IMPACT ASSESSMENT REPORT

COASTAL AREA DEVELOPMENT PROGRAM (CADP)

December 2017

Centre for Integrated Development (C *f* I D)

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Abbreviations

ACF	Ambuja Cement Foundation
AKAH(I)	Aga Khan Agency for Habitat (India)
AKRSP(I)	Aga Khan Rural Support Programme (India)
CADP	Coastal Area Development Program
CNHF	Conrad N Hilton Foundation
CSPC	Coastal Salinity Prevention Cell
GHCL	Gujarat Heavy Chemicals Limited
GWSSB	Gujarat Water Supply and Sewerage Board
HH	Household
IEC	Information Education Communication
IHHL	Individual Household Latrine
ISA	Implementation Support Agency
NGO	Non-Government Organisation
RRWHS	Rooftop Rainwater Harvesting System
SBM	Swachchh Bharat Mission
SHG	Self Help Group
SRTT	Sir Ratan Tata Trust
TCSRD	Tata Chemicals Society for Rural Development
TSC	Total Sanitation Campaign
VRTI	Vivekanand Research and Training Institute
WASMO	Water and Sanitation Management Organization

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Executive Summary

With more than 1600Km, Gujarat State has longest coastline in the country. Most of this coastline adheres to arid and semi arid regions of Kachchh and Saurasthra along with areas along Gulf of Khambhat. The major part of this geography was marred with recurrent droughts, water scarcity, depletion of ground water table, salinity ingress, reduction in green cover and vegetation and deterioration of natural resources. Coastal Area Development Project (CADP) was conceived to address issues of drinking water security and sanitation in this area. WASMO and CSPC implemented this ambitious project in more than 370 villages across nine coastal districts, roping in 14 different partner agencies over two phases from 2009 to 2015. Rapid Impact Assessment of the project in 100 villages across 8 districts was carried out in September- October 2017, covering around 2000 households. The major findings of the study are given here.

A) Water Supply and Roof Top Rain Water Harvesting System (RRWHS)

- Household tap connections increased from 6% to 83%, indicating huge investment by government and tremendous efforts by Implementation Support Agencies (ISAs) in ensuring village level storage and distribution network and water supply system in a participative manner.
- Increased availability of water at household level has reduced drudgery for women and saved productive hours of family members to a great extent. Study shows that families fetching water from less than 200 mt have decreased from 63% to 9% with increase in household tap connections. Also, 77% families now spend less than 30 minutes to fetch water and number of families spending 30-60 minutes to fetch water has reduced from 65% to 17%. Overall, it added to well being and productivity[1] of families, also benefiting children.
- Switching from local source to piped supply have reduced quality issues in some villages, but the larger challenge of addressing quality of local water sources remains more or less unaddressed. Few villages across all districts have quality issues like salinity, fluoride and impurities in drinking water. Only four out of 45 village Panchayats where FGDs were done had water testing kits and members of only two Panchayats are trained to use the kit. Panchayats are still dependent on GWSSB for water quality testing.
- According to household survey, 22% families have reported decrease in occurrence of water related diseases and corresponding savings of medical expenses.
- Water retaining structures like open wells in ponds in Kachchh have contributed to availability of water for cattle and other purpose in dry seasons, when surface water gets depleted.

B) Institutional Sustainability

- The process of working through Pani Samiti was largely successful and fair amount of community participation have been ensured in villages. However, with passage of time, change in Samiti members and restructuring of Samiti has led to dilution of the concept and principles of

[1] Well being and productivity is defined here in terms of reduction of loss of productive days for employment due to health reasons or/and engagement in fetching water

community managed water supply system. As of now, 63% villages have functional Pani Samiti. In rest of the villages, the management of water supply has been taken over by Panchayat body.

- Interestingly, of those Pani Samitis which are active, over 70% of villages are collecting water dues from the villagers, the operation and maintenance cost of water supply system are met with collected amount. In rest of the villages, it is added burden on Panchayats.

