Community WASH baseline survey

Badhaiyatal, Bansgadi, Barbardiya municipalities of Bardiya (Nepal)

First Draft Report

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SUMMARY

600 households in the three municipalities (*Badhaiyatal, Bansgadi, Barbardiya*) of Bardiya district of Nepal were surveyed from 12 to 18 January 2019. The survey households were selected randomly in numbers proportion to the population of the survey wards. Information was collecting on the status of water, hygiene, sanitation, household characteristics and behavioral factors of – risks, attitude, norms, ability and self-efficacy - for "water treatment" and "hand-washing with soap".

1 Household characteristic

The survey respondents were aged 39 years (average); 52% female; and 72% literate. The average household size was – 5.28, with 3.39 rooms in a house on average. Most (51%) of the houses are made up of brick walls in mud mortar, followed by cement masonry (38%) and clay in wood/bamboo (12%). Most of the house roofs are of CGI sheets (42%) followed by tiled (29%), RCC (21%) and thatched (6%). The contribution in sources of income are found to be as follows[1]: Agriculture (49%); Animal farming (20%), Non-skilled labor (9%), Business (6%), skilled labor (6%); Remittance (4%); service (4%); and pension-1%. Mobile is in most (92%) of the houses followed by bicycle (90%); fan (70%); Gas stove (54%); color TV (45%); private two wheeler (14%). Average monthly expenditure and income as reported has been found to be NPR 23933 NPR 20,000 respectively.

2 Water

2.1 Water source Primary source of water is private hand pumps (85%) followed by public hand pumps (8%), tube wells with motor pump (3%) and open water sources (2%). The hand pumps that are mostly shallow suction pumps are with proper platform in only about 50%[2] (41% in *Barbardiya*). The **deliveries of the water in the households are** as follows: (a) 80.5% yard point source; (b) 7% public taps; (c) 4% in neighbors; (d) 0.3% (2 households) plumbed within house; and (e) other 7%.

2.1 Water Treatment 17% of the households treat their water with water filters (10%) followed by boiling (6%). The use of water filters is concentrated more in Barbardiya. The filters used are mostly bio-sand filters (78%) with and without nails, followed by ceramic filters (15%) and composite filters (5%). Out of the 10 households using open water sources 9 households have been found to be not using any form of water treatment – an area that could be addressed with priority as open water sources pose significant risks of water borne diseases.

[1] The figures are based on number of times the sources of income were mentioned in multiple choice question
[2] 42% in case of public hand pumps in contrast to 57% in private hand pumps

Some recommendations that can be made from this information on water sources are: to develop program to promote *(a) construction of proper platforms in hand pumps, and (b) adoption of water treatment by those using open water sources*.

3 Hygiene

3.1 Hand-washing prevalence The weighted aggregate score of hand washing practice based on the data obtained on the likert scale of 0 to 4 (low to high), the respondent's report on current practice of hand washing with soap at the five critical times are as follows: 93% for hand washing after defecation; 78% for hand washing before eating, 73% before food preparation, 72%) after cleaning child's bottom and 75% before feeding child.

3.2 Hand washing place Most (92%) of the households wash their hand at the water points (tube wells / hand pumps) itself. There are more than one hand washing places in 32 of the 600 households, and the hand washing places were designated exclusively for washing after defecation and before eating in 14 of these32 households.

3.3 Hand washing material at the hand washing place Soap and water were present in 90%, 80% and 88% of the hand washing places in Badhaiyatal, Bansgadi and Barbardiya respectively. Aon with soap, ash and in some case earth was also found at the hand washing place. The presence of ash and earth were more in the municipality of Barbardiya.

A recommendation in hand washing that emerge here is to promote hand washing after cleaning child's bottom and before feeding the child which pose more risks.

4 Sanitation (toilets)

76% of the people uses pour flush toilets followed by flush toilets (10%); and pit latrines without water seal (5%). Open defecation is practiced by 4% of the households. Most of the toilets (53%) are connected to single pit, followed respectively by double pits (18%), septic tank (14%) and biogas (14%).

5 Floods

Flood was reported to be occurring in 42% of the household surveyed. Barbardiya is more prone to flood than Badhaiyatal and Bansgadi.

6 Communication channel

The following communication channels were reported to be in use in descending order - radio (28%); contact with people (24%), Television (19%); and Facebook (14%). Newspaper was mentioned the least (2%).

7 Behavioral factors

Along with the questions on household profile and WASH status, the survey also covered questions on behavioral factors of – risk (R), attitude (A), norm (N), ability (A), and self-efficacy (S) – for the two behaviors of "drinking water treatment" and "hand washing with soap". The questions on these behavioral factors were asked to the groups of respondents that qualified as "Doer" and "Non-doer" of the behavior in question.

The numbers of Does and Non-Doers surveyed on water treatment were - (a) Doer-46; (b) Non Doer-111. In case of hand washing, the surveyed numbers were – (a) Washer (Doer) with water and soap – 136; (b) Washer (Doers) without water and soap – 16; (c) Non washers (non-doers) – 37.

7.1 Behavioral factors analysis on Water Treatment

From the comparison of the aggregate scores on the behavioral factors for water treatment between the two groups of Does and Non-Doers the following behavioral factors are found to be with greater intervention potential (those with high percent difference in score between the Doers and Non-doers) are:

ATTITUDE: effortful – 193%, expensive – 138%, Like (or Dislike) – 66%
NORM: descriptive – 60%; RIKS: perceived vulnerability – 39%

Further the following were mentioned to be **not liked** in water treatment (by those who reported not liking): (a) taste – 9; (b) smell-1; (c) costly-1. Similarly those who reported liking treating water mentioned that they **liked** the following: (a) water is clean -25; (b) is good for Health-22 (including don't get cold and cough by one respondent); (c) it protects from disease-17; (d) taste -7; (e) just liked the filtered water-7 (this may be not be what they liked actually); (f) water is safe -4; (g) smell is good after treatment-3 (or free from bad smell); (h) lack of coloration -1.

7.2 Analysis of RANAS factors on Hand Washing with Soap

Here the comparison of the aggregate scores of behavioral factors between the Doers and Non-doers of hand washing with soap has the following to be factors of greater intervention potential in Hand Washing with Soap (those with high percent difference in aggregate score between the Doers and Non-doers):

ATTITUDE: expensive – 69%, effortful – 63%; time consuming – 27%;
DESCRIPTIVE NORM : Hand washing before eating – 37%; Hand washing after defecation – 27%, presence of soap and water at the hand washing place – 36%

SELF-REGULATIONS: commitment – 31%; and remembrance (making hand washing place with soap and water for day's hand washing) – 29%.

Further the Washers are also found to have the opinion that HWS (hand washing stations) or wash basin are better for washing hands than washing hands at the tube well.

8 Barriers and benefits from open questions

During the survey open questions were also asked to understand from the *non-doers* on what they perceived to be hindering them in adopting the behavior in question, the **barriers**; and to the *doers* on what they consider to be the **benefits** of engaging in the behavior of concern. Perceptions of **benefits** were also obtained from the *non-doers* by asking what they think they may get if they were engaged in the behavior. The barriers and benefits obtained for the three behaviors of "water treatment", "hand washing" and "hand washing place" is summarized in the following table.

behavior	**Water treatment**	**Hand washing**	**Making hand washing place with water and soap**
Barriers	(a) Costly (14); (b) tradition (14) (c) Lack of awareness (13) (d) Tube Well water is good (10) (e) Time consuming for boiling (5) (f) boiled-water-not being tasty (3)	(a) Lack of awareness-3; (b) tradition-4; (c) Cost-1; (d) झंझट /Bothersome; (e) lack of capacity;	(a) Cost-11 (b) Thinking not needed -8 (c) lack of awareness-2; (d) Laziness-5; (e) Need of place -1
Benefits (from Non-doers)	(a) Protection from disease-10 ; (b) water becomes tasty -2; (c) Less Medical Expense-2; (d) self-confidence-2; (e) clean-water -3; (f) Convenience -1; (g) prestige-1	(a) Free from disease-3; (b) feel clean -2, (c) Satisfaction-1, (d) Prestige-1, (e) Health-1.	(a) Stops disease spread; (b) Convenience; (c) Easy to wash hands, (d) Saves time, (e) Children can wash too, (f) Easy for relatives
Benefits (from Doers)	(a) Being Free from Disease-18 (b) Clean safe water-15 (c) Health-9 (d) Prestige, social good- 4 (e) Personal satisfaction-2	(a) Clean-hands-9 (b) Free from disease-6 (c) Health -4 (d) Wealth; getting rid of smell; and free from germs - 1 each	(a) Free from disease-6 (b) Health-4 (c) Ease in hand washing -3 (d) Helps in habit-formation-3 (e) Time-saving-2 (e) For children-1, (f) demonstration-1.

