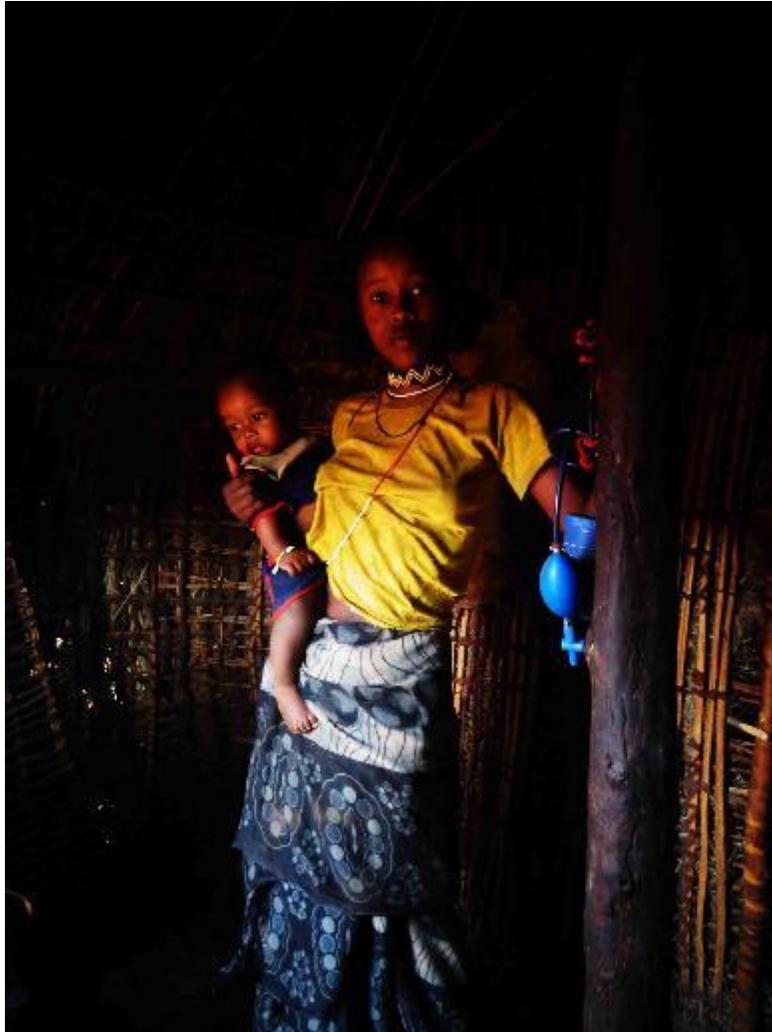


HWTS in Ethiopia: The State of Art and Ideas to Scale Up



Internal Report, Millennium Water Alliance - Ethiopia Program

September 2014



Foreword

The current phase of the Millennium Water Alliance (MWA) Ethiopia Program includes organizations such as CRS, CARE, Helvetas, Living Water international, and World Vision. Together with the Dutch non-governmental organization (NGO) Aqua for All and coordinated by IRC, MWA supports the government policy of scaling up access to water via Self-supply. Since Household Water Treatment and Safe storage (HWTS) is an important part of Self-supply, MWA took the initiative for a study to learn about the existing HWTS options in Ethiopia and experiences with them. To this end, MWA contracted a specialist in HWTS to undertake a study. The study aims to provide data and recommendations for actions to scale up HWTS with a market-based approach, including suggestions for cooperation, awareness and building up market-based supply chains of effective and attractive treatment products.

Information was collected with desk studies, interviews with government officials and key staff members of NGOs and the private sector- specifically, producers and sales companies of HWTS options. The study uses lessons learned in Ethiopia and other countries. A water filter survey was created and information from an existing water filter user survey was used. The list of companies and people contacted is included in Annex 4. Important documents used for this study were: policy papers from the Ethiopian Ministries of Water and Health, Global Enteric Multicenter Study (GEMS, 2013), study on the efficiency HWTS (3IE, 2009) and adherence of HWT (Brown, 2013), Perspectives (PATH), Safe water for the Bottom of the Pyramid (Hystra, 2012), and Scaling up Safe Water (300in6).

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The authors are grateful to all who provided input for this study. This includes the information from the Ethiopian Ministry of Health and the Ministry of Water, Irrigation and Energy, the organizations involved in HWTS, the producers and sales agencies of HWTS options like chlorine products and filters. A special thanks goes to Mr. Urs Heierli who supported this study with his wide experiences in poverty alleviation as a business and specific knowledge on why safe water is so easy to sell to the rich and so difficult to sell to the poor.

Authors: Henk Holtslag, independent consultant with support of Lemessa Mekonta (IRC)

Cover photo: Water filter used in Teltele district. Photographer: G. Mekonen



Abbreviations

BoP	Bottom of the Pyramid
CDC	US Center for Disease Control and Prevention
CRS	Catholic Relief Services
CSS	Chlorine stock solution
EKHC	Ethiopian Kale Heywet Church
GEMS	Global Enteric Multicenter Study
GoE	Government of Ethiopia
GTP	Growth and Transformation Plan
HEW	Health Education Workers
HIV	Human immunodeficiency virus
HSA	Health Surveillance Assistant
HSSP	Health Sector Strategic Plan
HWT	Household Water Treatment
HWTS	Household Water Treatment and Safe storage
IRC	International Reference center for Water and sanitation
JMP	Joint Monitoring Program for Water Supply and Sanitation
ETS	Ethiopian Bureau of Standards
MDG	Millennium Development Goal
MWA	Millennium Water Alliance
MoF	Ministry of Finance
MoH	Ministry of Health
MOU	Memorandum of Understanding
MoWE	Ministry of Water and Energy
MoWIE	Ministry of Water, Irrigation and Energy (Former MoWE)
MWA	Millennium Water Alliance
NGO	Non-Governmental Organization
PATH	Program for Appropriate Technologies in Health
PSI	Population Services International
SODIS	Solar Water Disinfection
SWAP	Sector-wide approach
TAF	Technology Applicability Framework, Technology Introduction Process
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
USD	United States Dollars
VAT	Value-added taxes
WASH	Water, sanitation, and hygiene
WHO	World Health Organization
WSP	Water Safety Plan (not to be confused with the Water and Sanitation Program of the World Bank)
WV	World Vision



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3 Executive Summary

In Ethiopia, around 58% of the 76 million people in rural areas do not yet have access to an improved water source (JMP, 2014). In addition, many people in urban and peri-urban areas do not always have safe drinking water from their water sources due reasons such as recontamination in transportation and storage, and old piped systems. Unsafe drinking water can result in diarrheal diseases, which are major contributors of high mortality rates, which in Ethiopia is 123 out of 1000 (Ministry of Health, 2011).

Rural potable water supply coverage – at a standard of 25 liters per capita per day and within 1 km radius - is to increase from 59% at the base year of 2014/15 to 85% by 2020. (One WASH National Program, 2013). One way to reach this goal is scaling up Self-supply, which means stimulating families or groups of families to (co-)invest themselves in their water sources: for instance, improving existing or constructing new hand dug or hand drilled wells combined with a well cover and low cost hand pumps. A hand pump can avoid contamination caused by a bucket and thus improve water quality in the well by as much as 60% (Gorter, 1995).

Another action is source treatment like well chlorination. This is only effective for a short time, since water often becomes re-contaminated by the bucket and rope, a nearby latrine or surface water that leaks back into the well. (Nestbuilders, 2014).

A third option to improve water quality is Household Water Treatment and Safe storage, like boiling, chlorination, or filtering which are now strongly promoted by the WHO. Consistent use of a HWTS option can reduce the risk of contracting water related diarrhoea by 65% if combined with hygiene education (3IE, 2009).

The Ethiopian Demographic and Health Survey (EDHS, 2011) indicates that only 9% of the population was using some kind of Household Water Treatment in 2011. With the increased promotion and dissemination of treatment products, the percentage of people using HWT in 2014 is between 10 and 13%. Of this, around 6-7% are boiling, 3-5% are using a chlorine product, and 1% are using some kind of a household water filter. There is no data available on the percentage of people practicing safe storage, but an estimation is 10-30% of the population.

The Government of Ethiopia promotes hand washing and sanitation, and increasingly HWTS. The National Hygiene and Sanitation Strategic Action Plan (2011- 2015) aims for an increase of families practicing some kind of HWTS from 8% (base year 2010) to 77% in 2015. A working group has been formed to advise on how to scale up, and Safe Water Plans are being developed.

This report recommends four key actions to scale up HWTS in Ethiopia:

- a. **Source improvements:** Simple and low cost interventions to improve water sources.
- b. **Awareness:** Increase public awareness on causes and effects of unsafe water and the existence of new treatment solutions.
- c. **Supply chains:** Improve existing and support new supply chains of effective, affordable, and attractive HWTS options.
- d. **Enabling environment:** A national strategy on HWTS, mobilizing resources, integration of HWTS in health services, harmonizing policies, developing implementation guidelines, control on product quality.



4 Key Findings, Barriers, Conclusions, Opportunities

4.1 Key Findings, Barriers

4.1.1 Water Source

- A major part of rural water sources are open wells, and water is extracted by a bucket, which can cause recontamination of the water in the well.
- Of wells that have a well cover, many are leaking water back into the well, causing contamination.
- Often, the water collected at improved water sources like standpoints, gravity systems, and piped systems is re-contaminated in transport or unsafe storage at the household level.

4.1.2 Awareness and Use

- There is limited awareness on the causes of water-borne diseases and on the health risks and related health cost of drinking untreated water.
- Some 10 to 13% of the population in Ethiopia is now using some kind of HWT.
- Besides boiling, chlorine is the most commonly used treatment option.
- Compared to chlorine, water filters seem to have a higher adherence if there is a felt need to treat the water, if the product is effective and if there is good training on use and maintenance.
- If the adherence of HWT reduces from by only 10%, the effect in *reducing* water borne diseases reduces by 98% (Brown, 2013).
- Regarding storage, the most common option is the 20-liter jerry can. This option runs the risk of not being considered safe storage if it is filled with unsafe water initially, or if the water is touched by hands. One risk of jerry cans is that their narrow mouths do not allow for thorough cleaning (though a narrow mouth as other advantages like reducing the exposure of water to airborne contaminants).

4.1.3 Supply Chains

- The supply chain of the three existing chlorine products is well developed: Bishan Gari is available in pharmacies.
- In the last four years new low-cost filters have entered the market, like the pot filter, Lifestraw family filter, Sawyer filter, and Siphon filter, with prices of \$25-50 USD.
- The number of sales points for filters country wide is now around 100.
- Families that fall above the absolute poverty line seem willing to pay \$15-25 USD for a good water filter. For instance, around 15,000 filters of the Siphon model were sold at commercial prices to families.
- Even the low cost \$25 USD filter models are still too expensive for the poorest families.
- There is not yet a range of effective, attractive, and affordable HWTS options available in each town and village, so there is hardly a choice for people.

4.1.4 Enabling Environment

- There is a lack of coordination among stakeholders. (Annex 1)
- HWT producers/sales companies see the import tax and VAT as a barrier.(Annex1)
- In almost all cases NGOs and governments give filters for free to special target groups.



- There is not yet sufficient understanding of the detrimental effect of direct donations of HWT products by NGOs on the supply chain/market for HWT products.
- There are very few, if any, indicators for monitoring

4.2 Conclusions

- The most common HWT option, boiling, is effective but has obvious Disadvantages like the cost of fuel, deforestation, indoor pollution, CO₂ emissions, etc.
- The second most common HWT option, chlorine products, is technically effective but seems to have a low adherence (consistent use). People will use it when they get it for free and when there is threat of disease, but only 5 to 10% of the families buy it after the gifts stop (PSI 2014).
- One reason that HWT in Ethiopia has not scaled up faster seems to be that the affordable options (boiling, chlorine, solar disinfection (SODIS)) are not attractive and the attractive options (nice-looking filters) are not affordable or available.
- In general the most promising, effective and attractive HWTS options seem to be:
 - a. Point of tap treatment (e.g. chlorine dispensers at tap points)
 - b. Household water filters (a range of effective and user-friendly filters)
 - c. Silver ceramic for safe storage (Silver-coated ceramic that floats in a jerry can and avoids recontamination)
- Conditions to scale up these promising options are: nationwide awareness on the social and economic benefits of HWTS, and a nationwide supply chain with a basket of effective and attractive HWTS options, so that families have choices.
- For the poorest, some kind of support is needed.

4.3 Opportunities

- Ethiopia has a very ambitious goal to scale up use of HWTS to 77% by the end of 2015.
- Fortunately, HWTS is now included in Self-supply policy and starting to be included in policies of the Ministry of Health .
- There is a new working group focusing on scaling up HWTS
- There are now WHO standards, and if applied, organizations and customers can trust existing and new products which comply with one of the three WHO product standards.
- There is an increasing awareness among policymakers and NGOs about the importance and high cost-benefit of using HWTS combined with good hygiene.
- There are lessons learned from other countries both on what products are effective, attractive and affordable, and approaches for market-based scale-up.
- The One WASH National Program has planned a budget of \$2.5 Billion USD for the coming 6 years (until 2020) of which some \$400 Million USD has been promised by donors. Of these funds, a part could be used for hygiene awareness and scaling up HWTS.

5 Key Recommendations

A general recommendation for MWA regarding HWTS is working with the Technical Working Group and with the two Ministries (MoWIE and MoH) of the Government of Ethiopia. Initially, the working group was established as an ad hoc platform, but now seems to be formalized under the Climate Resilience Water Safety Plan Working Group.



Other recommendations include:

5.1 Source Improvement

- A national campaign like, “Turn each well into an improved water source.”
- Promote the “water ladder,” or a step-by-step improvement. Start with a hand pump like a rope pump or EMAS pump, then a well cover and apron and hygienic seal. Later a more expensive hand pump or mechanized pump could be installed.

5.2 Awareness

- Design and implement massive public awareness creation and hygiene campaigns.
- Include information on (new) HWTS solutions in existing initiatives like the Health Development Army, education, etc.
- Use experiences from other countries: for instance, the successful CHC (Community Health Club) approach of Africa Ahead.
- In each district a WASH center could demonstrate for that area adequate source improvement and HWTS solutions, including locally produced low cost options (Smart Water Solutions) like improved hand dug wells, manual drilling, well deepening, well recharge, HWTS.
- For HWTS, learn from household interventions being undertaken in the country, like Self-supply, CLTSH, Household irrigation, bio-gas, and improved cook stoves.

5.3 Supply Chains

- A range of HWTS options (including chlorine and low-cost filters) should be available in each town and village. Existing supply chains like shops for plastic products, pharmacies, or others can be used for this, and /or new supply chains can be developed.
- In the case of subsidies for HWTS products, use voucher systems or other options to build up a strong supply chain. (Direct gifts will hamper the supply chain.)
- Cooperate with PSI, who is trying the Total Marketing Approach, involving different stakeholders in the provision of health services including HWTS for vulnerable with subsidy, for those who can afford partial subsidy, and for those who are able to pay market price

5.4 Enabling Environment

- Scaling up HWTS requires coordinated action of the Ministries of Water, Health, Education and Finance, and perhaps the Ministry of Agriculture, (irrigation water can be made potable with HWT).
- Conduct more studies on reception, willingness to pay for HWTS via a local institution in cooperation with a master study. An example is a study in Nepal by U. Heierli.
- Strengthen the HWTS working group with national and international experts in HWTS and BoP (Bottom of the Pyramid) marketing to further improve a national HWTS strategy, and make a HWT roadmap to reach the water-related Sustainable Development Goal. This



working group should review the progress yearly and discuss in a workshop with all relevant stakeholders.

- Include indicators to monitor scaling up of HWTS in one of the established monitoring systems: the Malaria Indicator Survey and Hygiene and Environment health monitoring system.
- Reduce or remove the import duties and VAT for HWT options which comply with one of the three WHO standards.
- Subsidies and free gifts should be strictly targeted to special target groups like pregnant women, the poorest, etc.
- Make a guideline for NGOs to avoid direct gifts to families. Instead, use vouchers, for example, which will strengthen the supply chain. NGOs who do not comply should be warned in some way.
- Create a WASH innovation center and regional centers where all relevant information is concentrated, with demonstration of solutions and training capacity to produce and/or market Self-supply and HWTS solutions. One option is to combine it with the Water Technology Institute, which reports to the MoWIE, in the southern part of Addis Ababa.
- Build capacity via the innovation center(s) to advise on a range of best solutions for each area, situation (Use Technology Applicability Framework).
- Use experiences of WASH centers like the SMART Centers in Tanzania and Malawi.
- Make knowledge on new WASH technologies part of the curriculum of Technical and Vocational Education Training.

6 Introduction

In Ethiopia, diarrhea is a leading cause of death among children under the age of five (UNICEF, 2012). Although the country is “on track” (UNICEF & WHO, 2012) to achieve the Millennium Development Goal¹ target for access to drinking water, 58% of the rural population still consumes water from unimproved sources (JMP, 2014). Countless more collect water from so-called “improved sources”² but re-contaminate their water during collection, transport or unsafe storage in the home. Key practices that can reduce the burden of diarrheal disease are hand washing with soap, the safe disposal of human feces, and HWTS.

Simple ways to improve water quality prior to consumption are boiling, chlorination, filtration or solar disinfection. These methods can reduce the risk of diarrhea by as much as 47% (Fewtrell et al, 2005; Clasen et al, 2006) and may cost as little as \$0.02 USD a day (Clasen et al, 2007). Integrating HWTS with water, sanitation and hygiene interventions has an even larger impact. Both UNICEF and the WHO recommend HWTS to reduce diarrhea. It is also considered an essential intervention in HIV/AIDS prevention (WHO, 2008), and safe drinking water is an important complement to food in assuring the healthy nutritional status of children. Still, despite the compelling benefits for personal health, only 10-13 % of Ethiopian households (across rural and urban settings) appropriately treat their drinking water.

Another option to improve water quality is to improve wells. The Ethiopian government gives much emphasis to lower-cost technologies and promotes improving wells for Self-supply (MoWR, 2009). Self-supply means that households (largely) finance their water source. Conventional

¹ In 2000, 189 countries declared their commitment to free people from extreme poverty, poor health and deprivations of water, sanitation and education. This pledge became eight Millennium Development Goals. Learn more at <http://www.undp.org/content/undp/en/home/mdgoverview.html>.

² According to the JMP, improved sources of water include a public tap or standpipe, a tube well or borehole, a protected dug well, a protected spring, and rainwater collection.



rural water supply, in contrast, concentrates on communal systems, with NGOs or government paying in general for all infrastructure. The users are then expected to pay maintenance and repair costs, which is often a challenge, especially when larger problems start like replacement of pump rods, etc. Many Self-supply water sources are hand-dug wells, manually drilled wells, or rainwater harvesting (Sutton, 2004, 2009a). Family-owned wells, even if not high yielding, can also be adequate for household use, and there are huge resources available in the country. The limited water requirements for small-scale irrigation can often be met by shallow wells, so Self-supply has potential to scale up access to an improved water source. If Self-supply is combined with improved hygiene, sanitation and HWTS there will be both more water for domestic and productive use and safe water for drinking.

Annex 19 includes an article by Mr U. Heierli about experiences in other countries and strategies to scale up safe water. The article explores why it is so difficult to create awareness for safe water in developing countries, and analyzes strategies adopted in western countries at the turn of the 20th Century when massive hygiene campaigns were launched to eradicate cholera and tuberculosis. These campaigns took place after the discovery of bacteria as agents to transmit wide-spread diseases. It is clear that scaling up safe water needs common and concerted actions between public and private actors with a role division: the public sector should embark on massive and long-lasting hygiene campaigns to create awareness and induce behavior changes, whereas the private sector should be encouraged to deliver solutions for safe drinking water via supply chains that make enough profit to be sustainable.

7 Policy Environment on HWTS in Ethiopia, Action Plans

7.1 Ministry of Health (MoH)

HWTS is one of the 16 health extension packages under water quality monitoring and surveillance. Promotion and guidance of HWTS is a coordinated activity with government extension workers and kebele managers, NGO staff if any, and community members such as trained model households and community health volunteers. In addition, Health Extension Workers undertake water quality monitoring at the household level to promote HWTS as per the National Drinking Water Quality Monitoring and Surveillance Strategy.

