January 2013

Africa User Research in Water & Sanitation

Ethiopia

MAILING ADDRESS
PO Box 900922
Seattle, WA 98109
USA

ADDRESS
2201 Westlake Avenue
Suite 200
Seattle, WA, USA

TEL: 206.285.3500
FAX: 206.285.6619

www.path.org

Suggested citation: PATH. *Africa User Research in Water & Sanitation—Ethiopia*. Seattle: PATH; 2013.

This work was supported by a grant from the Bill & Melinda Gates Foundation.

Introduction: PATH Safe Water Project

To increase access to safe drinking water and reduce the incidence of waterborne diseases, PATH's Safe Water Project (SWP) has been exploring the potential of market-based approaches to provide clean water for low- and middle-income households. In the initial phase of the SWP, the need for new and improved technologies to support this work became clear. The goal of the SWP's product development work has been to understand user needs and preferences around household water treatment and storage (HWTS); to foster widespread demand for and availability of new and/or improved products; and to raise the bar for affordability, quality, value, and performance of HWTS products. The SWP initially focused on India and Southeast Asia (in particular, Cambodia and Vietnam). The end-user research described in this report expands the project's work to three countries in Africa—Mali, Tanzania, and Ethiopia. This report focuses on the results of the user research in Ethiopia.

Africa user research

The end-user research in Africa was exploratory and designed to assess the HWTS and sanitation needs of households in each country setting. The study's main goal was to identify the needs, experiences, and preferences of potential low-income users in Africa in the areas of water treatment and storage as well as sanitation. The study was intended to inform new product development activities and possible adaptation of safe water products developed primarily for Asian users.

Public water point, Gelan. Credit: PATH/Jennifer Foster

The specific objectives of the Africa user research were to:

- Collect information on potential users and their environment, including water sources; water collection, storage, and treatment practices; awareness of water treatment methods; as well as similar issues involving sanitation.
- Compare and contrast findings with results of the device user research conducted by the PATH SWP in India and Southeast Asia.
- Begin to identify potential HWTS product solutions, options, concepts, and/or prototypes.

The research included qualitative interviews with women in urban, peri-urban, and rural areas and observation and documentation of household water collection, treatment, and storage practices as well as sanitation and hygiene facilities.

To ensure a variety of water sources as well as water treatment and storage practices, interviews were conducted with 16 potential users in urban and rural areas in Ethiopia (8 each). To provide context, interviews were also conducted with 8 stakeholders including health workers and water and sanitation system managers. Because this was an exploratory study with a small number of participants, both study sites were in the Oromia region—Gelan town and Aba Samuel village (kebele).

Identifying appropriate solutions

To understand user needs, experiences, and preferences in the areas of HWTS and sanitation, it is important to first understand what current *choices* are available—what water sources are available and what water treatment methods, if any, are used.

Awareness of and concerns about drinking water safety are also important, as they affect potential demand for household water treatment products.

Successful product development and market-based solutions need to consider *access*—both to markets where products can be purchased and individual resources are available to pay for products.

Framework—understanding user needs. Credit: PATH.

Jerry Cans

Among both urban and rural participants in Ethiopia, the use of jerry cans to transport and store water was ubiquitous. Jerry cans are repurposed containers (e.g., that originally contained cooking oil) that are used by households. One participant had also modified a jerry can to serve as a hand-washing station (by adding a tap). A 20 litre jerry can sold for 25 birr (about 1.37 USD) at the local market.

For households with a donkey, most collected two jerry cans of water at a time. The jerry cans fit into a wooden frame that was placed on a donkey's back. Otherwise a single jerry can was carried to the water source.

The jerry can also represent trade-offs between aesthetics and practicality. While clay pots were identified as a favorite style, the realities of transport, storage, and use make the jerry can the container of choice.

Findings on HWTS

Choice

Drinking water collection and storage

In Aba Samuel, almost all participants collected drinking water from an unprotected spring. Only one participant collected drinking water from a nearby pond, saying that the closest spring was just too far away (4.5 hours round trip).

In Gelan, most participants collected their drinking water from a water point (public tap) and/or backyard (private tap). However, some households were also using pond water. Because of availability—water points are only open certain hours, are not always operational, and lines are often long; participants who rely on public taps also reported collecting water from backyard or private taps.