Recommendations

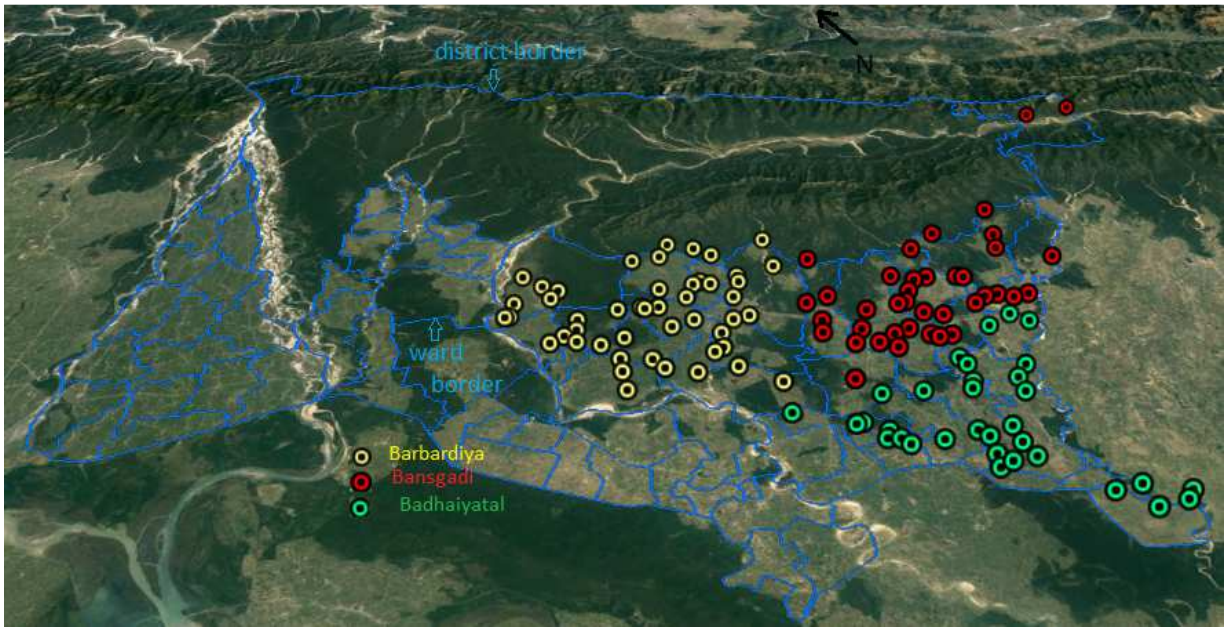
The following have been recommended to develop structured behavior change interventions following innovative ideation process making use of RANAS "behavior change techniques" and "Social Marketing" principles (a) Presentation to the Nepal Delegation Team followed by ideation sessions; (b) Presentation to the GERUWA and the enumerators followed by ideation sessions; (c) Ideation with the target group; (d) Prototyping and testing . Presentation and collaboration is also recommended to be done with other stakeholders such as - municipality, HCF, private or social entrepreneurs (such as those promoting/selling water filters) and those at national level.

1. Introduction

600 households in the three municipalities (Badhaiyatal, Bansgadi, Barbardiya) of Bardiya district of Nepal were surveyed from 12 to 18 January 2019 through 11 Enumerators[3] to collect information on the existing status on water, hygiene and sanitation and household and socioeconomic profile. The enumerator having academic qualifications of bachelor's and master's degrees were trained in Gulariya for two days prior to the survey. During the two days training the survey questions underwent improvements based on the interactions held with the enumerators and testing in the field. The survey questions developed in Kobo are presented here in Annex 1.

The distribution of the 600 households for the survey was done randomly in numbers proportion to the population of the wards of the municipality as shown here in Table 1.1. A group of five households located in each other's proximity were surveyed together in a cluster. For this 120 random points (cluster centers) were generated for the 600 households surveyed. The distribution of the cluster centers points (shown in Figure 1-1) were done by generating two random numbers for a cluster center representing the x and y coordinates in respective Google earth wards maps prepared by importing GIS maps in Google earth. During the survey, the randomly generated cluster centers allocated to the enumerator were accessed using GIS software in smart phone. Five households nearest to the each of the cluster centers were surveyed.

Figure 1-1 Surveyed cluster centers



[3] Of the 12 enumerators recruited initially, one had to be dropped after the training for not being capable to perform as per the needs of the survey.

[*Out of 423611 population of Bardiya district with 8 municipalities, the population of Barbardiya, Bansgadi and Badhaiyatal are respectively 68012; 55875; and 47868*]

Table 1-1 Surveyed households

Municipality	Ward1	Ward2	Ward3	Ward4	Ward5	Ward6	Ward7	Ward8	Ward9	Ward10	Ward11	Total
Badhaiyatal	15	20	21	15	15	15	20	19	15	x	x	155
Bansgadi	10	20	25	31	20	26	16	27	28	x	x	203
Barbardiya	20	21	25	25	21	20	20	22	22	26	20	242
Grand Total	**45**	**61**	**71**	**71**	**56**	**61**	**56**	**68**	**65**	**26**	**20**	**600**

Assessment Team – the survey design, data processing and the preparation of this report was done by Tdh WASH Regional Adviser. The survey was administered in the field together with Tdh Nepal WASH Manager and the team of local partner GERUWA[4] . The survey form developed in English was translated into Nepali by Tdh Nepal WASH Manager.

1.1. Behavioral Factors

In addition to information related to WASH, the survey questions also covered behavioral factors of – risks, attitude, norms, ability and self-efficacy - for the behaviors of "water treatment" and "hand-washing with soap". Further, under the factor "attitude" after the question on if the respondent "liked" or "disliked" the behavior in question ("water treatment" or "hand washing with soap") follow up qualitative open questions were asked to find out what the respondent liked or disliked actually. Similarly, the survey also had a qualitative open question on "people considered important" by the respondent following the questions on behavior factor "norm".

1.2. Survey context

This survey has been carried out under the two-year WASH in HCF project of Tdh that began from Aug 2018 in 23 out of 34 HCF (including district hospital) of Bardiya district funded by Solaqua Foundation. Based on the outcomes of the survey, software intervention such as to promote protection of water sources, drinking water fitters and hand washing with soap could be developed.

[4] Geruwa Rural Awareness Association

2. Survey Findings

2.1. Household characteristics

The characteristics of the 600 households surveyed are as follows –

(a) **Surveyed household type**: 87% of the households were the *owner* households, 11% *relative of the owner* households, 0.2% *tenants* and 2% *other*.

(b) The respondents were **aged** 39 years on average in the range 15 to 77;
57% of the respondents were **household heads**
52 % of the respondents were female

(c) **Academic qualifications** - Primary or just literate – 31%, None-28%; Upper Primary – 20%; Matric (SEE) – 11%; Intermediate (senior secondary) – 8%; Bachelor – 2%, and Master – 0.3%.

(d) **Household size** – 5.28; with 3.39 **rooms** in a house on average in the range 1 to 10.

(e) Source of **income**: Agriculture - 49%; animal farming - 20%; Non-skilled labor - 9%; Business - 6%; skilled labor - 6%; Remittance - 4%; service - 4%; pension-1%; and Other-1%.

(f) **House** – (a) **wall** type: Brick wall in mud mortar – 51%; Cement masonry wall – 38%, Clay and bamboo walls (or similar) – 12% (20% in Barbardiya); (b) **roof** type: CGI sheet- 42%; Tile - 29%; RCC - 21%; Thatched - 6%; Other- 3%.

(g) **Items in the household:** Mobile - 92%; bicycle - 90%; fan - 70%; Gas stove - 54%; color TV - 45%; private two wheeler - 14%; none - 3%; black and white TV - 1%; Cooler - 1%; AC - 1%; Private car - 0%.

(h) **Expenditure** monthly - NPR 23933/hh/month; income – weighted average approximate being NPR 20,000/hh/month (11 hhs < NPR 5k[5]; 82 hhs 5k -10 k; 122 hhs 10k - 15k; 156 hhs 15k - 20k; 131 hhs 20k - 30k; 61 hhs 30k - 40k; 20 hhs 40k - 50k; 14 hhs >50k)

[5] K-1000

2.2. Water

2.2.1. Water source

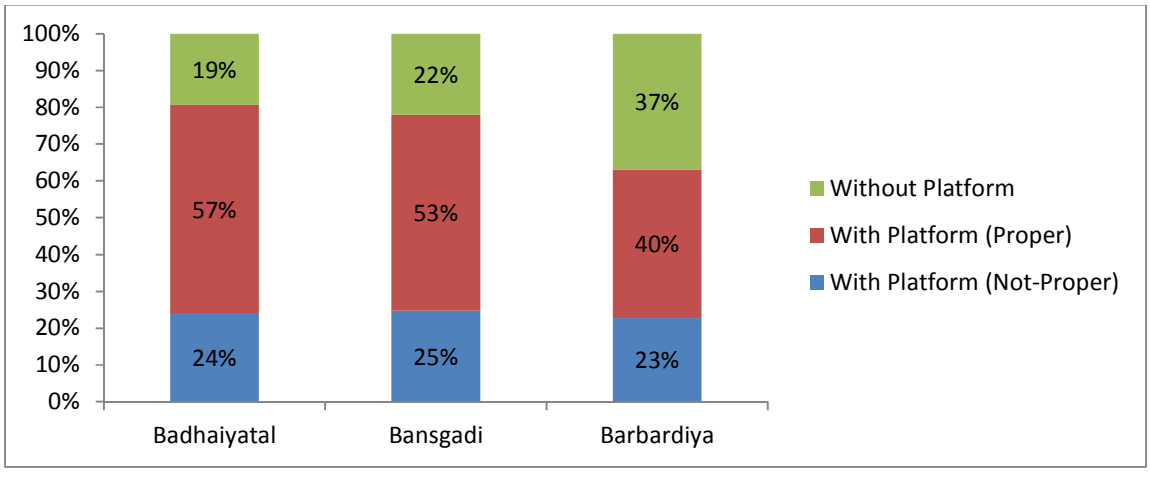
Primary source of water as shown in Table 2.2.1-1 are private hand pumps (85%) followed by public hand pumps (8%); and tube wells with motor pump (3%). 2% of the household are using open surface sources.

