Impact Assessment Study

Safe drinking water & improvement of sanitation & hygiene project - United Breweries Limited

August 2022

Price Waterhouse Chartered Accountants LLP

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1. Executive Summary

Executive Summary

The summary of key findings of this report are as follows:

Impact of water infrastructure support:

- **95% beneficiaries interacted with were aware of the RO[1] support**, while 70% respondents interacted with were aware of the borewell support provided by UBL.
- 87.9% of the respondents spend less than 15 mins to fetch water in the RO plant beneficial villages.
- 91.5% of the beneficiaries use RO plant water for drinking and cooking in the locations where RO plant is working.
- 99% beneficiaries agree that there is reduction in incidence of water borne diseases after installation of RO plant.
- Rising mains were beneficial connecting the borewell to the village OHTs. The distribution pipelines have helped to replace the damaged pipelines as well as lay pipelines for the future extension areas
- **77.5% respondents made use of the borewells installed by UBL**. Out of these, 89% respondents agreed that the borewells had been beneficial for them. 53.4% respondents used the borewell water for drinking & cooking, 58.3% respondents used it for non - drinking purposes & 6% respondents used the borewell water for washing clothes & utensils. The borewell water was able to cater to the additional demand of the water apart from addressing issue of water scarcity.
- **85.2% respondents who agreed that they saved money on health expenditure**, had an average monthly health expense of INR 361/- earlier which had reduced to an average of INR 293/- post installation of RO plants. Beneficiaries now can drink water without fear of falling sick. The number of patients visiting the hospital with water borne diseases has decreased due to a reduction in cases of water borne diseases.
- Beneficiaries now have access to drinking water at any time and are not dependent on the intermittent piped water supply. The RO plant has provided them with ease of access to drinking water of good quality at a reasonable price.
- **38.9% of the respondents made use of the farm pond**. The farm pond water was used mainly in the monsoon season for irrigation, as drinking water for cattle & it also helped to recharge the ground water table.
- 99% respondents were satisfied with the water infrastructure support provided by UBL. On a scale of 1-5, where 1 being the lowest and 5 being the highest the satisfaction level for **RO plant and borewell was stated 4.5 and 3.9 respectively by the beneficiaries.**
- Detailed findings can be referred to from the section in this report titled "Status of Water Infrastructure provided"

Impact of community & individual household dustbins:

- Out of the total respondents interacted with, **76% respondents agreed that they had community & individual household dustbins in their villages**. Out of these, 96% respondents effectively used the dustbins provided by UBL on a regular basis. Through the programme separate dustbins at the community & the household level with the purpose of ensuring wet waste and dry waste segregation were provided.

[1] Out of 8 Reverse Osmosis (RO) plants provided, 4 were non-functional, due to which water sample could not be collected for those plants. Therefore, the study provides analysis of the 4 functional RO plants.

- Before the distribution of dustbins, 76% of the respondents used to bury the waste in the open, 41% of the respondents used to throw it in the open & 51% of the respondents used to burn the waste causing environmental degradation & spread of diseases.

- **94% of the total respondents felt that the provision of community & individual household dustbins had been beneficial for them**. Out of these, benefits of the dustbins for 90% of the respondents included provision of a proper facility to dispose off the waste as opposed to the earlier practice of throwing the waste in an open field. For 61% of the respondents, this made the village surroundings cleaner & for 25% of the respondents, cleaner surroundings in turn reduced diseases & instances of falling sick caused due to flies & other insects that used to sit on unattended waste.

- Detailed findings can be referred to from the section in this report titled "Community and Individual household dustbins"

Impact of toilet infrastructure support provided:

- UBL provided financial assistance of INR 5,000 in two instalments for the construction of toilets to select households in the villages. Out of the total respondents interacted with, 18% had received this assistance for construction of toilets. All these respondents used to defecate in the open earlier.

- Post the construction of toilets, **91% of the respondents agreed that they no longer go out in the open to defecate**. 28% & 22% of the respondents agreed that the women of the household have experienced greater privacy & security respectively by provision of toilets, especially during the night. Frequency of falling ill has reduced for 8% of the respondents.

- Availability of toilets has also helped in saving time for the villagers as they no longer had to walk to nearby fields to defecate.

- Despite these benefits, during the field visit it was observed that in few of the households the toilets had been converted into storage rooms & were being used for other purposes. Despite efforts from ASSIST & UBL, there is a need to conduct awareness sessions on a more frequent basis to reaffirm the importance of toilets for the villagers.

- Detailed findings can be referred to from the section in this report titled "Impact of Construction of Toilets"

Impact of awareness sessions conducted:

- **72% of the respondents agreed that ASSIST had conducted awareness sessions and street plays on importance of water & sanitation.** 88% of the respondents stated that topics covered in the sessions included importance of clean drinking water, awareness education on dangers of animal & human fecal matter was covered as stated by 53% of the respondents. Importance of toilets and dustbins was covered with regards to open defecation & waste segregation as stated by 12% of the respondents.

- **92% of the respondents agreed that the awareness sessions had been beneficial for them**. Out of these, for 87% of the respondents it had led to an increase in awareness regarding safe drinking water & sanitation. For 70% of the respondents, it had led to positive behavioural changes like practicing waste disposal & segregation, reduction in open defecation etc. 17% of the respondents stated that this positive behavioural change helped to reduce water borne diseases.

- Due to the awareness sessions, **a change in the knowledge, attitude, behaviour & practices of the villagers was noted. 93% of the respondents agreed that good hygiene habits were essential for good health.** Post the awareness sessions, 73% of the respondents actively encouraged their family & community members to use dustbins for waste disposal & not to defecate in the open.

- Detailed findings can be referred to from the section in this report titled "Awareness sessions "

- Detailed recommendations are available in the section titled "Recommendations" in this report

2. Introduction and Background

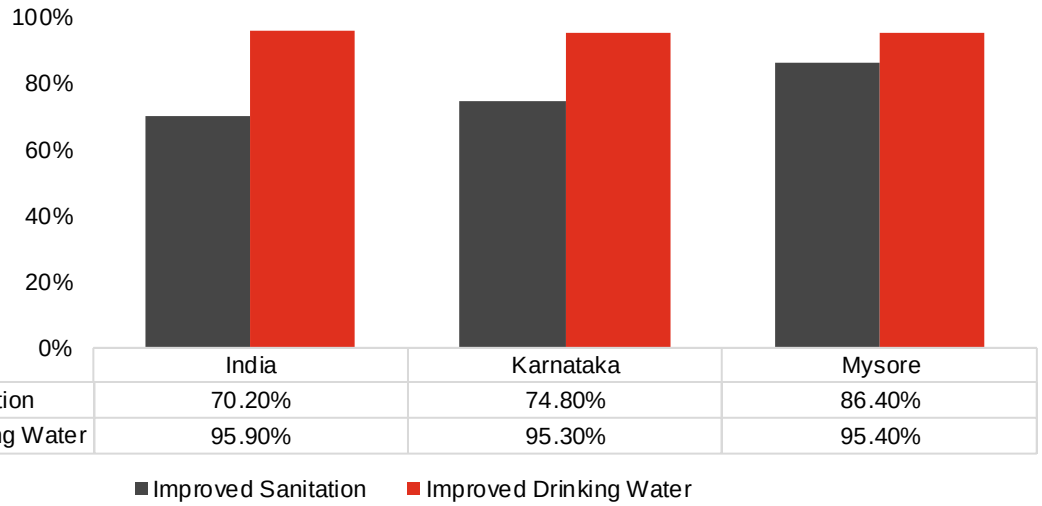
Introduction and Background

2.1. Background: WASH in India and Karnataka

There has been an urban and rural divide in access to safe drinking water, sanitation and hygiene. The Government of India has been continuously making efforts to enhance access to clean drinking water, sanitation and hygiene through various policies, interventions, and flagship programmes like Swachh Bharat Mission, Jal Jeevan Mission, etc.[2]

About three-fourth of the households in the country do not have drinking water at their premise. India is placed at 120th amongst 122 countries in the Water Quality Index, with nearly 70% of water being contaminated.[3]

Figure 1 - Indian Household WASH Access in FY 2020[4]



	India	Karnataka	Mysore
Improved Sanitation	70.20%	74.80%	86.40%
Improved Drinking Water	95.90%	95.30%	95.40%

Improved drinking water: Piped water into dwelling/yard/plot, piped to neighbour, public tap/standpipe, tube well or borehole, protected dug well, protected spring, rainwater, tanker truck, cart with small tank, bottled water, community RO plant

Improved sanitation: Flush to piped sewer system, flush to septic tank, flush to pit latrine, flush to don't know where, ventilated improved pit (VIP)/biogas latrine, pit latrine with slab, twin pit/composting toilet, which is not shared with any other household.

In recent years, the most prominent effort of the Government in terms of improving access to clean drinking water is the Ministry of Jal Shakti, which has provided tap water connections to 6 Crore rural households (as of 16th May 2022) under Jal Jeevan Mission launched since August 2019.

Karnataka scored 56.5 in Composite Water Management Index (CWMI) performed by Niti Aayog.[5] India has been declared ODF by the Government in October 2019.

The Government is now targeting sustaining ODF by a vision of ODF plus villages. Karnataka has been able to achieve coverage of 15.18% which is quite low when compared to top-performing and nearby states. Within Karnataka, Mysore has achieved only 1.56% ODF plus villages making it one of the lowest performing districts in Karnataka.[6]

2 Source: https://jaljeevanmission.gov.in/
3 Source: https://www.tatatrusts.org/our-work/water-sanitation-and-hygiene
4 Source: http://rchiips.org/nfhs/districtfactsheet_NFHS-5.shtml
5 Source: http://social.niti.gov.in/uploads/sample/water_index_report.pdf (pg 159)
6 Source: https://sbm.gov.in/phase2dashboard/PhaseII/NationDashboard.aspx

2.2. About UBL and ASSIST

United Breweries Limited (UBL) is an Indian conglomerate company headquartered in UB City Bangalore Karnataka. Its core business includes social beverages (alcoholic and non-alcoholic). It promotes responsible consumption of Alcohol. Through its CSR interventions, UBL intends to contribute to the preservation of environment & create social capital. UBL has integrated CSR in its corporate strategy and intends to drive it with a vision to bring about sustainable social development for its co-communities. UBL has the following focus areas for CSR::

- Water (including water conservation and safe drinking water)
- Women Empowerment
- Responsible Consumption of Alcohol
- Community Development

As part of its CSR initiative, United Breweries Limited has worked towards the provision of safe drinking water and improvement of sanitation and hygiene around 14 villages of Nanjangud Taluk, Mysore district in Karnataka in association with its implementing partner, ASSIST.

ASSIST is a registered non-governmental organisation working for the development of poor and marginalised communities in rural areas. Founded in 1985, for more than three decades, ASSIST has transformed thousands of lives by committing itself to the poorest of the poor, in areas where no other NGO has gone before. ASSIST helps the most underprivileged members of society, but it does so with a difference. The organisation's proven and sustainable approach focuses on the comprehensive development of its target communities.[7]

2.3. About the Project

The CSR project support included provision of construction of water treatment plants, borewell construction & pipeline extension. Additional support was provided through provision of financial assistance for construction of toilets & distribution of community & individual household dustbins for waste management. 1 community farm pond has also been constructed under the project.

The overall goal of the project was to provide safe drinking water, improved water supply for domestic and agricultural purpose and sanitation facilities to the underserved populations, especially to the poor and remote areas and to improve health and hygiene practices related to water and sanitation. Infrastructure support was also provided to 4 schools in the area (Refer below for snapshot of project):

[7] Source: Assist Website: https://www.assist-india.org/ as retrieved on 6 July 2022

1. Project implemented from 2017-20 in 14 villages
2. ASSIST was the implementing partner
3. Installation of household & community dustbins & financial support to 165 households for toilet construction
4. RO Plants provided in 8 villages
5. School infrastructure support in 4 villages
6. Provision of borewells, motors, pipelines, overhead tanks & 1 farm pond

2.3.1. Infrastructure Support in the Intervention Villages

Below table illustrates the infrastructure support provided by the UBL in the listed villages.

Figure 2 - Village wise Infrastructure Support

S.no.	Name of Village	Water treatment plants and wastewater management through pipelines constructed including fixing of motors and pump sets	Bore - well sets installed	Pipe-line extension and pumping main works	Financial assistance for toilet construction (No. of toilets)	Individual/Community Dustbins for families (dry and wet)	School infrastructure support
1	Basavanapura						
2	Immavu Hundi						
3	Immavu						
4	Hulimavu						
5	New Bokkahalli						
6	Old Bokkahalli*						

S.no.	Name of Village	Water treatment plants and wastewater management through pipelines constructed including fixing of motors and pump sets	Bore - well sets installed	Pipe-line extension and pumping main works	Financial assistance for toilet construction (No. of toilets)	Individual/Community Dustbins for families (dry and wet)	School infrastructure support
7	Chikkaiahnachatra						
8	Bachahallihundi						
9	Adakanahalli						
10	Hebya						
11	Tandavapura						
12	Kempasiddana Hundi						
13	Hejjege						
14	Toremavu						

Infrastructure Provided Infrastructure not provided

Denotes villages provided with water infrastructure support Denotes villages provided with school infrastructure support

*Old Bokkahalli was common for both water and school infrastructure support **(Source: Data Shared by the Implementing Partner)**

2.4. Project Scope of Work & Study Limitations

2.4.1. Scope of Work

PW has been engaged to conduct an independent Impact Assessment study of safe drinking water and improvement of sanitation and hygiene project of United Breweries Limited (UBL) Mysore, Karnataka. The scope of work includes:

- Understanding the Project implementation plan and process followed, reviewing the Key Performance Indicators (KPIs) as defined by the Management under the framework for implementing the Project for the outputs, outcomes and impact of the Project. Framework would be Inclusiveness, Relevance, Efficiency, Convergence framework (the 'IRECS') and provide recommendation on the project performance for Management's evaluation.
- As part of the scope of work, PW has assessed the following for providing recommendations for managements consideration:
    - Community awareness around safe drinking water, sanitation and hygiene among the villagers & the school children,
    - Effectiveness of water and sanitation committees
    - Hygiene and health impact on residents & students
    - The quality of the infrastructure created through the project
    - The status and usage of the safe drinking water plants, community dustbins, pipelines, borewells, household toilets

2.4.2. Study Limitations

- Due to schools being closed because of the ongoing summer vacation, the PW team could not see the school infrastructure support provided and was unable to interact with the school officials, students and teachers.
- Out of 8 RO plants provided, there were 4 non-functional RO plants in Hulimavu, New Bokkahalli, Old Bokkahalli and Chikkaiahnachatra, due to which water sample could not be collected for those RO plants.
- Due to the recent Panchayat elections, new WASH committees had not been formed, hence, the team could interact with only 2 WASH committees. Due to the non-availability of SHG members, interaction with them could not be conducted at the time of field visit.

