Embedding “best practice” into hearts and minds

SuSanA: the “go to” source for Knowledge Management

Esther Shaylor – On behalf of the SuSanA Consortium

Introduction

Guidelines, policy briefs, handbooks, design sheets and online resources available for WASH practitioners in the field (WEDC 2007, WASH Cluster 2013, Red Cross, Oxfam) are not always used by field staff: “best practices” not used.

SuSanA and Oxfam surveys tell us field practitioners prefer to learn and develop through workshops/training events and on the job training

Though not cost effective, face to face learning is preferred over use of written documents available online.

SuSanA’s online platform is continually updated to offer KM to the Emergency Management sector. There is a dedicated Working Group for this focusing on Emergency and Reconstruction Situations (http://www.susana.org/en/working-groups/emergency-reconstruction-situations).

Understanding the SuSanA operating environment

SuSanA is ‘an informal network of people and organisations who share a common goal of achieving the Sustainable Development Goals, in particular SDG6 (SuSanA, 2018).

SuSanA’s market environment includes what customers ask for (demand) and what sanitation experts can provide (supply). The market environment is described in Figure 1. The left side in blue summarizes categories of actors who provide similar/complementary products and services. The light pink oval just to its right includes all four areas of KM identified by Cranston and Chandack (2016).

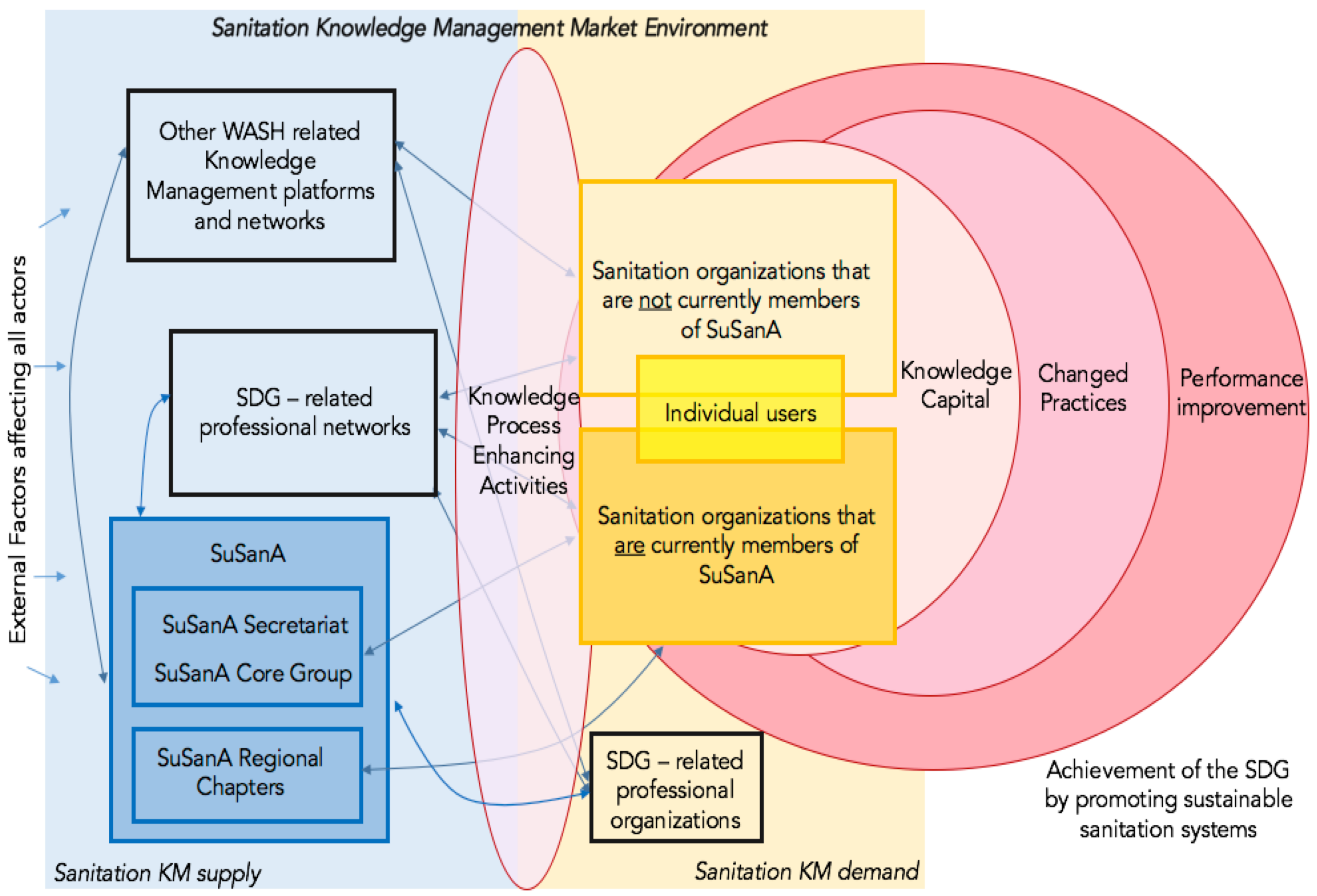

Figure 1 Sanitation Knowledge Management Market Environment and the ripple model for KM strategies within SuSanA

Understanding user needs

To better serve its users, SuSanA is working to identify the whole range of ‘personas’ who use SuSanA. This will provide more differentiation of priorities for more specific categories of users.

The persona concept can be applied in various ways:

- **Persona-based user profiles**: provide discussion forum users profile options allowing them to state interests and needs and, if they wish, to identify with a persona
- **Persona-targeted communications**: tailor emails, discussion forum digests and notifications to specific interests.
- **Persona-oriented curation** of content: following analysis of user profiles, adapt website content, Working Group thematic discussions, webinars, and meetings to particular user categories
- **Persona-oriented website interface**: Develop new interfaces on the website that are geared to the interests of the different personas.

