DACAAR

WATER EXPERTISE AND TRAINING CENTRE

Action Research on Performance Evaluation of Ceramic Candle Household Filter Kit


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1. Introduction & Rationale

Recent systematic reviews of water, sanitation and hygiene interventions suggest that the beneficial effect of improving household water quality at the point of use to reduce diarrheal diseases risks had been previously underestimated[1]. Contemporary reviews estimate 30-40% reduction in diarrheal disease by improving household drinking water quality at the point of use, making such treatment more effective than improvements at the source, which reduce diarrheal disease by 25%.[2]

The goal of point of use (POU) household water treatment and safe storage is to empower people without access to safe water to improve water quality by treating it and storing safely in the home. There are a number of different POU technologies which policy- makers, implementer and user can select as appropriate for particular circumstances and population[3].

Biosand filtration has become a popular option for some agencies to include in the solutions for looking for providing appropriate methods for delivery of safe water to households in Afghanistan. DACAAR has included the option and has constructed many thousands of concrete biosand filters as the filter is a good option for scattered communities and for those communities who have a reliable surface of fresh water source nearby.

The concrete biosand filter is popular and applicable in many villages in plain area. Due to their heavy weight many organizations have hesitation to introduce the concrete biosand filter in hilly region. All WASH implementers are looking alternative solutions for the treatment technlogy in the hilly region, even though some ogrnizations introuduce metal ones but that would be costy and not durable. DACAAR condcuted action researches on plastic bucket biosand filter and PVC biosand fitler the results of which were really intersting and these filters are applicalble in such diffcult conditions.

World Health Organization (WHO) is going to implement a project of household water treatment in Afghanistanand to distribute 1,000 A-Aqua Water Filters in four provinces showing high mortality and morbidity rates for under five and , Nangarhar, Nuristan, Paktika and Kandahar.This filter is imported from overseas however it is lighter, cheaper, durable, effective to remove bacteria and some chemicals. The beauty of the filter is no electrical power is needed for the operation simple gravity system can works. It is easy to install, easy to transport and instruction manual is available in the kit.It has an upper container with lid in which raw water can be store or poured. The self priming filters are immersed in the raw water, and after a few minutes the

[1]Clasen, T.; Schmidt, W. P.; Rabie, T.; Roberts, I.; Cairncross, S. Interventions to improve water quality for preventing diarrhea: systematic review and meta-analysis. BMJ 2007, 334 (7597),782.
[2]Fewtrell, L.; Kaufmann, R. B.; Kay, D.; Enanoria, W.; Haller, L.;Colford, J. M., Jr. Water, sanitation, and hygiene interventions to reduce diarrhea in less developed countries: a systematic review and meta-analysis. *Lancet Infect. Dis.* 2005, *5* (1), 42–52.
[3]CAWSAT, Calgary, Alberta, Canada Website: www.cawst.org Email: cawst@cawst.org,*Wellness through Water.... Empowering People Globally* Last Update: October 2009

filtered water will flow into the bottom container. Filtered water will flow as long as the upper container is topped up. Operation and maintenance of the filter is also easy and user friendly.The minimal quantity of water that can be filtered in a day is water 15-25L. and the lifetime of the filter is2500L. The filter will remain efficient even after 2,500 liters but will lose progressively its capacity to filter water. It would be interesting to re-test the water one year after the distribution.

The DACAAR's WET Center is always committed to introduce new technologies in the WASH sector and conduct action research on them to identify its suitablity,affordability, accessibility, user-friendly and adoptability for intermittent use for households. Therefore, WHO Afghanistan approached DACAAR with a request to conduct an action research jointly on Ceramic Candle Household Filter Kit in terms of effectiveness, efficiency and user friendlyness.

1.1. Research Topic

Performance Evaluation of Ceramic Candle Household Filter Kit in the context of Afghanistan

1.2. Objectives:

- To identify the removal efficiency of E-coli and Turbdity from source water.
- To analysis the cost-effectiveness of Ceramic Candle Household Filter Kit in the context of Afghanistan.
- To identify the users perception and satisfication of about the Ceramic Candle Household Filter Kit and conveniece in use of it.
- To disseminate the efficiency of A Ceramic Candle Household Filter Kit on learning exchange program (November 2016) and WASH Cluster..

2. Methodology

DACAAR will indentify and select 50 households in one of its coverage areas, who will be in real needs of household water filter. DACAAR and WHO staff will provide training on Ceramic Candle Household Filter Kit on the operation and maintenance.

The following are the criteria for the filter distribution:

1. Families who are using unprotected surface or groundwater.
2. Families with at least one PLW (Pregnant and Lactating Woman).
3. Women head families will be in priority.
4. Interested to use the filter properly and provide information to us.
5. The locations target are those affected by high mortality/morbidity rates related to diarrheal diseases

After training our staff in the cooperation of beneficiaries Ceramic Candle Household Filter Kit would be assembled and ensure the working properly. Before distribution of the filter

DACAAR staff will observe the existing source of drinking water and existing situation of the selected villages in terms of water related disease and health conditions of women and children.

Wagtech and DelAgua field water testing kits will be used by a certified lab technician. Testing procedure will be followed according to lab's standard testing procedures.

