (for water): Drinking safe water (water from a tap/ boiled water/ water treated consistently and correctly with Sûr'Eau) S (for sanitation): Using a clean and cleanable latrine</p>	<p>Product attributes W: What are most of the water sources in your community like? Are they safe, clean, etc? How do you know they are safe, clean, etc? Do they differ in how they taste? Smell? Look? Etc. How do they differ/ Can you compare them for me? S: What are most of the latrines in your community like? Are they clean / dirty? Can you smell them? How are latrines used by people in the community? How is your latrine different or similar to others' latrines?</p> <p>Social norms W: What do most people in your community do to get clean drinking water? (Probe on: Sources, treatment methods used) Do you do what other people in your community do? Why or why not? S: What do most people do about going to the bathroom? Do you do what other people in your community do? Why or why not?</p> <p>Sanctions/enforcement W: Who are the people in your community who are concerned about the quality of the water that you (as in the respondent) drink? What would you do if you had a complaint about the quality of your drinking water? Why?</p>	<p>Knowledge W: Is it important to drink clean drinking water? Why or why not? What do you do to make sure that your water is clean? Why do you do those things? How do you know that these things will result in clean drinking water? S: Is it important to use a clean latrine? Why or why not? What do you do to make sure that your latrine is clean? Why do you do those things? How do you know that they will make your latrine clean?</p> <p>Skills / self-efficacy W: Do you think it is within your own power to ensure that you have clean drinking water? Why or why not? Could you use a tap stand for all of your drinking water? Why or why not? S: Do you think it is within your own power to ensure that you have a clean and cleanable latrine? Why or why not? Could you improve your current latrine if you chose to? Why or why not? How would you improve your current latrine? Could you build a latrine with a concrete slab? Could you build a latrine with brick walls and a full roof? Why or why not?</p> <p>Social Support W: Are there other people that encourage</p>	<p>Attitudes and beliefs W: What do you think the relationship between clean drinking water and your health is? Is it the same for other people in your household? (Probe on children, elderly, sick, etc.). Have you always had the same ideas about clean water? How have your opinions changed? Why? How have they stayed the same? Why? S: What do you think the relationship between using a clean and cleanable latrine and your health is? Is it the same for other people in your household? Have you always had the same ideas about latrines? How have they changed / why have they stayed the same?</p> <p>Values W: Do you see any value in using water from the JIWARMA pipes / tap stands? Why or why not? Do you see any value in doing something at home to make your water safe for drinking? Why or why not? S: Do you see any value in improving your current latrine (ie: putting in a cement slab)? Why or why not? Is it important to you to use a clean latrine? Why or why not?</p> <p>Emotional/physical/mental drivers W: What are the characteristics of people</p>

	<p>Who would you talk to? S: Who are the people in your community who are concerned about the quality of your latrine and other people's latrines? What would you do if you had a complaint about your latrine? What would you do if you had a complaint about your neighbor's latrine or latrine practices? Have you ever heard of illicit latrine use? How do you feel about people breaking into others' latrines to use them illicitly? Does illicit latrine use concern or affect your decisions about latrine improvements? Why or why not?</p>	<p>you to drink clean water? Who? What do they tell you? What do you think about the things that they tell you? Do you encourage anyone to drink cleaner water? Who? Why or why not? S: Are there other people that encourage you to use a clean latrine? Who? What do they tell you? What do you think about the things that they tell you? Do you encourage other people to use a clean latrine? Who? Why or why not? Roles and decision making W: Who in your household makes the decisions about drinking water? Why is this person responsible? Who is responsible for making sure that water is clean? What does that person do to make sure water is clean? Are there ever any disagreements in your household about drinking water? (Disagreements about sources used, treatments used, costs, etc). How do you reach a compromise? S: Who in your household makes the decisions about cleaning latrines? Fixing latrines? Building a new latrine? Why is this person responsible? Who is responsible for cleaning latrines? Who is responsible for fixing latrines? Who is responsible for building a new latrine? Are there any disagreements in your household about latrines</p>	<p>that use tap stands? That use Sûr'Eau? That boil water before drinking? How are you like them / not like them? S: Please describe a nice latrine. What about those things makes that latrine nice? Why would one want a nice latrine? What are the characteristics of people that have a nice latrine? How are you like those people or not like them? Intention S: When you build your next latrine, do you intend to improve it? How? Why or why not? Will you use a concrete slab? Will you build brick walls? Will you put on a sturdy roof? Will you make it bigger? If so, why? If not, why not?</p>
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		(Disagreements about cleaning, fixing, improving, using, etc.) How do you reach a compromise? Affordability W: Is it expensive to drink clean drinking water? Why or why not? What are the expenses involved in making sure that your water is clean? S: Is it expensive to have a clean and cleanable latrine? Why or why not? What are the expenses involved in making sure that you have a clean and cleanable latrine?	
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Questions for a special purpose