Table 2.2.1-1 Primary water source

PRIMARY Water Source	Badhaiyatal	Bansgadi	Barbardiya	Total	Total (%)
hand pump - private	146	172	194	512	85%
hand pump - public	9	12	27	48	8%
tube well with motor pump		2	13	15	3%
Other		4[6]	6[7]	10	2%
Open Surface Water[8]		8	1	9	2%
Spring Spout (covered/protected),		3		3	1%
bottled water/ Piped water supply		1/1	1	2/1	0.5%
Grand Total	**155**	**203**	**242**	**600**	**100%**

The hand pumps that are mostly suction pumps drawing water from a depth of about 20 feet are not all with proper platform. As shown in Figure 2.2.2-1, and Table 2.2.1-2, only about 50% of the hand pumps and tube wells are with proper platform (57%, 53%, and 41%, respectively for Badhaiyatal, Bansgadi and Barbardiya).

Figure 2.2.1-1 Platform status of hand pumps and tube well



[6] No, self-flowing tap-2, neighbor
[7] From neighbors
[8] river, canal, pond, well, kuwa, open spring etc.

Further as shown in Table 2.2.1-2 – the status of public hand pumps are worse than that of private hand pumps. Only about 42% of the platforms are proper in case of public hand pumps (33%, 50% and 44% respectively for Badhaiyatal, Bansgadi and Barbardiya) in contrast to 57% (58%, 54% and 58% respectively for Badhaiyatal, Bansgadi and Barbardiya) for private hand pumps.

Table 2.2.1-2 Platform status of hand pumps/tube wells

Row Labels	hand pump - private	hand pump - public	tube well with motor pump	Total
Badhaiyatal	**146** (100%)	**9** (100%)		**155** (100%)
With Platform (Not-Proper)	32 (22%)	5 (56%)		37 (24%)
With Platform (Proper)	**85 (58%)**	**3 (33%)**		**88 (57%)**
Without Platform	29 (20%)	1 (11%)		30 (19%)
Bansgadi	**172** (100%)	**12** (100%)	**2**	**186** (100%)
With Platform (Not-Proper)	39 (23%)	6 (50%)	1	46 (25%)
With Platform (Proper)	**93 (54%)**	**6 (50%)**		**99 (53%)**
Without Platform	40 (23%)	x	1	41 (22%)
Barbardiya	**194** (100%)	**27** (100%)	**13**	**234** (100%)
With Platform (Not-Proper)	49 (25%)	3 (11%)	1	53 (23%)
With Platform (Proper)	**74 (58%)**	**12 (44%)**	**9**	**95 (41%)**
Without Platform	71 (37%)	12 (44%)	3	86 (37%)
Grand Total	**512**	**48**	**15**	**575**

Box 1 Recommendation related to water sources

1) Bacteriological test of tube well water to compare the quality of water of hand pumps with proper platforms and those without to develop program to promote construction of proper platforms.

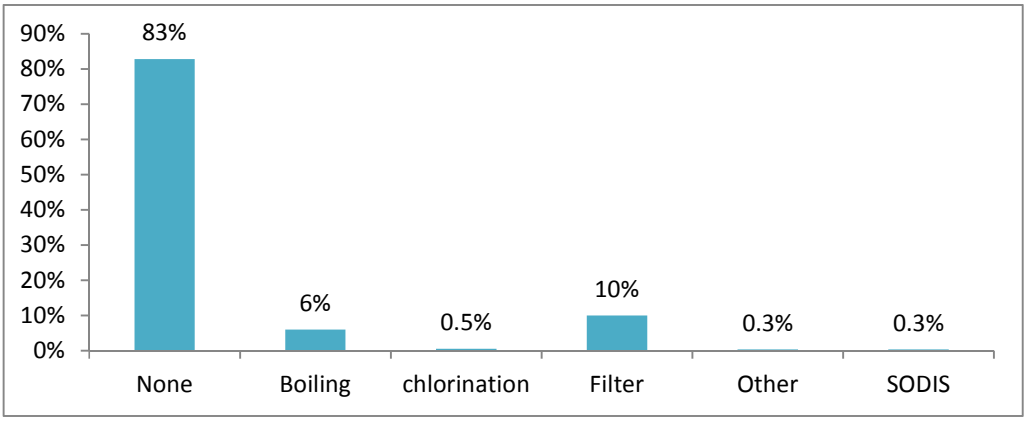
2) To priorities development of program to address the water quality of the households that are using open water sources and we will see in later chapter on water treatment that most of the household using open water sources are found to be not doing water treatment.

The **deliveries of the water in the households are** as follows: (a) 80.5% yard point source; (b) 7% public taps; (c) 4% in neighbors; (d) 0.3% (2 households) plumbed within house; and (e) other 7%.

2.2.2. Water Treatment

As shown in Figure 2.2.2-1 only 17% of the households treat their water with water filters (10%) followed by boiling (6%). Chlorination, SODIS and other methods are adopted by 1% of the households.

Figure 2.2.2-1 Drinking water treatment



And as shown in Table 2.2.2-1 the use of water filters is concentrated more in Barbardiya than in other two municipalities.

Table 2.2.2-1 water treatment

Row Labels	Boiling	chlorination	Filter	Other	SODIS	Total
Badhaiyatal	13		7		1	21
Bansgadi	12	3	7	2	1	25
Barbardiya	11		46			57
Total	**36**	**3**	**60**	**2**	**2**	**103**

The filters used are mostly bio-sand filters (78%) with and without nails, followed by ceramic filters (15%) and composite filters (5%). No household was found to be using RO or UV filters that are operated through electricity.

Table 2.2.2-2 water filters

Row Labels	Badhaiyatal	Bansgadi	Barbardiya	Total	Total %
Bio-sand with nails	1	2	33	**36**	60%
Bio-sand without nails	2		9	**11**	18%
Ceramic/candle/clay/ colloidal-silver filter	4	4	1	**9**	15%
composite (like pureit, kent etc) - not using electricity		1	2	**3**	5%
Other			1	**1**	2%
Grand Total	**7**	**7**	**46**	**60**	**100%**

Observation of the water treatment practiced against the water source shown here in Table 2.2.2-3 reveal that 9 of the 10 households using open water sources do not use any form of water treatment – an area to be followed that could be addressed with priority as open water sources in comparison to other water sources in use here pose significant risks of water borne disease.

Table 2.2.2-3 Water source vs. water treatment

Water sources	Treating water	
	No	Yes
hand pump - private	419	93
hand pump - public	44	4
tube well with motor pump	11	4
Other	10	x
Open Surface Water	8	1
Spring Spout (covered/protected),	3	x
bottled water,	2	x
Piped water supply,	x	1
Grand Total	**497**	**103**

2.3. Hygiene

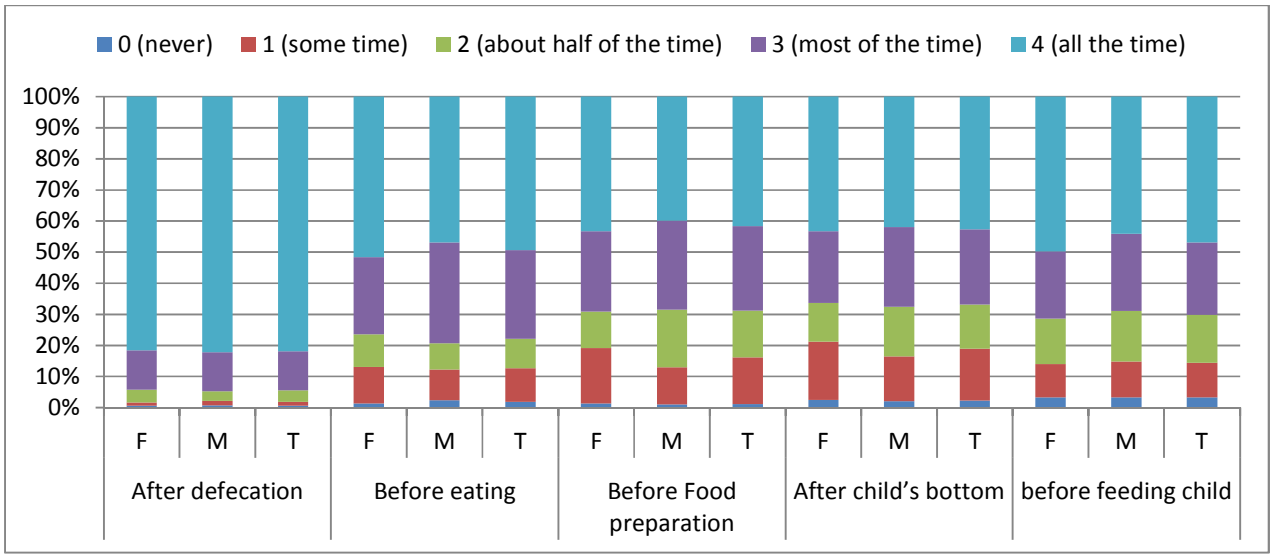
2.3.1. Hand-washing prevalence

The behavior analyzed under hygiene is hand washing with soap. The gender segregated findings of respond's report on current practice of hand washing with soap at the five critical times (before - eating, preparing food and feeding child; and after - defecation, and cleaning child's bottom) are summarized in Table 2.3.1-1 and Figure 2.3.1-1. The responses here were collected in five point *likert* scale ranging from 0 to 4 (low to high).