Any WASH related activity is undertaken in line with the signed Memorandum of Understanding (MOU) among different Ministries. The Ministry works closely with different government sectors and NGOs, like PSI, which works on the promotion of market-based HWTS. One WASH National Program document is the one under which MoH is operating. The Ministry does not support free provision of HWTS to users, except under emergency/promotion condition. Products used are PUR, WuhaAgar, and Bishan Gari. The health package mentions chlorine products in general, as well as boiling. There is no preference of one product over the other, as long as the criteria “simple and low-cost” are fulfilled as a strategy. However, there is no benchmark as yet for what is “simple” and what is “low-cost”. The Ministry activities include:

- Purchase and distribute water quality test kits;
- Evaluate the progress on quarter or biannual basis;
- Identify the need and provide the chemicals (PUR, WuhaAgar) to individual sellers; seed money is provided to the sellers until the market is matured as an incentive to the business (this has been tried in Wolayita area);



- Establish links with the market and also inspection of quality of the HWTS products when needed (e.g. Bishan Gari);
- Establish a technical working group on water quality monitoring and surveillance, under which HWTS would fall. It is at the beginning stage now and an action plan is to be prepared. It involves WHO, Water and Sanitation Program (World Bank), PSI, SNV, MoWIE, Education, Finance, WaterAid, Plan, etc.

Major challenges as indicated by people interviewed (See Annex 1):

- Lack of coordination among stakeholders/lack of harmonized approaches. For example, SNV produced one manual on social marketing of sanitation and supply chain, and so did PSI;
- Lack of budget/finance;
- Inability to buy and distribute water quality test kits for the Ministry of Health to monitor the extent of the problem;
- Lack of clear department/section for HWTS in different Ministries. Mandate is also an issue for the two Ministries (MoWIE and MoH) on HWTS;
- The set targets of HWTS (77%) under the Growth and Transformation Plan (GTP) were not revised;
- Lack of centralized laboratory to certify HWTS products in the country;
- Absence of standard on HWTS products apart from chemical products such as chlorine (EHWTS Workshop report, 2013).

7.2 Ministry of Water, Irrigation and Energy (MoWIE)

HWTS is one of the activities of the MoWIE: the Water supply Directorate and Hydrology department are leading it. There is no data on the coverage of HWTS after 2011, when it was indicated as 9%. The Water Safety Plan (WSP) which includes HWTS, has been piloted in three regions by different organizations: in Oromia the German Agro Action (Arsi Negele WASH program); in Amhara by COWASH (approaches involved Kebele Water Safety Action planning); and in Tigray by Drop of Water. A Water Safety Plan is now under preparation with different partners such as WHO; the MoWIE in the lead, and the MoH. Strategy and implementation guidelines are supposed to be produced, which will become national documents. Major challenges and actions as seen by the MoWIE are as follows:

- Poor supply chain, lack of coordination among stakeholders, lack of a harmonized approach, mandate issue (between Ministry of Health and Ministry of Water);
- Lack of work structure/department in the MoWIE that works with HWTS, and hence lack of attention;
- Sometimes, there is disagreement between NGOs/other organization and private sector actors on the HWTS products (e.g. between Bishan Gari and UNICEF);
- Need to promote HWTS with Self-supply, as both can be effective if implemented together, as indicated in Self-supply implementation guideline actions. The Government of Ethiopia promotes hand washing and sanitation, and increasingly HWTS. The National Hygiene and Sanitation Strategic Action Plan (2011- 2015) states that the number of families practicing some kind of HWTS is to be increased from 8% (base year 2010) to 77% in 2015;
- A task force (the Technical Working Group) is now formed to advise on how to scale up;
- HWTS is included in Water Safety Plans.



For interviews with stakeholders, challenges, and suggestions for action, see Annex 1 and Annex 2 on Notes of the WSP, March 2014

7.3 Summary: Actions Regarding HWTS

The Technical Working Group is now developing a strategy to enhance HWTS from 8% to 77%. The WHO is organized a Training of Trainers (TOT) for key sectors on the Water Safety Plan in December 2014, which included around 25 participants.

The idea among policymakers seems to be to work closely with and through HEWs. Awareness creation on hygiene and sanitation, including HWTS, is clearly indicated in the health extension package. Sensitization, preliminary survey, training, community participation, experience exchange, demonstrations, use of local resources, coordination among key actors, M & E, etc. are all part of the strategy.

8 HWTS Options Used in Ethiopia

This section gives an overview of the most prominent HWTS products in Ethiopia: Wuha Agar, Bishan Gari, Aguatabs, PUR, Bio-sand filters, ceramic pot filters, siphon filters, Lifestraw family filters, Sawyer filters and Waryt filters. Boiling is not included and SODIS (Solar disinfection) does not appear to have taken hold. Additionally, charts are included which provide an indication of the amount of HWTS products distributed (Note: distribution does not necessarily mean use).



8.1 Water Treatment Options

Product	Description, Experience in Ethiopia
<ul style="list-style-type: none"> Liquid chlorine Water Guard Wuha Agar 	<p>Water Guard is imported. Wuha Agar is locally produced and similar to Water Guard. One 150ml bottle of liquid chlorine can be used to treat 250 gallons of water. Treats 5 gallons of water in 30 minutes.</p> <p>Advantages</p> <ul style="list-style-type: none"> Removes invisible germs like bacteria and virus Wuha Agar is locally produced and widely available <p>Disadvantages</p> <ul style="list-style-type: none"> Limited shelf life of 3-6 months Does not remove cryptosporidium, a major cause of under five child mortality Does not remove dirt/particles Most people do not like the smell/taste at first. (If well applied, the unfamiliar smell and taste fade away after some hours) <p>Price: USD 0.2 – 0.4 / bottle Wuha Agar; Cost treatment 1000 Ltr: \$0.4 – 1</p>
<ul style="list-style-type: none"> Chlorine. Tablet Aguatabs 	<p>Similar to the liquid chlorine but in a tablet</p> <p>Advantages</p> <ul style="list-style-type: none"> Longer shelf life than liquid chlorine (5 years) Small volume, easier to transport Simple to use: no need to measure Can be purchased in amounts to suit available funds, even daily Safe: will not bleach or burn Quality assured (Active ingredient USEPA & NSF certified) <p>Disadvantages</p> <ul style="list-style-type: none"> Does not remove cryptosporidium, a major cause of under five child mortality Does not remove dirt/particles Per liter treated water 2-4 times more expensive than liquid chlorine Needs to be imported <p>Price: USD 0.2 – 0.5 USD / pack 10 tablets; Cost treatment 1000 Ltr: \$1-3</p>
<ul style="list-style-type: none"> Chlorine powder PUR Bishan Gari 	<p>Similar to PUR, Bishan Gari is a powder that both disinfects water and flocculates turbidity. After flocculation the dirt can be filtered out. One sachet is for 20 liters</p> <p>Advantages</p> <ul style="list-style-type: none"> Longer shelf life than liquid chlorine Small volume, easier to transport, store Simple to use: no need to measure Can be purchased in amounts to suit available funds Bishan Gari is locally produced and low cost <p>Disadvantages</p> <ul style="list-style-type: none"> Same as other chlorine products (smell, taste) PUR has to be imported <p>PUR Price: USD 0.1 - 0.2 /Sachet; Cost treatment 1000 Ltr: \$5-10 Bishan Gari Price: USD 0.05-0.10/Sachet; Cost treatment 1000 Ltr: \$3 - 5</p>
<p>Biosand filter. CAWST model</p> 	<p>The biosand filter removes dirt/particles and removes 80-99% of bacteria and protozoa. Treats 10-30 liters/hr. More information: http://www.cawst.org/en/resources/biosand-filter</p> <p>Advantages</p> <ul style="list-style-type: none"> Removes turbidity Has high filter volume Can, after training, be locally produced <p>Disadvantages</p> <ul style="list-style-type: none"> Takes 10 to 14 days before a biofilm has developed The bacteria removal is low compared to other HWTS options Large and heavy, so difficult to make it a commercial “off the shelf” product <p>Price: USD \$15-25 materials, labor; Cost treatment 1000 Ltr: \$1-2</p>



<p>Biosand filter: Desert Rose model</p> 	<p>The Desert Rose version of biosand filter has the same principle as CAWST model but is round, made of metal. Treats 15–40 liters/hr. More information: http://desertroseinnovation.com/sandstorm-resources/</p> <p>Advantages</p> <ul style="list-style-type: none"> • Cheaper in materials and easier to produce than the cement version • Higher filtering speed than the CAWST model • Can, after training, be locally produced <p>Disadvantages</p> <ul style="list-style-type: none"> • Similar limitation as other biosand filters • Not yet widely known and used • Large and heavy, so difficult to make it a commercial “off the shelf” product <p>Price: USD \$10-15 for materials, labor; Cost treatment 1000 Ltr: \$0.5-1.5</p>
<p>Ceramic pot filter: SMS model</p>  	<p>A ceramic pot filter consists of a plastic container and a pot-shaped filter element that is treated with colloidal silver. It removes turbidity and 97-99.98% of bacteria and protozoa. Treats 1–3 ltrs/ hour. Lifetime of filter element: 1–5 years. Developed and promoted by the NGO Potters for Peace; now produced in 25 countries world-wide and used by an estimated 5 million people. In 2010 this filter model was introduced in Ethiopia by the company SMS, supported by Engineers without Borders from Canada.</p> <p>Advantages</p> <ul style="list-style-type: none"> • Simple, people understand how it functions, and people like ceramic • Can be produced with local available materials (silver imported) <p>Disadvantages</p> <ul style="list-style-type: none"> • The bacteria removal is low compared to candle filters • Large, difficult to make it a commercial “off the shelf” product <p>Price: USD \$20-30/filter; filter element \$8-12; Cost treatment 1000 Ltr: \$1.5- 3</p>
<p>Tulip Siphon filter</p> 	<p>This filter consists of a hose with a bulb and a filter element of diatomaceous earth, treated with colloidal silver. It removes all turbidity and 99.995% of bacteria and protozoa. Treats 3-5 ltrs/hour. Lifetime of element: 1-2 yrs (7000 ltrs). More information:</p> <p>Advantages</p> <ul style="list-style-type: none"> • It is small so easy to transport and store in shops • High filter efficiency compared to pot filters • A large sales network in Ethiopia (over 80 sales agencies) <p>Disadvantages</p> <ul style="list-style-type: none"> • Relatively complicated to clean the filter element • Requires 2 buckets, one of which is sealed for safe storage • The filter has to be imported <p>Price: USD \$20 – 25; filter element \$7–10; Cost treatment 1000 Ltr: \$1- 1.5</p>
<p>Sawyer Filter</p> 	<p>The Sawyer Filter consists of a hose, membrane filter element, and a syringe for backwashing. The Point One model removes all turbidity and 99.999% of bacteria and protozoa. Treats 10-20 ltrs / hour. Lifetime: 1 million ltrs treated. Introduced in Ethiopia in 2013 and some 3000 have been sold until now to NGOs. For more information, email admasutesfaye@yahoo.com.</p> <p>Advantages</p> <ul style="list-style-type: none"> • Small, so easy to transport and easy to store in shops • High filter efficiency compared to the Siphon filter • The Point Zero One model also removes log 4 virus • High filter capacity <p>Disadvantages</p> <ul style="list-style-type: none"> • Relatively complicated to clean the filter element • Requires two buckets, one of which is sealed for safe storage • High cost compared to the Siphon filter • When the filter is broken, the whole filter has to be replaced (not fixed) <p>Price: USD \$50-60; Cost treatment 1000 Ltr: \$1-2</p>



LifeStraw Family



The LifeStraw Family filter consists of a 2-liter tank, hose, membrane filter element and a backwash bulb. This model removes all turbidity and 99.999% of bacteria and 99.99 % of all viruses. Treats 6-10 ltrs / hour Lifetime: 17,000 ltrs. Produced by Vestergaard Frandsen; introduced in Ethiopia around 2010. When sold at commercial price of \$50, did not take off. More information: <http://www.vestergaard.com/our-products/lifestraw>

Advantages

- Small, so easy to transport and easy to store in shops
- High filter efficiency compared to the Siphon filter
- Reduces log 4 virus
- High filter capacity

Disadvantages

- Relatively complicated to clean the filter element
- Requires a bucket sealed for safe storage
- High cost compared to the Siphon filter
- When the filter is broken the whole filter has to be replaced

Price: USD \$40-50; Cost treatment 1000 Ltr: \$1.5- 3

Tabletop filters: Asian models



This and other types of tabletop filters consist of a dirty water and safe water container with a tap, a ceramic or diatomaceous filter element. Depending on quality, they remove turbidity and 99-99.99% of bacteria. Treats 1-3 ltrs/hour. Lifetime of filter element: 6-12 months

Advantages

- They are nice looking, attractive filters
- Some models have an additional block with minerals claiming to improve taste
- High filter efficiency compared to pot filters

Disadvantages

- High cost compared to the Siphon filter and pot filter
- Has to be imported
- Not large supply chain developed yet, no spares available

Price: USD \$40-100; Cost treatment 1000 Ltr: \$2- 5

Waryt Filter



These filters combine a tabletop filter with a heater and/or cooler so one can tap warm/cold filtered water. Depending on the quality, they remove turbidity and bacteria. These models are mostly used in offices, but households can use them

Advantages

- Nice-looking, attractive filters
- Combination with cold water is very attractive
- Some models have an additional block with minerals claiming to improve taste

Disadvantages

- High initial cost
- Has to be imported
- Not large supply chain developed yet

Price: USD \$200-500; Cost treatment 1000 Ltr: \$5-10

Waryt Filter Can



This filter model is for small quantities of water; removes turbidity and some bacteria.

Advantages

- Nice-looking, attractive filters
- Simple to use
- Has a block with minerals claiming to improve taste
- High filter efficiency compared to pot filters

Disadvantages

- High cost compared to the Siphon filter and pot filter
- Small water storage
- Has to be imported
- Not large supply chain developed yet, no spares available

Price: USD \$25- 40; Cost treatment 1000 Ltr: \$5- 10



8.2 Safe Storage Containers

Regarding storage, a major part of the rural population collects and stores water in 20 liter jerry cans. Storage is only safe if the container is filled with safe water, if it is cleaned and if it has a lid. Taking out water should go without touching it by hands or other contamination sources. The % of people who practice safe storage are estimated to be between 10% and 20%. In areas with WASH activities and where MWA organizations are active it is around 30%.

Type of container	Description
20-Liter Jerry can 	<p>This is the most common used transport and storage option in Ethiopia</p> <p>Advantages</p> <ul style="list-style-type: none"> • Lightweight • Strong, has handle which makes it easy to carry or affix to a donkey • Has small opening at the top that is covered with a lid so not easy to get in with hands • If combined with a tap it is a safe storage container <p>Disadvantages</p> <ul style="list-style-type: none"> • Difficult to clean due to the small opening • More expensive than other options <p>Price indication: USD \$10-20</p>
Ceramic (clay) pot 	<p>This is a more traditional option for storage, volumes of 5-20 liters</p> <p>Advantages</p> <ul style="list-style-type: none"> • Locally produced with clay • Low cost compared to the plastic jerry can • The ceramic cools the water by evaporation • If it has a small opening at the top and is covered with a lid, or if combined with a tap it is a safe storage container <p>Disadvantages</p> <ul style="list-style-type: none"> • More easy to break than plastic • Less easy to clean than a similar plastic pot (rough surface) <p>Price indication: USD \$ 3-10</p>
Plastic bucket with tap 	<p>This is a simple method for safe storage</p> <p>Advantages</p> <ul style="list-style-type: none"> • Lightweight • Easy to clean • Cheaper than the jerry can • If combined with a tap it is a safe storage container <p>Disadvantages</p> <ul style="list-style-type: none"> • Opens at the top, so easier (for children) to get in with hands • More difficult to use for water collection, especially when it has a tap • Less strong than a jerry can <p>Price indication: USD \$5-12</p>
Concrete Container 	<p>This is a locally-produced storage tank</p> <p>Advantages</p> <ul style="list-style-type: none"> • It is cheaper per volume than the jerry can • If combined with a tap it is a safe storage container • Can be made with local materials (cement) • Water stays cool compared to plastic (because of evaporation) • Has a heavy lid so not easy for children to get in with the hands <p>Disadvantages</p> <ul style="list-style-type: none"> • It is heavy so more difficult to transport, needs a strong stand • Not suitable for water collection • It needs training to produce • More difficult to clean, rough inside <p>Price indication: USD \$ 15-20</p>



8.3 Distributed HWTS Chemicals by PSI and Bishan Gari

Distributed HWTS chemicals by PSI & Bishan Gari					
	Year	WuhaAgar (Bottle)	PUR (Sachet)	Bishan Gari (Sachet)	Remark
PSI	2007	2,923,465	7,211,303		PSI 2012
	2008	2,659,394	6,476,290		
	2009	2,798,124	11,489,715		
	2010	2,619,054	8,856,621		
	2011	1,520,806	16,972,225		
	2012	2,098,012	5,664,458		
	2013 & mid 2014	3,381,145	23,329,388		Personal communicatio with PSI
	Total	18,000,000	80,000,000		
Bishan Gari	Beginning to Now			300 Million	

8.4 Indication of HWTS Options Disseminated in Ethiopia

	Number of Units	Number of Users	% of total population
Boiling ³	NA	3-5 million	4-6%
Wuha Agar ⁴	18 million	2-3 million	2-3%
PUR	80 million	0.3-0.5 million	0.5%
Bishan Gari	300 million	1-2 million	1-2%
Aquatabs ⁴	Unknown	Unknown	~0.1%
Ceramic pot filter	1,000	6,000	
Biosand filters	22,000	130,000	0.2%
Life Straw Family Filter ⁴	1,000 ³	6,000 ³	
Sawyer Filter ⁴	3,000	20,000	
Tulip Siphon Filter ⁴	150,000	900,000	1%
Water filters (Korean King, Waryt filters, 2 models) ³	2,000	50,000	0.1%
Total HWTS		7-12 million	10-13%
Safe Water Storage	~1-2 million	~5-10 million	~10-30%

Table 1 Numbers are based on information obtained from producers/sales companies of HWTS options interviewed. Number of users of household filters based on 6 people per (rural) family

³ Numbers are based on information obtained from interviews

⁴ Product tested by a national laboratory, approved by the Ethiopian Standards Agency (Notes WHO meeting Feb 2013)



Tulip Siphon Filters: Mixed Results

*The most common water filter in Ethiopia is the Tulip Siphon filter of which over 150.000 have been sold and disseminated in the last 3 years. Experiences with this filter model are mixed. A user survey done by Welt Hunger Hilfe in the Dhas area indicates that **0% of the filters** are being used.*



*Another user survey done in September 2014 in the district Teltele indicates that **100% of the filters** are being used. A reason for this difference is, among others, that in Teltele the water sources were very turbid and no nearby alternative sources were available, thereby creating a need for water treatment, especially with visible results.*

1.

Installation of Siphon Filter

In Dhas, water sources had clear water, so did not feel the need to filter the water. Another difference seems the training. In Teltele there was a good training explaining the function of the filter and how to maintain it.



Water Source in Teltele

9 Promising New HWT options

There are several options that are not yet used in Ethiopia but have the potential to be introduced and scaled up in the country. These options include:

1. **Water kiosk:** Safe water delivery via kiosk or with home water delivery. People are willing to pay extra if safe water is delivered to their homes. A promising and cost effective model is Spring Health in India. www.springhealth.co.in/
2. **WATA:** Locally decentralized chlorine production with WATA devices that produce chlorine through electrolysis from water and salt. WATA technology is integrated in development programs through WATASOL. This approach aims to make the production and sale of chlorine a profitable activity for small businesses in communities in developing countries. The Flask with chlorine can be sold to households, health centers, pharmacies, churches, grocery stores and kiosks. Projects are on-going in Guinea-Conakry, India, the Democratic Republic of Congo, Pakistan, and Ebola-affected areas. <http://www.antenna.ch/en/research/safe-water/watasol-approach>



The chlorine used for this water system was produced from a WATA generator



3. **Chlorine dispensers:** Chlorine dispensers are installed at a borehole with a hand pump or other tap points. People collecting water can add a few drops of chlorine in their water container to purify the water and

avoid recontamination. After successful pilots, chlorine dispensers are now used in Kenya, Uganda, and Malawi. www.evidenceaction.org/dispensers/



Chlorine dispenser at a water kiosk of in Kisumu, Kenya



Chlorine dispenser at a water point in Uganda

4. **Silver products:** A product that can become an alternative for liquid chlorine is SilverDyne. This is natural silver used for over 20 years in Mexico, where it is widely available in pharmacies and used for water purification, washing vegetables, etc. <https://wearecleanwater.com/silverdyne/>



5. A safe storage option is the combination of **ceramic and silver**. One such product is **Plation**, a silver-coated ceramic ball that is placed in a container. It avoids recontamination by leaching out very little silver (below WHO standards) into the water.