2.5. Additional Assumptions and Limitations

- We have not been engaged to, nor have we, provided any management functions or made management decisions.
- PW has not acted in the capacity of UBL management; UBL identified qualified personnel responsible for overseeing the project. We have not assigned responsibilities to client personnel. It was responsibility of the client to identify the core member team who assisted us in this assignment. We did act in a supervisory capacity over members of client.
- We did not chair any internal meeting of client or represent the client / client management in meetings with the implementation partners and/or beneficiaries.
- This engagement does not relate to design of financial information systems or accounting or preparation of financial statements. We did not make or present recommendations in a way that our work amounts to designing a new financial system.
- We have not provided any solution/recommendation for dispute resolution, for UBL, with the NGO.

- We should not be held responsible for slippage of schedule due to non – availability of personnel from client side and delay in providing information or obtaining feedback or facilitating local consultations
- A data collection agency was deployed for the collection of quantitative data on the field.
- We have not finalized Company's CSR Policy, project implementation plan and monitoring & evaluation (M&E) framework relating to CSR. PW has only provided recommendations for improvements in the select CSR project assessed.
- We have not prepared any policy and procedures manuals and were not responsible for the implementation of our recommendations and management remediation plan.
- We were responsible only for providing options for consideration of client and not make any management decision for selection, prioritization and implementation of the same.
- PW has not provided any quality certification or attestation post review & analyses of quality of water infrastructure to the client. PW was only responsible for providing recommendations basis the analyses for client's consideration.

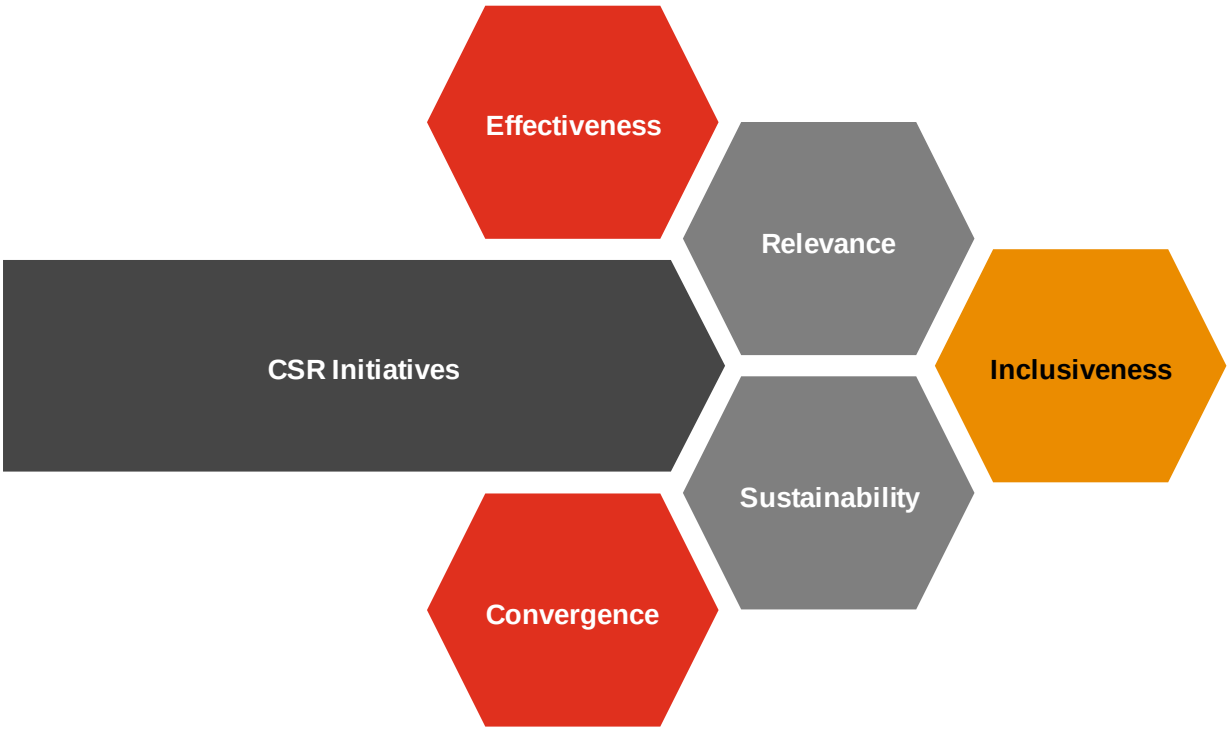
3. Approach and Methodology

Approach and Methodology

3.1. IRECS Framework

The impact of the programme was assessed using the IRECS framework. IRECS is geared to provide an overall feedback on the efficacy of implementation as well, as its efficiency in terms of achievement of the desired project outputs with reference to inputs. IRECS framework measured the performance of programme on five parameters – Inclusiveness, Relevance, Effectiveness, Convergence and Sustainability.

Figure 3 - IRECS Framework



Overview of areas assessed under each of these five parameters is provided below:

Inclusiveness - Ability of different stakeholders, particularly poorest and most marginalised - to access the benefits of activities, be part of institutions (healthcare / education committees) and derive equitable benefits from assets created.

Relevance - Are the services /inputs /institutions facilitated in the project able to meet community priorities? How was the planning done? Was it participatory? How were the success indicators developed? Was the community involved in development of project indicators?

Effectiveness (& Efficiency) - Have the activities been able to effectively address community expectations? How efficiently have the resources been deployed, monitored and utilized?

Convergence - Degree of convergence with government/other partnerships; relationship between individuals, community, institutions and other stakeholders.

Sustainability - Do communities feel ownership over the assets created by the activities and/or will the Project initiated community interventions sustain even after the exit of the funding agency. Are the institutions strengthened adequately to effectively manage and sustain the activities after the completion of project? Has an exit strategy been drafted?

3.2. Approach and Methodology

For the purpose of smooth and efficient conduct, the entire exercise was divided into 5 phases, as depicted below:

Plan

As part of the planning phase, the PW and the UBL teams agreed and finalized the scope of impact assessment as per specific requirements for each intervention. Thereafter, a careful desk review of the project relevant documents, as shared by UBL and ASSIST was carried out by the team. This was done to gauge the current situation on ground before starting the actual process.

Process

After the planning phase, the next step was the identification of the key stakeholders for data collection, such as beneficiaries, Gram Panchayat members, WASH committee members, amongst others. This was followed by a detailed secondary data collection and research on the locational spread which would help in preparing a sampling plan and field visits.

Prepare

The data collection plan was prepared and finalized in consultation with UBL and ASSIST teams. This was followed by development of stakeholder specific data collection tools such as FGD/IDI guides and the household survey. Samples were also finalized for the identification of respondents in the 11 villages for water infrastructure support and for conducting the FGDs/IDIs in 2 villages where school support was provided.

Perform

The field team was trained on the tools to collect data through household surveys, post which the team was deployed on ground for data collection. This included the household surveys, along with the interactions with Gram Panchayat members, RO plant operators, beneficiaries, and WASH committee members. As part of the study, water samples at the inlet and outlet of the RO water plants were also collected for testing purposes.

The data thus collected was further collated, cleaned and analysed.

Publish

Post the data collection, cleaning, and analysis, a draft report on the findings of the study has been prepared for UBL's consideration and feedback.

Apart from this, the team had specific methodology to assess the impact of each intervention carried out by UBL on ground.

The below graph depicts the steps undertaken for each of the water infrastructure assessment.

RO Water plant	Borewell	Farm pond	Pipeline
Visited 8 RO plant sites Geo tagged locations Discussion with RO operator on understanding how they operate and maintain the RO plant RO plant functionality status Gained understanding on Backwash, chemical dosing, cartridge, activated carbon, Total Dissolved Solids (TDS) monitoring, pressure monitoring RO inlet and outlet water sample collection for test	Visited Borewell locations Geo tagged locations Visual inspection on functional status of the borewell Identified the defunct, functional and non-utilized borewells Water quality tests of random borewell samples	Visited the Farm Pond location Geo tagged location Discussion with Gram Panchayat members on the benefits and impact of the farm pond	Visit to roads where the rising main pipeline is laid Geo tagged location Site visit to the area where the distribution line is provided Understanding the pipeline network from borewell to OHT and RO plants

3.3. Coverage of the Study

Selection of Villages

- 11 intervention villages where maximum water infrastructure support was provided were selected and visited for the study.
- Two (2) villages namely Old Bokkahalli and Kempasiddana Hundi were visited for conducting FGDs & IDIs to assess the school infrastructure support provided. Out of these Old Bokkahalli was common for both school and water infrastructure.
- Simple random sampling was deployed for selection of sample households keeping in mind distribution across the villages. Sample is drawn in consultation with UBL at 95% Confidence interval & 5% margin of error. Out of total 4,050 households across 11 villages, 365 households were covered for the household survey.

Table 1 - Village wise number of households and sample size

S.no.	Village name	No. of households (HHs)	Number of samples covered
1	Basavanapura	161	15
2	Immavu Hundi	283	25
3	Immavu	264	24

S.no.	Village name	No. of households (HHs)	Number of samples covered
4	Hulimavu	386	35
5	New Bokkahalli	211	19
6	Old Bokkahalli	354	32
7	Chikkaiahnachatra	231	21
8	Bachahallihundi	360	32
9	Adakanahalli	211	19
10	Hebya	214	19
11	Tandavapura	1375	124
Total		**4,050**	**365**[8]

Interaction with stakeholders (Qualitative)

The interaction with the stakeholder comprised of In-depth interviews and FGD's. The stakeholders involved were the beneficiaries, WASH committee officials, Gram Panchayat officials, and RO plant operators/caretakers.

- 64 IDIs & 2 FGDs were conducted with the beneficiaries covering 81 beneficiaries
- One (1) FGD was conducted with the ASSIST team.
- Two (2) IDIs each were conducted with WASH committee members & Gram Panchayat officials, respectively.
- Eight (8) IDIs were conducted with RO plant operators/ caretakers covering 11 villages (out of 8 RO plants available in the intervention villages).

[8] Sample size as agreed with UBL

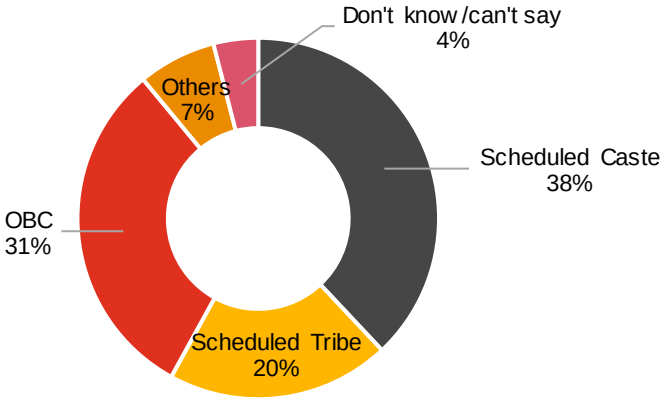
4. Findings of the study

Findings of the study

4.1. Profile of the Respondents

The majority (79%) of respondents were males, and 38% of them belonged to the scheduled caste category. Refer below a snapshot of the distribution of respondents based on gender, social category, and economic profile.

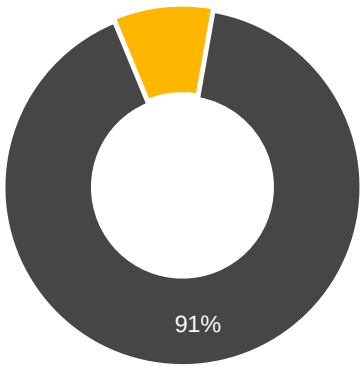
Figure 4 - Social category wise distribution of Respondents (n=365)



Others: General

Respondents were asked about their economic status, wherein, most respondents reported to belong to Below Poverty Line (BPL) category.

Figure 5 - % of respondents below poverty line (BPL) (n=365)



The respondents reported to be in the following occupations as presented in the table below.

Table 2 - % distribution of respondents as per their occupation (n=365)

Occupation	Percentage
Cultivator	56.20%
Unskilled worker	12.60%
Sharecropper/Agricultural laborer	11.00%
Shop/Business/Trade	7.90%
Animal husbandry	5.50%
Salaried (Pvt.)	2.70%
Salaried (Govt.)	1.40%
Domestic help	0.50%
Currently unemployed	1.90%
Others[9]	0.30%

The data reflects that the respondents in the intervention villages primarily depend on an agrarian economy, 56% of the respondents were cultivators on the field. The average monthly income of the respondents was in the range of INR 5,000 – INR 10,000 while the average monthly expenditure of the respondents was in the range of INR 2,000 – INR 5,000 as was reported by the respondents.