Table 2.3.1-1 Hand washing practice at five critical times

Row Labels	After defecation			Before eating			Before Food preparation			After cleaning child's bottom			before feeding child		
	F	M	T	F	M	T	F	M	T	F	M	T	F	M	T
0 (never)	2	2	4	4	7	11	4	3	7	7	5	12	7	7	14
1 (some time)	3	4	7	37	28	65	56	34	90	51	35	86	23	24	47
2 (about half of the time)	13	9	22	33	24	57	37	53	90	34	39	73	31	34	65
3 (most of the time)	40	36	76	78	93	171	81	82	163	63	62	125	46	52	98
4 (all the time)	256	235	491	162	134	296	136	114	250	118	102	220	106	92	198
Not applicable (no child)	x	x	x	x	x	x	x	x	x	41	43	84	101	77	178
Grand Total	**314**	**286**	**600**	**314**	**286**	**600**	**314**	**286**	**600**	**314**	**286**	**600**	**314**	**286**	**600**

Figure 2.3.1-1 Hand washing with soap (gender segregated)



The weighted scores for the prevalence of hand washing for the five critical times are– 93% highest, for hand washing with soap after defecation; followed by hand washing before eating

(78%), before food preparation (73%), after cleaning child's bottom (72%), and before feeding child (75%).

Box 2 Recommendation in hand washing

> *As hand washing after cleaning child's bottom and before feeding the child pose more risk (in that the feces of children are more dangerous than that of adults and contraction of disease by children are more serious than by adults) this could be an area to focus in hand washing promotion program.*

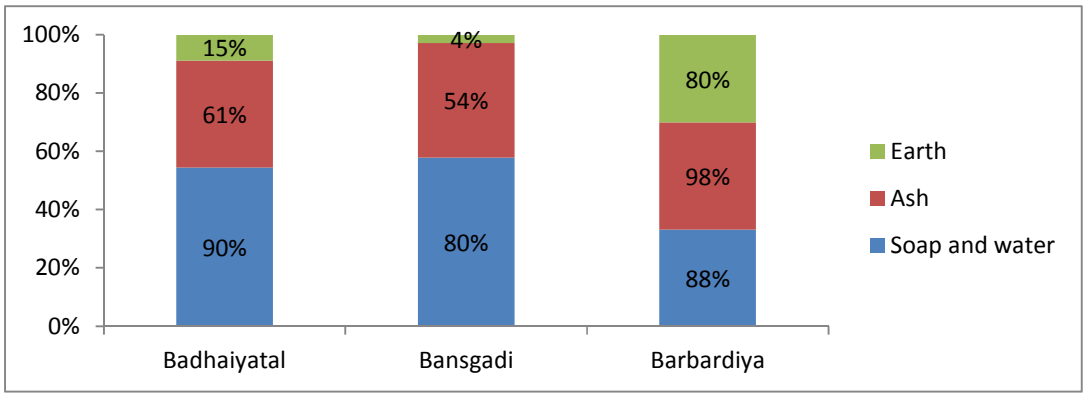
2.3.2. Hand washing place

92% of the respondents mentioned washing hand at the water points (tube wells / hand pumps) itself. The use of hand washing stations and wash basin were report by only 1% of the respondents in each category. The remaining 6 % reported following a combination of places such as water point and hand washing station and/or wash basin and/or other.

Number of hand washing places Of the 600 households there is one hand washing place in 93% of the households, 2 in 5% (31) and none in 8% of the households. One household had three hand washing places. Out of the 32 households that had more than one hand washing place, the hand washing places were designated exclusively for washing after defecation and before eating in 14 of the households.

Hand washing material at the hand washing place As shown in Figure 2.3.2-1, soap and water were present in 90%, 80% and 88% of the hand washing places in Badhaiyatal, Bansgadi and Barbardiya respectively. It is interesting that along with soap and water ash and in some case earth was also found at the hand washing place. The presence of ash and earth were more in the municipality of Barbardiya – in 98% and 80% of the households. The presence of ash and earth along with soap can be justified as the hand washing places in most case are the water point itself where other activities such as utensil cleaning are also done. (to be followed with survey team on qualitative aspects)

Figure 2.3.2-1 Hand washing material



2.4. Sanitation

2.4.1. Toilet type

Most (76%) of the toilets in use are pour flush; followed by flush toilets (10%); pit latrines without water seal (5%). Open defecation is practiced by 4% of the households. About 3% are using neighbors' or shared toilets. Two toilers were found to be of temporary type. (Table 2.4.1-1)

Table 2.4.1-1 Toilet type

Row Labels	Badhaiyatal	Bansgadi	Barbardiya	Total	Total %
pour flush toilet	120	172	165	457	76%
flush toilet	17	6	35	58	10%
pit without water seal	5	9	15	29	5%
open defecation	5	9	12	26	4%
neighbor's toilet	5	7	8	20	3%
other[9]	3		7	10	2%
Grand Total	**155**	**203**	**242**	**600**	**100%**

2.4.2. Toilet containments

As shown in Table 2.4.2-1, most of the toilets (53%) are connected to single pit, followed respectively by double pits (18%), septic tank (14%) and biogas (14%).

[9] Banaudai gareko, Chhimeki ko-2, shared, Jethani ko gharma, Khariya le bereko khalde charpi, Maita ko shauchalaya, वार वेरेको

Table 2.4.2-1 Toilet containment

Containment type	Badhaiyatal	Bansgadi	Barbardiya	Total	Total %
single pit	74	115	106	295	53%
double pit	24	35	42	101	18%
septic tank	30	12	38	80	14%
bio gas	17	25	33	75	14%
other	x	x	3	3	1%
	145	187	222	554	100%

2.4.3. Toilet use

Of the 574 respondent household using toilets, when asked in 0 to 4 five point likert scale, 88% responded using the toilet always, while 7% responded suing most of the time. No response was received at the mid-point of 2. One responded using sometime.

Table 2.4.3-1 Toilet use frequency

Row Labels	Badhaiyatal	Bansgadi	Barbardiya	Total	Total (%)
0) never (ODF)	5	9	12	26	4%
1) some time			1	1	0.2%
3) most of the time	13	24	7	44	7%
4) always	137	170	222	529	88%
Grand Total	**155**	**203**	**242**	**600**	100%

2.5. Other information

2.5.1. Flood

Of the 600 households surveyed 253 responded as flood occurring in their place. The frequency of the flood is reported to be as in Table 2.5.1-1. In 152 houses the flood is reported to occur every year. As can be seen, Barbardiya is more prone to flood than Badhaiyatal and Bansgadi.

Table 2.5.1-1 Flood frequency

Row Labels	Badhaiyatal	Bansgadi	Barbardiya	Total
(No flood)	122	166	59	347
Almost every year	3	30	119	152
About once in 2 years	7	4	51	62
About once in 3 years	9		12	21
About once in 5 years	2	1		3
Once in more than 5 years	11		1	12
Do not know	1	2		3
Grand Total	**155**	**203**	**242**	**600**

2.5.2. Communication channel

As in Table 2.5.2-1 radio was mentioned highest (28%) followed by contact with people (24%), television (19%) and Facebook (14%). Newspaper was mentioned least (2%).

Table 2.5.2-1 Communication medium

Row Labels	radio	People contact	Tele vision	Facebook	Other[10]	viber	Whats app	Other social media	News paper
Badhaiyatal	110	50	95	55	21	15	14	9	14
Bansgadi	105	111	115	69	35	18	7	15	11
Barbardiya	174	183	61	67	25	9	7	10	2
Grand Total	**389**	**344**	**271**	**191**	**81**	**42**	**28**	**34**	**27**
	28%	24%	19%	14%	6%	3%	2%	2%	2%

[10] Gathering-4 (group, meeting), tea shop-1; market-1, conversation-1; people-1; village-1; mobile-1

2.6. Behavioral factors

Along with the questions related household profile and WASH status, the survey also covered questions on behavioral factors of – risk (R), attitude (A), norm (N), ability (A), and self-efficacy (S) – for the two behaviors of "drinking water treatment" and "hand washing with soap". The questions on these behavioral factors were asked to the groups of respondents that qualified as "Doer" and "Non-doer" that is performer and non-performer of the behaviors in question. Whether a responded would be qualified as Doer or Non-doers were decided based on the criteria shown in Tables 2.6-1 and 2.6-2 respectively for "water treatment" and "hand washing with soap".