Most of the households used donkeys to collect water. Jerry cans were used both for transport and storage, although a few households used larger barrels to store drinking water.

Public water point, Gelan. Credit: PATH/Jennifer Foster.

Water treatment methods

Participants were familiar with some water treatment products, in particular, two chlorine-based products, Wuha Agar (or WaterGuard) and Bishan Gari (a locally produced flocculent and disinfectant). However, none of the participants reported regularly treating their household drinking water. A few participants in Aba Samuel reported using Bishan Gari to treat water for cooking and other household uses.

Awareness

Need to treat

The awareness of the need to treat household drinking water and perceptions of drinking water quality varied among the participants. Clear water was considered to be "clean" water, while water that was not clear was not trusted. Because of turbidity, some participants in Aba Samuel reported treating pond water prior to household use. However, while the water from the unprotected spring was "clear," some participants were concerned about access by animals. In Gelan, the type of water source itself influenced perceptions of safety; for example, tap water was considered "safe water" Several of the respondents also said that tap water did not need to be treated because they presumed it had already been treated at the source, although, in reality, stakeholders reported intermittent treatment.

Dispensing water, Gelan. Credit: PATH/Jennifer Foster.

Awareness of drinking water quality and the need to treat drinking water varied. On the whole, when asked about common health concerns, water-related illnesses were two of the top three health concerns reported by participants—diarrheal disease, common cold, and typhoid/typhus.

Available products

Some participants were familiar with consumable water treatment products (such as Bishan Gari); however, most had no experience with durable HWTS products. In Gelan, one participant reported previous use of a bio-sand filter and another indicated that her family was interested in purchasing a durable HWTS product.

Access

Markets

Access to markets was challenging, particularly for participants in Aba Samuel. While the local health center distributed Bishan Gari for free, they did not receive enough to provide Bishan Gari to all households in the village. Also, while water treatment products such as Bishan Gari and Wuha Agar can be purchased in pharmacies, the pharmacy the study team visited in the market town was out of stock. The pharmacist noted that "rural people" are not the customers for these products. While Gelan was on the main road, the closest market was more than 10 km away. The cost of getting to market was also a barrier to access: "*One sachet of Wuha Agar costs 2 birr [about 11 cents USD]…a round trip to market costs 6 birr*." (stakeholder)

Resources

Water treatment products are not usually free of charge and thus access to resources—both to get to market and to purchase water treatment products—often presents a major challenge to low income households that want to drink safe water. While in Aba Samuel, distribution of Bishan Gari was free; in Gelan, all of the participants reported paying for their drinking water—either directly to the municipality or to the public tap operator and/or private tap owner. Prices ranged from 15 Ethiopian cents to 1 birr per can. Participants with water meters paid around 10 to 15 birr/month; however, participants with private taps often reported selling water, so their monthly payments were much higher—one household reported paying 70 to 90 birr/month and another reported paying 300 birr/month.

Identifying potential solutions—product options and concepts

Formative research and subsequent product development conducted by the SWP in India and Southeast Asia resulted in a set of design guidelines for HWTS devices, three new gravity-fed HWTS devices, and a redesigned Ceramic Water Pot. The Africa research aimed to gather user feedback on product options and concepts, including the three gravity-fed devices based on these design guidelines.

In Ethiopia, two types of product concept cards were used to assess user opinions about device configurations and characteristics. First, a series of line drawings were shown to participants to gather feedback on potential product shapes without the influence of color and material. Second, a set of color photos of durable HWTS products was shown—including the new product prototypes developed following the formative work described above. Participants were asked about overall product preferences—which product they liked best, least, and why, as well as about particular product attributes such as shape, size, durability, and perceived affordability.

Product feedback—shapes and products

The participants expressed needs and preferences related to specific attributes of durable HWTS products.

For the **line drawings**, the most popular shape was a drawing of a traditional hourglass-shaped clay pot with a wider mouth, narrow middle, and wide round bottom. Participants liked the familiarity and aesthetic form of this design. Two priority features used by participant to evaluate products were *durability* (products that looked like they would not easily break or tip over) and *ease of cleaning* (both inside and under the base).