Personas	Learning method	Information management: 1. Prime topic not satisfied 2. Access method 3. Main bottleneck	Preferred knowledge sharing mechanism	Preferred communication channel	Preferred choice of social media
Government	workshop conference	1. financing 2. websites 3. cost of access	conference	email	Twitter
Donor	on the job	1. technical 2. websites 3. too much info	professional network	email	Facebook
Implementing NGO	on the job	1. links to other sectors 2. websites 3. too much info	professional network	colleagues and friends	LinkedIn
Consultant	on the job	1. financing 2. reports 3. too much info	professional network	email	Facebook
NGO	workshop conference	1. financing 2. websites 3. cost of access	local/regional meetings	email	Facebook
CBO	workshop conference	1. financing 2. website 3. cost of access	local/regional meetings	email	Facebook
Entrepreneur	on the job	1. financing 2. websites 3. too much info	professional network	websites	Facebook
Academic	on the job	1. financing 2. peer-reviewed journals 3. cost of access	conference	colleagues and friends	LinkedIn

Table 2 the personas created from the research findings

SuSanA working for the emergency sanitation sector

SuSanA’s Working Group 8 supports the emergency sanitation community, it has 2100 members with the lead members coming from, Malteser International, WASTE and BORDA. The online discussion forum focuses on the challenges of Emergency and Reconstruction Situations amongst other things. These modalities allow for discussion amongst the emergency sanitation community and collaboration over a digital platform, this has allowed contributions from SuSanA to the newly published Compendium of Sanitation Technologies in Emergencies (2018).

SuSanA is utilising the persona concept to be better placed to support emergency sanitation activities on the ground, through well designed digital curation of appropriate information and resources.

Next steps

Within the emergency sanitation sector, and to further develop the activities of WG 8, SuSanA will utilize the personas of the relevant actors to tailor the approach to KM that will best support activities on the ground. Through SuSanA and working closely with key partners such as Oxfam, SuSanA can explore how to break down topics, best practices and innovations in the sector into different media formats.

This will address the current development needs of emergency sanitation practitioners in engaging ways to find out what is most effective for triggering actual learning and better practice across the sector.

Conclusions

SuSanA’s newly developing strategy and website revamp includes improved search and filtering options. Work surrounding curation has been ongoing through 2017 and will continue into 2018. To enhance the quality of the KM products and features within SuSanA for the benefit of its stakeholders, the focus is on what is directly useful to practitioners. That includes:

- recommended readings on topics,
- calendar of sector events,
- case studies,
- webinars and thematic discussions on the Forum,
- top readings for the Working Groups,
- generating summaries in new formats such as short how-to videos, podcasts and infographics.

Content development through the library, project database, Working Groups, discussion forum and in-country and regional events will benefit from understanding user needs better. The demand driven approaches that SuSanA adopt will have a strong focus on mediating knowledge exchange between policy and research stakeholders on the one hand and the implementers on the other.

Developing a series of KM focused resources in an engaging format will build on the wealth of knowledge and materials already generated by the sanitation Community of Practice. Going forward, this work will be an additional multiplier for disseminating ‘best practice’ in the sector. The work will also contribute to a more efficient use of resources to address KM needs.

Bill & Melinda Gates foundation · WaterAid · SEI · giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH · On behalf of BMZ Federal Ministry for Economic Cooperation and Development

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SUSANA (2018) About the SuSanA Network [online] available from <http://www.susana.org/en/about/faq>

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FACTSHEET

WASHaLOT 3.0

Group Washing Facility

Handwashing with soap is the single most effective way to prevent infectious diseases. Regular handwashing, specifically after using the toilet and before eating should be part of a daily routine in everyone's life. Schools, kindergardens, day care centers, hospitals, bus-stations, canteens are public places, where handwashing should be made possible for many people at the same time.

FEATURES

The WASHaLOT 3.0 is a prefabricated system, which can accommodate handwashing, toothbrushing, feetwashing for up to 20 people at the same time.

Allow groups of users to perform hygiene activities either together or individual due to individual water outlets.

The water outlets are designed to release water only when manually touched and thereby reduce water consumption.

One pipe filling carries up to 28 litres of water and will accomodate about 150 handwashing activities.

The water carrying pipe can be connected to a piped water supply or can be filled manually.

Easy operation & maintenance due to wide openings at both sides and at the bottom on the pipe.

TECHNICAL DETAILS

Dimensions: length 300cm
Materials used: HDPE Pipe (Outside Diameter 110mm or 125mm), Stainless Steel Outlets
Number of Outlets: 10

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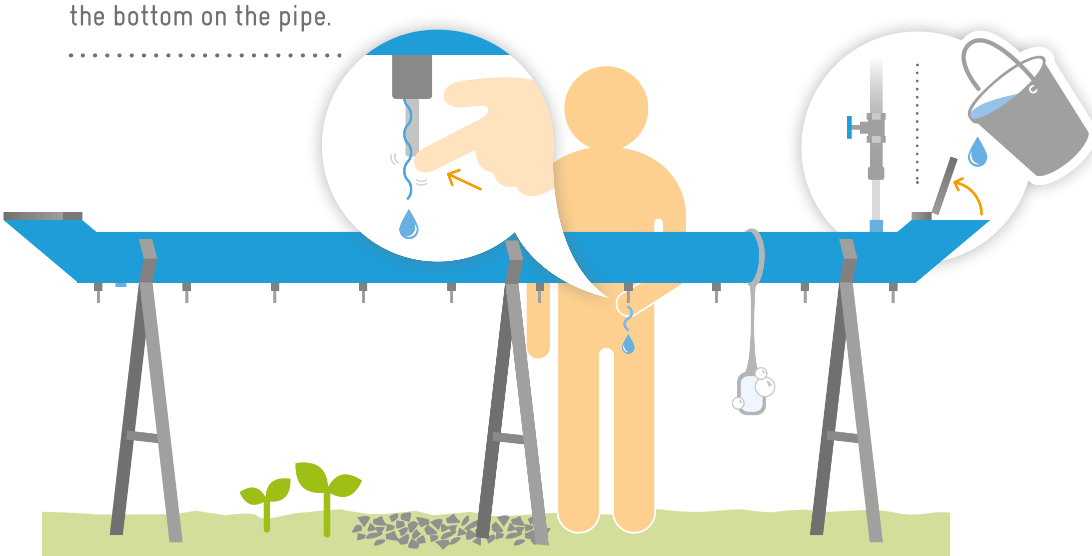

german cooperation
DEUTSCHE ZUSAMMENARBEIT

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

sustainable sanitation alliance

Is humanitarian water safe to drink (with respect to disinfection by-products)?