[9] Others – 1 Housewife

4.2. Water Infrastructure

The below table summarizes the status of the water infrastructure provided in the villages.

Table 3 - Status of water infrastructure provided in the villages

Village	RO Plant	Borewell	Pipeline Extension Work
Hulimavu	It was operational only for 6 months after installation. Card system is damaged, and plant is non-functional from last 2.5 years	There is 1 borewell set installed Borewell was connected to RO plant inlet. As RO plant is non-functional, bore well is connected to existing Over Head Tank (OHT) and water is supplied to Households (HH) of the village	Not applicable
Old Bokkahalli	Plant is non-functional from last 3 years Machine suddenly switches off while working	There are 2 borewell sets installed Borewell -1 was connected to RO plant. As RO plant is non-functional, bore well is connected to existing OHT and water is supplied to HH of the village Borewell-2 is converted to Hand pump and effectively utilized by villagers for drinking and other domestic purpose	Pumping main of 240 m – From bore well to RO plant
New Bokkahalli	Plant is non-functional from 1.2 years Card system is damaged	There is 1 borewell set installed Borewell was connected to RO plant inlet. As RO plant is non-functional, bore well is connected to existing OHT and water is supplied to HH of the village	Pumping main of 200 m – From bore well to RO plant

Village	RO Plant	Borewell	Pipeline Extension Work
Immavu	RO plant is functional. It's partially utilized with consumption of about 600 ltr/day Card system is not functioning; hence the control panel has been bypassed to avoid recharging the filter process	There is 1 borewell set installed Borewell is located near the RO plant and is connected to the RO inlet	Total pipeline length of 365 m Pumping main – From bore well to RO plant Distribution Main – Extension lines from the existing pipelines and replacement of damaged distribution pipelines
Immavu Hundi	RO plant is functional only from last 3 months. It's partially utilised as raw water availability is very low due to insufficient pressure at the RO inlet point It was under repair due to damage of filter system	There is 1 borewell set installed which is converted to hand pump due to low pressure. Currently it's defunct	Not applicable
Tandavapura	Not applicable	There are 3 borewell sets installed Bore wells are connected to existing OHT and water is supplied to HH of the village 2 borewell are functional and 1 is defunct	Total pipeline length of 792 m Pumping main from borewell to OHTs. Distribution Main – Extension lines from the existing pipelines and replacement of damaged distribution pipelines
Hebya	RO Plant is functional, but the control panel is not working It is partially utilized with consumption of about 100-200 liters/day	There is 1 borewell set installed Borewell is located near the RO plant and is connected to the RO inlet The Borewell has two outlets- one for the RO and other is not utilized	Total pipeline length of 550 m Pumping main – From bore well to RO plant Distribution Main – Extension lines from the existing pipelines and replacement of damaged distribution pipelines

Village	RO Plant	Borewell	Pipeline Extension Work
Chikkaiahnachatra	Plant is non-functional from past 1 month Card system is not working	There is 1 borewell set installed Borewell is located near the RO plant and is connected to the RO inlet	Pumping main – pipeline extension of 273 m length of 2- inch diameter distribution pipeline
Bachallihundi	RO plant is functional It is utilized for its full capacity with consumption of about 3,000 liters/day Card system is modified to card cum coin system by the operator	There is 1 borewell set installed Borewell is located near the RO plant and OHT and is connected to the RO inlet	Total pipeline length of 365 m Pumping main – From bore well to RO plant Distribution Main – extension lines from the existing pipelines and replacement of damaged distribution pipelines
Adakanahalli	Not applicable	There are 2 borewell sets installed Borewells are connected to existing OHT and water is supplied to HH of the village	Total pipeline length of 975 m Pumping main – From bore well to OHT Replacement pipeline for damaged pipe
Kempesiddanahundi	Not applicable	Four sets of Borewell have been installed 1 was defunct due to non-availability of water 1 was functional but was not utilized 1 was connected to the village OHT 1 was reserved for future planning	Not applicable
Basavanapura	Not applicable	One borewell set has been installed and is connected to the village OHT and is operational for 3 hours per day	Pumping main – From bore well to existing raising main of 152 m length of 2.5-inch PVC

Village	RO Plant	Borewell	Pipeline Extension Work
Summary	Out of the 8 RO plants visited, 4 were not functional at the time of the field visit by the PW team namely Hulimavu, New Bokkahalli, Old Bokkahalli and Chikkaiahnachatra	Out of the 19 borewells visited, 3 were not functional at the time of the field visit by the PW team namely Tandavapura, Immavu Hundi & Kempesiddanahundi	All the pipeline extension were functional as stated by the beneficiaries. The PW team visited the pipelines and geo-tagged the same.

Additionally, 1 Farm pond is constructed at Hulimavu village. The farm pond had dried out due to summer. It is utilized by villagers for cattle feeding, picnic spots and irrigation during rainy season.

4.2.1. RO Plants

4.2.1.1. Comparative Analysis of Functional Aspects

A comparative analysis[10] of each of the functional aspects, namely, Operation and Maintenance, Financial, Beneficiary Impact, and Repair and Maintenance was conducted based on various parameters (Refer Annexure – 1: Evaluation Criteria for Comparative Analysis of RO Plants) along with an overall summary as depicted in the table below.

Table 4 - Comparative Analysis of the functional aspects of RO Plants

Parameters	Hulimavu	New Bokkahalli	Old Bokkahalli	Immavu	Immavu hundi	Hebya	Chikkaiahnachatra	Bachallihundi	Evaluation parameters
Operation and Maintenance									
Operational Responsibility	×	×	×	🔴	🔴	🟡	×	🟢	The operational responsibility is taken up by dedicated operator and is available most of the time
Operator Awareness	×	×	×	🟡	🟡	🟡	×	🟡	The operator is aware of the overall functioning of the system and how to monitor and read the sensors
Regular Cartridge replacement	×	×	×	🟢	🟡	🟡	×	🟢	Operator cleans the cartridge every month and replaces it every 6 months
Activated carbon replacement	×	×	×	🔴	🟢	🟡	×	🔴	The operator should be aware of activated carbon filter media and the procedure for replacing

[10] Note: Hulimavu, New Bokkahalli, Old Bokkahalli and Chikkaiahnachatra RO plants were not functional during the visit - Detailed evaluation criteria for each colour coding given in Annexure 1

Parameters	Hulimavu	New Bokkahalli	Old Bokkahalli	Immavu	Immavu hundi	Hebya	Chikkaiahnachatra	Bachallihundi	Evaluation parameters
									which is decided based on free Chlorine in test samples. Was replaced only in Immavu Hundi RO plant
Backwash of Filters	×	×	×	🟢	🟢	🟡	×	🟢	Backwash to be done on a regular basis for every 6 hrs of filtration cycle
Chemical dosing	×	×	×	🟢	🟢	🟢	×	🟡	The operator is aware of chemical dosing and does it as per the norms prescribed.
Water tank maintenance	×	×	×	🔴	🟢	🟢	×	🟢	The storage, filter storage and outlet tank to be cleaned regularly
Handheld pH and TDS meter	×	×	×	🔴	🔴	🔴	×	🟡	Operators to know how to operate the meters and record regularly
Financial									
Financial Responsibility	×	×	×	🟡	🟢	🟢	×	🟡	Operator takes responsibility to handle minor repair works as well as spends on upgrading the system as required. Gram Panchayat should provide

Parameters	Hulimavu	New Bokkahalli	Old Bokkahalli	Immavu	Immavu hundi	Hebya	Chikkaiahnachatra	Bachallihundi	Evaluation parameters
									funds for maintenance from the corpus fund
Funding for Maintenance	×	×	×	🟡	🟢	🟢	×	🟡	Funding for maintenance is provided by UBL fund, Gram Panchayat, or is self-funded by operator
Earnings from RO Plant	×	×	×	🟡	🟡	🟡	×	🟢	The grading is made on the increasing order of earnings per month from the RO plant usage
Salary for the operator	×	×	×	🟡	🟡	🟢	×	🟡	Whether fixed salary is paid to the RO plant operator.
Impact on Beneficiaries									
Daily Footfall	×	×	×	🟡	🔴	🔴	×	🟢	The number of people using RO plant on a daily basis
Daily Consumption	×	×	×	🟡	🔴	🔴	×	🟢	The number of people using RO plant on a daily basis based on Discussion with operator
Dependency on RO Plant	×	×	×	🟡	🔴	🔴	×	🟢	The number of people using RO plant on a daily basis based on the survey and RO operator FGD

Parameters	Hulimavu	New Bokkahalli	Old Bokkahalli	Immavu	Immavu hundi	Hebya	Chikkaiahnachatra	Bachallihundi	Evaluation parameters
Impact on health	×	×	×	🟡	🟢	🟢	×	🟢	Improvement in health conditions based on FGD with RO operator, beneficiaries, Health officials and Survey
Repair and Maintenance									
Current Functionality Status	×	×	×	🟢	🟡	🟡	×	🟢	The current status of the RO plant as whether working or not
Frequency of repair	×	×	×	🟡	🟡	🟡	×	🟢	The amount spent on the repair and maintenance and the incidence of repairs
Funding for repair	×	×	×	🟡	🟢	🟢	×	🟡	Funding for maintenance is provided by UBL fund, Gram Panchayat, or is self-funded by operator
Status of card system	×	×	×	🔴	🟢	🟢	×	🟢	Based on the physical and functional condition of the card system (RFID, Signal strength, Buttons, Master card)
Control panel and sensors	×	×	×	🟡	🟢	🔴	×	🟡	The control panel may be non-functional, modified or is maintained as provided

Parameters	Hulimavu	New Bokkahalli	Old Bokkahalli	Immavu	Immavu hundi	Hebya	Chikkaiahnachatra	Bachallihundi	Evaluation parameters
Record keeping	×	×	×	🔴	🔴	🔴	×	🔴	Any bookkeeping practices on recording the consumption per day
Summary – Consolidated Analysis									
Operation and Maintenance	×	×	×	🔴	🟢	🟡	×	🟢	Operator responsibility, awareness, aware of maintenance procedures
Financial	×	×	×	🔴	🟡	🟢	×	🟡	Gram panchayaths role in financing, funding for maintenance and salary and earnings from RO plant
Impact on beneficiary	×	×	×	🟡	🔴	🔴	×	🟢	Daily footfall, consumption, Dependency on RO plant and impact on health conditions of beneficiaries
Repair and Maintenance	×	×	×	🔴	🟢	🔴	×	🟢	Status and functioning of the internal systems –card, control panel; record keeping; frequency of repairs

Legend 🟢 Good 🟡 Average 🔴 Low × Not applicable for RO plants which were not functional during site visit

4.2.1.2. Water Quality Test Results

The team conducted water quality tests in the different Gram Panchayats. RO water samples were collected at the inlet and outlet of the functional RO plants and two non-functional plants at New Bokkahalli and Chikkaiahnachatra.

Below table depicts the analysis of RO water test of villages at Hulimavu Gram Panchayat

Table 5 - Analysis of RO water test at Hulimavu Gram Panchayat

Parameters	Acceptable Limits	Permissible Limits	Immavu		Immavu Hundi		New Bokkahalli	
			RO Inlet	RO Outlet	RO Inlet	RO Outlet	RO Inlet	RO Outlet
Sulphates SO4, mg/l	**200**	**400**	63.4	✓	42.4	✓	43.7	✓
Iron Fe, mg/l	**0.3**	**No relaxation**	0.1	✓	0.1	✓	0.1	✓
Total arsenic As, mg/l	**0.01**	**No relaxation**	<0.001	✓	<0.001	✓	<0.001	✓
Fluorides F, mg/l	**1**	**1.5**	0.5	✓	0.5	✓	0.5	✓
Nitrates NO3, mg/l	**45**	**No relaxation**	6.1	✓	4.3	✓	5.1	✓
Residual free chlorine, mg/l	**0.2**	**1**	<0.1	✓	<0.1	✓	<0.1	✓
Total Coliforms MPN/100ml	**Not detectable**		Not detected	✓	Not detected	✓	<1	✓
E Coli MPN/100ml	**Not detectable**		Not detected	✓	Not detected	✓	<1	✓
Colour, Hazen units	**5**	**15**	<5	✓	<5	✓	<5	✓
Taste	**Agreeable**	**Agreeable**	Agreeable	✓	Agreeable	✓	Agreeable	✓
Odour	**Agreeable**	**Agreeable**	Agreeable	✓	Agreeable	✓	Agreeable	✓

Parameters	Acceptable Limits	Permissible Limits	Immavu		Immavu Hundi		New Bokkahalli	
			RO Inlet	RO Outlet	RO Inlet	RO Outlet	RO Inlet	RO Outlet
pH	**6.5- 8.5**	**No Relaxation**	7.24	✓	7.38	✓	8.02	✓
Turbidity NTU	**1**	**5**	1.8	✓	1	✓	1.9	✓
TDS mg/l	**500**	**2000**	841	✓	301	✓	602	✓
Total Hardness CaCO3 mg/l	**200**	**600**	480	✓	180	✓	350	✓
Chlorides Cl, mg/l	**250**	**1000**	180	✓	70	✓	130	✓
Total alkalinity CaCO3 mg/l	**200**	**600**	390	✓	186	✓	320	✓

Below table depicts the analysis of RO water test of villages at Tandavapura Gram Panchayat