Plation used in a container

Tulip Addis may introduce this option. http://akvopedia.org/wiki/Plation_float

6. **Tulip tabletop Filter:** A low-cost tabletop filter model will be launched in 2015. It will be assembled locally using a filter element like the one used in the Tulip Siphon filter, imported from India.



Simple tabletop filter as produced in Malawi

Other parts such as the plastic containers will be produced in Ethiopia. The difference between the tabletop and the Siphon model is that is it simpler to use (no backwash system) and includes two containers, one for dirty water and one for clean water. It has a lower flow rate, but the production of 30-40 liters per day is still enough for most families. The expected price for this model will be USD \$20-25.



10 Efficiency of HWT Options, WHO Norms, Scaling Up

The efficiency of HWT in reducing diseases depends on aspects like: adherence/consistency of use; efficiency of a HWT product in removing pathogens; and hygiene.

10.1 Adherence

A recent study (J. Brown & T. Clasen, 2013) indicates that if a treatment option is not used 100% of the time, the effect in reducing water borne diseases is almost zero. When and where water is an important source of pathogen exposure, water quality interventions can reduce exposure to pathogens and result in improved health. Our results suggest, however, that the potential health gains are reduced sharply with even occasional consumption of untreated drinking water. Our results are consistent with the findings of a similar QMRA analysis by Hunter et al, 2009. This study concluded that the health benefits of improved quality drinking water (as delivered by centralised treatment and distribution) were limited if even a small percentage of overall water consumed was of lower quality, for example during interruptions of service in piped water supply or when the alternative drinking-water source was surface water. Hunter et al. concluded as we have that the overall risk attributable to drinking water is controlled by those periods of higher exposure risk when no quality protection is in place, reducing overall impacts of water quality improvements significantly if the intervention is not present a high percentage of the time. A decline in adherence from 100% to 90% reduces predicted health gains by up to 96%, with sharpest declines when pre-treatment water quality is of higher risk.

In conclusion, a high adherence of HWT is essential to realize potential health gains.

In Ethiopia and other countries there seems to be a low adherence of HWTS products. For chlorine products, barriers seem to be taste and smell. People do not like to add a chemical to their drinking water. Also, for less educated people it maybe complicated in use the chemical needs to be added daily. For the poorest families money is not always available or there is no priority to buy a new bottle. Filters sometimes have a low adherence such as the Life straw family, Sawyer and siphon filters. Reasons seem to be the relative complexity to use and/or clean/backwash the filter. Experiences in Ethiopia with the siphon filter model are adherences ranging from 0% to 100%. In one project where families had water sources with clear water, adherence was 0%; while in another areas where people only had access to dirty, brown water the adherence was 100%. The high adherence in the last project was also due to a good training and follow up. For more information see Annex 6 and Annex 8.

In general for a consistent use, the HWT option should be attractive both aesthetically and in terms of cost, and simple to use. All types of HWT should also be combined with information/education on hygiene and use of the product.

10.2 Efficiency of HWT products, WHO Standards

The pathogens in water can be divided into protozoa, bacteria, and virus. To measure the efficiency of HWT products, the WHO has developed three targets with indicators. Log 10 reduction indicates the numbers of 9. For example Log 4 reduction is 99.99%.



Performance specification of Household Water Treatment products

Target	Log 10 reduction required: Bacteria	Log 10 reduction required: Viruses	Log 10 reduction required: Protozoa
1 Highly protective	4	5	4
2 Protective	2	3	2
3 Interim protection *			

* Achieves “protective” targets for 2 out of 3 classes of pathogens and results in health gains. (Interim protection should meet 2 out of the 3 targets)

Source: Evaluating Household Water Treatment Options. ISBN 978 924154822 9. WHO 2011

Water filters like Pureit, Life straw Family and Sawyer claim to reach Target 1 or Target 2. Chlorine eliminates bacteria and virus but does not eliminate protozoa like cryptosporidium (Crypto is world-wide the number 2 “baby killer” (GEMS Study, 2013), so seems to be a Target 3 product.) Siphon filters and some tabletop filters remove Log 4 of the Bacteria and Protozoa but have a low virus reduction so are a Target 3 option. Most Biosand filters and some ceramic pot filters do not reach the Target 3 but could be used in combination with chlorine or boiling. At this moment 10 HWT products, including filters, are being tested in WHO-certified labs, and results will be public beginning 2015.

The efficiency of all HWT products depends on hygiene. For instance, an efficient tabletop filter is not effective if the container to store the filtered water is not clean. Therefore, with the dissemination of HWT products, hygiene awareness is essential.

10.3 HWT Products, Potential for Scaling Up

To scale up the commercial sales of HWT there are 4 Ps of marketing (Promotion, Product, Price, Place) and the publication “Marketing safe water” of U.Heierli includes the fifth P, People. Commercial market potential depends on cost but maybe more on how attractive a product is. Household Water Treatment products can be divided into:

- Additives like chlorine products
- Filters like biosand filters, pot filters, candle filters membrane filters
- Others like boiling, UV treatment

10.3.1 Chlorine Products

The supply chain of the three chlorine products is best developed and available in pharmacies in cities and towns in Ethiopia. One limitation is the taste/smell of chlorine, and another is the awareness that it is a chemical. However, people will use it when there is a threat of disease like cholera. Free distribution can help to create awareness but consistent use is still a challenge. In certain projects, only 5 to 10% of the families who received free chlorine products bought it themselves after the free gifts stopped (PSI, 2014). An advantage of chlorine products is the low cost, and the relative ease of stimulating it with subsidies and low cost is attractive. A study in Kenya indicated that only 35% of the sample households bought WaterGuard when it was the full market price, but 67% bought it when it was offered with 50% subsidies (Blum, 2014).

10.3.2 Filters

Examples in other countries of options that have proven to be attractive and which are commercially sold in large numbers are tabletop filters in Asia of different brands (100-200 million filters sold); Stefani filters in Brazil which cost 40-100 USD apiece, (10-20 million sold), Pureit



filters in India for 25-80 USD (5 million sold); ceramic pot filters in Cambodia for 40 USD (300,000 sold); NAZAVA tabletop filters in Indonesia for 20- 50 USD (35,000 sold).

In the last four years new low-cost filters have entered the market in Ethiopia, such as pot filters, Life straw family filter, Sawyer filters and Siphon filters with prices of 25-50 USD. The number of sales points for filters countrywide is now around 100. According to the interviews we conducted, the numbers of filters disseminated are as follows: 150,000 Tulip siphon filters, 22,000 Biosand filters, 1000 Life straw family filters, 3000 Sawyer filters and 1000 ceramic pot filters. The production of ceramic pot filters started last year in Ethiopia by SMS, and Tulip Addis will start with a low cost tabletop filter similar to NAZAVA filter models. In Ethiopia, almost all filters have been sold to NGOs and local governments who mostly give filters for free to special target groups. However, some 15,000 filters, mostly siphon filters, were sold to private families, indicating that a) there is a market; b) fewer poor families seem willing to pay 20-40 USD for a good water filter. For the poorest families, a low cost 20 USD filter is still too expensive.

10.3.3 Boiling, SODIS

The most used HWT option is boiling which does not eliminate turbidity but is very effective in eliminating virus and bacteria. Even heating till 70 degrees is enough to eliminate Pathogens. There are Disadvantages to boiling like indoor pollution, cost of fuel, emission of CO₂, change of taste, dangerous for children, takes time to cool before it can be consumed, recontamination if stored in unsafe storage container.

Another treatment option is UV disinfection with the SODIS method which is a low cost option. Besides specific circumstances like refugee camps, this options does not seem to take off in Ethiopia or other countries. Reasons include; not user-friendly, need many bottles in the rainy season, looks like a “poor man solution”, does not reduce turbidity, is not a business model (nobody makes money with it).

10.3.4 Safe Storage

Unless water is supplied to the house through a piped connection, the common practice in Ethiopia, particularly in rural areas is to collect water from protected or unprotected sources, transporting it to home and storing at home until it is consumed. Containers used for transporting are also used to store water at home. Jerry cans of various storage capacity (3- 25 liters) are used to transport and store water. Children usually use 3- 10 liter jerry can to transport water, while adults usually carry a 20 liter jerry can. The majority of jerry cans were not produced for water transportation and storage, but for oils, usually edible oil. Clay pots are the traditional containers both for transportation and storage. The size depends on the carrying capacity of a person. Though both males and females transport water, it is not common for a male to carry water in clay pot; this may be attributed to its design, which is not convenient to put on the shoulder. Only if the jerry can is filled with safe water and if the water is taken out by pouring or a long spoon can this option be considered safe. If the water source is contaminated or water is taken out with a cup, this is not safe storage.



Child with jerry can



Woman with jerry can



Woman carrying clay pot

10.4 What Do People Like and What HWT Options Have the Potential to Scale Up?

Of the filters and chlorine products, filters seem to be preferred and have the most potential to scale up. This is in line with the opinion of HWT specialist Paul Hunter, who said, “With the current available evidence, ceramic filters are the most effective form of HWTs in the long-term. Disinfection-only interventions appear to have poor, if any, long-term public health impact. (School of Medicine, University of East Anglia, Norwich, UK, ES&T, 2009).

The adherence of filters can be high for instance in Southern Ethiopia, where the siphon filter has 100% adherence. This was also because the only water source was a pond with dirty brown water and by using the filter the water became clear and clean. Of the different filter models people seem to like the simple tabletop models, (dirty water in, clean water out from a tap, simple to clean.) One example is Cambodia. There, the nice looking pot, called the Tunsai filter, is 10 USD more expensive than the simple pot filter, but commercial sales now are 70% higher than the low cost model (Perspectives, 2013). Ecofiltro in Guatemala has similar experiences and sold over 170,000 filters in the last few years. The NAZAVA models also seem to be attractive as mentioned before. They sell a range of siphon and locally produced, nice looking water filters including low cost options of 20 USD. The sales are doubling each year, with 60% of the filters sold to families and 40% to organizations.

10.4.1 When will people invest in HWT?

To convince people to treat their water, awareness is needed for themes like: diseases caused by unsafe water; the fact that clear water can contain germs; health-related costs of unsafe water; etc. However, to convince people to invest in HWT it has been proven that health is not a strong motivator (Heierli, Scaling up Safe Water). Ideas that convince families to invest are: aspiration, peer pressure, social status, economic benefit, trust in the product, the benefit for the baby, etc. In all cases, it is essential that products (and spare parts in the case of filters) include affordable options and are available nearby. For more information on how to scale up HWT, see Annex 19.



10.4.2 How to reach the poorest?

A major challenge is how to reach the poorest. There are interesting examples in which they have been reached, such as ORS, or oral rehydration solutions that were promoted in Bangladesh by BRAC in a spectacular campaign of door-to-door persuasion, reaching 10 million homes. Another example is malaria bednet distribution, which brings up a conflict between the advocates of social marketing versus free gift approaches. A wise conclusion is to mix the two in a smart way: in the case of filters use free or highly subsidized filters to reach a high initial coverage, but set up supply chains through a rural retail network to guarantee the spare parts and replacement needs.

10.4.3 Funding to scale up HWTS

One option to generate funds to scale up HWT is carbon credits. The logic is as follows: if a family uses a treatment like chlorine or a filter they do not need to boil water. This avoids the use of fuel and so reduces carbon emissions. Even if people now do not boil water, by using a HWT they do not need to do this in the future so is still considered a reduction (suppressed demand). The amount of carbon emission reduction can be verified with good monitoring of families using a HWT. Then carbon credits can be generated. The International Network on Household Water Treatment and Safe Storage recently hosted a webinar on this topic and the proceedings are available at: http://waterinstitute.unc.edu/hwts/events/2012_webinar1. In addition, 300in6 has a video on this topic and sponsored a report on carbon finance, available at: <http://300in6.org/documents/>. Aqua for All believes that Tulip Addis is starting a carbon credit program with partners. Funds come from companies who are interested to combine social projects and carbon credits. (With filtering water instead of boiling, CO2 emission is reduced.)

Much of the aid that Ethiopia receives is discretely allocated to specific programs rather than pooled for use by the MoH thus making it challenging to find support for HWTS. As a result, HWTS needs to be integrated within a broader health program. The One WASH program of the government has a planned a budget of 2.5 Billion USD for WASH to 2020 with about 50% from the government and 50% is expected from donors (Kebede Gerba, pers. comm). Some 400 million USD is said to have been promised by donors. However, while HWTS is recognized in the One WASH program there do not yet seem to be substantial activities planned and budgeted in the program.

Several NGOs now invest in HWTS and/or health projects or have funds for dissemination of Chlorine products or filters in cases of emergency. By coordinating actions, part of these funds could be used to support awareness at the regional or national level.

Smart subsidies can be used to subsidize products with less distortion of markets. Members of vulnerable groups could be identified, located and provided with financial assistance (in the form of vouchers or cash transfers) to purchase HWTS products. Such an approach is not without its challenges. For example, an informal market for vouchers may develop in which recipients trade or sell them for other products of higher perceived value.



10.4.4 Ideas for payment

One of the findings in this study is that if families say that they can pay for a filter in small portions of example 1 to 5 USD month, they would consider buying a filter. Since amounts of 20 to 50 USD are in general too small for conventional micro credits schemes, alternatives need to be investigated. One option could be group credits. A group of 10 families for instance who all want a filter of 20 USD may get a credit of 200 USD, with one family being responsible. Another option could be payment with mobile phones like the MPESA system in Kenya. Investigation in other options is needed, like the consumer credits from micro-finance institutions, which were successful in India (POUZN Project, 2010), although some local players remain dubious of the business case.

An option to disseminate filters in rural areas could be a hybrid business model. An example is Ecofiltro, an award winning firm producing ceramic pot filters in Guatemala. Via sales points/shops they sell 40 USD filters to rural families, but these families can pay in 4 instalments. The cost and risk of this system is paid by urban families who have bought the filter in one instalment. The higher profit margin in the urban areas compensate for the lower profit margins in the rural areas.

11 Findings, Conclusions, Opportunities

11.1 Findings

11.1.1 Water source

All water sources in Ethiopia carry substantial risks of contamination, including urban piped water supplies and protected rural water supplies. These sources are associated with considerable risks due to contamination of supplies where service is irregular or due to contamination between the source and point of use. Risks are even higher where households rely on poorly protected (including much self-supply) or unprotected water sources. It may be useful to distinguish between different segments or markets for HWT products such as 1) urban piped water supplies, 2) protected rural water supplies, 3) households with self-supply and 4) households collecting water from unprotected sources.

Major reasons of source contamination of (open) wells are:

1. The extraction of water with a bucket. If the bucket is dirty it will contaminate the well.
2. Water leaking back into the well due to a broken well cover or lack of a well cover. Of wells that have a well cover and pump, many well covers are leaking so water leaks back into the well causing recontamination.
3. Nearby latrines or other surface contamination sources

It is relatively simple to turn an open well into an improved water source and improve the water quality. Experiences in other countries indicate that just a hand pump on an open well improves water quality by 60% as compared to extracting with a rope and bucket (Gorter, 1995). Of course combining a hand pump with a well cover and a good apron will even improve water quality more. Water collected at improved water sources like standpoints, gravity systems, piped systems, etc. is often re-contaminated in transport or unsafe storage at the household level.

11.1.2 Awareness

Despite campaigns for hygiene and HWTS and explanation of health benefits, few Ethiopian households currently treat their drinking water appropriately. An indication of levels of uptake by the population is boiling (6%) chlorine products (3%) and filters (1%). Reasons for these low



figures include: a) people are not aware of the diseases that can be caused by unsafe water and hence high cost of unsafe water. Awareness is gradual as it is related to human behavior; it should be a continuous process; people are much more aware of the health benefit of HWTS when there is an outbreak of disease; b) the perception that clear water is safe to drink and that water from boreholes or tap points is safe or already treated, so there is no need to treat it at the household level.

11.1.3 Supply chains

To build up supply chains there needs to be a demand, a market. Communities are sensitive toward cost and quality. The experience in Ethiopia is that for different products communities are suspicious about the quality and effectiveness. HWTS product demand creation is affected by bad experiences with promotions of other products in rural areas like agricultural inputs. Contrary to this there are products that communities simply copy from another and use them without intensive promotion.

11.1.4 Enabling environment

While scaling up the use of HWTS to 77% by the end of 2015 seems overambitious, it is positive that there is a recognized target. While there is a target however, HWT is not reflected adequately in current health monitoring systems, so there is no mechanism to track uptake. Policy is there, but the translation to action and probably funds to realise it is lagging behind. At a HWTS workshop in 2013 in Addis Ababa organized by WHO and the government, it was proposed to form a HWTS task force to advice on how to scale. After a delay this idea was taken up again. There are general business constraints that affect HWT since the private sector is expected to lead production and marketing of products. HWT producers/sales companies see the limited availability of forex, the import tax and VAT as bottlenecks. (Annex 1)

11.2 Conclusions

There is an ongoing discussion on how efficient HWT options are. A recent study indicates that if a treatment option is not used all the time, the effect in reducing water borne diseases is almost zero (Brown, 2013). The free dissemination of chlorine or a filter does not mean that people will use it all the time or buy it themselves after the donations stop. Reasons that there is no sustained use are bad taste, smell, not always money available, and complicated to use, no nearby availability of spare parts, and other reasons. Ongoing awareness and follow-up training on use is essential with filter options. Other conclusions:

- The most common HWT option, boiling, is effective but has obvious disadvantages like cost of fuel, deforestation, indoor pollution, CO₂ emission, etc.
- The second most common HWT option, chlorine products, is technically effective but seems to have a low adherence (consistent use). People will use it when they get it for free and when there is a threat of diseases, but only 5 to 10% of the families buy it after the gifts stop (PSI, 2014).
- In general, the most promising (effective and attractive) HWTS options seem to be:
 1. Point of Tap treatment (e.g. chlorine dispensers at tap points)
 2. Household water filters (e.g. a range of effective and user friendly filters)
 3. Silver ceramic for safe storage



Conditions to scale up these promising options are: nationwide awareness on the social and economic benefits of HWTS and a nation-wide supply chain with a basket of effective and attractive HWTS options so families can choose.
For the poorest some kind of support is needed.

11.3 Opportunities

- Ethiopia has a very ambitious goal to scale up use of HWTS to 77% by the end of 2015 and this high ambition provides a good starting point.
- A good development is that HWTS is now included in health strategy (Ministry of Health) and in the strategy of some other ministries (e.g. MoWIE's self-supply policy).
- HWTS is being promoted within working groups such as those on water safety planning and self-supply. There is also potential to build on progress being made in sanitation marketing, which may have many similar characteristics.
- There now are WHO product standards so both organizations and customers can trust existing and new products which comply with one of the 3 WHO product standards.
- There is an increasing awareness among policy makers and NGOs about the limitations of all kinds of water supply in delivering safe water (including contamination before consumption) and the possible role of HWTS in reducing risks
- There are lessons learned from other countries both on what products are effective, attractive and affordable, and approaches for scaling up.
- HWTS was mentioned in the One WASH program, and that program is attracting considerable funds

12 Recommendations

1. Improvements at the source
 - Upgrade open wells into an improved water source by installing a simple hand pump. This can improve water quality by 60% as compared to extracting with a rope and bucket (Gorter, 1995).
 - If families have more funds they can also install a well cover and hygienic seal.
 - Start a national campaign like, "Turn each well into an improved water source" and, "Everything is better than a rope and bucket."
At decentralized level: i.e. make in each kebele and /or village a demonstration of simple, low cost options to upgrade existing wells and to make new low cost wells.
 - At national level: create a WASH knowledge center where a range of useful and affordable WASH self-supply solutions are demonstrated, including all HWTS options. This center can have the capacity of training NGOs, government, local private sector and others in the production and repairs of technologies but also aspects like quality control, marketing, and business skills.
 - Use experiences of WASH centers like the SMART Centers in Tanzania and Malawi. These have some 20 self-supply technologies including well deepening, manual well drilling, aquifer recharge, EMAS pump and rope pumps, well reducer rings, well covers, hygienic seals, water storage tanks, water filters, zero cement latrines, plastic latrine seats, hand washing ideas, etc.
 - HWTS in Schools: Schools could become promoters of HWTS. Lessons on water borne diseases and low cost options for treatment could be conducted in schools. By



installing household water filters in schools and making sure they are functioning, the schools could become a demonstration and marketing place for these products because children may take home the message to their parents.