(To Proprietaires/Locataires on latrines): Have you ever spoken with your tenant/landlord about installing a new latrine? About fixing an old latrine? How did the conversation go? Who started the conversation? Why did the conversation start? Do you think it is important to have a clean latrine? Are you willing to invest in getting a new latrine? Why or why not? What prevents you from improving your latrine?

(To those who heat water before consuming): How do you heat your water? Do you heat enough that you can touch and it feels warm? Why do you heat water? How do you know that heating water makes it healthy? Why does heating the water make it healthy? Do you boil it (please do not say “boil” unless respondent has said “boil”)? (If they say they boil it) How long do you boil it? Why do you boil it that long?

Behaviors that interest us the most

Using clean drinking water (tap stand/Sûr'Eau/boiled)

Using a clean and cleanable latrine

Themes (supplemental questions listed above)

Product attributes

Social norms

Sanctions/ enforcement

Knowledge

Skills / self-efficacy

Social Support

Roles and decision making

Affordability

Attitudes and beliefs

Values

Emotional/physical/mental drivers

Intention

APPENDIX. IV

Debriefing Session #2

Report from Semi-Structured Interview Activities

General Observations

Most observations made during Free Association (FA) emerged again during In-Depth Interviews (IDI). Neither Fanja nor the interviewers (Anisca and Cidric) could think of findings from the IDIs that contradicted findings from the FAs.

Observations from interview manager Fanja and interviewers Cidric and Anisca:

No interviewees in this community have been asked their opinions and behaviors as they relate to sanitation and hygiene.

To the surprise of interviewers, people spoke of their feelings when it came to latrines- their personal comfort, the fact that the latrine is a reflection of the household. Historically, latrines aren't part of the household nor are they a reflection of the household. It also a private topic.

Malagasies do not like to complain or talk about complaining. If a neighbor steals property, if there are problems surrounding the communal latrine, there is a Malagasy phrase to describe that they "hope the other person will find their conscience" and change their habits. The phrase is: "Aleo izy ho tonga saina." Malagasies will not directly broach the issue with the person or complain about the person to authorities.

Rumors are widely believed. One reported rumor is that Sûr'Eau causes sterility.

There used to be more animators last year. It seems that they have disappeared.

Malagasies are not comfortable talking about time, ie minutes, hours, days. Interviewees will generally agree with whatever time period you mention first.

Everyone would prefer a concrete slab to a wood slab for several reasons- hygiene is often not a reason or, when it is, it is more of an afterthought. (common reasons: dry area for feet, concrete doesn't wear down like wood so you won't fall in)

Nobody considers buying a new slab until the current pit is full (2 to 7 years)

People do not typically make budgets or plan out their expenses/ household improvements. Fiscal planning is done day-to-day.

Several social norms emerged. See below for a complete list.

Interviewees (village, age, employment)

Nine women from Sabotsty (S) or Ambohidrapeto (A)

1. S. 50. Warehouse merchant.
2. S. 20. Saleswoman
3. S. 25. Factory worker
4. S. 30. Housewife
5. S. 32. Housewife
6. S. 42. Merchant
11. A. 48. Seamstress
12. A. 30. Saleswoman
13. A. 41. Seamstress

Themes (with illuminating quotes)

Water (W), Latrines (L)

1. Characteristics
2. Social norms

3. Knowledge
4. Attitudes
5. Perceived benefits
6. Perceived barriers
7. Roles and decision making
8. Affordability
9. Values
10. Intentions
11. Issues of Owners/Renters
12. Sanctions/Enforcement

Characteristics

W: What are most of the water sources in your community like? Are they safe, clean, etc?