Table 6 - Analysis of RO water test at Tandavapura Gram Panchayat

Parameters	Acceptable Limits	Permissible Limits	Bachallihundi		Chikkaiahna-chatra		Hebya	
			RO Inlet	RO Outlet	RO Inlet	RO Outlet	RO Inlet	RO Outlet
Colour, Hazen units	**5**	**15**	<5	✓	<5	✓	<5	✓
Taste	**Agreeable**	**Agreeable**	Agreeable	✓	Agreeable	✓	Agreeable	✓
Odour	**Agreeable**	**Agreeable**	Agreeable	✓	Agreeable	✓	Agreeable	✓
pH	**6.5- 8.5**	**No Relaxation**	7.24	✓	7.38	✓	8.02	✓
Turbidity NTU	**1**	**5**	1.8	✓	1	✓	1.9	✓

Parameters	Acceptable Limits	Permissible Limits	Bachallihundi		Chikkaiahna-chatra		Hebya	
			RO Inlet	RO Outlet	RO Inlet	RO Outlet	RO Inlet	RO Outlet
TDS mg/l	**500**	**2000**	841	✓	301		602	✓
Total Hardness CaCO3 mg/l	**200**	**600**	480	✓	180	✓	350	✓
Chlorides Cl, mg/l	**250**	**1000**	180	✓	70	✓	130	✓
Total alkalinity CaCO3 mg/l	**200**	**600**	390	✓	186	✓	320	✓
Sulphates SO4, mg/l	**200**	**400**	48.6	✓	17.2	✓	37.5	✓
Iron Fe, mg/l	**0.3**	**No relaxation**	0.1	✓	<0.1	✓	0.1	✓
Total arsenic As, mg/l	**0.01**	**No relaxation**	<0.001	✓	<0.001	✓	<0.001	✓
Fluorides F, mg/l	**1**	**1.5**	0.5	✓	0.2	✓	0.3	✓
Nitrates NO3, mg/l	**45**	**No relaxation**	4.7	✓	1.9	✓	3.7	✓
Residual free chlorine, mg/l	**0.2**	**1**	<0.1	✓	<0.1	✓	<0.1	✓
Total Coliforms MPN/100ml	**Not detectable**		Not detected	✓	Not detected	✓	Not detected	✓
E Coli MPN/100ml	**Not detectable**		Not detected	✓	Not detected	✓	Not detected	✓

✓- denotes the sample meets the maximum permissible limits as per IS 10500:2012

✗- Denotes the sample does not meet the limits as per IS 10500:2012

Out of the 6 RO plants for which water quality testing was conducted, it was noted that all RO plants were successful in meeting the maximum acceptable limit for drinking water specifications as per IS 10500:2012 as depicted in the table below.

Table 7 - Inferences from Water Quality Tests

Sample	Result
Immavu RO outlet	Meets maximum acceptable limits
Immavuhundi RO outlet	Meets maximum acceptable limits
New Bokkahalli RO outlet	Meets maximum acceptable limits
Hebya RO outlet	Meets maximum acceptable limits
Chikkaiahnachatra RO outlet	Meets maximum acceptable limits
Bachallihundi RO outlet	Meets maximum acceptable limits

4.2.1.3. Understanding the Impact of RO Plant

Pre-Intervention Scenario:

- 66% of the respondents who earlier did not have drinking water facility inside the house and later used the RO plant water post intervention, (n=183) used to fetch water within 15 mins of travel time.
- In villages where the RO plants provided by UBL are currently functional, earlier 79% of the people (n=58) used to spend less than 15 mins to fetch water
- Average time to fetch water was 13.8 mins in villages where UBL funded RO plants are functional and where respondents did not have facility to get water inside the house (n=58)

Post-Intervention Scenario:

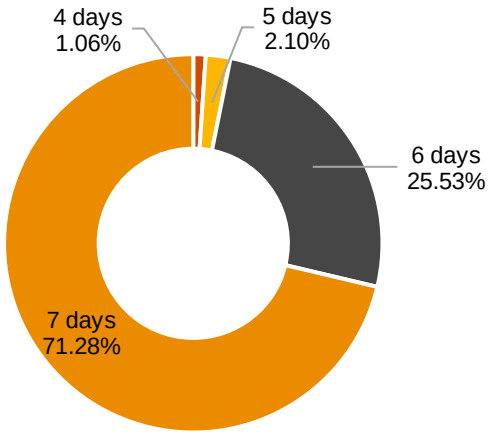
- 70.5% of the respondents who earlier did not have drinking water facility inside the house and currently use the RO plant water, (n=183) now fetch water within 15 mins of travel time.
- In villages where the RO plants provided by UBL are currently functional, 87.9% of the people (n=58) spend less than 15 mins to fetch water
- Average time to fetch water is now 12.9 min (decreased by 6.5%) in villages where UBL funded RO plants are functional and where respondents did not have facility to get water inside the house (n=58)

The implementation of the RO water plants has not influenced the travel distance (average of ~ 175m in both scenarios) for the beneficiaries to fetch water but has reduced the travel time as the water availability at the borewell or public taps was intermittent and had to fetch water at specific time period while RO plants has helped to avoid these by making water available any time which reduces the dependency on source at a specific time slot.

94% of the villagers (n=100) reported to use the RO plant water. 91.5%[11] of the beneficiaries (n=94) reported to use RO plant water for drinking and cooking in the locations where RO plant is working. 72% RO users fetch more than 200 liters of water/ week and 71% RO users fetch RO water daily. 48% respondents pay more than INR 100/month to fetch water (100% of Bachahallihundi beneficiaries pay more than INR 100/month)

The graph below illustrates the frequency at which the respondents draw water from the RO plants.

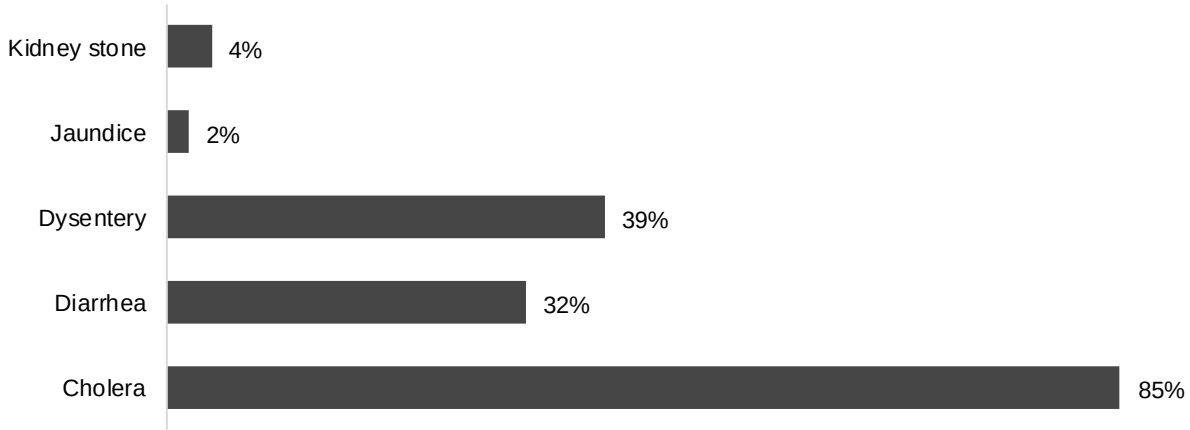
Figure 6 - Frequency of water drawn per week from the RO plants (n=94)



It was observed that on an average a household consumes 219 liters of RO water/ week which shows that more than a 20-litre can is used by a household per day. 84.7% of the beneficiaries completely agreed that the provision of RO Plants has been beneficial for them. Detailed discussion with beneficiaries revealed that men of the household usually went to fetch water on their cycles/bikes/scooters as the RO plant was situated at some distance from the house.

Below is an illustration of the prominent water-borne disease that were prevalent in the area before the interventions.

Figure 7 - % of Households with prominent water borne diseases (Pre-intervention scenario) (n=365)



Before the installation of RO Plants, Cholera was the most prominent water borne disease prevalent in the villages as stated by 85% respondents. Other diseases included stomach related ailments like diarrhoea & dysentery which spread due to contaminated water.

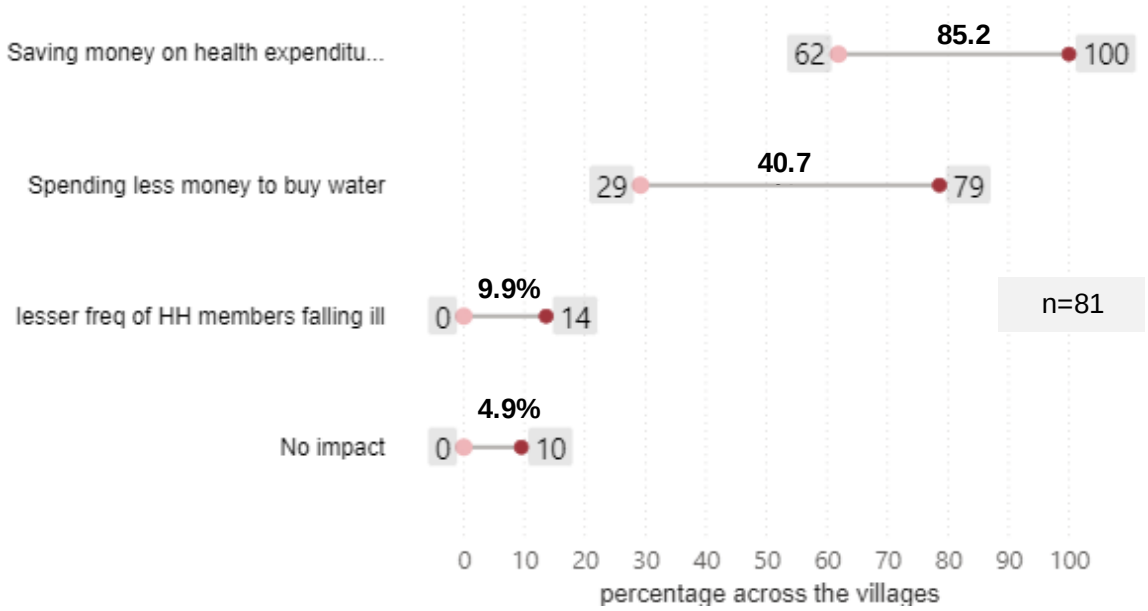
99% beneficiaries agree that there has been a reduction in incidence of water borne diseases after installation of RO plant. The number of patients visiting the local PHC & CHC for such health issues have also reduced.

[11] 4 Villages where UBL funded RO plants are functional & for beneficiaries who use RO Plants (n=94)

81.9 % respondents (n=94) stated that the subsidized water from RO Plants had a positive financial impact for them.

81 villagers have responded for the benefits of RO plant and has been represented in the dumbbell chart below. The average percentage of positive responses for each query varied across the villages (for example – the average percentage of positive response for saving money on health expenditure ranged from 62% to 100% across the villages with an average of 85.2%)

Figure 8 - Benefits of the RO plant (n=81)



85.2% respondents[12] (n=81) who agreed that they save money on health expenditure, had an average monthly health expense of INR 361/- earlier which has reduced to an average of INR 293/- post installation of RO plants.

4.2.2. Borewell

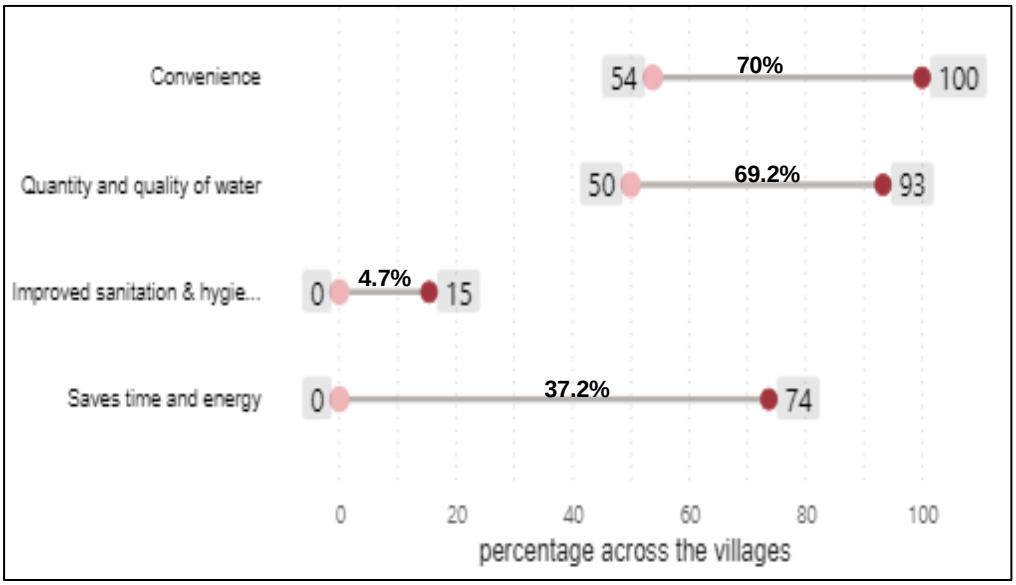
4.2.2.1. Understanding the impact of Borewells

77.5 % (n=365) respondents reported to use borewell. Out of the beneficiaries who use borewells (n=283), 89% respondents agree that borewells have been beneficial for the households.

253 villagers have responded on the benefits of Borewell and has been represented in the dumbbell chart below. The average percentage of positive responses for each query varied across the villages (for example – the average percentage of positive response for Borewell being convenient ranged from 54% to 100% across the villages with an average of 70%).