Table 2.6-1 Doer Non-doer grouping for Water Treatment

Criteria (water treatment)	**group**
"Percentage of treated drinking water consumed out of total daily drinking water consumption" > 80%,	Doer
"Percentage of treated drinking water consumed out of total daily drinking water consumption" < 20%	Non-doer
"Percentage of treated drinking water consumed out of total daily drinking water consumption" is from 20% to 80%,	in-between
Those not having water filter or not treating water	WO filters

Table 2.6-2 Doers Non-doers grouping for Hand Washing with Soap

Criteria (hand washing with soap)	**group**
(a) the combined score of "hand washing after defection with soap" and "hand washing before eating with soap" obtained on likert scale of 0, 1, 2, 3 and 4 is > 5; and (b) has water and soap present at the hand washing place;	Washers (doers) with water and soap
(a) the combined score of "hand washing after defection with soap" and "hand washing before eating" obtained on liker scale of 0, 1, 2, 3 and 4 on each is > 5; and (b) does not have both water and soap present at the hand washing place;	Washers (doers) without water and soap
combined score of "hand washing after defection with soap" and "hand washing before eating with soap" obtained on likert scale of 0, 1, 2, 3 and 4 is 5 or less.	Non washer (Non-doers)

The numbers of Does and Non-Doers surveyed on water treatment were - (a) Doer-46; (b) Non Doer-4; (c) Inbetween-9; and (d) WO filters -98. In case of hand washing, the surveyed numbers were – (a) Washer (Doer) with water and soap – 136; (b) Washer (Doers) without water and soap – 16; (c) Non washers (non-doers) – 37. The aggregate frequencies of hand washing for these three groups are shown in Table 2.6-3.

Table 2.6-3 Doer Non-doer Hand Washing prevalence score

Doer Non-doer category	Hand washing aggregate frequency score						N
	(a) after defecation	(b) before eating	(c) before food preparation?	(d) after cleaning the child's bottom?	(e) before feeding child	Aggregate (a b c d e)	
Washers with water and soap	**3.9**	**3.6**	**3.4**	**3.3**	**3.3**	*3.5*	**136**
Washers without water and soap	**3.9**	**3.3**	**2.8**	**2.7**	**2.5**	*3.0*	**16**
Non Washers	**3.1**	**1.2**	**1.8**	**1.6**	**1.7**	*1.9*	**37**
Score range	0-4	0-4	0-4	0-4	0-4	*0-4*	x

Similarly the scores on treated drinking water consumed out of the total drinking water consumed in a day for the doers and non-doers of water treatment are present in Table 2.6-4. Also shown in the table are the scores on the respondent's intention to drinking treated water always.

Table 2.6-4 Doer Non-doer Water Treatment practice score

Category	N	CB1) % use	CB2) Intention
(A)Doer	**46**	**89.8**	**3.8**
(B) Non-doer total (i+ii+iii)	111	x	x
Non Doer (i)	**4**	**12.0**	**2.8**
In between (ii)	**9**	**51.9**	**3.1**
WO filters (iii)	**98**	x	x
Response scale	x	6-96	0-4

2.6.1. Analysis of RANAS factors on Water Treatment

The outcome of the survey on RANAS behavioral factors for water treatment is summarized in Table 2.6.2-1. Also shown in the Table are the sample size [for doers and non-doer, no-doers being further categorized into – (i) non-doers, (ii) in between and (iii) without water filters], percentage of treated water consumed, and intentions to drink treated water. Bottom row shows the range of the scale on which the responses were obtained.

For comparison the three groups of non-doers (non-doers, in-between and without water filter) have been grouped together under the heading Non-doer Total. From the table the factors of greater intervention potential in water treatment (those with high percent difference between the Doers and Non-doers) are:

ATTITUDE: effortful – 193%, expensive – 138%, Like (or Dislike) – 66%
NORM: descriptive – 60%; RIKS: perceived vulnerability – 39%

What are liked and dis-Liked

Under the factor attitude, the respondents having answered how much they Liked (or Disliked) were also asked what they liked (or disliked) actually. Eighteen (18) responses that were obtained on what was **not liked**[11] in water treatment are as follows: (a) to change (not habituated or habit related) – 6; (b) lack of experience – 1; (c) taste – 9; (d) smell-1; (e) costly-1. [what are not liked here are in a more precise way can be taken to be – taste, smell and cost]

Similarly the frequency of what was mention to be **liked** by those who liked treating water is as follows: (a) water is clean -25; (b) is good for Health-22 (including don't get cold and cough by one respondent); (c) it protects from disease-17; (d) taste -7; (e) just liked the filtered water-7 (this may be not be what they liked actually); (f) water is safe -4; (g) smell is good after treatment-3 (or free from bad smell); (h) lack of coloration -1.

2.6.2. Analysis of RANAS factors on Hand Washing with Soap

Similar to water treatment, the outcomes of analysis of data obtained on RANAS behavioral factors for Hand Washing with Soap is summarized in Table 2.6.2-2. Here the question on Description Norm (what is) was asked on hand washing before eating and after defecation and presence of soap and water at the hand washing place; and question on Injunctive Norm (what ought to be) was asked on hand washing station or wash basin with water and soap. This was to obtain a balance between the hand washing behavior and hand washing place and material (water and soap), the latter (hand washing place and material) being in themselves the determinants of hand washing. From Table 2.6.2-2, the factors of greater intervention potential in Hand Washing with Soap (those with high percent difference between the Doers and Non-doers) are:

ATTITUDE: expensive – 69%, effortful – 63%; time consuming – 27%;

DESCRIPTIVE NORM : Hand washing before eating – 37%; Hand washing after defecation – 27%, presence of soap and water at the hand washing place – 36%

SELF-REGULATIONS: commitment – 31%; and remembrance (making hand washing place with soap and water for day's hand washing) – 29%.

Here question was also asked on if HWS (hand washing stations[12]) or wash basin is better for washing hands than washing hands at the tube well. The response obtained on 0-4 scale was as: (a) washers - 2.5; (b) non-washers - 2.1; (c) difference between washer and non-washers - 0.4; and (d) percent difference – 17%.

[11] Like/dislike scores here were: -3 (dislike very much) – 1; -2 (Dislike moderately) - 7; -1 (Dislike somewhat) - 7; +1 (Like somewhat) – 3.

[12] Such as covered water bucket with faucet for washing hands easily

Table 2.6.2-1 RANAS analysis summary for Water Treatment

Category	N	CB1) % use	CB2) inten-tion	Risk		Attitude				Norm			Ability	Self-regulation	
				RW1) perceived vulnerability	RW2) Perceived severity	RW4) if time consuming	RW5) if expensive	RW6) if effortful	RW7) Like (or Dislike)	RW8) Norm Descriptive	RW9) Norm Injunctive Approval	RW10) Norm Injunctive Disapproval	RW13)	RW15) remember-ing	RW16) commit-ment
(A)Doer	46	**89.8**	**3.8**	**3.5**	**4.2**	**1.1**	**0.6**	**0.4**	**2.5**	**2.0**	**3.1**	**0.8**	**1.6**	**3.6**	**3.5**
Non Doer (i)	4	12.0	2.8	2.8	2.5	1.0	1.3	0.5	1.5	0.0	3.3	0.0	-0.3	3.0	2.8
In between (ii)	9	51.9	3.1	2.3	3.3	0.8	0.7	0.1	2.1	1.2	2.9	0.8	1.1	3.1	3.1
WO filters (iii)	98	x	x	2.1	3.1	1.5	1.5	1.3	0.7	0.8	2.2	1.0	x	x	x
(B) Non-doer total (i+ii+iii)	111	x	x	**2.14**	**3.09**	**1.43**	**1.43**	**1.17**	**0.84**	**0.80**	**2.30**	**0.95**	x	x	x
Diff (Doer – Non-doer)	x	x	x	1.36	1.11	-0.33	-0.83	-0.77	1.66	1.2	0.8	-0.15	x	x	x
% difference				39%	26%	-30%	-138%	-193%	66%	60%	26%	-19%	x	x	x
Response scale	x	6-96	0-4	0-4	1-5	0-4	0-4	0-4	-3 to 3	0-4	0-4	0-4	-2 to 2	0-4	0-4

Table 2.6.2-2 RANAS analysis summary for Hand Washing with Soap

Category	N	**Risk**	**Attitude**				**Norm -Descriptive**			**Norm-injunctive**		**Ability**	**Self-regulation**	
		rh1) vulnera bility	rh1) if time consuming	rh2) if effortfu l	rh3) if Expensive	rh4) Like or Dislike	rh8a) hw before eating	rh8b) hw after defecation	rh9) Soap and Water	rh10) Approve HWSs or wash basin	rh11) Dis-Approve HWSs wash-basin	- rh13) making HWS*	rh17) remembra nce	rh18) commit-ment**
Washers with water and soap	**136**	**3.2**	**1.1**	**0.4**	**0.7**	**2.5**	**2.9**	**3**	**2.8**	**3.2**	**0.9**	**2.2**	**3.6**	**3.2**
Non-washers	**37**	**2.7**	**1.4**	**0.6**	**1.1**	**2**	**1.8**	**2.2**	**1.8**	**2.4**	**0.8**	**1.7**	**2.6**	**2.2**
Diff washer - non washer	x	**0.5**	**-0.3**	**-0.2**	**-0.5**	**0.5**	**1.1**	**0.8**	**1**	**0.7**	**0.1**	**0.5**	**1.1**	**1**
Diff %	x	**16%**	**-27%**	**-63%**	**-69%**	**20%**	**37%**	**27%**	**36%**	**24%**	**13%**	**24%**	**29%**	**31%**

** With bucket and faucet; **to maintaining Hand Washing Place*

3. Barriers and benefits from open questions

During the survey open questions were also asked to understand from the *non-doers* on what they perceived to be hindering them in adopting the behavior in question, the **barriers**; and to the *doers* on what they consider to be the **benefits** of engaging in the behavior of concern. Further, perceptions of **benefits** were also obtained from the *non-doers* by asking what they think they may get if they were engaged in the behavior.

The barriers and benefits obtained for the three behaviors of – (a) water treatment; (b) hand washing and (c) hand washing place with soap and water – are summarized in Table 3-1. Also shown on the table is the respondent's number (sample size, N) for each category.