2. Awareness on need for HWTS; demand creation

Aspects in scale up of HWTS include: awareness/demand creation, supply chain, and enabling environment. Increasing awareness can be done at the family level on diseases which can be disseminated by unsafe water, lack of hygiene, the danger of recontamination, the fact that clear water can have harmful bacteria, etc. Ideas to increase awareness include:

- Blue bus campaigns, (see example of Nicaragua)
- CHC (Community Health Clubs); the approach of the organization Africa Ahead similar to the “Community Health army”
- Publicity on radio, television, theater
- Idea surrounding the Football for Water program (see program in Kenya)
- Use famous artist, singer, sports hero, high profile community leaders
- Do pilots with Household filters in schools to see if this way of marketing is effective.

3. Awareness on existence of HWTS options

- Increase knowledge of policy makers, government officials, donors about existing and new HWTS options by means of national or regional short HWTS training days
- These training can include information about the functioning, the use, the maintenance, properties and advantages and disadvantages of each product and can take place in WASH centers.

4. Convince people to invest in HWTS

Arguments of health do not move people to buy treatment products. Major drivers for families to invest in for instance a water filter are peer pressure, social status, aspiration, trust.

- Trust: In the case of chlorine or other additives, all packages should have standardized and simple information on contents and indication of the efficiency in removing % of bacteria, viruses, protozoa.
- On both chlorine and filters an indication if the product complies with one of the 3 WHO norms (Highly protective, Protective, Interim protective)

Products not complying with a WHO norm like Biosand filters could be combined with chlorine and be allowed for dissemination since it is proven that they have a positive effect on reducing water-borne diseases. (UNICEF Cambodia) If all products have information as mentioned above the consumer can make the decision as to which treatment to buy.

5. Supply chain

To build up supply chains, recommendations are:

- A supply (sales point or other option) in each town and village
- Start with sales points in urban areas in the first years, commercial pharmacies, local shops, and government infrastructure (e.g. clinics, mother and child care, hospital, pharmacies). This approach is likely to achieve economies of scale, critical masses



and so ensure sustainable supply chains. Promotional messages tend to trickle into rural areas so HWTS products become known and demand in rural areas is created.

- NGOs, government can support local production of filters by buying local products. There are existing productions of bio sand filters and ceramic pot filters and a local production of tabletop filters is planned by the company Tulip Addis. Examples of successful marketing can be learned from Cambodia/ IDE.
- In case of donations NGOs, health clinics etc. should not give the filter themselves but give a voucher. With this voucher one can go to the local supplier and get a filter. This allows families to choose products they want which may encourage more sustained use. Another option can be that the voucher has a certain value, e.g. 10 USD. With this a family can go to the local supplier and choose. Or use it for chlorine or choose a filter. If they choose a filter of \$15 they pay \$5 extra. If they choose a \$30 filter they pay \$20 extra
- Increase range of filters so families have choices. An example of a successful approach with a range of different water filters is NAZAVA in Indonesia
- Stimulate the introduction of promising new low cost options like the chlorine dispenser for point of tap treatment or the chlorine generator like Watasol for decentralized chlorine production with salt and water. This can be useful for hospitals and emergencies, as is now being proven in the Ebola affected areas.
- Other promising “new” products are the silver brick, SMS ceramic pot filter, the Sawyer membrane filter, and the Tulip tabletop filter.

6. Enabling environment

- Develop a national action plan on HWTS
- Host consultative meetings with stakeholders to discuss key priorities in scaling up HWTS.
- Select the highest priority actions identified during the consultations and from the list of recommendations and include them in the national action plan.
- Mobilize financial resources from stakeholders.
- Develop a strategy to disseminate HWTS through maternal health services
- Integrate HWTS into the guidelines for HIV/AIDS.
- Consider a protocol for HWTS in emergency situations like floods.
- For really poor include it in health programs

7. Institutional environment

Harmonize existing policies and address the following:

- Issue a policy directive and public statement through the print and broadcast media that HWTS is not only an emergency intervention, but an essential, routine and recommended practice to improve drinking water quality in all cases where there is no guarantee of a continuous supply of safe water in both rural and urban areas.
- Monitor and evaluate HWTS programs and develop guidelines for the implementation of HWTS using the toolkit for monitoring and evaluating HWTS programs (WHO & UNICEF, 2012).
- Consider to only allow HWT products which comply with the 3 performance tiers recommended by the WHO. These tiers are 1) Highly protective, 2) Protective, and 3) Limited protection (WHO, 2012)
- Products that do not comply with the lowest tier, Limited protection, (like ceramic pot filters or biosand filters) should be stimulated to either improve the efficiency or be combined with a disinfectant like chlorine.



- Consider mandating that all HWTS products are tested by one of the laboratories recognized by the WHO. Then there is less need to test again in national labs.
 - Consider to have a label on all HWTS products indicating a) the WHO tier, and b) simple and standardized information on efficiency of reducing bacteria, virus, and protozoa. For additives, the label should include the contents of chemicals
8. Dissemination of HWTS; Public awareness
- Develop guidelines for vouchers for the dissemination of HWTS to vulnerable groups;
 - Consider the use and / or demonstration of HWTS in schools (Ministry of Education)
 - WASH center to build the capacity of local entrepreneurs to produce, maintain, sell, start business of market-based HWTS
 - Make key sector policies and strategies available online to facilitate information flow between government, civil society, and the public.
 - Make a HWTS catalogue of existing and promising new options with relevant information. A publication similar to SMART Disinfection Solutions (NWP, 2008)
 - Demonstrate HWTS options in rural health units, mother and child facilities. Opinions of health workers are valued by consumers.
9. Taxes
- Reduce or eliminate taxes both on import and local VAT to reduce the cost for the consumers and so increase the market potential.
10. Vouchers
- Create an advice group with national and international specialist in voucher systems
 - Develop HWTS guidelines for NGOs: For instance, introduce the rule that NGOs should not give free gifts unless in emergencies, or to special target groups like pregnant women.
 - In general, NGOs or governments should not give HWTS products directly but via vouchers to support the supply chain.
 - Use experiences with vouchers for filters from NAZAVA Indonesia.
 - Payment options for those who cannot pay in one instalment, like group credits, consumer lending through micro-finance institutions.

As professionals we could also practice what we preach. Sector meetings could use filters instead of expensive bottled water. MWA could take a lead to promote use of filters or other products at meetings and events.

13 Next Steps

This scoping study has uncovered a wealth of information. It is recommended that this could be further utilized through:

- Organization of a workshop early in 2015 to discuss the analysis and opportunities presented in the report. This should engage NGOs (e.g. MWA members), government, development partners, business and research organizations.
- Editing and publishing a summary report suitable for external publication.



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ANNEX 1: Summary of discussions with different institutions/individuals (HWTS)

SN	Contacted person	Institutions	Key Points
1	Abdulmejid Seman	MoH	<p>HWTS is one of the 16 Health extension packages Under WQ Monitoring & surveillance. The ministry activities include;</p> <ul style="list-style-type: none"> • Purchase and distribute WQ test kits, cost about ETB 107,000 per kit • Evaluate the progress on quarter or biannual basis <p>Any WASH related activity is undertaken in line with the signed MOU among different Ministries</p> <ul style="list-style-type: none"> • One WASH National document is the one under which we are operating • As Health sector, we are giving emphasis to WQ & HWTS • The Ministry does not support free provision of HWTS to users, except under emergency/promotion condition • Major products are PUR, WuhaAgar, & BishanGari <ul style="list-style-type: none"> • The Ministry works closely with different government sectors & NGOs For example with PSI that works on the promotion of market based HWTS • Identify the need and provide the chemicals (PUR, WuhaAgar) to individual sellers; seed money is provided to the sellers until the market is matured as an incentive to the business; this has been tried in Wolayita area • HWTS is a free market; the Ministry links with the market and also inspects the quality of the HWTS products when needed; e.g. BishanGari • PSI has a good experience in HWTS promotion since 2007 in the country; now it has about 17 centers in the country apart from that of Addis Ababa to promote HWTS <p>Major challenges:</p> <ul style="list-style-type: none"> • Lack of coordination among stakeholders/lack of harmonized approaches; for example SNV produced one manual, and so was PSI • Lack of budget/finance • Inability to buy & distribute WQ test kits to monitor the extent of the problem • Lack of centralized laboratory to certify HWTS products in the country The set targets of HWTS (77%) under GTP was not revised <p>Actions</p> <ul style="list-style-type: none"> • The Ministry took an initiative to establish Technical working group on WQM & Surveillance that has HWTS under it; it is at the beginning stage now. It involves WHO, Water and Sanitation Program (World Bank), PSI, SNV, MoWIE, Education, Finance, Water Aid, Plan, etc. The Technical working group is supposed to be operational during the early 2007 EC; • Action Plan is to be prepared
2	Belay Seyoum	MoWIE	<p>Climate resilience Water Safety plan is now under preparation with different partners such as WHO; and the Ministry is the lead; two documents are supposed to be produced: Strategy and Implementation guideline. They will be National documents</p> <ul style="list-style-type: none"> • HWTS is one component of it; MoWIE, Water supply Directorate and Hydrology department are leading it • No data on the coverage of HWTS after the 2011 EDHS that indicated as 9% • Water safety plan has been piloted in three regions by different Organizations: in Oromia by German Agro Action (Arsi Negele WASH program, WSP progress so far), in Amhara by COWASH (Approaches involved in Kebele Water Safety Action planning) and in Tigray by Help of Drop of water, Ethiopian University Students Initiative <p>Major challenges</p>



			<ul style="list-style-type: none"> • poor supply chain, lack of coordination among stakeholders lack of harmonized approach, mandate issue (between Ministry of Health & Ministry of Water), • lack of work structure/department in the Ministry that deals with HWTS, and hence lack of attention; • sometimes disagreement between NGOs/other organizations and private sectors happen on the HWTS products (e.g. between Bishan Gari and UNICEF) • Need to promote HWTS with Self-supply as both can be effective if implemented together as indicated in Self-supply implementation guideline
3	Waltaji Terfa	WHO	<p>Under Climate resilience program, led by Ministry of WIE, HWTS is one component under the WQ monitoring and surveillance</p> <p>Major challenges</p> <ul style="list-style-type: none"> • There is an on and off effort in addressing HWTS; but commitment and continuity lacks • No coordination among different actors; particularly government sectors • Technical working group including Water and Health sectors was established during the 2013 HWTS workshop organized by WHO/UNICEF and MoH; but not operational up to now • Lack of standard and also quality checking • Most HWTS use only faecal coliform excluding other pathogens such as protozoa and virus to indicate the performance of their product <p>Suggestions</p> <ul style="list-style-type: none"> - As much as possible the market based HWTS should be aligned with the WHO/UNICEF performance indicators of HWTS - Use the M & E tool kit of the same organizations
4	Bekele Abaire and Mussie Tizazu	CRS	<p>CRS through its implementing partners has distributed about 8000 Tulip filters for emergency during the year 2011. The price was about 23USD/pcs</p> <ul style="list-style-type: none"> • About 100 Tulip/lifestraw have been distributed under MWA program • All were distributed to users with full subsidy • Distributed chemicals were BishanGari, PUR and Aquatabs; no biosand filter; all were distributed to users with full subsidy
5	Sintayehu Legesse	WV	<ul style="list-style-type: none"> • HWTS is not a regular activity, but intervened only during emergency • Priority is on proper source protection and disinfection; household level intervention is only a recent start through Self-supply
6	Tamene Gosa	UNICEF	<p>UNICEF supports whatever requests come from government in line with HWTS; as far as it is government interest/program, UNICEF supports it. UNICEF does not promote single brand</p> <p>During emergency, UNICEF supplies different HWTS products</p> <p>Major challenges</p> <ul style="list-style-type: none"> • HWTS lacks attention from different partners including government; • It has less attention than water quality issue • No clear strategy on HWTS • Lack of regulatory body to take responsibility such as on standardizing, quality check, etc. • There is poor coordination among all stakeholders in promoting HWTS • Need to strengthen the government regulatory body on HWTS • Unless CLTSH approach is followed it is hardly possible to achieve the 77% target of HWTS at the end of 2015 • Government, NGOs and private sectors should be involved to sustain HWTS; but no fertile ground to engage private sectors • Capacity building of local manufacturers/suppliers is another important thing for sustainability and to achieve the target



7	Sileshi Gobena	Water Aid	<p>Only supply and promote HWTS during emergencies. So far they have supplied 'WuhaAgar' , 'Aqatab' and Emergency Water treatment Kits for household water treatment during emergencies</p> <ul style="list-style-type: none"> • Works in 'Ticho' in Oromia and 'Konso'-Southern Nations Nationalities and People(SNNP) and in Benshangul Gumuz • Begun to promote HWTS in the intervention areas at the end of 2012 • 10,975 bottles WuhaAgar have been distributed; as it was under emergency situation, it was distributed for free; cost covered by donors, different organizations & individuals • Works with government at different levels, and also other organizations such as ORBIS • The bulk price of Waterguard is ETB 3/bottle • Government Health sector inspects the quality of the product during distribution • The Organization focuses on source protection & disinfection, communal reservoir disinfection, safe transport and storage • Water quality testing before handing over to users
8	Berihanu & Alemnesh Abebe	Water Action	<p>Priority is on source protection, disinfection and community reservoir disinfection</p> <p>Water Action has distributed 114 household filters (35 lifestraw & 79 Tulip) each for one household in Kalu woreda under MWA program; in addition it has provided "WARYT" filter for health institutions in its intervention areas in Kalu woreda</p> <ul style="list-style-type: none"> • At household level, safe storage and handling is promoted • In areas where there is no option of feasible water source protection, household water treatment is promoted; e.g. for pond & other surface water users • Some household filters have been distributed with full subsidy in Kalu woreda; this is aimed at two purposes: promotion of the technology & provision of safe water supply to households as no feasible protected water supply is available • Hence, basically household water treatment is promoted under two conditions: emergency (outbreak of disease such as Diarrhea and unprotected water supply sources). Three years ago under emergency Aquatabs and other chlorine products were distributed for households freely • Household water treatment product distribution to users is usually planned in line with the need of the users and umbrella partner (CRS)⁵ <p>Challenges</p> <ul style="list-style-type: none"> • Unavailability of chlorine products close to the users is one of the limits to use it
9	Netsanet Golche	BishanGari	<p>Produces BishanGari water purifier that has both flocculation and disinfection effect to treat water; it is in powder form</p> <ul style="list-style-type: none"> • Begun in 2008, and works in all regions • So far has sold 300Million sachets, each with 2.5gm and able to treat 20lit water • 350,000 households use or have used it so far • The bulk price is ETB 1.1/sachet; but if piece, it is ETB 1.2/sachet. promotes buying; however under emergency conditions, the organization donates to regions • Partners are mainly NGOs, Government sectors at different levels (Ministry of Water, Health, etc.) and private sectors such as whole sellers and pharmacies • Last year alone sold at ETB 10Million; and next year sales of ETB 15Million is expected • 20- 30% of the distributed products were disseminated through shops

⁵ Water Action is the local implementing partner for Catholic Relief Service (CRS)



			<ul style="list-style-type: none"> • 2-5 % of the distributed is purchased by private families • The organization has three sales agents in three Regions capital towns (Tigray, Amhara & SNNPR); in others areas there are contact pharmacies and drug stores • The Organization is an ISO 9001: 2008 Quality Management system Certified Company • BishanGari is tested and approved by certified laboratories such as Shrirram Institute for Industrial Research Center /Delhi India/ and the Health and Nutrition Institute of Ethiopia • 96% of the raw materials required to produce BishanGari is purchased from local market; that is why the product is low priced <p>Challenges</p> <ul style="list-style-type: none"> • Despite the low price, the habit of buying it to treat water is minimal; people usually expect free provision, which is the case under emergency (drought, disease outbreak, conflict, etc.) when NGOs and government supply freely • User survey is not conducted yet though it is necessary; however, tour to regions, and communication with agents, pharmacies and whole sellers have been made • 60- 65% of the Organizations provide the product free to users including government sectors at different level. In some cases, the products are bought by organizations, stored somewhere and sold to users at lower prices; but storage after expiring date has a risk as it may not be safe • Lack of fair market: Some development actors can play a decisive role in the sector/WASH; they mobilize and/organize donors for collective effort and also to pull resources. Though this is good; it sometimes misses its objectives and some influential NGOs can make unfair contact/relation with private sectors (locally or internationally) in such a way that un fair market/business can happen • There is an awareness problem; people relate water borne disease with other causes; they give their own justification • Expect third party to solve their water related problem. It requires a joint effort to overcome the dependency syndrome; users need to be aware they have to bear the cost of treating their own drinking water <p>Suggestions</p> <ul style="list-style-type: none"> - To achieve the goal of 77% HWTS coverage at the end of 2015 the government should be enhancing local capacity through: - Helping poor people to be engaged in income generating activity to buy the HWTS product when needed - Assisting private sectors in such a way that they can provide the products at reasonable price - Raising users awareness on the consequence of drinking unsafe water; and stimulate them to allocate monthly budget for HWTS like for regular consumable food items - Need to improve coordination and joint efforts among different sectors, regions and federal, government and other development actors including private sectors - If users are unable to get it for free, but they understood its importance, then they will search for it and buy it themselves from local pharmacies
10	Fayissa Lema	Oromo Self-help Organization (OSHO)	<p>Produce Bonechar filter for defluoridation /both household and community level</p> <ul style="list-style-type: none"> • Uses Bonechar grains



			<ul style="list-style-type: none"> • Now trying to test synthetic bone instead of organic bone to overcome cultural and religious perception of people; agreement has been made with USAID to test it • Another plan to test membrane filter/reverse osmosis but that might be expensive for households.
11	Adis Meleskachew	PSI	<p>PSI is a major player in HWTS in Ethiopia. It is not promoting a single brand of HWTS product, but uses all the products that can bring behavior change</p> <p>Operates in 67 countries in behavior change & communication</p> <p>Proctor & Gamble (P & G), which is the producer of PUR supports PSI through funding the product & training on an integrated WaSH</p> <ul style="list-style-type: none"> • Some of the products that fit for behavior change are PUR and Water Guard/WuhaAgar; they are also promoted by CDC • WuhaAgar & PUR since 2007 have been distributed by PSI. 70 million sachets of PUR and 18million bottles of WuhaAgar have been distributed from beginning up to now by PSI • PSI has introduced HWTS in Ethiopia though CARE has disseminated PUR for emergency ahead of PSI introduction <p>PSI does HWTS intervention/promotion with market based approach:</p> <ul style="list-style-type: none"> ○ Begin with developing marketing strategy; for example, which products work well under what condition and where (PUR for turbid water in Afar, Somali & low lands of Oromia) ○ What type of water sources are people using <p>Once these are identified, market based promotion work is undertaken for different social segments using different approaches, such as:</p> <ul style="list-style-type: none"> ○ Road side show, TV, Radio, posters, etc. ○ Engaging water vendors, and providing them posters ○ Initially, used schools, but later on it was noticed that children can share the information to their parents but they are not influential in the family to buy the product <p>Working with Institutions/NGOs:</p> <ul style="list-style-type: none"> - Different NGOs & other organizations such as CARE, UNICEF, Save the Children buy and distribute the products including emergency situations; under this condition, PSI provides training and marketing intervention - As some NGOs intervention is only for short period (emergency), provision of information about HWTS product alone is not sufficient for sustainability but also establishment of supply chain/availability; PSI supports its availability - PSI is planning to distribute PUR in Afar region for the next two months to establish market outlet <ul style="list-style-type: none"> • PSI is now heading for total marketing, which is not product specific, but behavior change. The total marketing also includes social marketing aimed mainly at establishing private sector engagement in the intervention • In the total marketing, different social segments will be identified in such a way that those at the bottom of the pyramid may need subsidy (emergency, pastoral areas, etc.) • For Self-supply wells, peoples may use also chlorine dispenser around the source • PSI is now planning to undertake research to get evidence based result why peoples are not practicing HWTS; previously it was only either by assumption or based on insufficient data that it has been reasoned out. The research will also identify key behavior determinants of practicing HWTS. The research will focus on urban settings • The price for WuhaAgar varies from 5ETB to 10ETB per bottle depending on location. 1 bottle can treat 1m³ water. Whereas the price for PUR is 1ETB per sachet; it can treat 10lit water/sachet • PSI has also been distributing Lifestraw Family filters in the country; the cost is about ETB 300;



			<ul style="list-style-type: none">• It promotes also Tulip that costs about 300ETB including Value Added Tax (VAT)• PSI loses some money from PUR due to tax; until recently, all the products have been taxed; but now trying to make them tax exempted <p>Major challenges:</p> <ul style="list-style-type: none">- Products may not reach the user properly; if distributed by some organizations, it may be kept somewhere at store, and even can expire- Promotion of the product usually focuses on the health benefit/diarrhea alone not on the lifestyle/prestige/dignity. Now PSI is promoting in an integrated WASH intervention approach- Private sectors couldn't be fully involved as the business is still immature- Product availability and the capacity avail them
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ANNEX 2: Water Safety Plan workshop in March 2014: Notes

There was a one-day workshop, organized by the Ministry of Water, Irrigation and Energy in collaboration with Finland Government supported by COWASH, sharing experiences from COWASH, UNICEF, Help for a Drop of Water and German Agro Action.