- Water in our community is generally good and not a concern. Water is bad for you if it tastes bad, looks “mavomavo” (literally means “yellow” but does not reference the color yellow) or has bugs. Water is generally not treated. The safest water is water from a tap (due to JIRAMA technology which consists of pipes, bleach and other “medicines” put in the water). Wells are generally regarded as safe. There is a consensus that you don’t judge water safety by looking at the water, you judge it based on where it came from.

Water Treatment:

A. Most people who treat, treat by boiling. Even if they get water from the pump, many people boil because there is “dust that gets in the bucket on the way from the pump.”

B. Sûr’Eau is used very rarely. When it is used, it is poured in wells.

- a. Not a habit
- b. It leads to sterility, nausea
- c. Time
- d. Budget

L: What are most of the latrines in your community like? Are they clean / dirty? Can you smell them?

How are latrines used by people in the community?

- Latrines are commonly shared by 20 people. A latrine is typically a hole in the ground, with walls and a door and with a wood slab. A bucket near the pit is for used paper. Paper is burned when the bucket fills and the remnants are put in the hole. The bucket is not cleaned.

Latrine cleaning:

1. Sweeping
2. Pouring some water (but very very little to avoid filling hole)
3. Burning papers (everyone mentioned burning papers)

A clean latrine:

1. Feces in the hole (not spread around)
2. Papers collected and burned
3. No strong odor
4. A private latrine (or one that is not shared with many people and children)
5. A dry slab
6. A washable floor
7. Not a full hole
8. A latrine that is cleaned every day

Social norms

W. Below is a list of general social norms as they relate to water.

Pressure from authorities: “We worry more about cleanliness than we did in the past because the sanitation committees from the Fokotany puts more pressure on us to maintain cleanliness.” (1)

Change in habits: “In the past, people would take water with just a bucket from the pond. Now with the wells, we use a chord to get the water.” (1)

Change in habits: Children today are beginning to drink water even when it’s not in the middle of a meal (which is the only time most adults drink water). Children also drink more cold water rather than Ranovola. This is why mothers are nowadays more in the habit of having water available during the day. (Several interviewees said this)

Women get water: “It’s my mom who is in charge of getting water. Even when my father is angry (that we don’t have water), he won’t go get any water (because it’s the woman’s role).” (5)

Don’t complain or point fingers: “If there is a problem with the pump, you can go to the Fokotany but you must never critique someone else in the community (even if it’s his fault and you know it is his fault).” (11)

Pumps are only for drinking.

L. Below is a list of general social norms as they relate to latrines.

Disregard the importance: “There are a lot of people who don’t give a hoot about their toilets.” (citation to come)

Respect: “In terms of neighborliness and the community, people get very annoyed when your toilet smells strong.” “People who do their business everywhere are egotistical and witches.” “People judge you based on your toilet.” (citations to come)

Changes in habits: “When I was a child, I lived with my parents and everybody defecated in nature especially in pine forests. At that time nobody had latrines. After this there was an evolution of sorts. Because of a promotion on behalf of the Fokotany and because people began to earn more money, they could build latrines.” (4)

Women clean latrines: “My husband said he’s not happy with the dirty latrine. He will only go in it with a cigarette because the smell is so bad. He told me it’s the job of women to take care of this.” (5)

Fear of reprimanding neighbors: A rich man was always pouring his septic tank into the alley and it was smelly and it stuck to your feet when you walked and you brought it into your house. After this happened several times, a neighbor tried to indirectly mention the subject. “I spoke with him and he said he doesn’t do that. But to bring someone to an authority is difficult because the ending will always be bad.” (1)

With renters/ landlords: When there are many renters in a house and there’s a problem with another renter (and, for instance, their toilet habits) fellow renters will never complain to the landlord.

Knowledge

W. Is it important to drink clean drinking water?

You drink clean water because you don’t want to get sick.

“Dirty water gives belly aches and bilharzias.” (citation to come)

“Even people who are not instructed can feel that you have to drink clean water.” (2)

What do you do to make sure your water is clean? Why?