Findings from MSF's surface water treatment plant at Palorinya, Uganda

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Problem Statement

Given our reliance on chlorination for water treatment in humanitarian emergencies, concerns have arisen about disinfection by-products (DBPs) such as trihalomethanes (THMs) in the water provided to beneficiaries. To our knowledge, there has never been an investigation of DBPs in an emergency bulk water supply intervention. As such, MSF set out to investigate DBP levels at its surface water treatment plant (SWTP) in Palorinya, Uganda in order to determine whether a DBP-related health hazard exists or not.

DBPs & THMs: Essential Facts

- DBPs including THMs are formed when chlorine reacts with natural organic matter (NOM) in raw surface waters.
- DBP/THM formation increases with chlorine and NOM concentration, temperature, contact time, and pH. They are chemically stable and will accumulate in treated water in the presence of chlorine and NOM[1–3].
- DBPs/THMs may be linked to cancer and other adverse health effects, and are therefore subject to maximum allowable concentrations from WHO, US EPA, and EU[2,4].
- Current epidemiological evidence shows a consistent association between long-term THM exposure (30+ years) and risk of bladder cancer although causality is not conclusive, whereas epidemiological evidence concerning other cancer sites is insufficient or mixed[5–11].
- Current evidence suggests minor effects on fetal growth from high THM exposure during pregnancy, but is inconclusive for other reproductive outcomes (e.g., fetal loss, preterm delivery, congenital malformation)[5,12,13].

Site Background

We undertook a study during Aug-Sept 2017 at the SWTP built and operated by MSF on the Nile near the Palorinya refugee settlement in northern Uganda (average output: 1200 m3/day). At the time of the study, the SWTP was divided into two sides each with a unique treatment process:

1. <u>Standard treatment</u>: pre-clarification via coagulation-flocculation (aluminium sulphate or poly-aluminium chloride) done before disinfection via chlorination (HTH) in separate tanks.
2. <u>Rapid treatment</u>: clarification via coagulation-flocculation and disinfection via chlorination done simultaneously in the same tank (same chemicals).

We focused DBP/THM sampling on the standard treatment side. Chlorination at the SWTP targeted 1.5 mg/L free residual chlorine (FRC) at plant output prior to water trucking in order to achieve 0.8-1.0 mg/L FRC at the tapstand.

Raw Water Quality

Selected raw water quality parameters from the source are given in Table 1:

Parameter	Mean (95% CI)	Reference Range (Drinking Water)
Turbidity (NTU)	15.8 (13.2-18.4)	<1 NTU
pH	7.2 (7.1-7.3)	6.5-8.5
Electrical Conductivity (uS/cm)	150.7 (143.4-158.1)	0-800 uS/cm
Alkalinity (mg/L $CaCO_3$)	66.1 (60.4-71.8)	20-200 mg/L
Apparent Colour (units Pt-Co)	133.0 (92.1-174.0)	Distilled water: 0 units Pt-Co

Table 1: Raw water quality of Nile surface water source during Aug-Sept 2017 at the Palorinya SWTP.

Figure 1: Raw water intake from the Nile River at the Palorinya SWTP in Aug 2017; note marshy condition of river (Syed Imran Ali, MSF).

Methods

Measuring DBPs usually requires complex techniques such as gas chromatography that are ill-suited for use in humanitarian field settings. Recently, simpler colorimetric techniques have become available such as the Hach *THM Plus* Method that have made in-field testing possible. The Hach method has[14,15]:

- Good correlation with instrumental reference methods;
- Validated as a screening tool for trihalogenated DBPs (reporting cumulative total of 11 species including 4 total trihalomethane species);
- Established track record of use in US water treatment facilities.

We implemented the Hach method at the Palorinya SWTP laboratory and sampled 26 unique parcels of water in which we observed DBP/THM levels:

i. 30 minutes after chlorination;
ii. 24 hours after chlorination (to simulate what beneficiaries consume).

We compared our observations to the guideline limit for THM compound chloroform stipulated in the WHO Guidelines for Drinking-water Quality[16] (300 ppb) in order to assess whether there is a DBP-related health hazard or not.

Research Ethics Review

This research did not involve human participants or their data. As it only collected water quality data at the SWTP, it was exempted from a full ethics review by the MSF OCA Medical Director.

Findings

DBP/THM observations at the Palorinya SWTP are given in Table 2:

Treatment Process	Time Elapsed	Number of Observations	FRC (mg/L)	DBP/THM (ppb)
			Mean (95% CI)	Mean (95% CI)
Standard Treatment	30 min	17	1.76 (1.32-2.18)	59.4 (50.1-68.6)
	24 hours	16	0.74 (0.47-1.01)	85.0 (71.0-99.1)
Rapid Treatment	30 min	3	0.30 (0-1.36)	202.5 (0-441.1)
	24 hours	3	0.27 (0-0.87)	218.0 (151.2-284.4)

Table 2: DBP/THM observations for standard and rapid treatment at 30 minutes and 24 hours post-chlorination.

Importantly, we found that DBP/THM levels after 24 hours did not exceed the 300 ppb WHO guideline limit, either for standard treatment (85.1ppb; 95%CI: 70.9-99.1; $p<0.0001$) or for rapid treatment (218.0ppb; 95%CI: 151.2-284.8; $p<0.02$), using a one-sided Student's t-test.