[12] Villages where UBL funded RO plants are functional (n=81) and opined on the impact of RO

Figure 9 - Benefits of the Borewell (n=253)



Out of the beneficiaries who use borewells (n=283), it was reported that:

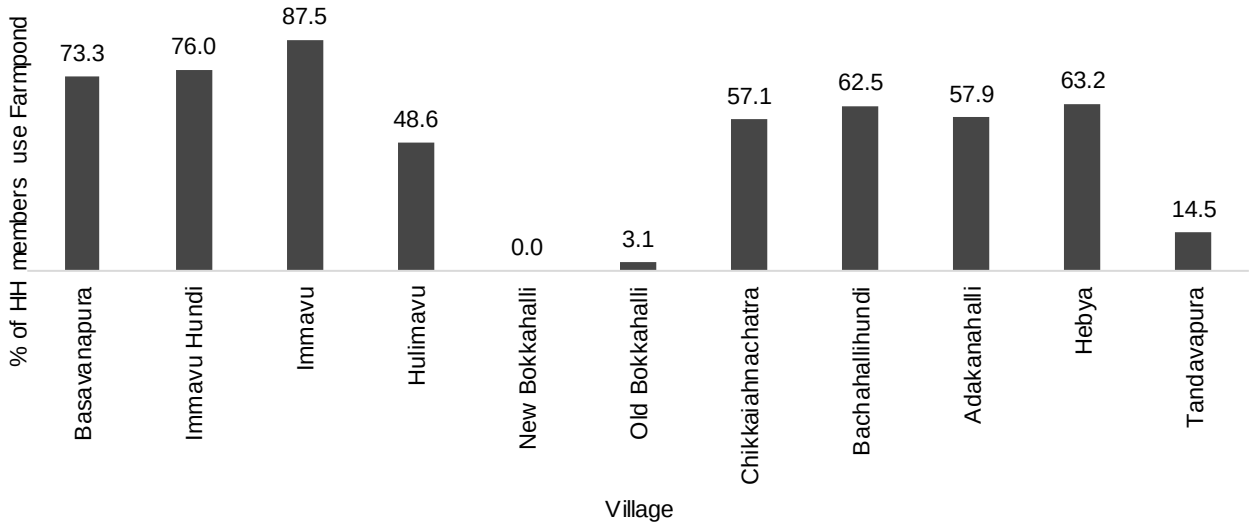
- 53.4% use it for drinking/cooking-purpose
- 58.3% use it for non-drinking/cooking purpose
- 6% use it for washing purposes

It can be inferred that earlier the ~92% (n=283) respondents who used to depend on piped water supply sourced from borewell for drinking purpose had now reduced to 53.4% (n=283) post installation of the RO plants. This shows that people are now depending on better quality water, i.e., the RO plant water.

4.2.3. Farm Pond

38.9 % villagers (n=365) reported to use farm pond with majority villagers (more than 70%) being from Basavanapura, Immavu, Immavu hundi villages, as is illustrated below.

Figure 10 - % of household members using the Farmpond (n=365)



The farm pond is used by the villagers mostly in the monsoon season when it is filled with water. It has helped to recharge the ground water level also as stated by some beneficiaries. Additionally, it was reported by respondents that:

- 21% use the farm pond as picnic spot
- 88% use as source of water for livestock
- 22.5% for non-drinking purposes

4.2.4. Overall Impact of Water Infrastructure Support

Pre intervention[13]:

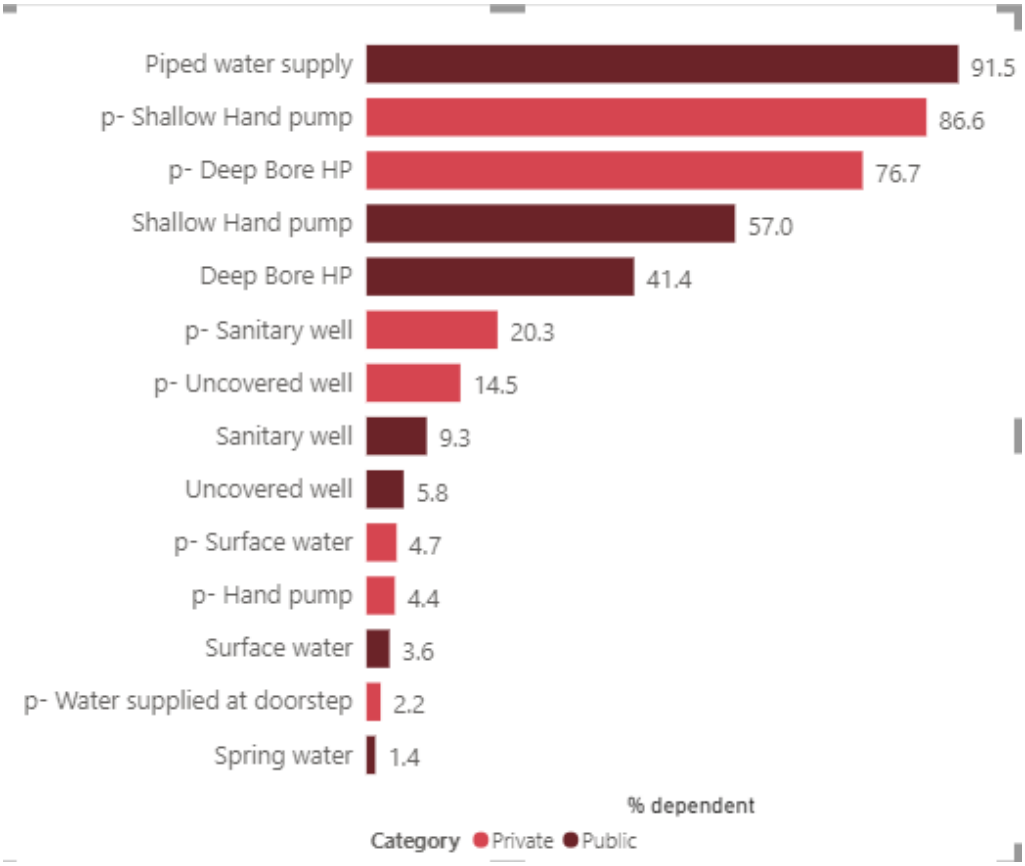
51% of households surveyed in the 11 villages used less than 15 Litres Per Capita Per Day (LPCD). Over 42% of water sources (bore wells, creeks and canals etc.,) observed in the villages were likely contaminated by human or animal feces. 64% of the canals and tanks observed in these villages had a high potential for fecal coliform contamination. 30% to 70% of the 11 villages surveyed were observed to have open defecation. Villages had higher occurrence of diarrhoea (during the assessment period) for children <6 years old. Poor hygiene knowledge and implementation among 82% of the households surveyed in the target area unfamiliar with diarrhoea prevention which was highlighted in the need assessment study of ASSIST.

Before the installation of the RO Plants, villagers majorly depended on public piped water supply as stated by almost 92% respondents. The water sources were unprotected & were contaminated with fecal matter. The supply of water was also sporadic & the villagers used to get water once a day for 1-2 hours only.

Illustrated below is the general preference pertaining to drinking water sources amongst the beneficiaries before the intervention.

[13] Data taken from need assessment conducted by ASSIST in 2017

Figure 11 - General preference for drinking water before installation of RO Plant (n=365)



The general preference for drinking water before installing RO plant was Public piped water supply (92%), private shallow hand pump (87%), private deep bore hand pump (77%) and public shallow hand pump (57%) (N=365).

Post Intervention:

The average service level of all the villages is more than 35 Litres Per Capita Per Day (LPCD) post intervention. 99% beneficiaries agreed that there is reduction in incidence of water borne diseases after installation of RO plant. They also reported access to clean water free from coliform contamination.

The subsidized RO water has had financial impact by saving money on health expenditure and Spending less money on buying water. The dependency on Borewell for drinking and cooking has reduced to around 50%. The awareness sessions have helped to increase awareness regarding safe drinking water.

The beneficiaries have rated the different water infrastructure support measures on a scale of 1-5 (with 1 being the lowest and 5 being the highest) as follows:

- RO Water Plant – 4.53/5
- Borewell – 3.94/5
- Farm Pond – 4.07/5

4.3. Community and Individual Household Dustbins

4.3.1. Provision of community & individual household dustbins

Illustrated below are the percentage of respondents who have received community and individual household dustbins along with the percentage of respondents who are using it regularly.

Figure 12 - % respondents having community & individual household dustbins* (n=365)

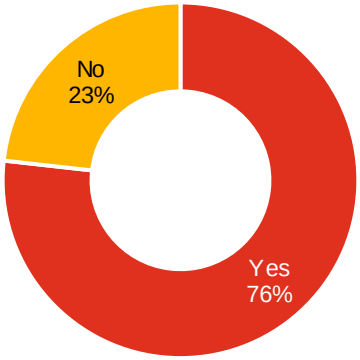
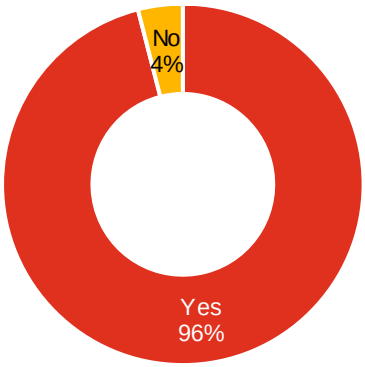


Figure 13 - % respondents using dustbins regularly (n=279)



*1% respondents were not sure if they have received the dustbins

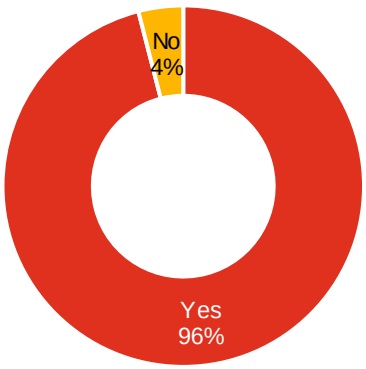
Out of the total respondents interacted with, 76% respondents agreed that they had community & individual household dustbins. Out of these, 96% respondents effectively used the dustbins provided by UBL on a regular basis. ASSIST have provided separate dustbins at the community & the household level with the purpose of ensuring wet waste and dry waste segregation. Before the distribution of dustbins, 76% of the respondents used to bury the waste in the open, 41% of the respondents used to throw it in the open & 51% of the respondents used to burn the waste causing environmental degradation & spread of diseases.

The villagers were made aware of the importance of proper waste disposal with focus on waste collection and segregation. This enabled the villagers to ensure proper recycling of the waste & detailed discussion with the beneficiaries revealed that majority of them were using wet waste as compost for their agricultural fields. 4% respondents who reported not using the dustbins regularly, it was observed that they had converted the dustbin containers into storage containers for other purposes as the dustbins did not come with a top lid and were small in size.

4.3.2. Impact of effective use of dustbins

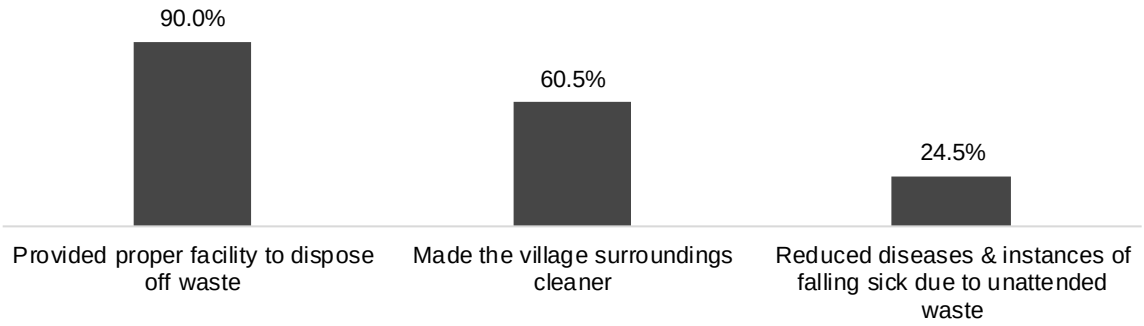
Approximately 96% respondents highlighted that the provision of having a dustbin has benefitted them as illustrated in figure below.

Figure 14 - % respondents who felt provision of having dustbins benefitted them (n=279)



The beneficiaries rated 4.25/5 on a scale of 1-5 (with 1 being the lowest and 5 being the highest) their satisfaction level for dustbin support. Illustrated below are the benefits of using dustbins, as per the responses from the respondents who felt that the provision of dustbins have benefitted them.

Figure 15 - Benefits of using dustbins (n=261)



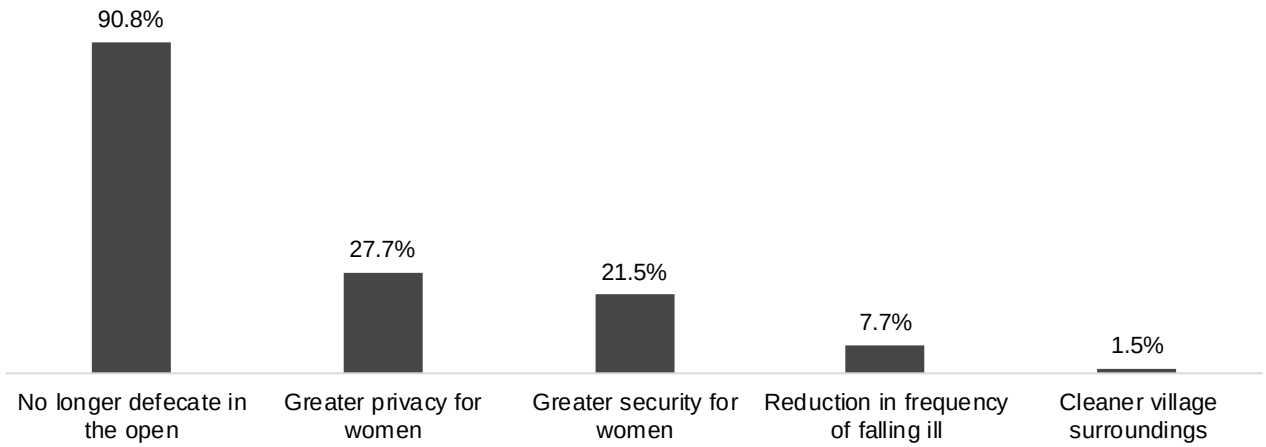
94% of the total respondents felt that the provision of community & individual household dustbins had been beneficial for them. Out of these, benefits of the dustbins for 90% of the respondents included provision of a proper facility to dispose off waste as opposed to the earlier practice of throwing the waste in an open field. 61% of the respondents stated that using dustbins made the village surroundings cleaner, 25% stated reduced diseases & instances of falling sick caused due to flies & other insects that used to sit on unattended waste.