“I boil water... From the Fokotany I learned about the free Malagasy methods to clean things like filtering water with sand.” (1) But she doesn’t do any of methods that the Fokotany taught. Why? It’s not part of her habit. She continues to boil water. (1)

“The Fokon’olona (the community committee) told me to empty the well and scrub it. The community committee then came and cleaned it for me.” (There is a collective cleaning that is systematic and performed yearly.) (11)

“On television I learned about clean water” (12)

“On the radio I heard commercials about Sûr’Eau.” (11)

L. Is it important to use a clean latrine? Why or why not?

Generally, a clean latrine is not a household priority.

“When your latrine is dirty, you have flies flying around, they come in the house and they get on your food. They bring sickness.” (2)

“Children are more easily rendered sick from dirty latrines.” (2)

“The odor from the latrines is what makes you sick.” (5)

Attitudes

W. What do you think the relationship between clean drinking water and your health is? Is it the same for other people in your household?

“We are used to drinking cold water. We only use hot water when we’re sick.” (11)

Wells are covered, protected, and people can’t put their feet in them, so they’re cleaner. For these reasons, many Malagasies use them instead of open water.

“Sick people drink a lot more water than people who are not sick.” (12)

Tap water is the best because of technology.

L. What do you think the relationship between using a clean and cleanable latrine and your health is? Is it the same for other people in your household?

One is truly in favor of ameliorations when they have the means.

While most people said children are most susceptible, one woman said “the health risks are equal for children and adults.” (13)

When you think about toilets and health, you think about the smell and the flies.

You have to keep the latrine far from the house. (4)

Smell tells you if it’s clean or dirty

It’s not the dirty toilet that makes you sick. It’s the smell that comes from the toilet that makes you sick.

“When it’s clean it doesn’t stink and it’s healthier” (12)

Perceived benefits

W. What are the benefits to using an improved water source?

JIRAMA supplies water steadily. It never gets cut.

It’s easier to get the water from the tap stand compared to wells where you have to have a chord and pull the water up.

JIRAMA water is clean all day.

Health is a reason (usually the last) to use a tap stand.

L. What are the benefits of using an improved latrine?

Easy to clean

It’s easy to clean and moreover the dirty matter (feces) doesn’t spread everywhere. (13)

Dry

So you don't get wet feet (5)

Safe

"Wood, when it gets wet and washed can wear down and then you can fall in." (5)

We could not find a quotation about health.

Perceived Barriers

W. What are the perceived barriers to using a tap stand?

Distance

Restrictive hours

Not dependable tap stand employees

Cuts in the water supply (when JIRAMA pipes break)

L. What are the perceived barriers to using an improved latrine?

Cost: "You have to have a lot of money to make a septic system. Maybe 200,000 or 300,000 AR. But to do the WC Gazy, you don't spend more than 50,000 AR." (2)

Structure of the ground: "The earth is very wet and you can't dig into it; it will crumble." (3) "My brother made a WC and it crumbled." (3)

Roles and decision making

W. Who in your household makes the decisions about drinking water?

Mothers* make all decisions. (*Not mothers in law)

L. Who in your household makes the decisions about cleaning latrines? Fixing latrines? Building a new latrine?

Landlords- decisions on construction/ installation

Mothers- decisions on cleaning/ maintenance

Affordability

W. Is it expensive to drink clean drinking water? Why or why not?

At first, people say cost is not a problem (1,2,11). Later, interviewers observed that price is a problem.

One doesn't use pump water for everything because it costs a lot.

"The price is affordable. The proof is that many people go (to the tap stand) to get water." (11)

"Water shouldn't cost anything. But, fine, the price is acceptable." (2)

"It's expensive, but I have to buy it anyway." (5) The ideal price for her is 15 AR.

L. Is it expensive to have a clean and cleanable latrine?

Building latrines- even those that are plain pit latrines- is considered costly.

I live today. I'm not planning for tomorrow. It depends on how much money I'll have at the moment when I want to do buy a new latrine. We'll think about it when it arises. (several)

You make the new latrine when you have to and you have the money.

Values

W. Do you see any value in using water from the JIRAMA pipes / tap stands? Why or why not? Do you see any value in doing something at home to make your water safe for drinking?

NO:

I know about XXX treatment, but I'm not used to using it so I don't. (Several)

There is a general conviction that the habit currently practiced (whether that involves treating or not treating) is the best practice.