Key Takeaways

- Our findings did not indicate that a DBP-related health hazard is created when turbid surface water is chlorinated at the Palorinya SWTP.
- While we cannot generalize this finding to all emergency surface water treatment interventions globally, we believe the Palorinya study represents a "worst case scenario" as the water source was a highly marshy river (Nile) during the rainy season when NOM precursors are expected to be at their highest levels.
- In order to better resolve potential DBP/THM risks in emergency water supply interventions, we recommend that humanitarian agencies monitor DBP/THM levels at SWTPs using the Hach THM Plus method, which we found to be a suitable DBP/THM screening tool for humanitarian field settings.
- Ensuring adequate chlorination to protect against waterborne pathogenic contamination remains the priority as studies confirm that the health risks posed by waterborne diseases far outweigh those posed by DBPs[17–20].

References available on separate sheet. For more information on the study and its findings, please contact Matt Arnold (downthehole@yahoo.co.uk).

Priorities of Emergency WASH Practitioners when Selecting Household Water Treatment

Laura MacDonald
Candice Young-Rojanschi

Objective

To understand the key priorities of emergency WASH professionals for selecting, or rejecting, household water treatment methods for safe water provision in emergencies.

Introduction

Household water treatment (HWT) is used widely in international development. However, other than chlorine, its use has been less common in emergency contexts. There is a growing market of HWT products that could be appropriate for emergency response, but it is unclear what the important characteristics of HWT are in these settings.

As part of CAWST's support to the Humanitarian Innovation Fund's (HIF) Emergency Household Water Filter Challenge, we undertook a study of emergency WASH practitioners' HWT priorities. CAWST has continued the study to inform the development of emergency-related content on hwts.info.

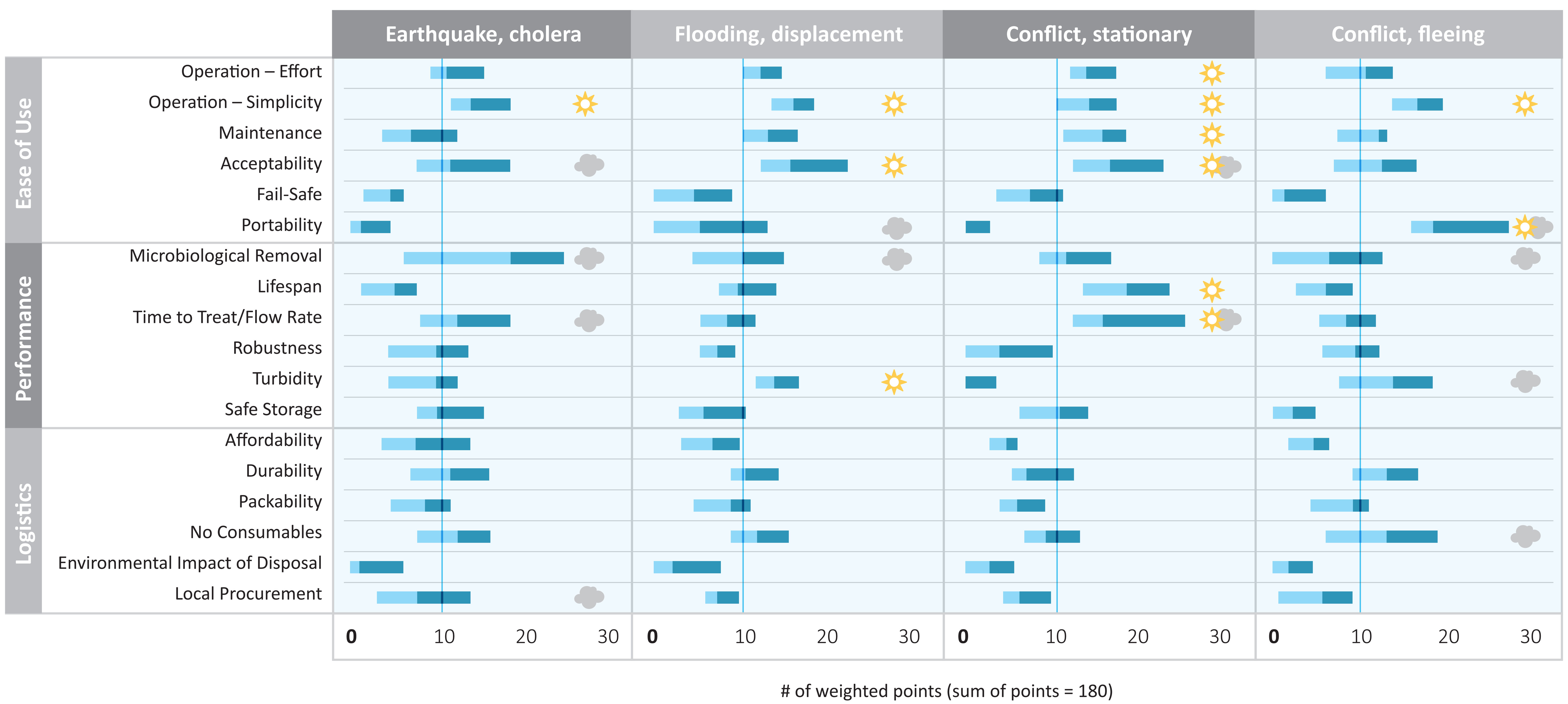
Methodology

Interviewees were recruited through the HIF Technical Working Group, the Global WASH Cluster, and CAWST's networks. They had a range of experience with HWT – from never using it to extensive experience with multiple products.

- Nine scoping interviews shaped the methodology and development of four scenarios:
  1. Earthquake, cholera, variable water
  2. Flooding, turbid
  3. Conflict, stationary population, groundwater
  4. Conflict, fleeing population, turbid
- 17 weighting interviews, where for each scenario, interviewees were asked to:
  - Divide 60 points amongst six characteristics for each of three categories: ease of use, performance, and logistics
  - Divide 100 points between the three categories
  - Points for each characteristic were adjusted based on interviewee's category weightings

25th percentile | median | 75th percentile — 10 = average — ☼ 25th percentile > 10 — ☁ Inter-quartile range > 10

A minimum microbial performance of 2 log bacterial removal was assumed. Scores above 0 indicate an interviewee stating a need for performance greater than this. Likewise, affordability referred to a cost of <$100 US, and flow rate/time to treat to the ability to treat >20 L/24 hours



Discussion

Simplicity, or intuitiveness, of the HWTS method was the one parameter that rated higher than average on all scenarios.