Table 3-1 Barriers and Benefits

Deter-minant	**Behavior**		
	Water treatment	**Hand washing**	**Making hand washing place with water and soap**
Barriers	N=27 **costly**-14; lack of **awareness**-13; **TW-water-OK**-10; old habit/**tradition**-8; thinking-6; **time-taking**-5 (boiling); **boiled-water-notTasty**-3; Laziness-2; effort-2; will-power-1; Need of Support-1; lack of (means-1, resources-1, know-how-1, guidance-1); Ignorance-1;	N=5 lack of **awareness**-3; **Cost**-1; habit-1; झंझट /**Bothersome**; old thinking and tradition[13]-3; lack of **capacity**;	**N=23** **cost**-11; **not-needed** -8; **did-not-think/know-before**-6; **Laziness**-5; **habit**-4; be-able-to-change-2; effort-1; need of proper place; awareness-2
Benefits (from Non-doers)	N=16 Free from **Disease**-18; **clean/** good/**safe/pure/germ-free -water**-15; **health**-8; healthy-life-1; (**prestige, social good**)- 4; satisfaction-2;	**N=3** **clean-hands**-9; free from **disease**-6; **health**/healthy-life-4; **wealth**-1; get rid of **smell** from hands-1; free from **germs** -1;	**N=2** **Ease** in hand washing-3; **time-saving**-2; facilitates hand washing for **children**-1; **demonstration** of good practice; helps in **habit-formation**-3; free from **disease**-6; **health**-4
Benefits (from Doers)	N=5 Protection from (**disease**, diarrhea, typhoid, As, germs)-9; smelly HP water-to-**tasty**-water-2; **healthy** family; **lessMedicalExpense**-2; self-**confidence**-2; **clean-water**-2; **free-from-sand**-1; **convenient** (can drink from kitchen)-1; **prestige**-1.	N=7 free from **disease** -3; to be and feel **clean** (and beautiful)-2, **satisfaction**-1, **prestige** in the community-1; **Health**-1,	N=9 Stops **disease** spread; one **cannot be lazy** to wash hands; **Easy** to wash hands, saves **time**, **children** can wash too, **easy for relatives** when soap and water are together

[13] as peopled were not seen washing in the past

The most important barriers in descending order of number of times they were mentioned, shown by the numbers in brackets, for the three behaviors are summarized in the following three sections.

3.1. Water treatment - barriers and benefits

(The important barriers and benefits in descending order of number of times they were mentioned)

Barriers water treatment

(a) Costly (14)
(b) Old habit, tradition or thinking of not treating water (14)
(c) Lack of awareness (13)
(d) Tube Well water considered to be not requiring treatment (10)
(e) Time consuming for boiling (5)
(f) boiled-water-not being tasty (3)

Benefits water treatment (from doers)

(a) Being Free from Disease-18
(b) Clean/ good/safe/pure/germ-free -water-15
(c) Health-9; (d) Prestige, social good- 4
(e) Personal satisfaction-2

Benefits water treatment (from non-doers)

(a) Protection from (disease, diarrhea, typhoid, As, germs)-10 (one being and healthy family);
(b) Smelly hand pump water becomes tasty -2;
(c) Less Medical Expense-2; (d) self-confidence-2;
(e) clean-water (including from sand)-3;
(f) Convenient (can drink from kitchen)-1; (g) prestige-1.

3.2. Hand washing - barriers and benefits

(The important barriers and benefits in descending order of number of times they were mentioned)

Barriers hand washing

(a) Lack of awareness-3;
(b) Old thinking, habit and tradition-4;
(c) Cost-1;
(d) झंझट /Bothersome;
(e) lack of capacity;

Benefits hand washing (from doers)

(a) Clean-hands-9
(b) Free from disease-6
(c) Health/healthy-life-4
(d) Wealth; getting rid of smell from hands; and free from germs - 1 each

Benefits hand washing (from non-doers)

(a) Free from disease -3;
(b) To be and feel clean (and beautiful)-2,
(c) Satisfaction, Prestige in the community, Health-1 each

3.3. Hand washing place with soap and water - barriers and benefits

(The important barriers and benefits in descending order of number of times they were mentioned)

Barriers hand washing place with water and soap

(a) Cost-11; (b) Thinking that it is not needed -8
(c) Did-not-think/know-before-6; lack of awareness-2
(d) Laziness-5; (e) Need of proper place -1

Benefits hand washing place with water and soap (from doers)

(a) Free from disease-6; (b) Health-4
(c) Ease in hand washing -3
(d) Helps in habit-formation-3; (e) Time-saving-2
(e) Facilitates hand washing for children, Demonstration of good practice, – 1 each

Benefits hand washing place with water and soap (from non-doers)

(a) Stops disease spread; (b) One cannot be lazy to wash hands;
(c) Easy to wash hands; (d) Saves time,
(e) Children can wash too,
(f) Easy for relatives when soap and water are together

[*The (a) outcome of the analysis of the RANAS's survey, (b) what the respondent Liked and Disliked, and (c) the outcome of Barriers and Benefits analysis - would be used in designing the interventions based on Social Marketing approach during the next step of the intervention*]

4. Recommendations

The survey on the status of WASH in addition to establishing the current baseline have also revealed a number of areas of concerns that could be addressed with priority, such as – (a) promoting construction of platforms for the hand pumps that are the major source of water; (b) ensuring that those using open water sources treat their water before drinking and other domestic use; and (c) promotion of hand washing with soap after cleaning the child's bottom and feeding the child.

The findings of the survey on the "current status of WASH", "RANAS's behavioral factors", and "barriers and benefits" can be used in the software aspect of the program with a broader scope – such as structured behavior change interventions systematically measuring the changes that may be brought about by our interventions.

4.1. Measuring change

Given the considerable sample size of the survey of 600 households selected randomly in proportion to the population of the smallest unit of sampling frame (the ward), the intervention program can be developed with the possibility of showing the impact statistically. For example – as shown in Table 4.1-1, with the sample size of 611, a change (impact) of 10% (0.1) in the population can be detected with the prevalence of the indicator (such as hand washing, use of water filters etc.) during baseline of 45% (0.45) and with α =0.95 and β=0.80. In case the prevalence during baseline is 10% (0.1) the samples required to reveal the change (impact) of 10% would be about 309. The table also shows the sample size required for higher values of α and β (α =0.95 and β=0.80).

Table 4.1-1 required samples to show impact

prevalence (P1)	Change to be detected	required sample size for α =0.99 and β =0.90	required sample size for α =0.95 and β=0.80	**Ref** - Sampling Guide, 1999 Robert *Magnani*, USAID
0.45	0.1	848	611	
0.1	0.1	428	309	

α - level of statistical significance, β - statistical power

4.2. Development of structured behavior change intervention

The results obtained from the RANAS survey and the barriers and benefit analysis on the two behaviors of "water treatment" and "hand washing" allow us to develop systematic behavior change interventions drawing from RANAS behavior change techniques (BCT) and social marketing. The strategies and procedures that can be adopted in this are presented below.

4.3. Strategies

4.3.1. RANAS Behavior Change Techniques

Having assessed relevant factors of RANAS along with the factors of greater intervention potential, RANAS's BCT (behavior change techniques) can be adopted in developing the communication strategies. The factors of greater intervention potential along with the RANAS BCT adapted from *Mosler H et al (2013)* are presented here in Table 4.3-1.

Table 4.3.1-1 RANAS BCT for behavior change

Potential behavioral factors	Doer Non-Doer % diff		**Intervention strategy**
	WT[14]	**HW**[15]	
Perceived vulnerability (R)	39%	x	***(1c) Personal risk information****:* such as giving qualitative and quantitative examples; to request persons to appraise their own susceptibility to lead to a discussion on their false beliefs about their invulnerability.
Effortful (A)	193%	63%	**Cost and benefit information**. **Use of *Persuasive attributes****:* such as explanation of underlying novel and important information that have been found (working with the target group following participatory discussion session) to be of high positive value for the target group. ***Giving opportunity to talk to others*** *in favor of the behavior:* when trying to convince others the person herself or himself is subject to self-persuasion because of arguments in favor of the behavior.
Expensive (A)	138%	69%	
Time consuming (A)	x	27%	
Like (A)	66%	x	***Affective persuasion****: A*ssess the feelings of the group about performing the behavior and about the consequence of the behavior – and then try to present the behavior as pleasant and joyful acts or other award giving acts.
Descriptive norm (N)	60%	37%; 27%; 36%	***Highlighting norms***. ***Public commitment****:* people here are facilitated in making their commitment to in favor of the behavior in public, thus showing to others that there are people who perform the behavior.
Commitment (S)	X	31%	The **commitment** to perform a behavior can be enhanced by making a contract with the person where she or he obliges her- or himself to perform the behavior (self-commitment).
Remembrance (S)	X	29%	***Prompts****:* are cues (memory aids) which trigger the behavior in the right situation and help to remember the behavior.

[14] Water treatment
[15] Hand washing

An example of social norm use in a hand washing behavioral change program is presented here in Box 3.

Box 3 Use of Social Norm (example)

SuperAmma (upper-mum) hand washing campaign, implemented in a rural setting of Andhra Pradesh, India, focused on disgust and nurture to promote hand washing with soap (*HWWS*). The program also introducing *HWWS* as a good manner and addressed local norms by making hand washing with soap (*HWWS*) seem common.