Despite these overall benefits of the dustbins, in some villages like Old Bokkahalli & Immavu, the beneficiaries stated that the dustbins had not been distributed to all households. Further, some villagers had cemented the opening of the community dustbin as the community van did not come regularly to collect the waste, which was leading to accumulation of the waste, hence causing foul odour & unhygienic environment. Greater involvement of the Gram Panchayat was suggested in this regard by the villagers.

4.4. Construction of Toilets

18% respondents interacted with received financial support for construction of toilets (N=365). 100% respondents who received financial support used to defecate in the open before construction of toilets (N=65). The below graphical representation demonstrates the benefits of toilet construction, as reported by the respondents who received the support.

Figure 16 - Benefits of toilet construction (n=65)



The average rating provided by the beneficiaries based on the satisfaction level for individual toilet infrastructure support stands at 4.05/5 on a scale of 1-5 (with 1 being the lowest and 5 being the highest).

According to a need assessment survey conducted by ASSIST in 2017 in the intervention villages, it was found that open defecation was prevalent in these villages. There was unavailability of proper infrastructure for defecation as well as lack of awareness with regards to harmful effects of open defecation. Open defecation near sources of water was further leading to water contamination & spread of water borne diseases.

UBL provided financial assistance of INR 5,000 in two instalments for the construction of toilets to select households in the villages. Out of the total respondents interacted with, 18% had received this assistance for construction of toilets. All these respondents used to defecate in the open earlier. Post the construction of toilets, 91% of the respondents agreed that they no longer go out in the open to defecate. 28% & 22% of the respondents agreed that the women of the household have experienced greater privacy & security respectively by provision of toilets, especially during the night. Frequency of falling ill has also reported to have reduced for 8% of the respondents. Availability of toilets has also helped in saving time for the villagers as they no longer had to walk to nearby fields to defecate.

Despite these benefits, in some of the households it was observed that the toilets had been converted into storage rooms & were being used for other purposes. Despite efforts from ASSIST, there is a need to conduct awareness sessions on a more frequent basis to reaffirm the importance of toilets for the villagers.

4.5. Awareness Sessions

4.5.1. Nature of Awareness Sessions conducted

The below table shows the level of awareness on the various UBL infrastructure interventions amongst the beneficiaries.

Table 8 - Awareness of UBL infrastructure interventions (n=365)

95% **RO plant**	**77%** **Individual dustbins**	**70%** **Borewell**	**38%** **Pipeline**	**32%** **Community dustbins**

Majority of the beneficiaries interacted with were aware of the WASH infrastructure support provided by UBL. ASSIST had approached the Gram Panchayats of the villages as part of the project & conducted a survey on the WASH related situation in the area. The Gram Panchayat members also gave their suggestions post which the intervention was planned.

The below graph summarizes the nature of awareness sessions and the topics covered as part of those awareness sessions conducted by ASSIST.

Figure 18 - Were the awareness sessions conducted by ASSIST (n=365)

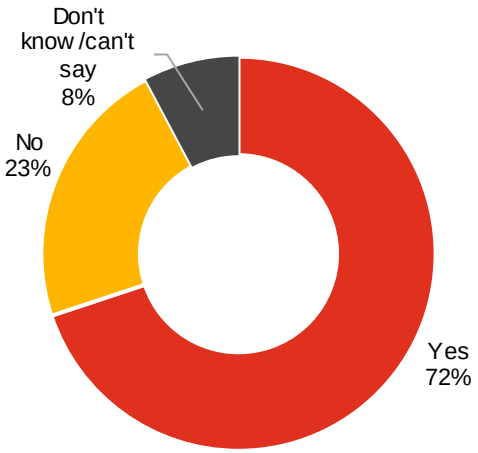
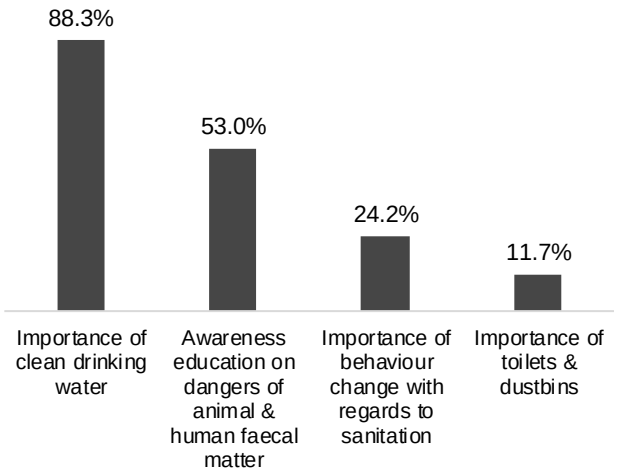


Figure 17 - Topics covered during awareness sessions (n=264)



72% of the respondents agreed that ASSIST had conducted awareness sessions and street plays on importance of water & sanitation. 88% of the respondents stated that topics covered in the sessions included importance of clean drinking water, awareness education on dangers of animal & human fecal matter was covered as stated by 53% of the respondents. Importance of toilets and dustbins was covered with regards to open defecation & waste segregation as stated by 12% of the respondents.

Detailed discussion with the beneficiaries revealed that ASSIST had conducted multiple street plays on usage of water, cleanliness, waste segregation & open defecation as part of the awareness sessions. These were conducted to introduce a behaviour change in the villagers. Several wall paintings were also observed across all the intervention villages in Kannada, highlighting the importance of WASH practices.

ASSIST also formulated village level water & sanitation committees consisting of Gram Panchayat members as well as Asha & Anganwadi members, who in turn provided further awareness to the villagers. 75% beneficiaries were aware of the existence of WASH committees. Currently, there were only two water & sanitation committees operational at the Gram Panchayat level in Hulimavu & Tandavpura. Due to recent Panchayat elections, new water & sanitation committees have not been formed in the last one year in the remaining villages.

4.5.2. Impact of the awareness sessions conducted

Majority of the respondents found the awareness sessions beneficial. The average rating provided by beneficiaries based on the satisfaction level for awareness and capacity building stands at 4.18/5 on a scale of 1-5 (with 1 being the lowest and 5 being the highest).

Figure 20 - Were the awareness sessions beneficial (n=365)

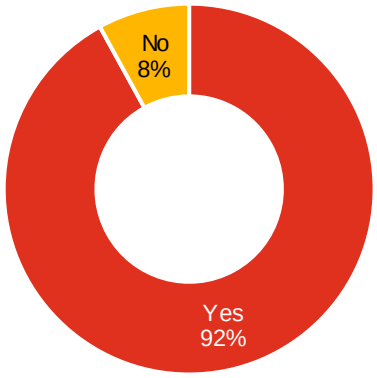
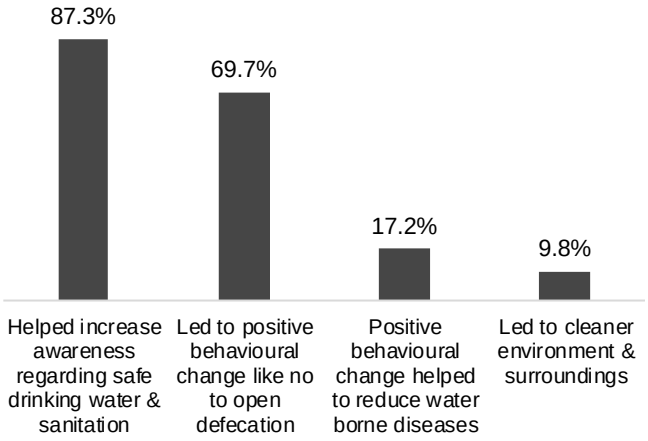


Figure 19 - Benefits of the awareness sessions (n=244)



92% of the respondents agreed that the awareness sessions had been beneficial for them. Out of these, 87% of the respondents reported that these sessions had led to an increase in awareness regarding safe drinking water & sanitation and 70% of the respondents reported positive behavioural changes like practicing waste disposal & segregation, reduction in open defecation etc. 17% of the respondents stated that this positive behavioural change helped to reduce water borne diseases.

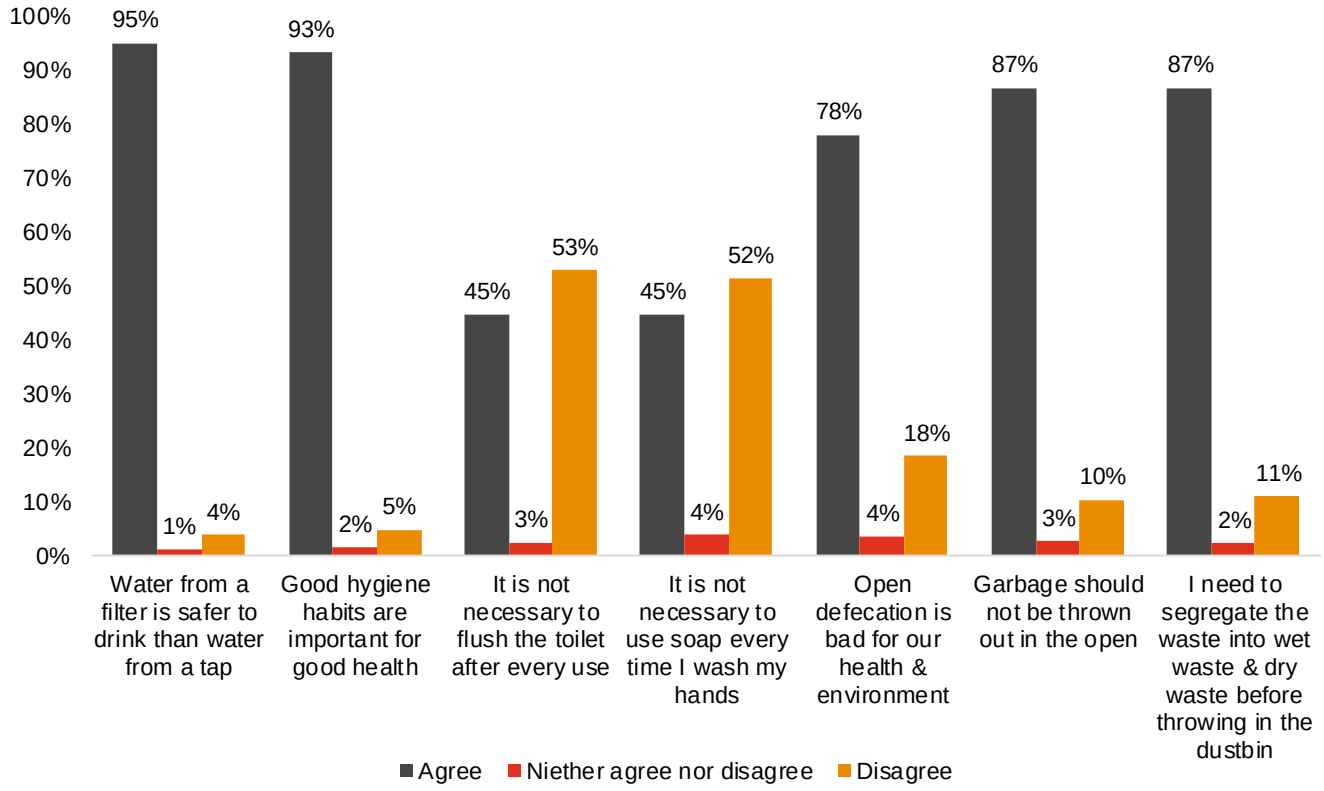
Prior to the intervention, 82% of the households had poor hygiene knowledge as observed during the baseline study. As part of these awareness sessions, ASSIST conducted discussions with women, community leaders & local Panchayat members to get their opinion on need for better WASH practices. IEC material was also distributed on WASH in the households & door to door campaign was conducted to make the villages open defecation free. Due to the awareness sessions, a change in the knowledge, attitude, behaviour & practices of the villagers were noted. 93% of the respondents agreed that good hygiene habits were essential for good health. Post the awareness sessions, 73% of the respondents actively encouraged their family & community members to use dustbins for waste disposal & not to defecate in the open.

4.6. Knowledge, Attitude, Behaviour, Practice (KABP) Analysis

4.6.1. Knowledge

The below graph depicts the knowledge level of the respondents related to the water and sanitation practices.