Results

Suggestions for the strategic and institutional development needed to scale-up WSP in Ethiopia and the approach and actors needed to implement rural WSP. Ms. Hermella Wondimu presented a study of three water schemes. Findings include that families take on average some 29 liters per day home from the water points, and only very few use household water treatment (chlorine, solar disinfection). Only 60% of the community used the protected systems, the others preferred the unprotected sources.

Some points of discussion:

- Well heads differ a lot in Ethiopia and often entail risks. There seems to be a need for a more standardized well head design.
- Health sector needs to actively participate in the WSP activities, as it is missing from or only loosely linked to the initiatives presented. The health sector was not present in the workshop although invited.
- A strategy needs to be developed for putting more attention to sanitation and hygiene practices, which is more focused on behavioral change.
- One generic problem from the study is that, the jerry cans used for water collection and storage often are not clean, so efforts need to be made to address the issue.
- A water quality problem was identified in most of the water points which requires a more in-depth analysis including water quality testing.
- The area-based approach is a timely one, as sustainability of water schemes are related to three components namely: i) water quality, ii) watershed management – as there is a risk related to rural water supply, which is caused by climate change. iii) Operation and financial management. In addition, WSP needs to consider other important components like: Sanitation, hygiene, and household water treatment and safe storage technology to be effective.

Group Discussion

Group 1: WSP strategy development and institutionalization

- Do we need WSP Strategy for Ethiopia? Yes for several reasons including: we have been engaged only in construction giving less attention to O&M; climate change impact puts water supply systems at risk (need also a clear link to catchment protection; serious risk as many people use polluted water (will also need to think at for example Household water treatment
- Who should lead the strategy development? The national WASH coordination office
- Who should be the partners involved in the WSP strategy development? All WASH partners including also Ministry of Urban Development, Ministry of Agriculture, Environmental Protection Agency
- Do we need to establish WSP Strategy Task Force to get the WSP strategy done? Task force is needed;
- If yes, who should be the members of the Task Force? National WASH coordination office will invite the members, but we recommend to include from government, development



partners, and practitioners; options mentioned WHO, UNICEF, Drop for Water, Agro Action, COWASH, urban water utilities)

- Do we need separate Task Force for Urban and another for rural? Not a separate task force but separate strategies are needed for rural and urban areas because of different complexities, actors, and capacities
- What needs to be done next to take the WSP strategy development and WSP institutionalization to scale? Share draft workshop proceedings among workshop participants for comments and additions. Workshop proceeding officially (also because they opened) submitted to national WASH steering committee chair through the water supply and sanitation directorate. Approval of need for strategy and establishment of task force as outlined in the proceedings and to include WSP as a strategy in the One WASH program. TOR to be developed for Task Force (which can be drafted by Task Force themselves for review or the informal group can make suggestions or both) and this needs also approach for financing the activities. The Task Force engages to work as per June 2014

Group 2: Rural WSP Process:

- What organizations need to be involved in the rural WSP process? At the different level: at woreda level, at kebele and at community level? Who needs to be informed and who should do the work? At Woreda level - Parties that need to be informed and that need to support the process are mainly members of WWT (Health office, Water office, education office, women and youth group and agriculture office). However, WWT misses representatives from important organizations that can have significant contribution to WSP (EPLAU and MFIs). The support to the WSP needs to be provided by a technical team led by the WWT. This technical team is suggested to have members from offices including: water health, women and youth, education, EPLAU and agriculture offices. At Kebele level - KWT members including: HEW, soil and water conservation DAs, Kebele Manager, Women and youth group, water extension worker, School director and other actors such as: Small and Micro Enterprises, artisans were suggested as parties that should form the KWSP team to carry out the WSP activities in the different water sheds. At community level – WASHCOs, Community based organization (CBOs) like Edir and HEW; some of them can become member of the Kebele WSP team
- Does the water and sanitation safe kebele concept need to be taken further in Rural WSP development? Yes. It is important to be taken further. And it needs to include components like: water supply, sanitation and hygiene, watershed management, household water treatment and safe storage. In relation with this it was suggested that a practical approach would be to organize the activities at micro watershed level looking at the risks all water point risk assessment and household water safety risk assessments. However the Kebele will lead and/organize the interventions at micro watershed interventions in the kebele and woredas will give support to Kebeles in any way needed. This set up is assumed to address the issue of integration between watershed development and sanitation into WSP planning and implementation.
- What needs to be developed next to take the RWS WSP to scale? Developing a national strategy and guidelines in a participatory way: organizing experience-sharing platforms, allocating resources for scale-up; establish a model demonstration site either by strengthening the effort of the pilot area or by expanding the intervention to other areas; carrying out evaluation of water safety plan interventions done so far; Strengthening capacity building and promotion of the activities; involving the private sector; promoting the idea of WSP at each level to get support from leaders of each level, so that, it can become part of their job; strengthening integration among sector offices to ensure safe



water supply. It can be done by assigning an accountable body, that is heavily responsible – especially water bureau.

Information received after the workshop

WHO Ethiopia informed the WSP stakeholders with the following message on March 7, 2014: Thank you very much for pushing forward this initiative. As I have informed you in our previous communication, WHO has received project support from Climate resilient WASH which includes WSP. Thus, the WHO can support financially and technically the development of National strategic framework and implementation guideline. We can also support implementation of pilot WSP for rural and urban. (Waltaji Terfa by E-mail)

List of participants

1. Abraham Kebede, COWASH RSU, Amhara Region
2. Alemu Geremew, Yilmana Densa Woreda Agriculture Office, Amhara Region
3. Addisu Fente, COWASH RSU, Amhara Region
4. Melkamu Jaleta, Millennium Water Alliance, Addis Ababa
5. Tamene Gossa, UNICEF, Addis Ababa
6. Dr. Samuel Godfrey, UNICEF, Addis Ababa
7. Martha Solomon, DFID, Addis Ababa
8. Takeshi Ono, JICA, Addis Ababa
9. Ephrem Fufa, JICA, Addis Ababa
10. Itsuro Takahashi, JICA, Addis Ababa
11. Girma Senbeta, JICA, Addis Ababa
12. Balew Sibel, MoWIE, HWQD, Addis Ababa
13. Abiy Girma, MoWIE, NWCO, Addis Ababa
14. Nuredin Muhammed, MoWIE, WSSD, Addis Ababa
15. Dr. Alemayehu Mekonnen, MoWIE, WSSD, Addis Ababa
16. Lakech Haile, MoWIE, WAD, Addis Ababa
17. Tamene Hailu, MoWIE, WSSD, Addis Ababa
18. Tamiru Gedefe, MoWIE, WSSD, Addis Ababa
19. Belay Siyoum, MoWIE, WSSD, Addis Ababa
20. Gezahegn Alemu, Embassy of Finland, Addis Ababa
21. Marko Saarinen, Embassy of Finland, Addis Ababa
22. Bekele Abate, Catholic Relief Service, Addis Ababa
23. Rahel Kaba, World Bank, Addis Ababa
24. Yohannes Solomon, Welthungerhilfe, Addis Ababa
25. Hermella Wondimu, Help for a Drop of Water, Addis Ababa
26. Jan Teun Visscher, MetaMeta, Netherlands
27. Likimyeles Nigussie, MetaMeta, Addis Ababa
28. Arto Suominen, COWASH, MoWIE, Addis Ababa
29. Melaku Worku, COWASH, MoWIE, Addis Ababa



ANNEX 3: Recommendations Made at the HWTS Workshop - “Evaluating Household Water Treatment Performance and Scaling up Safe-Drinking Water Solutions”

National Workshop 8-9 February 2013 Addis Ababa, Ethiopia

This national workshop was organized and facilitated by the Ethiopian Ministry of Health in partnership with the World Health Organization (WHO), United Nations Children’s Fund (UNICEF), and Population Services International (PSI).

Facilitate scaling-up of household water treatment and safe storage in Ethiopia

- Ensure that safe drinking water is integrated into relevant health and water strategies and policies
- The Government of Ethiopia has recently developed and/or has enacted a number of water, sanitation and hygiene strategies, policies and programs and it is important to ensure that safe drinking-water and HWTS specifically, is adequately and appropriate included in these strategies. Important national strategies, policies and programs include: Hygiene and Sanitation Strategic Action Plan 2011-2015, Drinking Water Quality Monitoring and Surveillance Strategy, Water Sector Policy, One WASH Program, National Policy Guideline for Self-supply and the Universal Access Plan (for water supply).
- Within the Self-supply Working Group, establish a sub-group on HWTS identify and pursue viable funding mechanisms, including microfinance, within HIV programs and other health and/or climate change mitigation efforts. In addition to addressing HWTS within the health sector, the importance of coordinating HWTS implementation with that of other efforts to improve drinking-water quantity and quality was discussed. Rather than establish a new working group on HWTS it was recommended to create a sub-group on HWTS under the Self-supply Working Group which is largely focused on household and community-based WASH interventions.
- Raise awareness of HWTS within existing water and health strategies (i.e. the National Hygiene and Sanitation Strategy). Among policymakers HWTS remains relatively unknown. Therefore it was recommended to raise awareness about the role of HWTS, especially among vulnerable groups. The forthcoming network briefing notes may be valuable in contributing to these advocacy efforts.
- Promote HWTS through social media, national networks, public service announcements, etc. Awareness raising is also needed in the public sphere on HWTS as according to the 2010 national survey only 8% of Ethiopians reported using any type of HWTS. Radio may be one means by which to reach a large audience, but other more targeted measures may be valuable including sending text messages to targeted populations and working through national and local networks.
- Facilitate access to HWT products in Ethiopia. It was recommended that the Government consider removing all tariffs for imported HWT products as current tariffs are a barrier to providing effective products at affordable prices. In a recent WHO survey of national HWTS policies³, 22% (out of 44) countries have eliminated tariffs on HWTS including neighboring Kenya.



ANNEX 4: List of contacted people for HWTS study MWA

S N	Name	Institution	Responsibilities	Contact address	
				Mobile	E-mail
1	Waltaji Terfa	WHO	WaSH expert	+251911312934	waltajit@et.afro.who.int
2	Abdulmejid Seman	MoH	WQMS/HWTS focal	+251915404847	Alias_seman@yahoo.com
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5	Fayisa Lema	OSHO	Technical manager	+251911832753	fayulem2013@gmail.com
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7	Sintayehu Legesse	WVE		+251911951288	
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11	Alemnesh Abebe	Water Action	Hygiene & Sanitation Officer (Kalu)	+251913038727	Alemab16@gmail.com
12	Sileshi Gobena	Water Aid	Senior Water supply Officer	+251924044026	sileshigobena@wateraid.org
13	Ayana Kalbessa	Oromia WME Bureau	WQ & Treatment expert	+251911678736	Ayuko2008@gmail.com
14	Netsanet Gochel	Bishan Gari	Marketing Officer	+251912051468	gochelnetsanet@gmail.com
15	Kebede Gerba Gemos	Ministry of water & Energy	State Minister		garbaabaa@yahoo.com
16	John Butterworth	IRC Ethiopia	Country director		butterworth@ircwash.org
17	Getaw Mekonen	Tulip Addis	Director	0911506856	getawmc@live.com
18	Admasu Tesfaye	Sawyer	Sales representative		admasutesfaye@yahoo.com
19	Hussein Kutabish	SMS Ceramic Pot filter producer	Manager	0911-202-918	hmkutabish@gmail.com
20	Yonatan Sani	EKHC Biosand program	Household Water Project Coordinator	00(251)-115-529231	yonatansani@yahoo.com
21	Andrew Smith	Desert rose innovation Bio sand filters			andrew@drcethiopia.net
22	Nazava				
23	Safi filers Malawi				



24	Basic water needs India				
25	Ecofiltro Guatemala				
26	Sjef Ernes	Aqua for All	Director		s.ernes@aquaforall.nl
27	Urs Heierli	MSD Consult CH			urs.heierli@msdconsult.ch
28	IDE Cambodia				
29	Ryan Rowe	HWTS network	Communication coordinator		ryanrowe@unc.edu

ANNEX 5: List of Producers/Importers of HWTS Products in Ethiopia

Company /City	Contact Information	Product	Year when started	Total No sold	Actual sales /month
PSI Addis	..	PUR			
Bishan Gari		Bishan Gari			
		Wuha Agar			
PSI Addis Ab.	..	Aqua tabs	2000		
SMS Mojo	Hussein Kutabish hmkutabish@gmail.com Phone: 0911-202-918 0911843863	Ceramic pot filter	2011	1000	
Desert rose innovation	Andrew Smith andrew@drcethiopia.net	Bio sand filters	2013	100	
EKHC Biosand program	Yonatan Sani Project Coordinator yonatansani@yahoo.com 00(251)-115-529231	Biosand filter	2000	25.000	?
Sawyer Addis Ab.	Admasu Tesfaye (local sales) admasutesfaye@yahoo.com	Sawyer filter, (Membrane filter)	2013	3000	?
PSI Addis Ab.		Life straw Family			
Tulip Addis Addis Ab.	Tulip Addis Getaw Mekonen 0911506856	Tulip siphon filter	2012	150.000	10.000
	Shops	Tabletop filter Brita			
		Tabletop filter Korean king			



ANNEX 6: Survey of Tulip Siphon Water filters, August 2014

No of families	50	Date	
District ; Teltele	Kebeles: Elkune, Handho Negele,	Debe Geya	
Respondents	..	Male... Female..	Age
Number of people in families;	4 to 12	Average 6.....	
Number of months that filters are used;	6- 7 months		
1. % of families using the filter? (<i>Observed if filter was wet</i>)			100%
2. % of families that have problems with broken parts.(Hose connection)			14%
3. % of families not using filter because element is worn (<i>check with end of life indicator</i>)			0%
4. % of families not using filter because too complicated?			0%
5. % of families saying that it does give enough water (30 l/day)			44%
6. % of families using more than 20 liters per day			10%
7. % of families using saying the filers gives clean water			100%
8. % of families have right installation, <i>Top container 0.7 mtr above clean container</i>			94%
9. % of families using always drinking from filter			90%
10. % of families not using filter for more than 2 days			6%
11. % of families using boiling water for drinking before they had the filter			50%
12. % of families boil on a 3 stone stove			50%
13. % of families boil on an improved stove			0%
14. % of families boil on a buta gas stove use			0%
15. % of families saying air in the house is better after the filter			44%
16. % of families say filter use reduced medicine cost over 100 Birr/month			90%
17. % of families used Chlorine before they had the filter			76%
18. % of families bought bottled water before they had the filter			12%
19. % of families spend over 100 Birr/ month for bottled water			6%
20. % of families have access to tap water			0%
21. % of families collect water from a hand pump /standpipe			14%
22. % of families collect water from open wells			90%
23. % of families got the filter for free			100%
24. % of families would be willing to pay 300 to 400 Birr for a filter			44%
25. % of families store water in a container			100%
26. % of families use filter because water taste better			100%
27. % of families use the filter because it gives safe water			100%
28. % of families replaced the filter element			0%
29. % of families know where to buy a new filter element			0%
30. % of families were trained in filter use, maintenance			100%
31. % of families know how to clean the filter <i>Observed cleaning 1st Backwash every day</i> <i>Use brush when clogged 3rd Scrape with scrub pad</i>			90% 2 nd
32. % of families like the filter because it looks nice			100%
33. % of families like the filter because clean water is good for health			100%
34. % of families like it because they can offer clean water to family			100%
35. % of families say they would like more filter capacity			14%
36. % of families say the filter is improving the family health			100%
37. Observations.....			



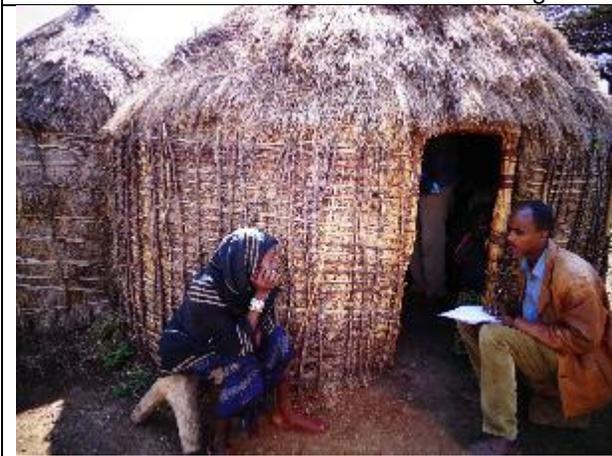
ANNEX 7: Photos, Siphon filters, South Ethiopia.



A water source for domestic use and drinking



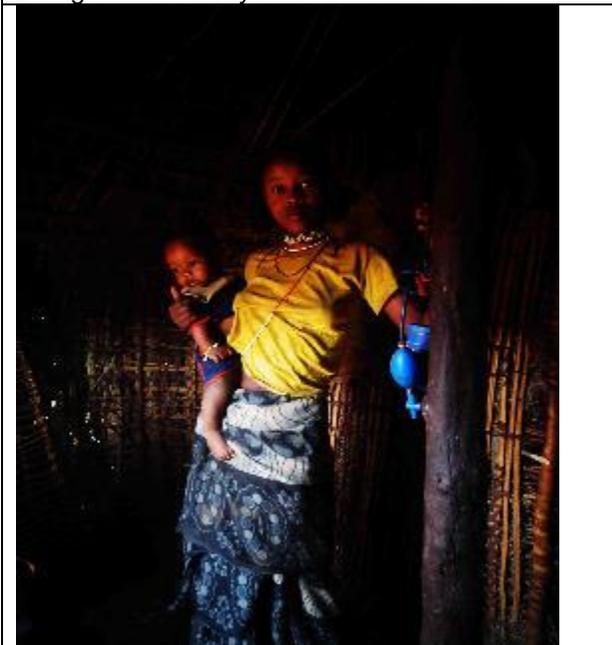
Water is very turbid



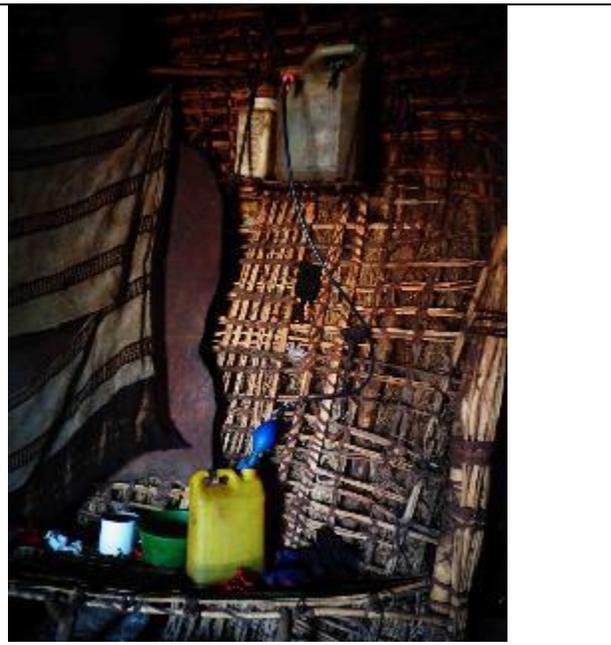
Doing a user survey after 6 months of use



Inside the hut



Using the siphon filter



Typical installation of the siphon filter



Dirty water in the high bucket



Women showing how to clean the filter element



Example of a good storage in a closed container



Training session in villages about the filter



Explaining the maintenance of the filter



Common 3 stone cooking stove



ANNEX 8: Gayo Pastoral Development Initiative in Partnership with WeltHunger Hilfe (WHH) – Field Trip Report on Tulip Monitoring in Gorile and Gayo (Dhas district), Gololcha and Dambala Dhibayu (Dirre district) and Harweyu (Yabello district) PAs through the ETH-1105 Project

by
Boru Jarso: WaSH Officer (ETH-1105)
July, 2014

1. Introduction/Background

Evidence has shown that hygiene and sanitation standards in the pastoralist community are extremely low causing health problems such as water borne diseases etc. water research carried out by Welthungerhilfe/GAA, RO has shown that post collection contamination of water with human faces is a serious source of health risks as well as the use of water from open unsafe water sources. In Borana water for human consumption is fetched at Ellas at the cattle trough. Improving hygiene and sanitation standards and handling of water will have a positive impact on the overall health situation of the Borana people. On other hand a traditional well and pond system is covering Borana since centuries providing water around the year. But, its management and maintenance and protection system was not well organized.