Between-scenario variability

- A portion of respondents had low between-scenario variability for scoring, either because:
  - Their organization would generally select and stockpile a single technology for all situations, so the specifics of the scenarios were less important, or
  - They saw certain parameters as being fundamentally more important than the others regardless of scenario.
- The other portion had higher between-scenario variability and placed high importance on the details.

Within-scenario (between-respondent) variability

- Microbial removal: tended towards a bi-modal distribution. Either:
  - A respondent believed that 2 log bacterial removal was sufficient, and weighted it quite low, or
  - They believed that it was not sufficient and weighted it quite high.
- Time to treat/flow rate and user acceptability of the device and/or treated water also tended to have higher variability in responses
- "Conflict, stationary population" had higher agreement about which parameters were of higher, or lower, than average importance

Acknowledgements

The first portion of this project was funded by the Humanitarian Innovation Fund in support of the Emergency Household Water Filter Challenge.

The authors would like to thank the emergency WASH practitioners who took the time to participate in our interviews.

Pilot of the random location cluster methodology for rapid WASH assessments in camps settings during acute emergencies

Matthew E. Verbyla (San Diego State University), Anangu Rajasingham and Colleen Hardy (Centers for Disease Control and Prevention), Elisabeth Vikman (Impact Initiatives), and Ryan Schweitzer (UNHCR)

Background

Develop an approach to rapid household assessment that can be used during emergencies. Requirements of the approach:

- collect data in a single day with a small team of enumerators (2-4)
- can be used in the absence of detailed or up to date map
- no prior information about the number of households or the location of shelters

Methodology: Random Location Cluster (RLC) Sample

Clusters of households are identified through the random generation of waypoints. A "20x3" approach means that 20 random waypoints within a specified area are generated and the nearest 3 households to that waypoint form the cluster. All three households are interviewed and therefore the total sample size is 60 HH. Both a 20x3 and a 30x2 approach have been tested.

Steps in the process:

1. Identify area on google maps and generate a polygon encompassing the site where data collection will occur
2. Save polygon and export into GIS program (e.g. Arcmap, Quantum GIS, etc.)
3. Generate 20 random waypoints within polygon in GIS program
4. Save area as a georeferenced PDF
5. Load PDF onto smartphone/tablet and open in mapping software (e.g. Avenza maps)
6. Load UNHCR's Rapid Household Survey (10 core indicators) onto smartphone/tablet open in Kobocollect or ODK.
7. Navigation to waypoint and data collection at nearest 3 households
8. Uploading survey data onto Kobo for collation
9. Downloading into excel and cleaning
10. Analysis using script (e.g. SAS, SPSS, R).

For more information visit: wash.unhcr.org

2017 Pilot Study

RLC approach was tested in emergency situations:

- 2 camps in Syria (Ein Issa and Al Hol) – REACH/Impact Initiatives
- 1 camp in Iraq (Kabarto)- REACH/Impact Initiatives
- 16 locations in Cox Bazaar, Bangladesh- CDC/UNHCR

A similar data collection tool was used in each of the three locations, with the objective to measure the following core indicators:

	Core WASH Indicators	Statistic to be Estimated	Type of Indicator	UNHCR Emergency Standard†	Assessed for Sites in Bangladesh?	Assessed for Sites in Iraq and Syria?
1a	Average number of liters per person of potable* water storage capacity†	Mean	Positive Numeric	≥ 15	✓	✓
1b	Percent of households with 10 or more liters per person of potable* water storage capacity†	Proportion	Binary	≥ 70%	✓	✓
1c	Average number of liters per person per day of potable water collected at the household†	Mean	Positive Numeric	≥ 15	✓	✓
1d	Percent of households collecting drinking water from protected sources†	Proportion	Binary	≥ 70%	✓	✓
1e	Percent of households treating their drinking water†	Proportion	Binary	≥ 70%	✓	
2a	Percent of households reporting defecating in a toilet†	Proportion	Binary	≥ 60%	✓	✓
2b	Percent of households with toilets that are operating without problems‡	Proportion	Binary	n/a	✓	
3a	Percent of households with access to soap†	Proportion	Binary	≥ 70%	✓	✓
3b	Percent of households with a designated bathing facility	Proportion	Binary	n/a	✓	✓
4a	Percent of households with ≥1 person with 3 or more loose or watery stools in past 14 days	Proportion	Binary	n/a	✓	✓

Table 1 Core WASH Indicators used in the Rapid Household Assessment Pilot along with the UNHCR Emergency Standard

Results

The design effects for the 20x3 RLC sample is shown in Table 2. The three indicators with the highest design effects (they all had confidence intervals that exceeded 2.0) were 1d, 1e, and 2a. A design effect of 2.0 means that the cluster sample has the same precision as a simple random sample with half as many households.

	Indicator	Mean Design Effect (95% CI)
1a	Liters per person of water storage capacity	1.7 (1.6, 1.8)
1b	% of HH with 10 or more LPP water storage capacity	1.2 (1.1, 1.3)
1c	Liters of water collected per person per day	1.7 (1.6, 1.8)
1d	% of HH collecting water from protected sources	1.8 (1.2, 2.4)
1e	% of HH treating their drinking water	1.6 (1.2, 2.0)
2a	% of HH reporting defecating in a toilet	2.2 (1.8, 2.6)
2b	% of HH with toilets that are operating without problems	1.5 (1.2, 1.7)
3a	% of HH with soap for handwashing	1.3 (1.2, 1.5)
3b	% of HH with a designated bathing facility	1.5 (1.3, 1.7)
4a	% of HH with at least one person with 3 or more loose watery stools in the last 14 days	1.1 (1.0, 1.2)

Table 2 Design effects estimated for the core WASH Indicators used in the Rapid Household Assessment Pilot with a 20x3 design

Results (continued)

In order to assess the results of the RLC approach, a standard data collection exercise using simple random sampling and a larger sample size (i.e. 350 HH) was performed in each site. The results showed that the RLC method was comparable. Below is a graphic showing the comparison (i.e 20x3, 30x2, and the larger random sample) that was done in one of the zones in Kutapalong Camp in Bangladesh (Zone TT).