The following activities were carried out to address social norm in f of hand washing.

(a) Influential people such as village authorities, the *Sarpanch* (village chief), school and preschool teachers were mobilized. Short video clips of these influential people making statements about *HWWS* were shown at community events and their images also appeared in *HWWS* posters that were displayed in public places. These individuals also appeared in person at community events.

(b) Women were asked to pledge to *HWWS* in public and when they did so stickers were placed on their doors (as shown in the photo on the right) identifying them as *HWWS* supporters. Their names also included on a public display board in the center of the village.

(SuperAmma program, London School of Hygiene and Tropical Medicine)

4.3.2. Social marketing strategy

In social marketing, change (in behavior or other outcomes) is viewed to occur through an offer (our intervention) which the target group finds valuable enough in **exchange for the behavior**.

The interventions here are designed (that is our offer is placed) through the four tools (4Ps) of – *product, price, place, and promotion*.

Here (a) p*roduct* is what we put into the exchange; (b) *price* is what our target group puts into the exchange; (c) *promotion* is the way we communicate to the target group about the benefits of the product; and (d) *place* is the way we deliver the product to the target group (the location and the method of distribution). In a successful blood donation program of the American Red Cross - (a) the product was perceived by the target group in different forms such as 'feeling good about oneself', 'helping save life', 'sticker of blood donation', 'orange juice and cookies', and 'missing class for the high school kids'; (b) promotion here was communication about the benefits of blood donation; (c) place decision (how they got the product delivered and the

exchange made) covered blood mobile that went to the customers – an innovative aspect of their program; and (d) the price placed in the exchange by who donated was 'blood'[16].

Another example of different elements of 4Ps encountered in a hand washing behavior change FOAM framework program is as follows: (a) product - need of smaller and more durable bars of soap; and development of hand-washing stations; (b) price – need to set price for hand washing stations and more affordable soap; (c) place – need to fix sales points for hand-washing stations and soap including sales via bicycle salespeople; and (d) promotion – need to encourage mothers to cut laundry or bar soap and place at hand-washing stations, build skills through interpersonal communication aimed at conserving soap and making it available to all household members, encourage setup of more than one hand-washing station per household, convince mothers that all soap is effective for hand-washing, and promote the use of more durable soap specifically for hand-washing.

More on exchange leading to Behavior Change[17]

In general, "for an exchange or change in behavior to take place, target audiences must perceive benefits equal to or greater than the perceived costs". This (benefit=>cost) should however be taken to the case on average, the range being – change taking place almost automatically to when the benefits are more than twice the cost. Most interesting here is the situation when the change takes place almost automatically – the mechanism leading to such phenomenon is called as *priming* or *nudging.* In priming or nudging, the automatic mode of people's thinking is activated (in contrast to the rational mode of thinking). Some example of use of nudge in WASH are presented here in Box 4.

On the other hand the need of the benefits to be more than twice the cost would be in situations when the Status-quo bias would be active. Status-quo bias is the phenomenon that exerts inertia against change causing humans to stick to their current situation even when changes are very much in their interest. One of the many factors leading to status-quo bias is the "loss aversive" tendency of humans. Loss aversion tendency alone is considered to make us loosing something roughly twice as miserable as gaining the same thing makes us happy (after Thaler, 2008) in an exchange.

So our aim in designing the interventions would be to – reduce the perceived barriers, increase the perceived benefits and nudge where possible.

[16] Professor Barbara Kahn of Wharton school, University of Pennsylvania
[17] Adapted based on related aspects from Behavioral Economics

Box 4 Examples of nude in WASH

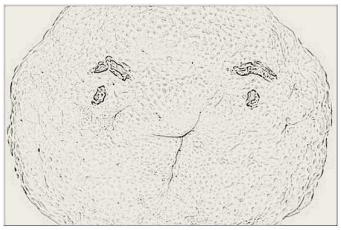
a) Reduction in spillage with image of black housefly imprinted on men's urinals

At the men's rest rooms at Schiphol Airport in Amsterdam, the imprinted image of a black housefly into each urinal is helping to reduce urine spillage by 80%. The appearance of the fly is considered to lead the man using the urinal to aim at the fly increasing attention and accuracy. In absence of this nudge there remains a tendency not to pay much attention on where to aim leading to messy spillage. (Thaler R H et al 2008)

2) Increase in hand washing in school with colored pathways and painted footprints and handprints (a test performed in Bangladesh)

Here the *nudges* are - (1) paved pathways painted in bright colors connecting the latrines to the hand-washing; and (2) painted footprints on footpaths guiding students to the hand-washing stations and handprints on the hand washing station. *Results* – an increase in the incidence of washing both hands after the toilet from 18% to 58% after making of the first nudge, and then to 68% when the second nudge was added. The hand washing rate after two and six weeks is reported to have remained both at 74%. (Dreibelbis R et al 2016).

3) Picture of man's staring eyes and citrusy smell nudging people in hand hygiene



In a surgical intensive care unit at a teaching hospital in Miami, Florida - citrus smell was found to have improved hand hygiene (use of hand gel dispenser) among health care professionals and service receivers from 15.0% to 46.9%; and the placing of "male eyes" over the hand gel dispenser from 15.0% to 33.3%. This is considered to be one of the first studies to demonstrate that priming (in this case: olfactory – clean, citrus small; and visual – male eyes) can influence hand hygiene compliance in a clinical setting (Dominic K et al, 2015).

4.4. Implementation procedure

The findings of the survey shall be presented in Nepal Delegation followed by discussion on the aspects that could be addressed now under SAFA project. In SAFA project, awareness in WASH is to be delivered in the community (one vulnerable community in the service area of each of the 23 HCFs) particularly targeting water quality and hand washing.

[Information from the assessment that may not be addressed fully through SAFA project can be kept for other proposal development that could be WASH stand alone or Health / DRR integrated interventions. Similarly the interventions under SAFA project that would be delivered in limited area (one vulnerable community in the service area of each of the 23 HCFs) as per the project proposal, could be in a later stage developed in to a scaling project in the form of campaigns mobilizing a broader stakeholders and communication strategies]

4.4.1. Ideation

2 **Ideation sessions in Nepal Delegation**

Nepal Delegation team shall be facilitated in an Ideation session to develop ideas on innovate solutions for the WASH aspects that could be addressed now under SAFA project. Here in addition to the findings of the survey, the RANAS BCT strategies and all the relevant elements of Social Marketing approach shall be presented to the participating Nepal Delegation team. The team shall then be facilitated in a creative process for the development of innovative interventions ideas. The objectives here would be to generate as may ideas as possible following the 8 brainstorming rules of ideation presented here in Annex 3. [These ideas along with others to be generated later from the GERUWA field team and the target groups shall be used to select few ideas (say 3 to 5) through agreed criteria to be prototyped and test]

3 **Ideation with field team**

Presentation of the survey outcomes to GERUWA and the survey team (the enumerators who carried out the survey) followed by ideation sessions on development of innovative intervention as done with Tdh Delegation team mentioned above.

4 **Ideation with the target group**

Ideation with the potential target group would be carried with slightly differently than to be done with the project team mentioned above. Here carried out in the form of focus groups, discussions could be held first on the barriers and benefits of the behavior in question. This could then be followed by discussions to obtain views on the following related to the 4 Ps following similar idea-

generation process: (a) what could someone say to you that would make it more likely that you would consider adopting this behavior; (b) what could someone show you that would make it more likely that you would adopt this behavior; (c) is there anything someone could give that would help you adopt this behavior; and (d) is there anything someone could do for you that would help you adopt this behavior. We could then test ideas that we developed working with Tdh and project team with the group, particularly those that the audience did not mention.

Box 4 shows a small example of ideation done with target group in which a respondent during the midterm evaluation of Tdh Bangladesh's integrated health program in 2016 said on how the then on-going 'hand washing station' program could be promoted.

Box 5 Idea generation with the target group (example)

How to *promote* hand washing stations – a motivator note from Bangladesh

Studies on hand washing behavior have revealed that absence of proper hand washing station is an important barrier to proper hand washing.

Based on this evidence, integrated health program of Tdh Bangladesh during (2015-17) promoted installation of hand washing stations (where water flows through a faucet connected to a bucket) against the competing behavior of washing hands at the tube wells. During the midterm review of the program, there came an opportunity in north *Daldalia*, ward no 6 of *Kurigram* to ask a resident on how this could be promoted in the community. His response was as follows.

"*If hands are washed at the tube well, as one hand has to work on the tube well handle to pump the water, hands cannot be washed properly and conveniently. Germs may also spread through the handle. Washing hands at the hand washing station is better way where we can wash both the hands properly. If we tell this to the people or show them they will understand and where they may have difficulty we could support them. This is neither difficult and nor expensive. It could cost about 300 BDT (3.5 USD). We can fill the hand washing bucket while we take shower*."

4.4.2. Prototyping and testing

The selected interventions shall then be prototyped and tested for their relevance and effectiveness with the target group for the proven ones to be replicated. In line with social marketing approach in addition to the development of communication strategies and material for promotion, there may be need to work on the infrastructure (such as choice of appropriate filters, development of hand washing station models) and making the infrastructure accessible to the target group including subsidies if necessary any to some group.

Similarly potential stakeholders such as the municipality, HCF, private or social entrepreneurs (such as those promoting/selling water filters) and those at national level would be involved too in the process. An important element here could be having a common understanding on the type of water filters to be promoted – both in the community and the HCFs.