Hence, in order to strengthen the Borana pastoralist society and increase drought resilience based on the above mentioned constraints GPDI in partnership with Welthungerhilfe has identified the following needs: Rehabilitation of traditional wells and ponds, Hygiene, sanitation and water quality management and Improving rangeland and forest management. As part of these intervention our organization was distributed Water filter(TULIP) in all PA of project intervention and currently Rehabilitating ponds and clearing bush in some PA.

As a consequence, a team composed from GPDI organizations, were involved in field monitoring of Tulip, rehabilitating pond and Bush clearing activities. The following were field trip travellers:

S/n	Name	Sex	Organization	Position	Cell phone No/mail address
1	Wako Godana	“	GPDI	Rangeland Officer	0913-42-78-08/ godanawako@yahoo.com
2	Boru Jarso	“	“	WaSH Officer	0911707936/ boru_jarso@yahoo.com
3	Liban Boru	“	“	Natural Resources officer	0926-22-06-63/ libanborug1@gmail.com

2. Project Name

The name of the project is” Reduction of drought impact and strengthening of pastoralists’ livelihood by increased access to water, improved water quality, rangeland/forest land management, animal health and stakeholder networking in Yabello, Dirre, Dhasi and Moyale districts of Oromia regional state of Borana Zone”.

3. Travel date

The field trip took place as of 22-26 July, 2014

4. Objective(s) of the trip

The main objective(s) of this field trip was.

- Monitoring of the distributed

5. Methodologies used

The following methods used during the trip

Tulip monitoring questionnaire:

Awareness raising and Demonstration of Tulip

7.1 Tulip Monitoring



.In each PA we have conducted the monitoring of tulip first we used to contact the PA Administrations personnel (PA leader or Manager) and/or HEWs and introduce our organization, about the projects the GPDI is implementing in their Pas and the objective of our visit (Monitoring), then we tried to get some information of the community from them and the status of tulip usage in their PA, the attitude of the community toward the importance of the tulip and the change they observed since introduction (distribution) of tulip by GPDI.

After the general status update of the PA, we were directly moved to the tulip beneficiaries Household with support of the PA's representatives. On the arrival of each household we tried to greet the household members in Borana cultural ways and introduce ourselves and the organization we are representing at time and also our objective for visiting their households. Then we start our duty, if they accept/welcomed us to proceed.

The monitoring methods we have used were interviewing the household wife and/or head by tulip monitoring questionnaire and observation of the tulip status. Our monitoring questionnaire includes the following points;

The tulip status:- in identifying weather they are using it or not, how frequent they used it and if not the reason for why they didn't used it

Knowledge and attitude they have toward the tulip

Checking Skills of the beneficiary on maintenance and cleaning the tulip

The storage and consumption system of a filtered water

Depending on the above points we have assessed and observed the following results

The status of Tulip usage

Eventually, in all visited household the distributed tulips were at hand and all of them were tried to used it at beginning or at a time of distribution for a few period of time, but the functionality, the frequent they used it and the reason they told us to stop using it were quite poles apart.

Totally we have conducted the monitoring in Harweyu PA of Yabelo district, Gorile and Gayo PAs of Dhas district and Bokola PA of Moyale district. In all above mentioned PAs the households we were interviewed and observed were almost not using the tulip currently due to different reasons. The reasons they mentioned or responded during our interview were:

They stopped to use the tulip since they are currently using hand pump or motorized water or traditional well

The amount of water the tulip pass or drop through it is very little or it takes too much time filter the amount of water they need for family

The tulip is not functional or stopped to pass the water through it

They understand as the tulip used only by time of consuming pond water or dirty water

They stopped because of the procedure of other water treatment is very easy and takes a little time as compared with tulip

Even if they mentioned the above reasons and stopped currently to use the tulip; they have seen that the water filtered by tulip was very clean and has very good taste as compared with other water treatment technologies.

Knowledge and Attitude of the beneficiary on the Tulip/water filter

In our monitoring we have tried to assess also the knowledge and attitude of the community (beneficiary) of tulip on the purpose and importance of the water filter/tulip. The understanding of the beneficiary on purpose or importance of the tulip was on different level; almost more than 80% of all household we have tried to interviewed were know a little about the purpose/importance of tulip where as the remaining has a good knowledge on it. But, despite the procedure and long time it takes to filter the amount of the water they need for their household member, all of them (beneficiary) have liked the taste, quality and color of water filtered by tulip as compared with other water treatment technologies. Apart from these the



following are the summary of their respond for the question of “how do you see the purpose/importance of Tulip?”

Some them said, “Tulip helps to clean/filter the dirty water but not kill germs”

Tulip is used for pond water only

The water filtered by tulip has good taste like “highland water”

A Very few of beneficiary said “ tulip helps to filter/clean water and prevent different water-borne disease by killing germs during filtering water if we used it correctly”

So, we have seen that how there were big gap on understanding of the tulip beneficiary even on the purpose of or importance of it. These show that the awareness they got and the follow up by was very low.

The skills of Beneficiary to clean and maintain the Tulip

To know and identify their skill on cleaning and the maintenance of the tulip, we used to ask them to demonstrate us the way they used to do it. All households we tried to observe were told us that they couldn't maintain it if gets problem but, even if they used different methods of cleaning all of them know that tulip should be cleaned after each filter process. From all households we have tried to interview only half of them knows and show us the back wash technique, whereas almost all of them used and know to wash with its washing rubber. The missed understanding we have seen during skill assessment was, a few beneficiary used to clean the tulip with soap and used other water treatment chemicals with tulip.

Generally, the skills of the beneficiary on maintenance and cleaning the tulip was also not good and needs an improvements

Storage and consumption system of filtered water

Even if, all of them were not currently using the tulip by the time they have been used tulip they told us as if they used to filter and stored the water in washed and cleaned jerry can, which has a cover. The unique storage we have heard was in Bokola PA of Moyale district a few beneficiary were used to filter and store the water in empty Plastic of mineral water (Highland Plastic). Regarding the system of their consumption of the filtered water all of the beneficiary we have tried to monitor were told us, as if they were used clean and washed glass of water and as if they were wash their hands before handling the filtered water storage container. But needs additional observation and follow up by the time they begin to use Tulip.

Awareness raising and Demonstration on Tulip/water filter technologies

During our trip the other activities we have done was awareness raising and demonstration of tulip or water filter technologies in Gololcha and Higo PAs of Dire district.

Hence, our team has conducted awareness raising program on tulip/water filter technologies in above mentioned two PAs for 65 (45F) beneficiaries of Tulips. The awareness raising program was on the following point

Overview of the tulip technologies

The purpose of the tulip

The benefit of using the tulip for family and community

The disease transmitted by water and easily prevented by tulip

How to handle and clean the tulip

How to stay the filtered water safe during storage

How to consume water safely

In both PAs we have demonstrate how to operate the tulip after the awareness raising program.



Participants of program:

S/n	PA	# of beneficiary participated			remarks
		M	F	Total	
1	Higo	15	12	27	
2	Gololcha	3	35	38	
	Total	18	47	65	

Gaps identified

All beneficiary of the tulip are using it currently

They do have low awareness on purpose and importance of the tulip

The skills of beneficiary on maintenance tulip were very low.

Recommendations and follow ups

The following are recommendations and follow ups in the future

The mass community awareness raising program and community conference should have to conducted in each PA with collaboration with government

The training should have provide to the beneficiary on maintenance and technical aspects of the Tulip. Continuous follow ups and technical back up/support from both GPDI and government stakeholders.

Photos during awareness raising and demonstration of Tulip





ANNEX 9: Questions to be asked to NGOs Implementing HWTS

- What is or what are the HWTS options you promote in your program? (Boiling, chlorine Liquid, Aquatabs, PUR, SODIS, Biosand filters, Filters like Life straw , Sawyer, Tulip siphon, other?)
- In which regions are they implemented?
- When did you start with the HWTS activities?
- What is the total number of HWTS option disseminated until now, how many families reached?
- Do families pay for the HWTS options? If so, how much?
- If families do not pay, who pays?
- Do you have user surveys, and indication if families still use the HWTS products after 1 year?
- The national policy is that 77% of all families in Ethiopia will use HWTS by the end of 2015, what would be your recommendation to reach this target?

ANNEX 10: Questions/Answers for Importers of Sawyer Filters Ethiopia, Aug. 2014

How many filters have you sold in total since 2000?	3000
How many filter elements have been sold in total since 2000?	Not applicable
What were the filter sales in the last year?	3000
What are the sales that you expect for the coming year?	5000
Is that the same or higher than this year ?	Higher
What % of filters disseminated by organizations, woredas is given for free?	70%
If organizations do not give it for free, what do people pay?	Not known
What is the % of filters that are purchased by private families?	30%
Of the filters sold on commercial base what % of those are in urban areas?	Not known
What is the price per filter for NGOs if they buy in bulk of 100 or more?	Ca 1100 Birr
What is the commercial price for families if they buy a filter?	Ca 1100 Birr
What is the commercial price for spare filter elements?	NA
How many sales agencies are in place?	45
In what regions are these agencies situated?	
Oromia, southern,Somalia,Hareri, Afar regional states of zonal level and in some places at Wereda level.	
Is your filter approved by the Ethiopian Standard Agency?	Yes
If not, is your product tested by any certified laboratory?	By American labs also
If so, which laboratory?	
What is the cost of importing filters?	226 Birr / filter
Do you have feed back of users about the filters?	They are satisfied
Are they satisfied> and if not what are major problems?	
What % of families boiled water before they started to used the filter?	No data
If you have user surveys, can you send those?	No surveys yet
What do you see as major reasons for success	
The quality of the filter, the policy of the government. The aggressive move of WASH members.	
What are major bottle necks to scale up the sales?	



Its affordability. The shortage of hard currency. Long time to have bank permission.

The high tax. Lack of media coverage to make more awareness.

Would you want support of Government, others?

Yes

If so, what kind of support?

Tax exemption. Priority to get Hard currency. Financial support to import sufficient products at a time

Any other information you would like to share?

NGOs have to work harder than they are doing now. Work together with the suppliers like supporting social marketing etc. The Gov. offices have to do also the same. All media private or Go. owned have to give enough air time on WASH movement.

ANNEX 11: Questions for importer/sales companies of Chlorine products, Aug 2014

How many liters of water can one unit treat?

How many units have you sold in total since the year 2000?

What were the sales in the last year?

What yearly sales number do you expect for the coming years?

Is that the same or higher than this year ?

What is the price per unit for NGOs others if they buy in bulk of 1000 or more?

What is the price for families if they buy one unit ?

What % of units is disseminated via shops?

What % of units is disseminated by organizations, woredas is given for free?

If organizations do not give it for free, what do people pay?

What is the % of units are purchased by private families?

How many sales agencies are in place?

In what regions are these agencies situated? Do you have a list?

or maybe easier where do you not have yet a sales agencies?

Is your product approved by the Ethiopian Standard Agency?

If not, is your product tested by any certified laboratory?

If so, which laboratory?

What is the cost of importing units or material needed to produce the product?

(What is the % of import tax, other taxes)?

Do you have feed back of users about your product?

Are they satisfied? and if not what are major problems?

What % of the families boiled water before they used your product?

If you have user surveys, can you send those?

What do you see as major reasons for success

What are major bottle necks to scale up the sales?

Would you want support of Government, others?

If so, what kind of support?

Any other information you would like to share?



ANNEX 12: Questions for importers/sales companies of water filters Ethiopia, Tulip Addis

How many filters have you sold in total since 2000? *150,000 filters sold since 2012*

How many filter elements have been sold in total since 2000? *5000 sold since 2012*

What were the filter sales in the last year?

What are the sales that you expect for the coming year? *100.000 to 250,000*

Is that the same or higher than this year ? *Much higher*

What % of filters disseminated by organizations, woredas is given for free? *No Info*

If organizations do not give it for free, what do people pay? *No info*

What is the % of filters that are purchased by private families? *15%*

Of the filters sold on commercial base what % of those are in urban areas? *10%*

What is the price per filter for NGOs if they buy in bulk of 100 or more?

We don't have different price. The price of the Tulip water filter is *368 ET Birr*

What is the commercial price for families if they buy a filter? *368 ET Birr*

What is the commercial price for spare filter elements? *115 ET Birr*

How many sales agencies are in place? *82*

In what regions are these agencies situated? Do you have a list?

We have 82 sale agents in all regions in Ethiopia besides Afar and Gambela

Is your filter approved by the Ethiopian Standard Agency?

Yes also approved by all Regional water resources Bureau.

If not, is your product tested by any certified laboratory?

If so, which laboratory? *1, Ethiopian Conformity Assessment Enterprise 2, Water Works Design and Supervision Enterprise 3, S/N/N/P/R/S Regional State Water resources Development Bureau 4, Oromia Regional state water, Mineral and Energy Bureau 5, Amhara Regional Water resources Bureau 6, Mekelle University Department of Earth Science.7, Somali regional State water Resources Development Bureau*

What is the cost of importing filters? (What is the % of import tax, other taxes)? *35%*

Do you have feed back of users about the filters?

Feed back from sales agents (who do training in filter use) organizations and government officials is that families are pleased with the Filter

Are they satisfied> and if not what are major problems? *Yes*

What % of families boiled water before they started to used the filter? *Around 30%*

If you have user surveys, can you send those?

What do you see as major reasons for success.

Affordability, Durability Accessibility and Hold Replacement Filter.

What are major bottle necks to scale up the sales?

Promotion and keep the price as low as possible.

Would you want support of Government, others? *Yes*

If so, what kind of support?

Tax Exemption and Solve Foreign currency shortage for importing the filter

Any other information you would like to share?

Honestly speaking the acceptance of the Tulip Water Filter is growing because of Tulip Addis Water Filter company good services for it's Customers.



ANNEX 13: Info SMS water filter

SMS WATER FILTERS



SMS Ceramic Water Filters

Our business is the production and distribution of silver coated Ceramic water filters. Using our technologies accomplishes the following:

- A reduction of waterborne diseases in families that use the filter.
- Reduction in the use of fuel for boiling water and use of chemicals to treat water.
- Reduction in use of plastic bottles by creating a filter in every household.
- Use sawdust from the remains of carpenter shops (one of the inputs to producing the filter)
- 90% of the in-puts are locally available, clay, sawdust, receptacles.

The filters reduce the cost of transportation, doctors' fees and medication consumption by drinking healthy treated water. Beneficiaries will BETTER understand the importance of potable water in relation to the family's health cycle and will be able to clean and maintain their own filtering element.

Ceramic filters are widely applicable in situations where the drinking water source is bacterially unsafe, which is often the case where people rely on surface water sources or open (hand dug) wells, rivers, piped water which could be contaminated.

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Annex 14: Article by Joe Brown and Thomas Clasen

High Adherence Is Necessary to Realize Health Gains from Water Quality Interventions

Joe Brown*, Thomas Clasen

Department of Disease Control, Faculty of Infectious and Tropical Diseases, London School of Hygiene and Tropical Medicine, London, United Kingdom

Abstract

Background: Safe drinking water is critical for health. Household water treatment (HWT) has been recommended for improving access to potable water where existing sources are unsafe. Reports of low adherence to HWT may limit the usefulness of this approach, however.

Methods and Findings: We constructed a quantitative microbial risk model to predict gains in health attributable to water quality interventions based on a range of assumptions about pre-treatment water quality; treatment effectiveness in reducing bacteria, viruses, and protozoan parasites; adherence to treatment interventions; volume of water consumed per person per day; and other variables. According to mean estimates, greater than 500 DALYs may be averted per 100,000 person-years with increased access to safe water, assuming moderately poor pre-treatment water quality that is a source of risk at high treatment adherence (.90% of water consumed is treated). A decline in adherence from 100% to 90% reduces predicted health gains by up to 96%, with sharpest declines when pre-treatment water quality is of higher risk.

Conclusions: Results suggest that high adherence is essential in order to realize potential health gains from HWT.

Citation: Brown J, Clasen T (2012) High Adherence Is Necessary to Realize Health Gains from Water Quality Interventions. PLoS ONE 7(5): e36735. doi:10.1371/journal.pone.0036735

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Competing Interests: This study was supported in part by a grant to the London School of Hygiene & Tropical Medicine by Unilever, Ltd., which produces and sells point-of-use water treatment products including the PureitH water filter. Unilever had no role in the design of the study, analysis of the data, or preparation and submission of the manuscript for publication. As an employee of LSHTM and otherwise, TC and JB provide research and consulting services to UN organizations, government agencies, NGOs and private companies that promote water, sanitation and hygiene interventions including point-of-use water treatment products. These include, without limitation, the World Health Organization, UNICEF, the United States Agency for International Development, the Department for International Development, Medentech, Unilever and Vestergaard-Fransden. This does not alter the authors' adherence to all the PLoS ONE policies on sharing data and materials.