C) RRWHS

- RRWHS has largely provided much needed water security in remote villages, with availability of personal large storage tank. This has become an important asset for households as they use it has reduced burden on daily water fetching and uncertainty of availability of water. It has been great relief from drudgery for women. However, with availability of alternate water sources (like piped supply), very few families actually harvest rainwater in the tank for longer period. Most of the families use this tank for storage purpose only, refilling it with external sources rather than rainwater.
- RRWHS were designed with elementary filter chamber to keep off the dust and provision of hand pump for fetching water from the tank. Interestingly, most of the houses use hand pumps but more than 50% households have not installed filter system with RRWHS. Only 10% households have functional filter, while 38% HHs surveyed have installed filter, but it is not functional. This may be because of lack of awareness on design of filter chamber or cost cutting by mason or owner.

D) Sanitation

- The major push from government in recent years have surged in number of families having household toilets. This has definitely reduced open defecation to large extent in rural areas.
- About 52% of toilets had bathroom units constructed along with toilet. This indicates that people have invested substantially in building these assets for them. In most districts, beneficiaries have contributed through material, cash as well as through labour participation.
- Hygiene practices like hand washing is largely prevalent among children and adults of the villages.
- However, there is still long way to go to ensure 100% usage and safe sanitation practices in villages. Declaration of Open Defecation Free (ODF) villages have not ensured actual abolishment of open defecation. In few instances, even toilet blocks, constructed with help of government subsidy are not used by households due to one or other reasons.
- Common maintenance issues, which are also largely responsible for non usage of toilets by family members include incomplete toilets, missing or damaged doors, overflowing soak pits or septic tanks. Other than these, habitual preferences, particularly of old age people are also reason of non usage of toilets in many cases.

Conclusion

The general view of CADP implementing partners in different districts were fairly positive. Strategy to work with Pani Samitis, building their capacities and sensitizing community to develop strong community managed water supply has been fairly successful. All the ISAs opined that the project by and large had met its objectives of ensuring water security and enhancing sanitation barring some issue like a) truncated role of ISAs in sanitation activities in Phase II and b) delays due to lack of coordination with administration and government agencies. But the long term presence of ISAs in the area, their rapport with local communities and leaders and tenacity to work in hostile conditions helped them to overcome the obstacles.

Recommendations

- Sustained refresher courses and induction projects can be taken up for Pani Samiti members, especially new members who are not exposed to guidelines of Pani Samiti roles and functions and concept of community managed water supply concept.

- A comprehensive capacity building project on emerging challenges in operation and maintenance of water supply systems, quality control, water budgeting, conservation of local water sources, rainwater harvesting, conjunctive use of water etc can be developed and implemented with Pani Samitis. Develop service delivery models for operation and maintenance of water supply systems in rural areas.

- Interventions for Improving environment sanitation, including building demonstration models for sustainable solid waste management and waste water recycling systems can be taken up. Social and Behaviour Change Communication (SBCC) programs can be taken up for adoption of safe sanitation practices, including abolishing open defecation.

- There is a need of block level water testing laboratory to monitor water quality of major sources at regular intervals.

- Panchyats should be sensitized to develop a mechanism to ensure that every new house constructed must have toilet whether privately constructed or under government program/scheme.

1. Background

1.1. Introduction

Imbalance between the ecology and economy in coastal regions has created serious problems for the life and livelihood of coastal population. One of these problems is salinity ingress which is leading to degradation of land and water resources. Gujarat State, with its more than 1600 km of coastline is acutely suffering from these issues, and the coasts of Kachchh and Saurashtra are afflicted by this very seriously. Since coastal areas are an attractive destination for a large number of economic activities like salt works, industries, agriculture, mining and quarrying, trading and shipping, ports, jetties and other infrastructure, tourism etc, these activities have proliferated at an increasingly rapid rate. This has put a huge pressure on the coastal and marine ecology, including land and water resources in coastal areas.