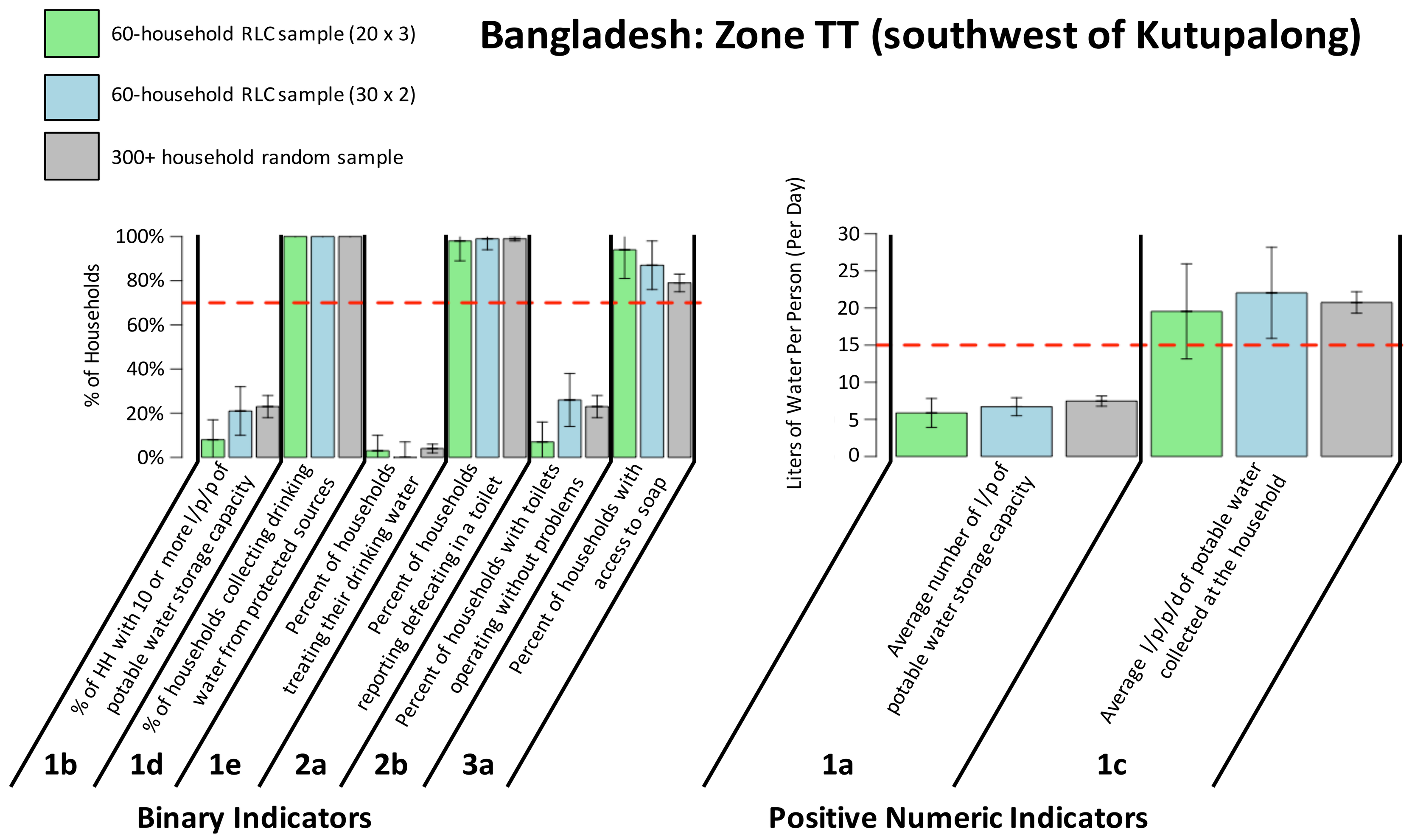


Figure 1 Results of the validation exercise in Bangladesh comparing the 30x2 and 20x3 RLC samples with a 300 HH random sample

Limitations to Approach

- RLC application requires 2 days of training for enumerators with no prior data collection experience. For enumerators with previous experience a ½ day training focusing on navigation is needed.
- Waypoints that fall in very sparsely populated areas were problematic for data collection and could result in bias in the final results. Further testing is needed to understand how to minimize these effects.
- Conclusive validation of the approach was not possible with the given data because the selected indicators in the pilot locations yielded very high or very low results. .
- Current analysis procedures require specialized statistical skills.

Next Steps

UNHCR and Impact Initiatives will continue testing the RLC in at least 5 countries in 2018 to gain more experience, continue feasibility and validation testing to be able to refine the methods, and update guidance document. Dissemination of these findings will be done through the Global WASH Cluster.

UNHCR The UN Refugee Agency
IMPACT Shaping practices Influencing policies Impacting lives
San Diego State University
CDC

Rapid *E. coli* Water Quality Testing

unicef

UNICEF Supply Division

For more information, contact:
Dr. Peter Harvey
pharvey@unicef.org

Creating Impact

E. coli is the WHO preferred indicator for measuring faecal contamination of water but the current methods for testing for *E. coli* involve complicated procedures that are not ideal for the communities and governments who need to use them.

As a result, UNICEF is challenging product developers to identify an easy-to-use, rapid detection method that can accurately determine faecal contamination in drinking water.

UNICEF is seeking solutions for three key use cases: 1) data collection in household surveys; 2) behavior change and water safety planning with communities; and 3) on-site or field testing for regulatory oversight or surveillance purposes.

A rapid *E. coli* test could empower individuals and local communities to monitor and manage their water quality, ensuring their own health and safety.