For the **photographs**, participants reacted most strongly to the attribute of *shape*. As with the line drawings, the favorite product was a clay pot with a rounded base. Participants liked that it was a *familiar shape* as well as a *familiar material*. On the whole, the products participants liked the least were shapes or materials that they described as resembling rubbish bins (although a few participants also liked that the shape was familiar).

Other preferred product attributes were *size* (devices that looked as if they would hold enough water), *durability, ease of cleaning,* and *transparency* (this applied to products made of plastic, as participants liked seeing water levels and the filter inside the device).

Given general unfamiliarity with durable products, the interviewer provided a brief explanation of water filters and how they work to participants. Despite their lack of experience with durable products, all participants expressed interest in owning a product that would provide clean water and contribute to their family's health.

HWTS user needs

The formative research on HWTS and sanitation in Ethiopia provided information about user needs—both expressed (needs that were clearly articulated by the participants) as well as observed (needs that were identified through the research but not overtly stated by participants).

Participants clearly expressed the need for and importance of having a safe, reliable water source that is easy to get to. In describing water from a new water point in her community, one participant said *"We are really happy about this water; the difference is a miracle [better quality, freshness]."*

The researchers observed needs related to safe household drinking water. First, there is a clear need for information about drinking water quality—both of source water and water stored for household use. Participants expressed the belief that "clear" water was "clean" water, which can be an erroneous and potentially harmful assumption. For example, one participant, who relied on water from the unprotected spring in Aba Samuel, said that she gave her Bishan Gari to a neighbor since her own water was clear and did not need to be treated. Second, even if source water is clean, the team observed a variety of opportunities for recontamination during collection, transport, and storage—using hands as a funnel during water collection; insufficient cleaning of transport and storage containers; uncovered drinking

water storage containers in the home; and potential for contamination during dispensing drinking water at the point of use.

Finally, there is a need for a greater awareness of water treatment products and a better understanding of reasons for use. For example, in Aba Samuel, all of the participants were familiar with Bishan Gari. However, many of the participants described using Bishan Gari for water for household use rather than for their drinking water. While participants liked the clarity provided by Bishan Gari, participants did not like the taste or smell of chlorine in their drinking water. In Gelan, the perceived need for Wuha Agar or liquid chlorine was often prompted only by diarrheal or other water-borne disease outbreaks.

Water collection, Gelan. Credit: PATH/Jennifer Foster.

Results for sanitation needs

The Africa user research also included an initial exploration of user sanitation needs and experiences of users. According to the most recent World Health Organization/United Nations Children's Fund Joint Monitoring Programme for Water Supply and Sanitation data, only 21 percent of Ethiopians use improved sanitation facilities, and 46 percent practice open defecation (WHO/UNICEF 2012).1

User experiences—sanitation

Unimproved pit latrines, Aba Samuel. Credit: PATH/Jennifer Foster.

Sanitation facilities

The majority of the participants—in both Aba Samuel and Gelan—used unimproved sanitation facilities. However, there were clear differences between the urban and rural areas.

In Aba Samuel, all but one of the participants used rudimentary pit latrines; the remaining participant did not have a latrine at all. The majority of the latrines were open pits; however, in a few cases, sticks and

[1] "Improved" sanitation facilities are defined by the World Health Organization as sanitation facilities that (a) ensure hygienic separation of human waste from human contact; and (b) are not shared (used by a single household).

other natural materials, were used to partially cover the hole. Only one participant had any type of superstructure for privacy. Overall, the toilets in Aba Samuel were constructed more recently, and many were built in response to a push (threat of fines) by the government. Stakeholders also expressed a concern about the "poor utilization" of sanitation facilities in the areas.

Shared latrine, Gelan. Credit: PATH/Jennifer Foster.

In Gelan, the majority of the participants (5 out of 8) also used unimproved pit latrines. Sticks and other natural materials were used to partially cover the hole and provide support for either a roof (of corrugated metal or sticks) and/or walls (of sticks or cloth). Only one of these latrines provided any real privacy for users. The remaining three participants had either improved or were improving their latrines. These improvements included using more durable materials (including corrugated metal, concrete, ceramics, and heavy plastic); adding walls (or superstructures) for privacy; building more permanent structures (including arrangements for emptying waste); moving latrines farther from the home (location); and adding handwashing stations (hygiene).