In the interval one month, the following tests will be carried out for three times:

1. Source sample: 50 Bacteriological and physical (pH, EC, Turbidity, Temp) parameters
2. Storage on beneficiary's house: 50 Bacteriological and physical
3. Filtered water: 50 Bacteriological and physical

All of the households in the chosen villages will be interviewed by an enumerators who will be trained to conduct household survey. In priority, women head of households (in charge of caring for babies and tasks related to water). Household interview will be carried out at the end of the study as the filter would been used by people for at least three months.

3. Data entry and analysis

The Statistical Package for Social Sciences (SPSS, Ver. 18) will be used for data entry and analysis. The results will be presented in percentages to visualize the results more effectively.

4. Budgeting *(WHO & DACAAR Contribution)*

Budget Code	Description	Quantity	Unit	Frequency	Unit	Unit Cost (USD)	Total Cost (USD)	DACAAR Contribution	WHO Contribution
1	Water Quality Testing Costs						9,000	0	9,000
1.1	Physical and bacteriological water samples analysis	150	sample	3	test	20	9,000	0	9,000
2	Travel Costs						1,470	1,470	0
2.1	Lab staff travel to Balkh	2	person	3	trip	105	630	630	0
2.3	Staff Accommodation	2	person	3	night	40	240	240	0
2.4	Staff Per diem	2	person	30	day	10	600	600	0
3	Personnel Costs						5,335	5,335	0
3.1	Staff Time (2 Lab Technicians)	2	person	1	month	700	1,400	1,400	0
3.2	Staff time (WETC Manager)	1	person	0.5	month	3,360	1,680	1,680	0
3.3	Staff Time (Deputy Manager)	1	person	1	month	2,255	2,255	2,255	0
4	Ceramic Candle Water Filter Cost						3,000	500	2,500
4.1	Filter Cost	50	Number	1	Number	50	2,500	0	2,500
4.2	Transportation	50	Number	1	Number	10	500	500	
	Grand Total						**18,805**	**7,305**	**11,500**
	Contribution Percentage						100%	38.8%	61.2%

5. Appendixes

5.1. Questionnaire

Province	
District	
Village	
Date	
Interviewee	
Interviewer	
Verbal consent	1. Yes 2. No 3. 99. Other
Does filter appear to be in use?	1. Yes 2. No
Household Constitution	
Number of people in family	
Number of children less than 1 year	
Number of children 1-5 years	
Number of children 5-15 years	
Number of adult men	
Number of adult women	
Who is the head of the family	1. Male 2. Female
Water Storage	
Are the water storage container present?	1. Yes 2. No
What type containers are they?	1. Narrow mouthed 2. Wide mouthed 3. Bothe
Are the container covered?	1. All 2. None 3. Some
Do the containers appear clean?	1. Yes 2. No
Measurements	
Electrical conductivity of Water In	
Electrical conductivity of Water Out	
Temperature in degree C Water In	
Temperature in degree C Water Out	
Turbidity of Source Water (NTU)	
Turbidity of Water In	
Turbidity Water Out	

Turbidity of Water Stored	
pH of Water In	
pH of Water Out	
Bacteria in Source Water	
Bacteria in Water In	
Bacteria in Water Out	
Bacteria in Water Stored	
Water questions	
Where do you get water?	1. Well (well equipped wells, damaged wells (showing cracks on the apron, etc… 2. Piped 3. Canal, river, pond and stream 4. Rain 5. Other (Specify)_____
How much water do you use in the filter every day?	Quantity:
How long does it take to get water?	Minute:
A-aqua Water Filter Questions	
does the filter covers the daily needs of the family?	1. Yes 2. No
What are all the purposes' you use filtered water for?	1. Drinking 2. Food preparation 3. Bathing 4. Hand washing 5. Cleaning of fruits/vegetables 6. Other (Specify)…….
Do you do anything with the filtered water before you put into the filter?	1. Let it settle 2. Racket 3. Pour it through cloth 4. Nothing
Do you do anything else to treat water after filtering it?	1. No 2. Yes, Specify,
What method do you use to take water out of the containers?	1. Tap 2. Dip 3. Pour
Please tell us about the taste of the water?	1. Better 2. Worse 3. About the same
What about its smell?	1. Better 2. Worse 3. About the same

What about its appearance?	1. Better 2. Worse 3. About the same
Since you started using filter, do your family's health has improved, stayed the same or became worse?	1. Better 2. Worse 3. About the same
Does the filter produce enough water for the entire family?	1. Yes 2. No
Do you give water from the filter to your neighbours or others?	1. Yes 2. No
Who is in the household knows how to use the filter?	1. Men 2. Women 3. Older children 4. All of the family members
Is it easy to use the filter?	1. Yes 2. No, Why
How often do you clean the filter?	1. At least Once per day 2. At least Once per week 3. At least Once per month 4. Rarely 5. Never 6. Other……
What is the reason that you decided to clean the filter?	Explain:
Who is responsible for the cleaning of the filter in the household?	1. Men 2. Women 3. Older girl 4. Older boy 5. other
How did this person learn about the maintenance of the filter?	1. Training by NGO 2. Informed by male member 3. Other, specify:
How do you clean the filter? (Observe the demonstrate how they do it??	1. Remember properly 2. Did not remember properly 3. The respondent is not the user
Have you had problem with the filter?	1. No 2. Yes, specify:
Do you ever require help to fix the filter?	1. Yes 2. No
If the answer to above is yes, whose do	1. Household member 2. Relevant person from community

you seek to get the problem fixed?	3. NGO 4. Other, specify:
Do you like the filter?	1. Yes, because: 2. No, because:
Have you recommended the filter to the filter?	1. Yes 2. No