UNICEF Target Product Profiles

UNICEF initiates product innovation projects based on needs and lack of fit-for-purpose solutions on the market. By communicating needs to product developers, offering incentives to de-risk R&D investments, and working with our partners to design pathways to scale, UNICEF hopes to accelerate product development and ensure impact.

Target Product Profiles (TPP) include information on how a new product will be used, by or for whom, and the minimum and ideal performance criteria. The purpose of a TPP is to guide industry to develop products that meet UNICEF's needs. The below summarizes the key criteria for Rapid *E. coli* Detection products. For the full TPP, please visit https://www.unicef.org/supply/index_91816.html

Attribute	*Acceptable*	*Ideal*
Key Function	Detection of faecal contamination in drinking water.	Detection of faecal contamination equivalent to *E. coli* in drinking water.
Limit of Detection	Equivalent to 10 CFU/100mL (*E. coli*).	Equivalent to 1 CFU/100mL (*E. coli*).
Sensitivity & Specificity	False positive < 10%; False negatives < 10%.	False positive <5%; False negatives < 5%.
Time to Result	Less than 3 hours.	Less than 30 minutes.
Quantification	Differentiation between P/A and low/moderate (1-100/ 100 mL) and high levels (>100/100 mL).	Differentiation across four risk levels (0, 1-10, 11-100, >100 per 100 mL) or quantification of *E. coli*.
User Training	Minimal training (3 hours) that can be understood by non-technical user.	Minimal training; sufficient for home use.
Target Unit Price	Unit price less than $1,000; Per test cost < $5.	Unit price less than $250; Per test cost < $1.

Project Status and Next Steps

Encouraging product development: Revised TPP has been published and expressions of interest received from product developers (in Categories A, B & C).

Testing and validating: UNICEF, with WHO, has convened a technical advisory committee and is working with them to develop appropriate laboratory protocols and validation mechanisms.

Ensuring fit for purpose: Use-cases outlined in UNICEF's TPP are intended for low-resources settings, for use by users with minimal training. All new products must be field tested in this context.

Category A
- Most similar to current methods. Easiest to validate.
- Time to result 3-8 hours
- Most available now or in next 1 year.

Category B
- Known technology, new application. Early research on comparison to current methods.
- Time to result 0-2 hours.
- Most 1-2 more years.

Category C
- New tech or new indicator. No clear validation pathway currently.
- Time to result 0-1 hours.
- 2+ years

Creating pathways to scale: UNICEF will explore options for offering incentives through mechanisms such as Advance Procurement Commitments to reduce the investment risk for suppliers.

For more information on UNICEF WASH Product Innovation Projects visit:
https://www.unicef.org/innovation/innovation_81416.html

VIRWATEST: A METHOD FOR DETECTION OF VIRUSES IN WATER SAMPLES IN THE CONTEXT OF HUMANITARIAN CRISIS SCENARIOS

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With the collaboration of: OXFAM Intermón
Funded by: HIF Humanitarian innovation fund | elrha

Viruses found in a variety of aquatic reservoirs are associated with health risks and are responsible for infections in humans. The proposed standards for the quality control of faecal contamination, as well as for monitoring effectiveness of disinfection measures, are *E. coli* and enterococci, used as faecal indicator bacteria (FIB). But, there is little reason to believe that FIB can predict the presence of viruses which are more resistant to many inactivation processes.

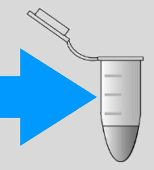
Until recently, viral monitoring of water samples required complex logistics, a specialized team and shipment to a reference laboratory for analysis representing a low sensibility of methods due to lack of adequate experimental, storage and shipping conditions. To our knowledge, there was no affordable and simple procedure for concentrating and detecting viruses in water at the-point-of-use until VirWaTest was developed. **The method is on validation process.**

virwatest

Test for detection of enteric Viruses and viral fecal indicators in Water

1 virwatest Concentration

10L water



3mL viral concentrate

The concentration of viruses is based on an organic flocculation-based method with little required equipment and independence on power supply and freezers

Conditioning

- **10L water** samples are conditioned by adding **sea salts** and **citric acid**

Flocculation

- **Skimmed milk** is added to the water sample and stirred at **room temperature** for **8 hours**

Flocs collection

- Flocs sediment for **5 hours**
- Supernatant is discharged
- Flocs are transferred to a 500ml container and let to sediment for **1 hour**
- Supernatant is poured
- Flocs are transferred to a collection tube and **preservative solution** is added

Store at **<25ºC** for a maximum of **15 days**. Otherwise keep refrigerated

Ship to a **reference laboratory, at room temperature,** for viral detection

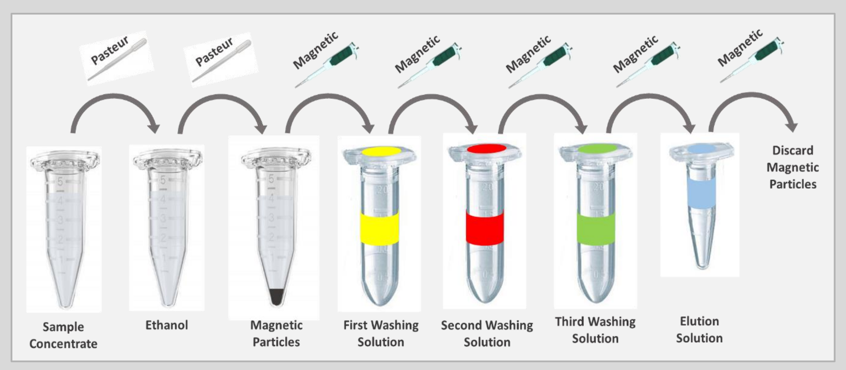
2 virwatest Extraction

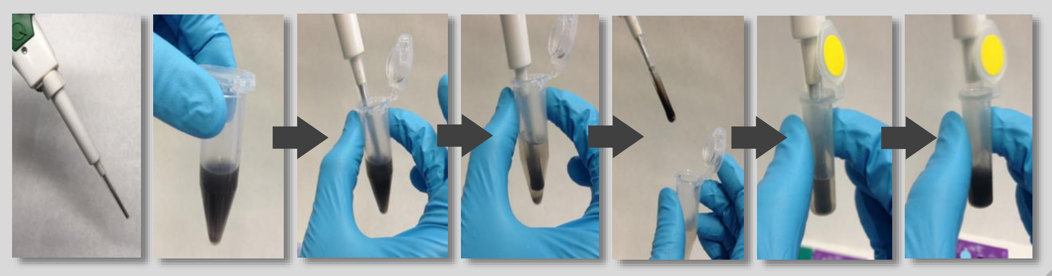
Developed nucleic acid extraction is a fast magnetic particles-based method that does not require any equipment