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Annex 15: Graphs

Causes of Child mortality; Efficiency of interventions in reducing diarrhoea

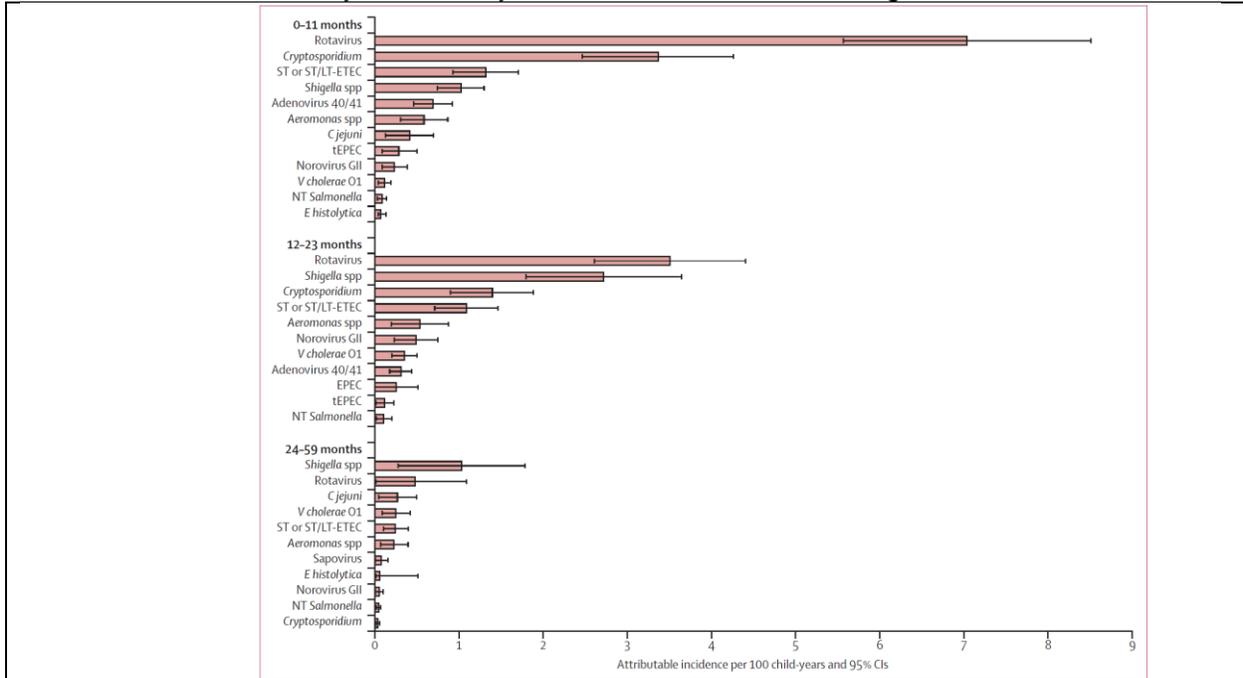
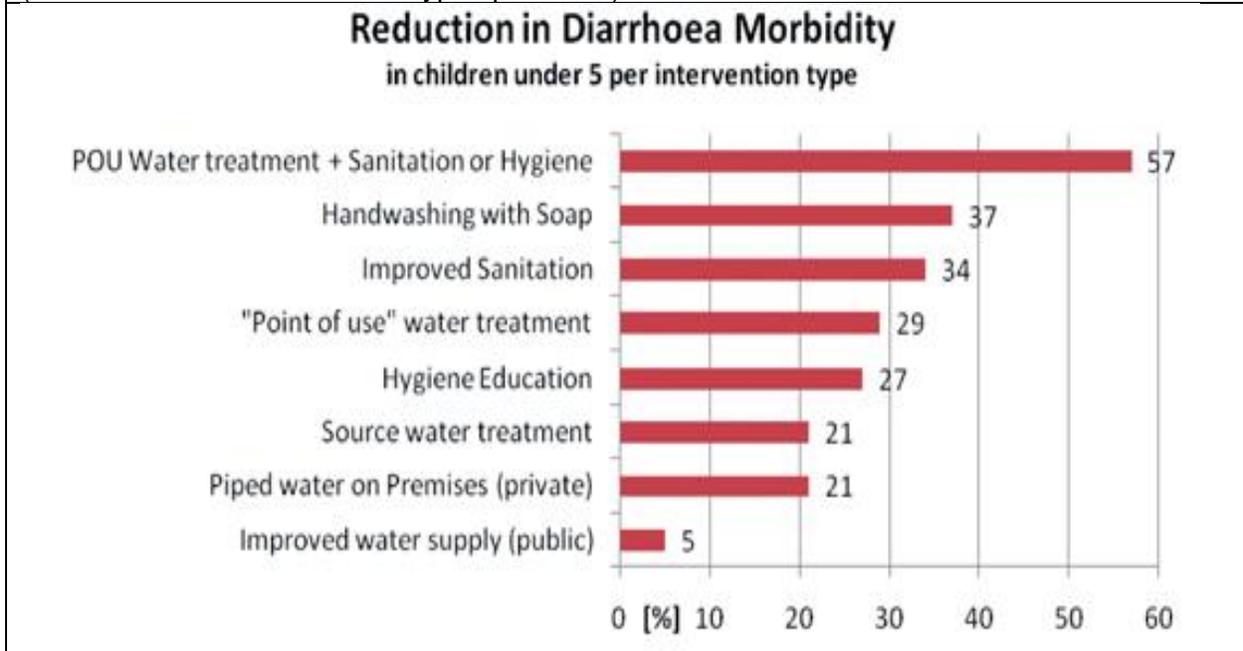


Figure 4: Attributable incidence of pathogen-specific moderate-to-severe diarrhoea per 100 child-years by age stratum, all sites combined

Major causes of child mortality GEMS study 2013. The No 1 Cause in the first 2 years is Rotavirus not often spread by water. No 2 is Cryptosporidium which is spread by water. (Chlorine does not eliminate Cryptosporidium.)



Efficiency of POU treatment (HWTS) in reducing diarrhoea

Combining HWTS with Hygiene is 3 times more effective than source treatment.

Source; 3IE (2009) International Initiative for Impact Evaluation, Synthetic Review 001

Quoted in UNICEF (2009) Evidence Base

Annex 16

Fostering safe drinking water with carbon finance

Carbon finance is being turned into an innovative tool to scale and monitor safe drinking water programs around the world.

The diagram illustrates the mechanism. Eliminating the need to boil water to make it safe to drink results in carbon emission reductions. This can be achieved, for example, by using water filters. By undergoing a rigorous accreditation process, the emission reductions can be certified and, crucially, converted into carbon credits. The carbon credits are then sold to the markets.

This generates a significant new revenue stream that can help scale up and enhance existing safe drinking water programs.



Benefits

Using carbon finance in this context has two key benefits:

1. **Additional source of revenue.** Carbon finance creates a new income stream. This can turn safe drinking projects into profitable enterprises which can therefore continue thriving after donor funds have ran out. Crucially, by attracting private capital, these projects can also scale up.
2. **Increased effectiveness.** Carbon credits are obtained after a rigorous monitoring process to ensure that people are using the water filters properly. This strengthens existing safe water programs, as it helps find solutions where the filters are being used incorrectly or not at all.

Case study – Believe Green in Ethiopia

Believe Green, together with Aqua for All and Basic Water Needs are implementing a carbon finance program in Ethiopia¹. The project, which is already distributing tens of thousands of filters each year, is in the advanced stages of certifying its carbon emission reductions. This will soon generate carbon credits that will result in several million dollars in additional revenue over the next decade.

The revenues will be used in several ways:

1. Fund awareness campaigns to educate local people on the benefits of safe drinking water.
2. Reduce the cost of water filters, thus making them more affordable.
3. Generate local jobs to run the monitoring system and carry out several other tasks and roles.

¹ For more information visit: <http://www.believegreen.org/#!carbon-for-water/c1kib>



ANNEX 17: A Randomized Trial of the Impact of Rope Pumps on Water Quality

A.C.Gorter,⁶ J.H.Alberts,¹ J.F.Gago,¹ & P.Sandiford⁷

Published in *Journal of Tropical Medicine and Hygiene*, 1995; 98:247-255

Abstract

Rope-pumps are now widely promoted as a low cost, easily maintained means to improve water availability in developing countries. However, in some instances their acceptance has been limited by concerns over the microbiological quality of the water. This study looked at the well water quality under a variety of different conditions, comparing unimproved bucket and rope wells, with wells with a windlass and rope-pump wells with and without a concrete cover. Other factors influencing the water quality were also examined.

Results indicate a 62% reduction of the geometric mean of the faecal coliform contamination of the well water as a result of the installation of a rope-pump with or without a concrete cover on wells which were originally equipped with a rope and bucket. Other factors found to influence the level of contamination of water in hand-dug wells were rainfall, number of households using the well, amount of water extracted daily and the distance of the well to the nearest kitchen. The last three factors probably reflect domestic activities with poor hygiene around the well.

The installation of a simple rope-pump on family wells improves the water quality and availability at a favorable cost/benefit ratio.

ANNEX 18: Blum, 2014

Article In magazine *Water*, June 2014
<http://www.mdpi.com/2073-4441/6/7/1873>

Marketing Household Water Treatment: Willingness to Pay Results from an Experiment in Rural Kenya

Annelise G. Blum, Claire Null, Vivian Hofmann

Abstract: Despite increasing availability of household water treatment products, demand in developing countries remains low. Willingness to pay for water treatment products and factors that affect demand are not well understood. In this study, we estimate willingness to pay for WaterGuard, a dilute chlorine solution for point-of-use water treatment, using actual purchase decisions at randomly assigned prices. Secondly, we identify household characteristics that are correlated with the purchase decision. Among a sample of 854 respondents from 107 villages in rural Kenya, we find that mean willingness to pay is approximately 80% of the market price. Although only 35% of sample households purchased WaterGuard at the market price, 67% of those offered a 50% discount purchased the product. A marketing message emphasizing child health did not have a significant effect on purchase behavior, overall or among the subset of households with children under five. These findings suggest that rural Kenyans are willing to pay for WaterGuard at low prices but are very sensitive to increasing price. Households with young children that could benefit the most from use of WaterGuard do not appear to be more likely to purchase the product, and a marketing message designed to target this population was ineffective.

Keywords: household water treatment; chlorination; willingness to pay; Kenya

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⁷Liverpool School of Tropical Medicine, Liverpool, UK



ANNEX 19: Experiences from other sectors and countries

Based on the Paper “Going to scaling up safe water” by Urs Heierli

<http://www.300in6.org/wp-content/uploads/2014/06>

This part is about experiences in other countries and strategies to scale up safe water. It is about why it is so difficult to create awareness for safe water in developing countries and looks at strategies adopted in Western Countries at the turn of the 20th Century when massive hygiene campaigns were launched to eradicate cholera and tuberculosis. This was done after the discovery of bacteria as agents to transmit the wide-spread diseases.

It is clear that scaling-up safe water needs common and concerted actions between public and private actors with a role division: the public sector should embark on massive and long-lasting hygiene campaigns to create awareness and induce behavior changes whereas the private sector should be encouraged to deliver the solutions for safe drinking water via supply chains that make enough profit to be sustainable.

More oases or greening the desert in-between?

Considerable progress was made in improving the access to safe water at the base of the pyramid in recent years, and many improved technologies and delivery models are now available. However, still millions people lack access to safe drinking water both in rural and urban areas. Even the most successful projects – as described in the Hystra study: “Access to Safe Water for the Base of the Pyramid”ⁱ – look more like oases in the middle of a huge desert. It is unlikely that scaling these projects will lead to universal access. What is badly needed are not more oasis, but a greening of the desert in-between, and this requires significant changes from business as usual.

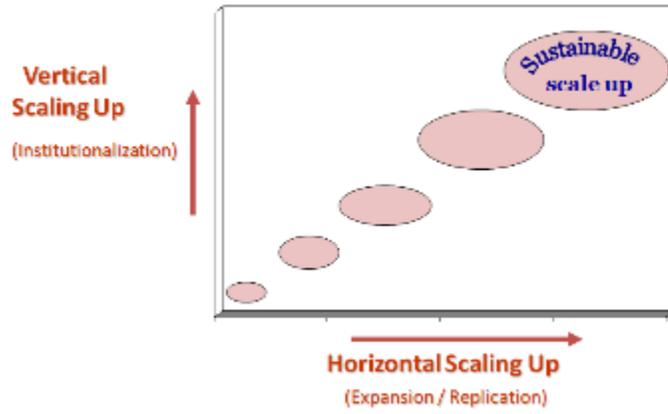
This part attempts to sketch a change agenda and ideas what is needed to go to scale. Scaling-up is not a linear process of replicating successful models or pilot projects at a larger scale: it means to apply a much more holistic, better coordinated and/orchestrated approach involving not only project partners but mainstream institutions of the society. The HIP (Hygiene Improvement project) of USAID says: “At scale begins by taking a whole systems approach, rather than targeting pieces of the problem, and engages multiple sectors, actions, options, and stakeholders in defining the problem”ⁱⁱ

SDC, the Swiss Agency for Development and Cooperation, did put scaling-up as a priority. “For reasons of sustainability and effectiveness there is a need to move from “project islands” to a more systematic and systemic approach”ⁱⁱⁱ SDC distinguishes between vertical and horizontal scaling up.

Vertical scaling up: Systematically rolling out concepts that have proved their worth at local level by institutionalizing them, so as to achieve a broader impact.

Horizontal scaling up: Rolling out concepts to cover a wider geographical area

These two approaches are illustrated in the following graph. For this paper it is clear that we aim at not only horizontal but vertical scaling-up and thus focusing on the institutionalization of safe water initiatives.



Scaling-up: how other sectors do it



The need to up-scaling has been recognized in different sectors of public health, namely in sanitation and cook-stoves, and Thomas Clasen has written an insightful paper on scaling-up Household Water treatment^{iv} What can we learn from these experiences?

Igniting change – the cook stove alliance

The Global Alliance for Clean Cook stoves was founded in September 2011 and announced by Hillary Clinton as a global initiative to disseminate 100 million improved cook stoves by 2020. It is a Public-private partnership run by the UN Foundation and involves Government agencies, NGOs, R&D institutions and the private sector (Morgan Stanley and Shell).

The alliance has published a change agenda: “Igniting Change – A Strategy for Universal Adoption of clean cook stoves”^v. This strategy was based on a large process of 9 Working Groups and two cross-cutting Committees and is based on three main pillars (see also the graph on the next page):

Enhancing Demand

Boosting the demand is needed to create a viable market that allows the private sector to deliver better stoves that are suitable to cooking habits, affordable and desirable.

Strengthening Supply: delivery systems of affordable and well-designed stoves reaching the last mile, making finances and carbon-finance available at scale must be strengthened to reach scale.

Fostering an enabling environment

International standards and testing approaches should make the stoves reliable for the customer, massive awareness campaigns and removal of tax, custom and other barriers are necessary to scale-up the dissemination.

Many lessons learned can be learned from the global cook stove alliance.





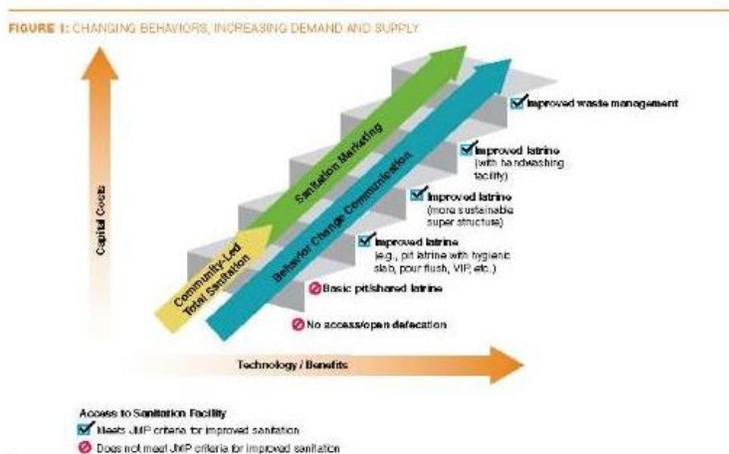
Scaling-up sanitation

A recent publication “What does it take to scale-up sanitation?”^{vi} arrives at quite similar conclusions. Based on recent experiences with successful scaling-up programs around the World, it recommends a strategic focus on:

Create demand: the methodology of Community Led Total Sanitation (CLTS) as introduced in Bangladesh by the turn of the century was preceded by a strong social mobilisation campaign that created demand, but only the CLTS methodology also banned the “bad” behavior of open defecation.

Change behavior: Behavior change communication is another instrument to enhance the demand in a sustainable way. What has worked as social coercion in Bangladesh may not be used in Ethiopia and culture specific messages need to be developed to sustain behavior change as a new daily routine.

Increase supply: the third pillar is sanitation marketing and this is one of the key factors of success in scaling-up in Bangladesh: the fact that a thriving private sector of latrine producers was created made it possible to deliver all kind of latrines at affordable prices in every village. The importance of sanitation marketing and involving and supporting an efficient private sector was long-neglected in the debate on total sanitation, and the impression was created so that it was sufficient to introduce CLTS on a large scale and the private sector would deliver. However, the private sanitation sector does not fall from heaven – as long as there is no market – and the considerable efforts to strengthen a private sanitation sector in Bangladesh was not well-known.^{vii} The strategy puts also emphasis on the process along the “sanitation ladder” allowing a broad range of solutions even if some of them do not comply with the standards of



the Joint Monitoring Project for improved sanitation.

The report also emphasizes the importance of an enabling environment, an active participation of government actors at national and especially local level, and the cooperation with the private sector and NGOs in a concerted way.

Scaling-up Safe Water

Thomas Claasen concludes: “The goal of scaling up HWTS will not be achieved simply by putting more resources into existing programs or transitioning current pilot projects to scale. The gap between where we are and where we need to be is too great, given the urgency of the



need. What is needed is a breakthrough. The largely public health orientation that has brought HWTS to its present point now needs to enlist the help of other experts: consumer researchers, product designers, educators, social entrepreneurs, micro-financiers, business strategists and policy advocates. The private sector is one obvious partner; it possesses not only much of this expertise but also the incentive and resources to develop the products, campaigns and delivery models for creating and meeting demand on a large scale. At the same time, market-driven, cost-recovery models are not likely to reach vast populations at the BoP where the disease burden associated with unsafe drinking- water is heaviest.”

Claasen quotes some interesting examples where a certain scale has been reached, namely ORS, the oral rehydration solutions that were promoted in Bangladesh by BRAC in a spectacular campaign of door-to-door persuasion reaching 10 million homes. Also, the Carter campaign to eradicate the Guinea Worm globally is a success story. However, all these campaigns were mainly public health campaigns and have not created a sustainable and dynamic “industry”. Similarly, the debate around malaria bednets is controversial between the advocates of social marketing versus free gift approaches. A wise conclusion is to mix the two in a smart way: use free or highly subsidized bednets to reach a high initial coverage (catch-up) but setup a supply chain through a rural retail network to guarantee the replacement needs (keep-up).^{viii} So, what is needed to achieve the breakthrough that Claasen advocates?

The Change agenda for safe Water

No doubt, many household water treatment solutions have achieved remarkable numbers and especially water boiling has become quite a large-scale accepted method in many countries, as Clasen points out. Another trend is the booming market for bottled water in most developing countries indicating that – at least the middle classes – are very aware of the dangers of drinking contaminated water. However, none of these methods reach poor rural populations and urban slum dwellers at the base of the pyramid, and especially their most vulnerable members, the children. What is needed is a comprehensive, coordinated massive scaling-up effort for safe water focusing on:

- Enhancing demand to create a market
- Strengthening supply chains through private sector delivery
- Enabling environment to create conducive conditions for growth

Enhancing demand – can we learn from developed countries?

It is crucial to create a market for safe water products for middle class because without a thriving market, no viable supply chains can be established and flourish that is essential to also serve the base of the pyramid.

The first mover is the loser

The Hystra study came to a first dramatic conclusion that (until 2011) there was not a single example of a successful business model to deliver safe water to the poor. Not even Hindustan Lever with its pure-it filter for the lower middle classes is considered as a true business proposition because of the high marketing costs especially with direct sales.

Most of the safe water solutions sold today are convenience goods that replace boiling, and to market filters or safe water to poor people is costly. Much more costly is it to persuade poor and less educated people to change their behaviour.

Companies who sell water treatment products and who will invests in social marketing campaigns may lose that money to competitors who will step in, once the market is created.



Some examples: In Cambodia, Hydrologic has created – in cooperation with other players such as RDIC^{ix} and the Red Cross - a market for the locally produced Ceramic Water Purifiers, but it faces competition from cheap imported Vietnamese filters. PSI has introduced WaterGuard in Kenya with large social marketing efforts and is now facing competition from AquaGuard.

Unfortunately, the first mover in creating a market is the loser: since his investments in building up a demand will benefit competitors.

Social marketing is a public health task. For this reason, demand creation for safe water solutions like HWTS is not a private but a public health task. What is needed to create a significant demand for HWTS products is not a linear strategy that addresses individuals but a massive, coherent and long-ranging strategy of hygiene education and persuasion at all levels of a society. The reasons for this need are:

- **Awareness is lacking**: there are many reasons why people drink contaminated water for generations and do not relate any disease to this water. For instance many people think that clear water is safe to drink or do not understand that Germs you can not see can harm health
- **Awareness is not enough**: even if people are told their water is contaminated, this is not enough to change behavior and buy for instance a water filter and use it daily.
- **Social norms**: awareness creation leading to behavior change is not an individual but a social process. If the entire village uses a filter and drinks safe water it becomes a social norm, but initially, those who start using a filter are deviants and may be laughed at.
- **Behavior changes**: are often facing stiff resistance. It may require a long-term persuasion to really step away from century old traditions toward adopting a new behavior in the daily life of an entire family and village.

Moreover, many poor people do not only have a low awareness and information level on the causes for diseases, they often have habits and preferences – and very often circumstances – that are totally opposite hygienic behavior and their poor housing situation is full of sources for infections. The concept of prevention is often unknown and if at all they treat a disease, they would prefer curative medicines, mostly antibiotics as described in the publication “Poor economics”.

How was hygienic behavior introduced in Europe?