As long as this method works, we're not going to change our habits. Until we see that someone has definitely gotten sick because of water, nothing will change. (Several)

YES:

Cleaning water guarantees safety for children. (Several)

"To drink water without having to heat it, like when you get home from work (reason cited for drinking JIRAMA)." (12)

My mother has always done it this way (boiling water), so I do it this way.

One woman (12) drinks an ORS sachet every day because her mother did this (her mother had heard about ORS in a commercial). "This allows me to drink water without heating it." (12)

L. Do you see any value in improving your current latrine (ie: putting in a cement slab)? Why or why not?

Most people don't have experience with something better, so they don't want to change.

Motivations to change are dictated by when the latrine fills (~2 - ~7 years)

"I don't have yet any idea of what I will build. It depends on what one presents to me when the time arises." (2)

From Free Listing, we learned that two people were planning to build or had built improved latrines because they had been exposed to other latrines either at work or at another residence.

Fanja believes motivations would be significantly improved if people could go to a store, see the latrine and experience it in some way.

Intentions- more like ideals, not necessarily an indication of what will be done

L. When you build your next latrine, do you intend to improve it? How? Why or why not? Will you use a concrete slab? Will you build brick walls? Will you put on a sturdy roof? Will you make it bigger? If so, why? If not, why not?

"I would like something well made with improved/enforced walls." (12)

"I would like something well made with a roof and everything, something that's like the house." (5)

"... what there is, in the norms. To have an on-site septic system." (2)

"Wall enforced with cement" (4)

Something tiled, "So it's easy to clean, not wet" (5)

Cement slab.

Anything easy to clean. "Tiles, for example" (12)

Some kind of improved pit. "walled in brick... with special rocks that prevent the pit from filling too quickly" (3)

A bathroom that is not communal.

Issues of Owners/Renters

L. Have you ever spoken with your tenant/landlord about installing a new latrine? About fixing an old latrine? How did the conversation go? Who started the conversation? Why did the conversation start?

Do you think it is important to have a clean latrine? Are you willing to invest in getting a new latrine?

Why or why not? What prevents you from improving your latrine?

"We can't change anything because we're renters. We can only do things that the landlord wants to do." (4)

"Everything depends on the landlord (in terms of latrines)." (5)

When the landlord lives on-site, he concerns himself with the latrine. "It's ours so we have to be responsible for what happens with the WC here." (11, a landlord)

When renter and owner live together, renters often say they clean more/create a cleaning system.

Owners often say that when they live with tenants, they clean more.

(In Freelisting Association)- In Ambohidrapeto, the owner wanted to buy an improved latrine, so did renters. But renters did not have money. The owner refused to loan money or create a payment plan.

They instead built a latrine of the same quality.

A woman wanted to buy a new latrine. She went to a Fokotany-led discussion and signed up for more information about latrines. She hasn't heard anything back yet, she couldn't remember when she signed up. She said it doesn't really matter what the Fokotany says; at the end of the day the landlord will be the one to make the final decision.

In Madagascar generally, in our target population especially, there are no tenant contracts. Renters don't feel that they can repair or change their houses- especially as they don't own it and don't have many rights as renters.

Many in this group move around every few (~2) years. There seems to be an attitude of Why care about latrines? Why fix things up? You're only helping the landlord.

Santions/Enforcement

W. Who are the people in your community who are concerned about the quality of the water that you (as in the respondent) drink? What would you do if you had a complaint about the quality of your drinking water? Why?

With tap stands, you either speak with the Fokotany or the pump employee.

"One could speak with someone at Jirama if there was a problem. I don't know of any problems that have happened with the pump yet." (12)

L. Who are the people in your community who are concerned about the quality of your latrine and others' latrines? What would you do if you had a complaint about your latrine? What would you do if you had a complaint about your neighbor's latrine or latrine practices?

One doesn't complain (Several)

"There are fines from the Fokotany when you have a dirty garbage site, dirty kitchen, dirty latrine." (1)

(From interviewers, I learned that there is no hesitation to show the latrine to the Fokotany: "When the Fokotany says, 'We want to see the latrine,' you show the latrine.")

"The Fokotany sends a social committee to examine the cleanliness of the WC and regulate problems." (11)

"(The Fokotany) needs to verify that people do what was told to them in terms of cleaning the latrines. There is a lack of follow-up." (11)

APPENDIX. V

Quantitative Survey