1 Sample Preparation	Transfer 1 mL of the sample concentrate to the tube containing the ethanol.
2 Adsorption	Transfer the final volume to the tube containing the magnetic particles. Incubate at RT continuously mixing.
3 Washings	Transfer the magnetic particles throughout the tubes containing the washing solutions by using a magnetic pipette.
4 Elution	Transfer the magnetic particles to the tube containing the elution solution by using the magnetic pipette.
5 Nucleic Acids Recovery	Recover the magnetic particles and discard them. The nucleic acids remain in the solution.

Ship to a **reference laboratory, at room temperature,** for viral detection

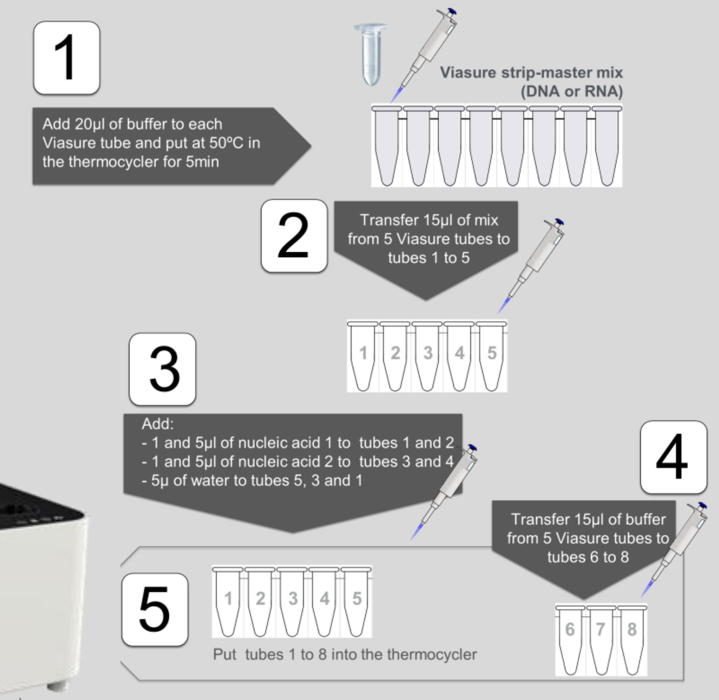
The transfer of the magnetic along the binding, washing and elution solutions is carried out by using a magnet-equipped pipette

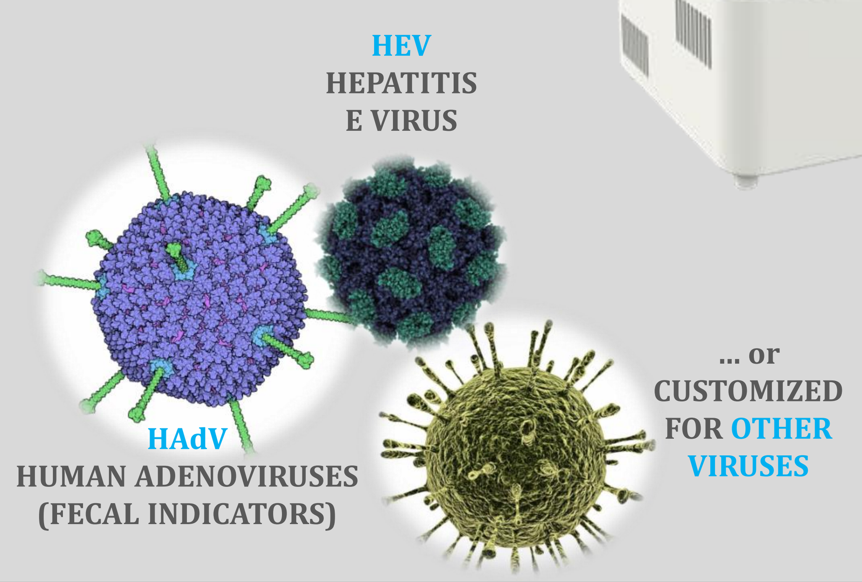




3 virwatest Detection

For viral detection by Real-Time Quantitative PCR at the point of use, lyophilized master mix, primers and probe are used. The thermocycler used may be a conventional Real-Time one or a battery-powered if power is not guaranteed (Mini8 Plus Real-Time PCR System, Coyote Bioscience)





Ongoing validation:

- The recovery of the VirWaTest concentration method was tested in human adenovirus and MS2 phages spiked groundwater samples.
- The viral **recovery** of the VirWaTest concentration and extraction method was estimated to be of **3.01 to 18.02% for MS2 and of 17.52 to 44.22% for HAdV.**
- The method has been validated in the field by Oxfam Intermón in **Bangui, Central African Republic** and in **Quito, Ecuador** by our collaborators at the University of Las Américas.
- In Banghi, human adenovirus were detected in 6 out of 6 well water samples analyzed with concentration values ranging from 3.27×10^1 to 1.80×10^2 GC/L whereas 1 out of 5 well water samples collected and concentrated in Ecuador tested positive for HAdV at a concentration of 3.46×10^2 GC/L. We continue working in the validation of the method.

Do you want to test VirWaTest?
Contact the Laboratory of Viruses Contaminants of Water and Food
sbofill@ub.edu