Most of the severe hygiene problems have been solved in Western Europe, but this was not always the case: Cholera, tuberculosis, syphilis, were endemic and epidemic in most Western countries at the turn of the 20th century, but people thought that they were transmitted through bad fumes, and not seen as water-borne or air-transmitted diseases. The discovery of bacteria by Robert Koch and Louis Pasteur revolutionised the views on these epidemics.

Especially as the rich discovered that they also got sick from the bacteria of the poor, large public health improvement programs were launched. Before that, the poor were left to their own destiny and it was considered as normal that they had to live with dirt and disease.

Some major studies emerged, like “Death in Hamburg”^x, an analysis of the cholera epidemic that stroke Hamburg in 1830 and more severely in 1892, when more than 10’000 people died in only 6 weeks. For a long time, the authorities had tried to wipe the disease under the carpet and this resulted in a major crisis of the political structure and society.



Interesting is that focus of solving the problem of hygiene was urban only and a clear result and reaction of epidemic diseases that were a real threat to the lives of the bourgeoisie. Nobody has better described this than Thomas Mann in his famous book “Death in Venice”. The campaigns that emerged from this public health challenge were very holistic and long-term. Altogether, the improvements took more than 100 years, from 1830 when Cholera was identified in Europe for the first time to around 1950 when hygiene practices, improved habitat, piped water for almost everybody and sanitation have become normal standards.

Holistic means here: these campaigns were covering a lot of aspects such as Habitat, better apartments, more light and sun (and less damp houses and filth), probably also a lot of less rats, cockroaches, but also washing hands with soap, dental hygiene, public baths, private bath tubs, introduction of courses – and even hygiene inspectors – for housekeeping. Sanatoriums, sanitation improvements, clean water in standpipes and piped water in the houses.

One of the first entrepreneurs introducing a hygiene product was Karl Lingner from Germany. He is also considered to be one of the fathers of marketing, as he promoted ODOL as an example for a cosmetic and hygienic product, through mass publicity campaigns. He was also obsessed with hygiene education, and was one of the founders of the Deutsches Hygiene Institut in Dresden. The exhibition and the museum was an educational discovery, showing many scientific insights into the human body, bacteria, parasites, worm infections and diseases. One innovation at that time was to show disease-infected body parts in ethyl alcohol. Many of these campaigns were led by civil society organizations, sometimes supported by the Governments and sometimes forcing the Government to take action. Some of the pioneers were Florence Nightingale for introducing hygiene practices in hospitals, and the Salvation Army had its roots in the UK and spreading then to many countries with the slogan “soup, soap, salvation”, which stands for decent food (of the poor and homeless), hygiene and moral education through religion.

Achieving a higher market penetration – where are the other 75%?

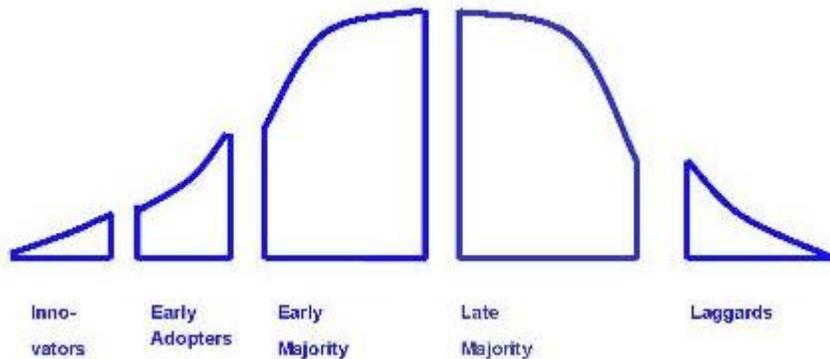
It is a fact that most HWTS only reach about 25% market penetration which means that 75% of the market is not reached. This is a big failure, especially because these 75% are most likely the poorest and most vulnerable population.

It is thus crucial to get area-wide coverage of social marketing and hygiene awareness campaigns. Just doing some thin spreading will not do. Required are massive and comprehensive campaigns with a long-term orientation and leading to broad-based behavior changes among the entire population. It is not enough to just reach the 25% early adopters, these are probably already those who are now boiling the water.

To go beyond the early adopters requires a comprehensive social marketing strategy similar to the CLTS campaigns. This means to change the behaviour by making the desired behaviour attractive, but also banning the undesired behaviour through exercising social pressure, like in sanitation to ban open defecation.



Social factors are important, and it is important to make the desired behaviour a norm or a standard, a social standard. Peer-to-peer influence is important.



There may also be a chasm between the early adopters and the late adopters. The book “Crossing the Chasm” by Geoffrey Moore explains why the adoption is not continuous between the innovators and early adopters, and the rest of the consumers of the early and late majority. He argues that there is a chasm between each group, and to penetrate into other market segments – e.g. the early majority – requires specific and targeted strategies, for example involving village leaders, educating children or regulation measures.

Reaching the late adopters – not talking about the laggards – is especially challenging and requires strategies of social coercion rather than just conviction: the late adopters will only adopt a new solution if they are forced to it by social norms or by practical factors. Their conservative attitude would make them wait as long as they can until they change anything in their daily life.

Comprehensive and effective social marketing campaigns

Awareness creation is a first step and is more effective if it is done in a comprehensive way with a good communication strategy. The Johns Hopkins University Communication Group is specialised in such campaigns that are playful and also comprehensive. A few years back, it introduced the successful blue bus campaign in Nicaragua, but unfortunately, only as a post-disaster activity after the Mitch, and it was not continued after a few years.

Similarly, the HIP project and the AED safe water education program in Uttar Pradesh were discontinued. There are good reasons to do so, but in order to be effective, they must be very long term, and accompanied with supply chains to deliver the solutions and spare parts. Otherwise, the campaigns will only be radiated in the “air” without making any impact on the ground. Awareness is by far not enough to change any behaviour: otherwise nobody in this world would still smoke.

Successful behaviour changes gets institutionalized as a daily routine. Changing behaviour from an old habit into a new habit is a difficult and comprehensive process. For example hand-washing behaviour seems to be a routine among middle class families in Europe, but it is still not a common practice always. The London School for Hygiene and Tropical Medicine discovered that the social factors are the most important and that “shame” is the best driver to boost hand-washing: if other people were watching, the hand-washing behaviour – especially of men – was increased.



To make a new habit a common practice it must be institutionalised and be implemented not just by targeting the individual. And to make it a daily routine, it must be practiced every-where and every-time. For example, schools are good starter, but it must also be implemented as a routine, for example in hospitals and hotels, it is crucial to measure the performance, due to the high risks involved. If one person does not wash hands, it can lead to a whole group of people getting infected.

Aspiration and social norms

To reach poor people, safe water products and solutions must be affordable, but it does not mean that poor people do not prefer “luxurious” products. Even – or especially – poor people would not like to have a product for the poor. The Super Tunsai filter of Hydrologics in Cambodia is an excellent example for this: This locally produced pot filter has the same ceramic filter element inside but the plastic container is more fancy than the basic Tunsai model. They sold much more Super Tunsai filter than the Lower cost basic Tunsai. When the basic model given away by NGOs free of cost or at a subsidized rate this took the “prestige” factor on the product. The sales of the super Tunsai increased when made available with credit.

So a question is how to make safe water products “must haves” and not only “nice to have” products. Besides the aspirational designs, it may be important to create a culture where having a safe water device is a must and becomes a social norm. Just like in sanitation people who are practicing open defecation are looked at as deviants, not having safe water in the house should be tagged with a negative social value.

In order to do this, it is important to have social leaders such as doctors, nurses, teachers, religious leaders and children become fully involved and exercising social pressure on their peers. Of special interest is the “Football for Water, Sanitation & Hygiene” (Football for WASH) initiative initiated in The Netherlands. This campaign could indeed pave the way for global scaling-up using football idols to give safe water the desirable “kick” it needs. Would it be too far a dream to think that FIFA could support such a global campaign?

Strengthening Supply chains- creating viable delivery channels

Demand and supply chain must go hand in hand

Demand creation can go up in smoke if it is not accompanied by a parallel delivery. This is explained with a very pertinent example of the Spring Health water kiosk project launched by Paul Polak in Odisha (formerly Orissa), India:

The project has introduced “water testing *melas*” (water testing village fairs) where the people could bring their water for testing. The petri dishes were then incubated and the person’s name was put on each dish and two days later, the dishes were shown to them. Almost everybody was shocked when they saw the results of the analysis and wanted to buy safe water. However, the delivery boy – at that initial stage – still had another job and did not deliver immediately. This was enough for the people to accept the old behavior and have an excuse not to switch over to a new habit. This shows that social marketing and supply must go hand in hand, otherwise action for awareness creation goes up in smoke.

5 Ps of marketing- the right mix

As NGO programs dominate the WASH sector, it is often overlooked how important it is to create of a viable supply chain of products and spare parts, stimulating the private sector and small entrepreneurs to operate profitable businesses. In the case of Spring Health water kiosks



in Odisha, people are ready to buy a jerry can of 10 liters for 2 Indian Rupees (3.5 US cents) at the kiosk, but are ready to pay 3 Rupees if the jerry can is delivered to their homes. The delivery boy with a cycle cart can keep the one Rupee and if he does not make 100 Rupees per day, it is not attractive for him to make his round in the village. He must therefore have at least a 100 customers per day, and if he only has 70, he will not work full-time and may not provide a reliable daily supply. This shows how important it is to have the supply chain evolve hand in hand with the awareness creation and if it is not reaching a certain volume of sales, the supply chain will collapse or never be established. How can effective supply chains evolve? Let us look at the 5 Ps of marketing: “Product”, “Price”, “Place”, “Promotion” and the last one is a social factor we want to call “People”.

Product: single or multi-product range?

The product can be a physical product like a water filter or a service like home-delivered safe water in bottles. In recent years, a considerable step forward was achieved by making available much better designed products. The example mentioned before is Hydrologic in Cambodia. They introduced – with the support of PATH – the Super Tunsai filter, a well-designed filter that is prestigious and will become part of the living room of a family. It has the same ceramic filter element inside that Ron Rivera has introduced 20 years back in Nicaragua, but the outside is now an industrially produced and nicely designed product.

Another example is the home delivered water jerry cans in the Spring Health project. It is interesting to learn that people are willing to pay more for convenience and for nice designs. Area-wide coverage with more hygienic solutions may only be achieved if we try out new marketing strategies that are more effective and certainly more holistic:

Multi-solution baskets: While every institution was pushing his own product in the past, it is now accepted that customers should be offered a range of products and/or services and be free to choose what solution they prefer multi-product marketing. For example, the promising AED project: This was creating market through a social marketing campaign with water testing, and providing solutions such as chlorine tablets or “pure-it” water filters with micro-finance.

Bundling of products

We should consider a much wider range of products. Not just a solution for safe water but others that improve the livelihood. A basket could include soap, cosmetics, toothpaste, improved cook stoves, water filters, sanitation, light but also a general improvement of the habitat such as showers?

Aspirations

If hygiene products are promoted as good for health, they are not easily accepted. If one learns from the cosmetic industry, they have had success because they positioned products such as soaps not just as useful to kill germs but as beauty products and must haves. They put an aspirational and trust ingredient in these products. Apparently, UNILEVER is preparing and combining wellness products and cosmetics with aspirational and proven effective safe water products.

Dreams

What people want and dream of is a nice-looking bathroom with a shower, nice tiles, a toilet and access to (safe) water. While it is tough to push water filters and chlorine out to people, everybody would probably queue up for a piped water tap in the house, if this was affordable.



We should be aware of that and understand that HWTS in this sense represent “second best” solutions.

Price: making it affordable – carbon finance subsidies

In general people like to have choices, so the range of Water treatment products should include options that are also affordable for poor families. As mentioned above micro credits will help and people will buy even a Super Tunsai. In all cases the price of a product should make it attractive to sell for the supply chain (see next chapter). However for the real poor, for emergencies etc subsidies are needed and what counts is to provide these subsidies in a smart form that neither distort nor discourage the markets.

Dangers are linked to two issues: motivation and selection. Customers should be motivated to procure safe water products so they should not be given away in the form of dumping them on people who do not want. If filters are given free or at a subsidized rate, there should still be a certain competition among customers to acquire them, and measures should be taken to ensure a certain desirability: for example, if children are invited to compete in a water testing activity and those with the best scores in a “quiz” will become the first eligible for getting a filter, then it is still ensured that only those are reached who really desire. It is then in a next step where the majority can be tackled.

Encouraging the supply chain: whenever subsidies or free gifts are used, it should be done through the supply chain and not undermining it. An example with filters. Vouchers can be distributed with which people can “buy” a filter at a local retailer. This will ensure a sales-point in the village, for new filters and spare parts.

It can make sense to subsidize products or services in order to make them more affordable, but the best way to use subsidies is for demand creation and for social marketing. It makes much more sense to use subsidies in a good education program – in schools than subsidizing the products and services themselves. People should get used to pay the right price needed to deliver the product or service in a sustainable way, otherwise the delivery channel will collapse again after subsidies are withdrawn.

Carbon finance can be a new option to get funds. By using a product like a filter, it is not needed to boil water with wood or other fuel and so carbon emission will be reduced. Companies become interested to combine the need to buy carbon emission rights and social investment like safe water. The incomes from this could be used to fund up-scaling

Place: making the delivery viable – reaching high volumes fast

It is essential that products and spares are available nearby the customer and the profit margins should be high enough to make it viable and attractive. Some options: An example for distribution are “Tupper ware” sales or house-to-house direct sales which is effective but is a costly way to sell products and requires a high margin per product. Other means are to use existing supply channels such as village shops or gasoline stations that can add water products to the existing products. In the Spring Health water kiosk model, selling water increases the turnover of other products.

To reach high volumes fast means to reach an upscale in a village and cover a large market share. This can be achieved with massive and effective social marketing campaigns that reach out fast to the entire village.

Promotion: comprehensive and holistic social marketing strategies



All the points mentioned in the past paragraphs call for massive, comprehensive and holistic social marketing strategies that can create a demand fast. Commercial Marketing and social marketing strategies must be well harmonized to create sufficient synergies. An example is given by the Johns Hopkins Center for Communication Programs. They revolutionized the public health communication and they had designed the famous “blue bus” campaign in Nicaragua.

Another option for promotion is to get “celebrities” involved like movie or football stars. The initiative to involve football for WASH is a very promising avenue.

It is very difficult to setup delivery channels for a single product and solution. It should be studied how safe water dissemination can link up with mainstream delivery channels. Maybe it is too much to ask Coca Cola to also disseminate cheap safe water solutions, but Spring Health in Odisha has shown that it is possible to use existing village shopkeepers as distributors for safe water, adding water to their existing product range of grocery products. Also, links with the hand washing campaigns and soap and cosmetic marketing would create synergies.

People: the social dimension

An important dimension is the creation of a social norm that makes drinking safe water a social obligation, just as the total sanitation program has made the use of latrines a desirable norm and open defecation as a socially unacceptable and banned behavior. The CLTS campaigns have been especially successful in banning open defecation by mobilizing village leaders, school children and intelligent social mobilization campaigns that made it impossible socially to continue the old habits. Another and yet underutilized potential seem to involve religious leaders.

Enabling environments: taking the challenge seriously

Safe water has not been on the development agenda as a top priority and was often neglected or denied. Many governments have not recognized the problem the problem of low water quality in urban areas and rural areas. Much focus has been on source improvement and delivering water quantity rather than water quality.

The common perception is that if the water is safe at the point of Tap / utility, it may also be safe at the point of use. However, there is significant evidence that this is not true:

Piped water: even if piped water in cities is safe at the origin, frequent electricity cuts may cause pressure drops which allows polluted water to enter the piped system. The best proof that people consider the water as unsafe is the booming market for bottled water in many cities in developing countries.

Re-contamination: another important pollution cause is the re-contamination between the point of tap and point of use because of dirty containers for transport or storage in the house. Accepting this as a problem is the first step for governments to create an enabling environment that leads to safe water to the masses of customers at the base of the pyramid.

Roles of the Government, NGOs and the private sector

Scaling-up needs comprehensive actions involving Governments, NGOs and the private sector and/orchestrating the cooperation so that all can march in the same direction. What are the key roles to be played?



Governments: the actions of Governments should focus on the creation of an enabling environment and conducive regulation policy. Governments can also play an important role for awareness creation and support the civil society and NGOs in implementing large-scale hygiene education campaigns. The awareness creation/ social marketing should be an activity of ministries of water health and education. Ministries of finance should of course also be involved

NGOs and civil society: mobilization, awareness creation, social marketing, hygiene education are all tasks that are best handled by the civil society and NGOs.

Private sector: the delivery of the solutions and products should be left to the private sector so that viable supply chains for good quality and certified products and services can emerge and delivered in the long term. Convenience is a key driver to convince people to pay. It is thus important that all the products and services – including spare parts like replacement filter cartridges – are available.

This should be the main division of roles. During the market creation phase it may be suitable to encourage the private sector with some upfront subsidies until the volumes are high enough to becoming profitable.

Regulation needs

Trust in the product is another and major important condition for families to invest in water treatment. Therefore it is essential to certify products. For a long time, a discussion on the right standards took place among the HWTS community UNICEF and the WHO and recently a document was published^{xi}. It advocates three levels of quality being Highly protective, Medium protective and Interim options. So customers, families can choose. If one only would accept the highest standard, they exclude lower cost products that still are effective. An example is the ceramic pot filter as promoted by Potters for Peace and now produced in over 20 countries. Investigations in Nicaragua, Cambodia and other countries indicate that the use of these filters reduce water borne diseases by 60% or more. Still they do not qualify for the medium or interim standard.

Some 4 laboratories are appointed worldwide and now are testing some 10 Household Water treatment products, mainly filters. Once they get a certification there is no need to undergo another certification process in each country, if the different countries would agree to recognize such tests.

Enabling environment – taxes and duties

Safe water products and services are not everywhere accepted as basic needs and are in some countries still levied with high luxury taxes, import duties and value added taxes. This should change if large-scale dissemination is envisaged. Scaling up the use of Safe water products or services activities will drastically reduce water borne diseases and so reduce health costs. Now an estimated 50% or more of the hospital beds in developing countries are occupied with patients with water borne diseases so it is a very cost effective measurement to reduce or eliminate taxes. It will reduce many millions of dollars in health cost. So safe water products should be exempted from import and value added tax, whenever possible.

The Change Agenda: what needs to be done An Alliance to voice the concerns and act together



The present forum for safe water, the Household Water Treatment and Safe storage Network (HWTS) is basically a technical forum, and this is good so. What is needed, is also an organization that can bring different actors together in an alliance for advocacy and action. This forum should use existing information on the State of the World in Safe Water and show successes and failures in scaling-up and thus play the role of advocacy. It should also be a platform for action and bring the key players together and search for more harmonization and aligning of the different individual efforts. It should aim at greening the desert and not the creation of oasis only. It should emphasize especially at changing the entire safe water sector and not just do more of the same. The focus should be on the removal of barriers.

Common action plans and/orchestrated approaches

It is essential to bring together the main actors – for example in national platform programs – with their complementary roles and actions and/orchestrate them in a comprehensive way. For example nationwide social marketing campaigns would help the entire industry and not just one player. By focusing on some common issues – e.g. the certification or getting access to carbon finance – it would stimulate and scale-up solutions for all participating partners and not just promote one single product.

Bringing the right stakeholders together

To start a change it is important that it is recognized that business as usual will not do and that we need a new approach. This means that one needs to involve more actors: not only WASH organizations but also the private sector, financing partners, micro-finance institutions, technical organizations, the scientific community, but also celebrities, football stars and/organizations.

300in6

The 300in6 initiative was created at the Istanbul Water Forum with the ambition to find ways to go to scale. In the course of action, it was discovered that more of the same is not doing, business as usual has only created some oasis but has failed to reach area-wide coverage. Conventional approaches have only 25% market penetration of those who are already aware. Scaling-up is thus not a linear process and not just doubling the speed of the present actors in the safe water industry. It means changing the industry and removing the hurdles. Now it is discovered what these hurdles are, one by one and more good examples are needed. New approaches are now being implemented in developing countries like Cambodia, Indonesia and Malawi. Innovative organizations are on the way to achieve local breakthroughs. 300in6 intends to bring the best ingredients of these emerging success stories together and digest them into a strategy.

With funding for social marketing and communication from social venture capital and the support of celebrities and football stars, allow the safe water solutions to go to scale, and bring a new ingredient: glamour.

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