Figure 21 - KABP Analysis - Knowledge (n=365)



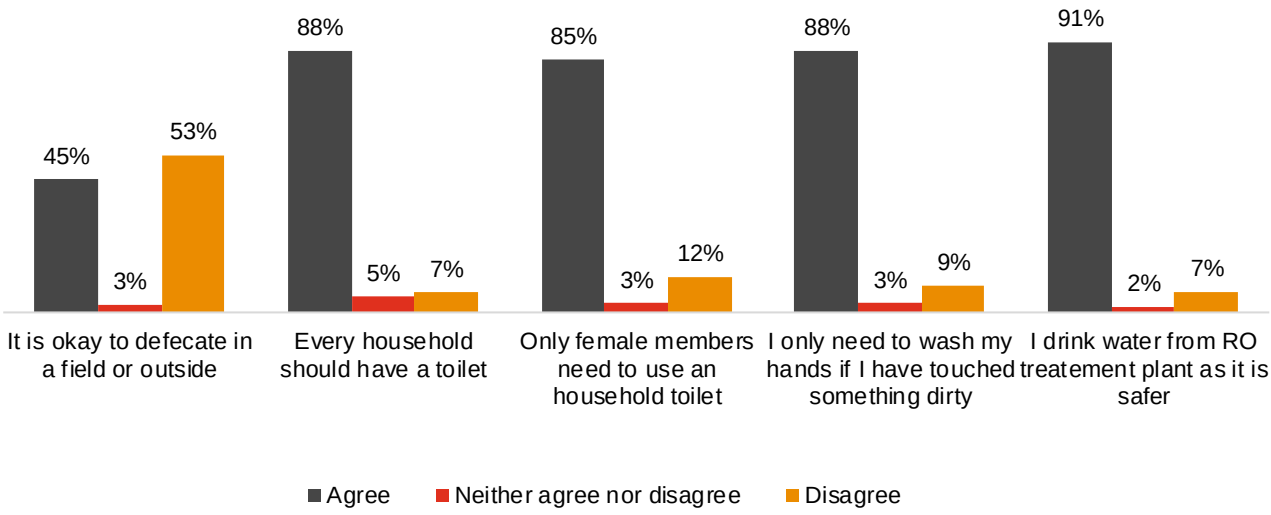
Responses to the statements reflect the beneficiaries' level of knowledge related to water & sanitation practices.

- For the statement, "Water from a filter is safer to drink than water from a tap", 95% beneficiaries showed their agreement.
- Similarly, for the statement, "It is not necessary to flush the toilet after every use", more than half the beneficiaries (53%) disagreed
- An understanding of the knowledge levels of the villagers highlighted that due to the awareness sessions, their knowledge & understanding with regards to the Dos & Don'ts of WASH related practices was present which in turn had a positive impact on their behaviour practices

4.6.2. Attitude

The below graph depicts the current attitude of the respondents related to the water and sanitation practices.

Figure 22 - KABP Analysis - Attitude (n=365)



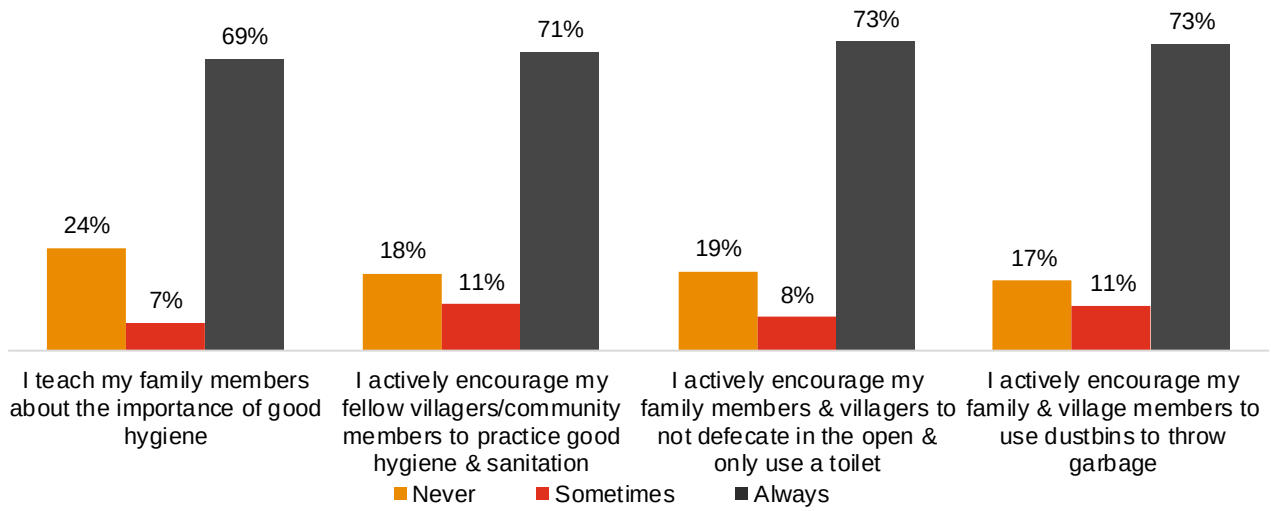
- 88% of the respondents agreed to the statement “Every household should have a toilet”.
- For the statement, “I drink water from RO treatment plant as it is safer,” an average of 91% of the respondents responded affirmatively.
- Despite the positive attitude responses, 85% beneficiaries stated that “Only female members need to use household toilets” & 88% respondents agreed that they “Only washed hands on touching something dirty”.

Therefore, responses for statements under attitude reveal that although beneficiaries are aware of the good practices, a reinforcement of the learnings is essential to enable its internalization by the villagers as some of the respondents were unsure on the correct attitude required with regards to WASH practices.

4.6.3. Behaviour

The below graph reflects the behaviour trends of the respondents related to the water and sanitation practices.

Figure 23 - KABP Analysis - Behaviour (n=365)



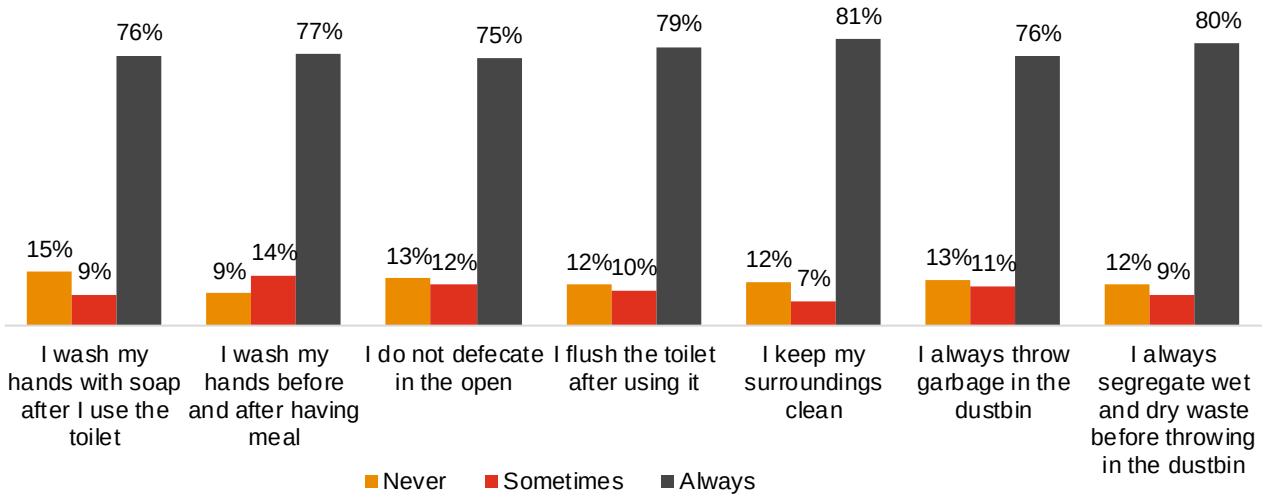
Responses to the statements reflect the beneficiaries' behaviour trends with respect to personal hygiene and sanitation measures.

- For the statement, "I teach my family members about the importance of good hygiene", 7% of the respondents responded as 'sometimes' against 69% of the respondents who responded 'always'.
- Based on the responses, a positive behavioural change was observed in the beneficiaries as they had inculcated good practices through enhanced knowledge & improved attitude with regards to WASH practices. The awareness sessions helped to bring about a change not only at a household level but also in the overall community.

4.6.4. Practice

The below graph reflects the beneficiaries' practice related trends towards water & sanitation practices.

Figure 24 - KABP Analysis - Practice (n=365)



Responses to the statements reflect the beneficiaries' practice related trends towards water & sanitation practices:

- For the statement, "I wash my hands before having meal and after using toilet, 76% of the beneficiaries responded as 'always'.
- For the statement, "I keep my surroundings clean", 81% of the responded as 'always'.
- Positive change in the knowledge, attitude & behaviour of beneficiaries was reflected in the practices followed by them with regards to WASH related activities. Their understanding on the harmful effects of open defecation, importance of proper disposal of waste etc. has increased. This has benefited the community as whole.

4.7. IRECS Analysis

Following is an assessment of the project implemented by UBL as per the IRECS framework.

Table 9 - IRECS Analysis

Inclusiveness	Relevance
The support provided by United Breweries Limited to the intervention villages is **inclusive in nature as all the households of the intervention villages** received support with regards to water infrastructure in terms of installation of RO Plants, borewells & pipeline extension. Additionally, the community & individual household dustbins were **provided for use to all the villagers irrespective of any discrimination basis caste, class or social category of the villagers**. The benefits of the support provided by UBL **are being utilized without any discrimination by all the villagers irrespective of their social community or gender.**	As per the baseline study conducted by ASSIST in 2017, 51% of households surveyed in the 11 villages used less than 15 L of water per day per person. Over 42% of water sources (bore wells, creeks and canals) observed in the villages were likely contaminated by human or animal feces. 64% of the canals and tanks observed in these villages had a high potential for fecal coliform contamination. 70% of the 11 villages surveyed were observed to have open defecation. The project support with regards to provision of RO Plants was **relevant for the intervention villages as there was a scarcity of safe drinking water availability in these villages.** Water available earlier from the taps was not treated leading to spread of water borne diseases in the villages. Additionally, the dustbins were useful for the villagers as earlier they used to throw the garbage out in the open or burn it. Provision of dustbins led to proper waste disposal practices in the villages. **The provision of toilets has reduced instances of open defecation in the villages.**

Effectiveness

A moderate degree of effectiveness has been observed in the support provided as most of the respondents have benefited from the support provided.

- 94% of the respondents agreed that provision of dustbins had been beneficial for them.
- 91% of the respondents who had received toilet construction support did not defecate in the open any longer.
- 91.5% respondents used the RO plants for drinking & cooking purposes.
- 99% beneficiaries agreed that installation of RO plants had helped to reduce water borne diseases in the intervention villages. The farm pond was being by the villagers for irrigation & as drinking water for cattle.

However, it was observed that there was a **lack of proper operation & maintenance of the RO plants due to which several plants were not functioning at the time of site visit**. There **was a lack of regular testing of the water quality of the RO Plants** due to non – availability of a local vendor. Despite the awareness sessions, **some households were using the dustbins for storage of grains & other items & toilets were being as storage spaces** which called for a need to spread greater awareness among the beneficiaries on regular intervals.

Convergence

The project has collaborated and taken support from Gram Panchayat members for convergence at the ground level. The provision of toilets was done as part of the Swachh Bharat Abhiyan.

However, there is limited convergence of this initiative with WASH related Government schemes like Jal Jeevan Mission where the main aim is to provide safe drinking supply to every rural household by 2024 or tie up with the Department of Rural Development & Panchayat Raj, Karnataka which has launched a scheme to provide 1,000 water purification plants in villages of Karnataka.

UBL can also **coordinate with the local PHCs to spread awareness on benefits of drinking clean water and sanitation**. Doctors from the local PHC can visit the villages on a periodic basis and conduct camps and awareness sessions with the villagers on importance of WASH practices.

Detailed discussion on the field revealed that the current role of the Gram Panchayat was limited with regards to O&M of the water infrastructure. The **WASH committees that were formulated during the project period were no longer functional in majority of the villages**. The Gram Panchayat may appoint new WASH committee members who can take up ownership & accountability of the infrastructure provided.

Sustainability

The service model under the initiative restricts long-term sustainability on its own. The maintenance and operation of the RO Plants requires a constant inflow of funds & the Panchayat should ensure proper collection of the user charges in order to ensure that the same are being used for operation & maintenance of the RO Plants.

Greater community ownership & accountability of the Gram Panchayat is **required to leverage more funds/support from other alternative sources**, be it Government or other corporates is required to ensure long term sustainability of the project.

5. Recommendations

Recommendations

1. Change in method of procuring water from RO Plant (Dispensing method to be changed)

- Detailed discussion with the beneficiaries revealed that the RO Plants installed in the programme required one time purchase of a recharge card and using the same card every time to get water from the RO plant. The card required a recharge of INR 100- 150/- on a regular basis upon zero balance to be able to access water from the RO Plants. The beneficiaries found the method to be non-user friendly as the recharge card is bound to be lost and villagers found it difficult to operate.

- Hence for such projects, installing coin based dispensing machine at the outlet of RO plant for effective usage of RO plant by the villagers could be considered. For example, the RO Plant in Bachahallihundi had both coin & card system due to which the RO Plant was being used on a regular basis by the villagers.

2. Involvement of a local vendor/agency for regular O&M of RO Plants

- For the RO infrastructure support, Piramal, a Gujarat based organization provided support in the installation process. Currently, there was no tie – up seen of a local Karnataka based vendor or agency who could support in ensuring monthly operation & maintenance of the RO Plants & the villagers were dependent on Piramal for support. Due to the same, several RO Plants were observed to be not functioning (4) or in need of repair.

- UBL may approach Rural Drinking Water & Sanitation Department (RDWSD) of GoK (Government of Karnataka) under Rural Development & Panchayat Raj Department. As RDWSD is running and maintaining 17,000 RO plants in Karnataka, UBL may initiate discussions with RDWSD and handover the RO plants supported by UBL as part of the CSR project to be operated and maintained by their registered vendors.