5. Reference

Dominic K, et al (2015), *"Priming" Hand Hygiene Compliance in Clinical Environments*. American Psychological Association, Health Psychology, 2016, Vol. 35, No 1, 96-101.

Dreibelbis, R; Kroeger, A; Hossain, K; Venkatesh, M; Ram, PK (2016) *Behavior Change without Behavior Change Communication: Nudging Hand-washing among Primary School Students in Bangladesh*. International journal of environmental research and public health, 13 (1). ISSN 1661-7827 DOI: https://doi.org/10.3390/ijerph13010129

Mosler, H-J; Huber, A; Inauen, J and Tobias, R (2013) *A guideline for behaviour change*. Eawag, Switzerland.

R Dreibelbis, A Kroeger, K Hossain, M Venkatesh and P K Ram (2016) *Behaviour Change without Behavior Change*

Robert Magnani (2012), *Sampling Guide* 1999 with 2012 Addendum, USAID

Lee, N.R and Kotler, P (2016) *Social Marketing Changing Behaviours for Good*, Fourth Editon, SAGE Publications, Inc.

Thaler R H and Sunstein C R (2008); *NUDGE* Improving Decisions About Health, Wealth, and Happiness; Yale University Press New Haven & London

Daniel K (2011), *Thinking, Fast and Slow*; Penguin Ramdom House, UK.

Annex-1 Survey Questionnaire

B Household Information
B1- Name of hh head
B1a - Is the Respondent the hh head?
B2- Name of respondent
B3 Household type
B3a Who is the respondent [${nameRespondent}] in the household?
B4 Age of respondent (yr)
B5 Sex of respondent
B6 Education of the respondent
B7 No of all members living now in the HH
B10 Sources of hh income
B10a Mention service category
B10b Mention Other income source
B11 Total number of rooms
B12 Type of main house Wall
B13 Type of main house Roof
B14 Items in the house
B15 Average monthly expenditure in Rs in the following items:
15a) Food - Rs/month
15b) Fuel (electricity, gas, kerosine, wood etc.) - Rs/month
15c) Education of children - Rs/month
15d) Medical expense - Rs/month
15e) Loan payment - Rs/month
15f) Other remaining expenses- Rs/month
B16) Average monthly income (in Rs)

C Water
C1- PRIMARY Water Source
C1.1 Mention other Primary water source
C1a Is the "${sourcePrimary}" with Proper Platform?
C2 Primary water delivery point (major)
C3 SECONDARY Water Source
C3.1 Mention other Secondary water source
C2a Is the "${sourceSecondary}" with Proper Platform
C4 Secondary water delivery point (major)
C5 Do you treat the water for drinking?
C6 How do you treate the water (major)
C6a Mention Other treatment method
C6b Mention water filter used
C6c Mention Other water filter used
C5a What is the reason for not treating the water?
C7 Do you pay for water
C8 Do you know how much you pay for water
C9 Average expenditure in water per month in Rs
CB1 Percentage of treated drinking water consumed out of total daily drinking water consumption.
CB2 How strongly do you intend to always drink treated water?
CB3 For long have you been drinking Filtered Water?
CB4 When do you treat/filter the water for drinking?

E Hygiene
E1a How often do you wash your hands with soap after defecation?
E1b How often do you wash your hands with soap before eating?
E1c How often do you or those who cook in your house wash hands with soap before food preparation?
E1d How often do you or those who care children in your house wash hands (or washed in the past) with soap after cleaning the child's bottom?
E1e How often do you or those who care children in your house wash hands (or washed in the past) with soap before feeding the child?
E2 Where do you wash your hands mostly? (hand washing place)
E2a Mention other hand washing place
E3 How many hand washing Places are there for this hh?
E3a What are the hand washing places meant for?
E4 Is there soap and water at the hand washing place?
E4a Is the soap and water at the next HW place?
E5 Is there ash at the hand washing place?
E6 Is there ash at the hand washing place?

F1) What are your major communication channels or information sources
F2) Mention the type and place of contact with people
F3) Mention other sources of information
F4) Do floods occur in this place?
F5) Flood frequency
F6) Type of toilet used
F6a) Mention Other toilet
F7) Toilet containment
F8) Toilet use
F8) GPS premise
Please take photo of the house

Annex-2 RANAS Questionnaire on water treatment and hand washing

(A) RANAS question on Drinking Water

RISK factors
RW1) How likely is it you think that you may get sick by drinking "water that is not Filtered"?
RW2) If you get sick by drinking "water that is not Filtered", how severe would its impact be on your life in general?
RW3) What disease do you think you may get by drinking "water that is not Filtered"?
RW3a) Mention OTHER diseases got by drinking "water that is not Filtered"?
ATTITUDE factors
RW4) Do you think that treating the water for drinking is time-consuming?
RW5) Do you think that having Filter and treating the water for drinking all the times is expensive?
RW6) Do you think that having Filter and treating the water for drinking all the time is effortful?
RW7) How much do you like or dislike the "water that is Filtered"?
RW7a) Ask what the respondent Likes or Dislikes as relevant.
NORM factors
RW8) How many of your relatives and or neighbours drink Filtered/Treated water?
RW9) Do you think that, overall, people who are important to you rather approve that you drink Filtered water?
RW10) Do you think that, overall, people who are important to you rather disapprove that you drink Filtered water
RW10a) Please mention who are the People Important to you
Ability factors
RW12) Please explain what you know on how water can be treated
SELF REGULATION factors
RW13) How sure are you that you can treat as much water you need for drinking within the next month?
RW15) How often does it happen that you forget to Filter your drinking water?
RW16) How committed do you feel to drink treated water?

(B) RANAS survey on hand washing with soap

RISK FACTORS (hw)
rh1) How Likely do you think that you may get sick by not washing hands with soap (a) before eating and after defecation?
rh) What diseases do you think you may get by not washing hands with soap before eating and after defecation?
rh) Mention Other Disease
ATTITUDE FACTORS (hw)
rh1) Do you think that always washing hands with soap and water takes a lot of Time
rh2) Do you think that always washing hands with soap and water is effortful?
rh3) Do you think that always washing hands with soap and water is Expensive?
rh4) How much do you Like or Dislike always washing hands with soap and water?
rh5) Ask what the respondent Likes or Dislikes as relevant.
rh6) What Concerns do you have with washing hands with Soap
rh7) Mention Other Concerns
NORM FACTORS (hw)
rh8a) How many of your relatives and or neighbors wash hands with soap regularly Before eating?
rh8b) How many of your relatives and neighbors wash hands with soap regularly after defecation?
rh9) How many of your relatives and or neighbors have always Soap and Water available at the HW place?
rh10) Do you think that, overall, people who are important to you rather Approve washing hands with soap at HWSs or wash basin*?*
rh11) Do you think that, overall, people who are important to you rather Dis-Approve washing hands with soap at HWSs wash-basin*?*
Ability factors (hw)

rh12) Do you know how the hands need to be washed with soap before touching food and after contact with faeces or dirt?
rh13) How confident is the respondent in making HWS with bucket and faucet?
rh14) Does the respondent think that washing hands at HWS or at wash basin can facilitate easy and regular hand-washing than at the water source (such as tube well) itself?
SELF REGULATION factors (hw)
rh17) How often does it happen that you forget to make your Hand Washing Place with soap and water ready for the day's hand washing?
rh18) How committed do you feel to maintain Hand Washing Place intact with water and soap for the day's hand washing by all the members of your hh?

Annex 3 Brainstorming rules during ideation

These are the suggested rules to be followed during idea generation and development[18]

1 **Stay focused on topic** Staying focused means getting into a narrow frame of reference so that much detained work can be done. This can be viewed as a T profile, where the top of the T is the broad understanding of the challenge but the depth of the T is actually how one can engage with a solution more deeply.

2 **Encourage wild Ideas** Any idea no matter how wild or silly it could sound at the beginning could actually be the genesis of something exciting and something new and out of these some radical or revolutionary ideas may emerge.

3 **One conversation at a time** during discussion this avoids distraction and going off in different directions enabling detailed discussions.

4 **Defer judgments** No idea is a bad idea when one is ideating. When we are brainstorming we should encourage any idea. By deferring judgments we do not discourage people from speaking up and saying something. Once all the possible ideas are collected later we can with the team or community filter through different lens and see what are important.

5 **Be visual** People respond much better to something that is visualized than just an abstract notion in one's mind as "a picture is worth a thousand words". So one must attempt to use schematics or three dimensional low-fi prototypes or anything that can help visualize the concept better

6 **Go for quantity** if we do many things and come up with many ideas, out of that richness of the design ideation process we are bound to find a good solution. For example compared to 10% of 10 ideas (that is one), if we have 100 ideas, its 10% is ten. It is worth noting here that there is no need to make a lengthy case for our ideas since no one is judging. Ideas should flow quickly.

7 **Build on the ideas of others** this is linked to the principle of not judging. If we dislike someone's idea, we can challenge ourselves to build on it and make it better. This we can do by thinking in terms of 'yes and' instead of 'but' and build up sequentially beyond onto something that can actually be very exciting.

8 **Think user-centric** one needs to be reminded during the process that ideation at its heart is user centered design. Everything we do should focus on the benefits that could occur to the end user and how empathy actually generates those kinds of solutions.

[18] Adapted from Online course, University of Cape Town and IDEO