Open defecation

Participants were asked if open defecation was a problem in their community. In Gelan, most of the participants reported open defecation as a concern—lack of awareness, resistance to change, and financial capacity were cited as reasons for open defecation. While open defecation was also practiced in Aba Samuel, and lack of awareness was cited as a key reason, open defecation was described as "normal" rather than a problem, *"We are rural people and there is no problem of place to defecate… [in] urban areas, everyone can see you, because it is a rural place, [you] can easily find a place, bush, to hide self and defecate in private."* (research participant in Gelan)

The stakeholders also described open defecation as an important issue: *"Yes. Open defecation is a big problem. It contributes to 47 percent of fecal-oral diseases. It contributes the lion's share of the top ten diseases in the area including acute watery diarrhea."* (health worker in Gelan).

Improved latrine with handwashing station, Gelan. Credit: PATH/Jennifer Foster.

User needs—sanitation

This initial assessment helped identify user needs and preferences around toilet facilities. The results also suggest different (although complementary) strategies towards sanitation in urban and rural areas. While there is a clear need to improve the basic sanitation facilities in Aba Samuel, there is also a strong need to raise awareness about the importance of using latrines and to promote behavior change. The functional sanitation ladder provides a framework for thinking about improving sanitation facilities and potential next steps for product development (Kvarnström et al., 2011). The rungs of the ladder include (1) excreta containment; (2) safe access and availability; (3) greywater management; (4) pathogen reduction in treatment; (5) nutrient reuse; (6)

eutrophication risk reduction; and, (7) integrated resource management. The first two rungs of the functional ladder, in particular, identify criteria for improving latrines as well as evaluating sanitation facilities.

Containment of Excreta	Safe Access and Availability
• Clean facility in obvious use • No flies or other vectors • No fecal matter lingering in or around latrine • Hand-washing facility with soap in obvious use • Lid • Odor free	• 24-hr access, year round • Privacy, personal safety, shelter • Adapted to needs of users (such as children, women, elderly)

Functional sanitation ladder (rung 1 and 2). Credit: PATH/Jennifer Foster.

In Gelan, where awareness is higher and space is limited, there is a need for "improved" latrines (either building new or improving existing latrines) that are free of fecal matter, reduce flies and other vectors, and provide for privacy.

Beyond building better latrines, adding hand-washing facilities to both new and existing latrines is another key to improving sanitation. Furthermore, given space limitations and the need for more permanent structures, providing pit emptying services and proper disposal of waste are other activities that could lead to improving sanitation facilities and public health.

Shared latrine, Gelan. Credit: PATH/Jennifer Foster.

Public health and expanding product choice

Product development and public health

This study constituted an initial phase in a user-centered design process for gathering information about the needs, experiences, and preferences of potential low-income users of HWTS and sanitation in three settings in Africa. This user-centered approach is crucial to developing a solution that is appropriate for the local context and environment, that is acceptable to potential end-users, and that will be used correctly and consistently to improve the health of low-income households. While qualitative, exploratory, and introductory by nature, findings from this study suggest directions for potential product solutions and concepts that could improve the health of children under the age of five and their families.

Appropriate solutions

Need for HWTS products

The Millennium Development Goals describe effective access to drinking water in two ways—as access to a reliable "improved" source and availability of safe water, that is, water that meets standards for microbiological, chemical, and other contaminants. This research highlights that access to clean water at

the source is necessary but not sufficient, since the researchers observed many behaviors that can cause recontamination during collection and storage. The need for improving consumer choice of household-level solutions is clear, including increasing the availability of both durable (HWTS devices) and consumable products (chlorine products).

HWTS product development

Product choice is important. Currently, the only available effective water treatment options in Ethiopia are chlorine-based water treatment products. Because locations have different water sources and needs, it is important to expand choice of both durable and consumable water treatment products. Users who collect water from unprotected springs require access to products that are appropriate and desirable for regular use. Users who collect pond water, have a particular need for products that address turbidity and remove contaminants. Users with access to clean piped water may only need products that can be used intermittently—for example during disease outbreaks or if the clean water source becomes contaminated or is unavailable.