3. Regular testing of quality of water of RO Plants

- Detailed discussion with the beneficiaries & RO Plant operators revealed that in majority of the villages, the cartridge filters/ pressure sand filters/ activated carbon filters of the RO Plants had not been changed since the time of installation of the plant leading to certain parameters coming under non-conformance.

- There is a need to ensure testing of the quality of water of the RO Plants on a monthly basis to by a local vendor in order to check if there is a requirement to change the water filters and changes in the quality of water. Alternatively, there are Field Test Kit (FTKs) available at the gram panchayat office under the ownership of VWSC and it is recommended to use the test kits to test the major water quality parameters which will help in maintaining the water quality in the long run.

4. Greater ownership & accountability of the Gram Panchayat

- It was observed that currently the involvement of the Gram Panchayat was limited with regards to ensuring the operation & maintenance of the RO Plant infrastructure in the villages. In some of the villages, the RO Plant operator was collecting the amount & recharging the cards of the villagers. No fixed remuneration was also being provided to the RO Plant operators. Additionally, the initial funding of INR 1 Lakh provided by UBL to the Gram Panchayat to be used over 5 years was felt to be limited & had already been utilized in some of the villages. The role of the Gram Panchayat in mobilizing the WASH Committees was also observed to be limited.

- There is a need to ensure greater ownership & accountability of the Gram Panchayat members. The Gram Panchayat members can provide assistance to the villagers in recharging the cards. The amount collected from the villagers can then be used in the O&M of the RO Plants & giving a fixed salary to the RO Plant operators. This will ensure long term sustainability of the infrastructure provided & the villagers will be able to use the RO Plant on a regular basis.

5. Effective functioning of the WASH Committees

- During the current site visit it was observed that the Water & Sanitation Committees that were earlier formulated as part of the project were not operational in most of the villages for the past 1 year due to the

Panchayat elections. As the Panchayat members had changed, there had not been any reselection of the WASH Committee members.

- There is a need to ensure proper functioning of the village level WASH committees who will be responsible for spreading awareness among the villagers from time to time & also ensuring proper functioning of the water infrastructure provided by UBL. In the absence of the same, currently there is limited accountability & feeling of ownership among the villagers regarding the water infrastructure provided by UBL.

6. Greater awareness on usage of toilets & dustbins

- During the current site visit it was observed that some of the households that had received toilet construction support from UBL were not using the toilets effectively & had converted the toilets into storerooms. Similarly, some of the villagers were not making use of the individual household & community dustbins. The household dustbins were being used for storing grains or other goods. The household dustbins also lacked UBL branding.

- There is a need to ensure periodic sensitization or awareness generation sessions with the villagers either by the Gram Panchayat or the WASH Committee members highlighting the importance of proper waste disposal & harmful effects of open defecation so that all the villagers who were supported by the UBL intervention can make use of the resources they have received.

7. Awareness on the use of Borewells

- As per the mandate of the project the UBL has not promoted borewells as sources for drinking water. However, villagers should be made aware so that they understand that the borewells are not to be used for drinking water purposes. To this end, regular IEC activities and awareness drives could be explored when such projects are planned in the villages to ensure that all aspects are covered in the awareness sessions from the Panchayat level to the household levels

6. Annexures

Annexures

6.1. Annexure – 1: Evaluation Criteria for Comparative Analysis of RO Plants

Table 10 - Evaluation criteria for Comparative Analysis of RO Plants

Parameters	Evaluation criteria	Red	Yellow	Green
Operation and maintenance				
Operational Responsibility	The operational responsibility taken up by dedicated operator and is available most of the time	The RO plant has a RO plant operator but works parttime and has other duties. They have not taken necessary actions to repair the RO plant and has led to intermediate non-functionality	The Water man of the village has been assigned the responsibility of the RO plant as well and is not dedicated for the upkeep of RO plant exclusively as he also looks after the borewells and other Water infrastructure of the village.	Dedicated personnel is available all time for operating the RO plant. He has taken necessary actions to repair and maintain the RO plant
Operator awareness	The operator is aware of the overall functioning of the system and to monitor and read the sensors. They were aware of the basic functioning of the system.; Replacement of cartridges; Card recharge; Sensors on Backwash and multivalve control; recharging system; Aware of Chemical dosing; Aware of Activated carbon; Aware of reading TDS; Aware of RO membrane replacement; Aware of the pressure gauges	Has basic awareness on manual operations	Partially aware	Completely aware

Parameters	Evaluation criteria	Red	Yellow	Green
Regular Cartridge replacement	Operator cleans the cartridge every month and replaces it every 6 months	Does not replace	Operator cleans the cartridge every month and replaces it yearly	Operator cleans the cartridge every month and replaces it every 6 months
Activated carbon replacement	The operator should be aware of Activated carbon filter media and the procedure for replacing. Decided based on free Chlorine in test samples	Is not aware	Is aware of Activated carbon filter	Is aware of Activated carbon filter and has replaced it
Backwash of filters	Backwash to be done on a regular basis for every 6 hours of filtration cycle	Does not backwash	Is done but not practiced regularly (weekly)	Backwash to be done on a regular basis for every 6 hours of filtration cycle
Chemical dosing	The operator is aware of chemical dosing and does it as per the norms prescribed.	Operator is not aware	Operator is aware of chemical dosing and is not doing it	The operator is aware of chemical dosing and does it as per the norms prescribed.
Water tank maintenance	The Storage, Filter storage and outlet tank to be cleaned regularly	Does not clean any of the tanks	Any of the tanks is left uncleaned	The storage, filter storage and outlet tank to be cleaned regularly
Handheld pH & TDS meter	Operators to know how to operate the meters and record regularly	Operator does not have the handheld meters	Operators know how to operate the meters but does not use it	Operators know how to operate the meters and record regularly
Financial				
Financial Responsibility	Operator takes responsibility to handle minor repair works as well as spends on upgrading the system as required. GP should provide funds for maintenance from the maintenance corpus fund	Gram Panchayat (GP) and operator does not take responsibility	The RO operator takes the responsibility for repair and maintenance	The RO operator takes responsibility to handle minor repair works as well as spends on upgrading the system as required. Gram Panchayat should provide funds for maintenance from the maintenance corpus fund

Parameters	Evaluation criteria	Red	Yellow	Green
Funding for maintenance	Funding for maintenance is provided by UBL fund, Gram Panchayat, or is self-funded by operator	No funding	Funded by operator	Funded by GP or by both operator and GP
Earnings from RO plant	The grading is made on the increasing order of earnings per month from the RO plant usage	<500 /month	500 to 3000 /month	>3000 /month
Salary for the operator	A fixed salary is paid by the gram panchayath to the RO operator	No salary is paid to the operator by the GP	-	Salary paid by GP to the operator
Impact on beneficiary				
Daily footfall	The number of people using RO plant on a daily basis	<10 people per day	10 to 20 people per day	> 20 people per day
Daily consumption	Daily water consumption at the RO plant	<200 lts per day	200 to 500 lts per day	>500 lts per day
Dependency on RO plant	The number of people using RO plant on a daily basis based on the survey and RO operator FGD	Low	Medium	High
Impact on health	Improvement in health conditions based on FGD with RO operator, beneficiaries, Health officials and Survey	No significant health improvement	They do not see any significant changes, but the incidence of fever has reduced	The water borne diseases have decreased
Repair and Maintenance				
Current functionality status	Operational	Not functional	Functional but few components are not working	Fully functional
Frequency of repair	The amount spent on the repair and maintenance and the incidence of repairs	No amount spend on repair and maintenance	Amount spent but on minor repairs	Amount spent on replacing and modifications as per requirement

Parameters	Evaluation criteria	Red	Yellow	Green
Funding for repair	Funding for maintenance is provided by UBL fund, Gram panchayath, or is self-funded by operator	No funding	Funded by operator	Funded by both operator and GP
Status of Card system	Based on the physical and functional condition of the card system (RFID , Signal strength, Buttons, Master card)	Card system is not working	-	Card system is working
Control panel and sensors	Status of functionality of Control panel	Control panel is not working	Issues with Control panel (signal error)	Control panel is working
Record keeping	Based on the record keeping on water consumption, daily collection and O&M cost	Not practised	Any sort of bookkeeping (documentation) is followed	Book-keeping on daily consumption, money collected, and cost incurred for repair and maintenance

6.2. Annexure – 2: Case Studies from the Field

6.2.1. RO Plant

The RO plant with a capacity of 250 litres per hour installed in Bachallihundi village of Tandavapura Panchayat is a blessing for all the villagers.

The beneficiaries Marigowda, Kempamma, Ratnamma, Deepu and others believed that even though they have piped water supply they depended on RO water for drinking purposes and the quality of the water from the RO is much better as compared to the piped water.

Ratnamma, one of the beneficiaries, is now of the opinion that her health conditions had improved, and joint swelling, joint pain and water borne diseases had reduced in the village post usage of drinking water from the RO plant.

Overall, the beneficiaries were highly satisfied with the support provided by UBL and ASSIST.

The RO plant operator, Mahendra stated that the RO plant has been a blessing to the village and all the villagers drink RO water exclusively. He revealed that the numbers of villagers falling sick and having joint pain have reduced due to the good quality water of the plant. The ownership and accountability are shared by the villagers. The villagers give funds for the RO plants for any repair & maintenance.

6.2.2. Benefits of toilet construction

Villagers of Hulimavu village were provided financial assistance for construction of 28 toilets by funding INR 5,000 each. Detailed discussion with the beneficiaries revealed that the incidence of people falling sick has reduced over the years from around 100 -150 patients to 35-50 per month after the intervention of provision of toilets.

Mahesh is one of the beneficiaries who got assistance from UBL to construct the toilet. Earlier, the women of his house used household toilets of neighbors which were constructed by Government support or used to go in the open field. UBL assisted Mahesh with a fund of INR 5,000 and remaining amount was contributed by him to construct the toilet. The toilet has ensured the privacy & safety of the women of his household. It is more hygienic than defecating in the open. Awareness sessions conducted by UBL on effective use of toilets was also beneficial for Mahesh.

Beneficiaries Rajamma and Jaynathi of New Bokkahalli village have received toilet support as part of the project from UBL. Rajamma opined that the toilet assistance has been very useful for her family of 4. Earlier she and her daughter faced problem as they were forced to practice open defecation. Their daughter used to struggle during her menstruation cycle. Sometimes it was so difficult that her mother arranged temporary arrangement in the neigbour's house. The challenges are now no more as she has a toilet in her home now and they can use the toilet anytime as per their convenience which was not possible earlier.

Jayanthi revealed that the toilet support has been a valuable asset added to their joint family. Earlier the female members of the family had safety and privacy concerns when going out to defecate in the open. The challenges increased during rainy seasons and when people of the house had ill health. The construction of a toilet has made their lives easy and as now they don't have to defecate in the open at any time.

Beneficiary (Rajamma) with toilet support

Beneficiary (Jayanthi) with toilet support

6.2.3. Benefits of using dustbins

Hebya village was provided with 2 dustbins for each household for segregation of wet and dry waste. Vignesh's family also received 2 dustbins (for dry and wet waste segregation) as part of the support provided by UBL.

Community Dustbin

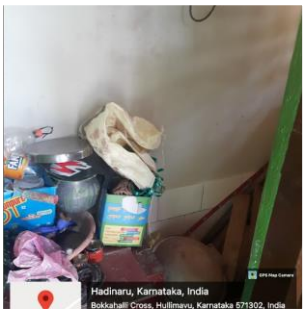
Individual Dustbin

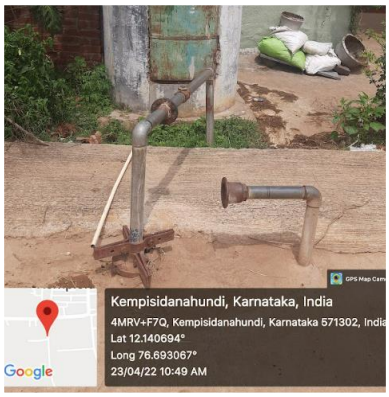
Earlier Vignesh and his family used to throw the waste out in the open field adjacent to their home as they found it to be convenient & time saving. The same empty plot was being used by other villagers for throwing waste as well. This led to spread of stench and diseases amongst the family members.

Post the provision of community & individual household dustbins by UBL, it has helped Vignesh & his family to get rid of the stench and the incidence of falling sick has also reduced over the time. The villagers are using community dustbins for throwing waste which has prevented littering. A van has been arranged by the Gram Panchayat to collect the garbage from the community dustbins. Awareness provided on segregation of wet & dry waste by the project has also been beneficial for Vignesh.

6.3. Annexure – 3: Snapshots from the Field

		
Borewell	**Community Dustbin**	**RO Plant, Immavu**
		
Farm Pond, Hulimavu	**RO Plant, New Bokkahalli**	**Wall Painting**
		
Individual Toilet at Immavu	**School in Kempasiddana Hundi**	**Beneficiary using RO plant, Bachahallihundi**

		
Wall painting for awareness	**Toilet Assistance**	**Toilet being used as storeroom in New Bokkahalli**
		
Community dustbin at Hebya	**RO plant visit in Old Bokkahalli**	**Beneficiaries during interaction, Old Bokkahalli**
		
Borewell being used as dump site in Bachallihundi	**Borewell at Tandavapura**	**School in Kempisidanahundi**

		
Borewell in Basavanapura	**Pipeline extension motor in Basavanapura**	**Borewell at Kempesidanahundi**

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