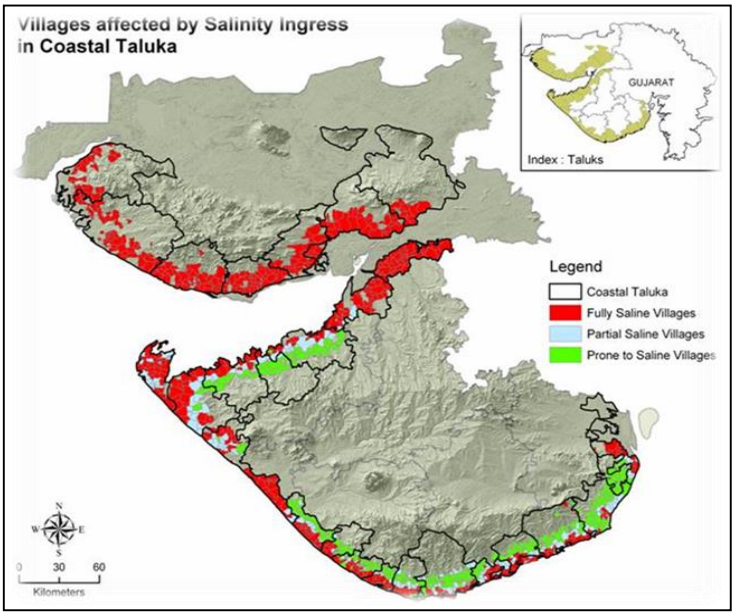


Figure 1 Salinity ingress in coastal Gujarat (Source: CSPC)

India still faces the most daunting challenge wherein around 65 percent of the total rural population remains devoid of access to basic sanitation facilities. Along with coastal salinity, lack of sanitation infrastructure and safe sanitation practices is also a major problem in coastal areas of Gujarat. Practice of safe sanitation is a crucial indicator for quantifying improvement in standards of living and it has now been realized that traditional and ordinary solutions cannot go a long way in addressing water and sanitation related issues. Hence, new approaches – technological as well as institutional will have to be thought of for resolving the problems in a sustainable, socially acceptable as well as cost effective manner.

1.2. About the Project & Stakeholders

While acknowledging the need to have a special focus on drinking water and sanitation issues in the coastal salinity affected villages of Gujarat, Water and Sanitation Management Organization (WASMO) and Coastal Salinity Prevention Cell (CSPC) implemented initiative called **Coastal Area Development Project** in identified coastal districts. The project aims to establish management systems to secure access to safe drinking water and sanitation facilities in the salinity affected coastal villages of Gujarat. Coastal Area Development Project (CADP) has been launched for ensuring safe drinking water and promoting safe sanitation in 555 villages across twelve coastal districts namely Ahmedabad, Amreli, Anand, Bharuch, Bhavnagar, Jamnagar, Gir Somnath, Dwarka, Junagadh, Porbandar, Rajkot and Kachchh.

With a view to enhance the project interventions to achieve overall improvement of water, sanitation and hygiene status in these villages; Conrad N Hilton Foundation (CNHF) and Rural Development Department, Government of Gujarat has also collaborated with the project. The Public Private Partnership (PPP) model bringing together Government, Non-Government and Corporate Funding Institutions is thus established to address the issues of rural community in coastal areas of Gujarat. More importantly, the rural communities are at center focal point of the project implementation who is one of the important stakeholders of this initiative.

1.3. Major Objectives of CADP Program

(a) Provide seasonal security and conservation of water supplies with an integrated combination of pipe and local traditional water sources to **300 (Phase 1 2009-2012)** and **255 (Phase 2 2012-2016) coastal villages;** with a special focus on water resource management for strengthening of local drinking water sources. Creating linkages between users (water committee) and suppliers (water supply department) for effective management of regional water supply systems;

(b) Provide household level drinking water security by providing Roof-top Rain Water Harvesting Structure (RRWHS) to **5,000 households**;

(c) Provide more hygienic household and community environments with sanitation improvement and increased hygiene awareness in communities covering around **20,000 households** and achieving Open Defecation Free (ODF) status to **100 villages**;

(d) Provide institutional facilitating support for community level groups at village and cluster level through the independent implementing support agencies;

(e) Demonstrate the benefit and rational use of multiple source water supply using technological options and integrated community managed solutions.