Products need to match local conditions. As a combined flocculent and disinfectant, Bishan Gari reduces turbidity and purifies water to make it safe to drink. However, participants who described their water as clear, even if the source was an unprotected spring, did not necessarily see the need to use the product. In areas where chemical contaminants are a concern, filter devices that target chemical rather than microbiological contaminants may be more desirable.

Products need to be tested by actual users. While participants expressed interest in the products featured on the concept cards, these products need to be tested in the field to evaluate the user experience (from initial setup and daily use to cleaning and maintenance); overall acceptability (including flow rates, storage capacity, and taste of treated water); and durability. In addition to extended product use, attention also needs to be paid to supply chains and consumer financing to ensure access. All these factors informed product design and market development as part of the Safe Water Project in Asia.

Products need to be accessible. Improving product choice is only the first step; for these products to have a health impact, potential users need to have access to markets and resources (including financing options)—to buy products, get replacement filters, and also to access repair and maintenance services if needed.

Products are only part of the solution. HWTS products that are correctly and consistently used can provide safe water for families. However, HWTS products themselves are only one part a strategy to address water and sanitation issues. Activities that increase awareness of water quality (including where and when to treat drinking water) and correct misperceptions (such as the belief that clear water is clean water) are also important. Complementary activities to improve sanitation and hygiene are also required to maximize the health benefits of HWTS.

Sanitation product development

This initial needs assessment provided valuable information on how product development could help improve sanitation facilities and move participants up the functional sanitation ladder. Notably, however, there was a clear difference in user needs and experiences in the two research areas, suggesting that solutions are not "one size fits all."

Products to support behavior change. Increasing awareness and promoting behavior change is essential, especially in areas like Aba Samuel where open defecation described as "normal". In addition, behavior change activities should be accompanied by the development of appropriate and acceptable sanitation products. The latrines in Aba Samuel were very basic and would need to be upgraded to meet the criteria for the first rung of the sanitation ladder—excreta containments. An improved pit latrine design based on the first two rungs of the functional sanitation ladder (and that could be constructed from local materials, and provide a positive use experience) could support behavior change through community-led total sanitation or other activities.

Products to support upgrading existing facilities. In urban areas such as Gelan, where open defecation is described as a concern, privacy is more of a consideration, and space to build replacement latrines is limited, product development activities could focus on supporting the improvement of existing sanitation facilities, including a superstructure design(s) to address privacy and safety concerns, the second rung of the sanitation ladder.

Product development—beyond latrines. Building a better latrine is only one step along the ladder to improve sanitation facilities as well as household and community health. In urban areas, as population increases, latrine use becomes more of a norm. People spend more resources on improving their latrines (such as using more durable materials, building more permanent structures, and improving privacy), hand washing, latrine emptying. Waste management technologies, for example, become more important to support healthy households and communities.

Next steps

The PATH Water, Sanitation, and Hygiene (WASH) team is actively looking for partners to pursue follow-up activities for the Africa User Research, not just in the three countries where the research was conducted, but also in Africa more generally.

Current activities (existing and proposed) that build on and incorporate the learnings from the Africa User Research include the following:

- Pilot product and user experience testing by partners in Africa, for example, in Uganda and Rwanda.
- Extended user testing of one or more of the three gravity-fed water filtration devices or the redesigned Ceramic Water Pot. This would include in-home product placement with months of actual use as well as monitoring and evaluation of the impact and use of the devices.

- Sanitation activities in Africa, including a superstructure design project in Kenya, and a WASH evaluation and targeted intervention in coffee-growing communities in Tanzania.

References

Kvarnström, E., J. McConville, P. Bracken, M. Johansson, and M. Fogde. “The sanitation ladder – a need for a revamp?” Journal of Water, Sanitation and Hygiene for Development, 01.1, pp. 3–12; 2011.

World Health Organization (WHO) and United Nations Children’s Fund (UNICEF). Joint Monitoring Programme for Water Supply and Sanitation. Geneva: WHO; 2012.