2. About the Study

Impact Assessment study mainly aims at conducting a field level assessment for understand the outcomes of CADP project in terms of

- Sustainability of drinking water systems including roof top rain water harvesting systems
- Current situation of water resources structures and its impact on ground water recharge
- Knowledge attitude and practices of community for safe sanitation practices
- Strengthening of local institutions in village for managing drinking water distribution system & sanitation practices,

2.1 Study Objective

Major objective of this study is to undertake qualitative and quantitative impact assessment of water and sanitation interventions under CADP project with following indicators:

- Sustainability of the drinking water distribution system in terms of source sustainability, the physical structure of the scheme and frequency of distribution of water to all parts of the village.
- Strength of Community level institution (Pani Samitis) formed at village level in terms of its operations and maintenance (O&M) of drinking water distribution scheme.
- Improvement in quality of water accessible to the community in terms of reduction in chemical and microbial contamination.
- Sustainability and effective utilisation of Rooftop Rain Water Harvesting Structures (RRWHS) at Household (HH) level.
- Inclusion of all strata's of village community in drinking water distribution system and safe sanitation practices.
- Current situation of Water Resource Management (WRM) structures at village level and their impact on ground water recharge.
- Perception of target population on targeted WASH behaviours and knowledge of community enhanced on WASH behaviours.

2.2 Study Area

The study covers 18 blocks, across 8 districts namely Kachchh, Dwarka, Jamnagar, Junagadh, Gir Somnath, Amreli and Bhavnagar in Gujarat. As the focus of the study was Kachchh and Saurashtra, other districts like Ahmedabad, Anand and Bharuch have been excluded from the scope of study.

2.3 Study Methodology

The study is based on quantitative as well as qualitative impact study for various thematic interventions through primary data collection at household and village level.

- Primary data collection of 2000 HHs across 100 villages through structured schedule/questionnaires.
- Insights on relevant issues of water sanitation through FGDs in 45 villages

Table 1 Assessment framework

S. No.	Objective of assessment	Tool	Group
1	Water (Source and supply)		
1.1	Sustainability of the drinking water distribution system	Transect, FGD, Reports	Pani samitis
1.2	Source sustainability	Transect, FGD, HH Survey	Pani samiti and Households
1.3	Frequency of distribution of water to all parts of the village	HH Survey	Households
1.4	Inclusion of all strata's of village community in drinking water distribution system	FGD and HH survey	Pani Samiti
2	Strengthening of Community level institution (Pani Samitis)	FGD	Pani Samiti
2.1	Operations and maintenance (O&M) of drinking water distribution scheme	FGD	Pani Samiti and HH survey
3	Improvement in quality of water	FGD, Secondary report, KII (Wasmo)	Pani Samiti and Secodary data with WASMO
3.1	Reduction in chemical and microbial contamination	Secondary report, KII and FGD	Pani Samiti , Secondary data
4	Sustainability and effective utilisation of Rooftop Rain Water Harvesting Structures (RRWHS)	HH Survey	Households
5	Sanitation and hygiene		
5.1	Inclusion of all strata's of village community in safe sanitation practices.	FGD , HH survey	Households, village committee
5.2	Perception of target population on targeted WASH behaviours and knowledge of community enhanced on WASH behaviour Sanitation construction/availability and usage	HH Survey	Households, village committee
5.3	Validation of ODF status	Transect, Visual Survey, HH Survey	Households
6	Current situation of Water Resource Management (WRM) structures at village level and their impact on ground water recharge	FGD	Village committee

2.4 Sampling Methodology for primary data collection

- CADP Project covers 371 villages across 18 blocks in 8 districts implemented by 8 agencies. Phase I covers 122 villages and phase covers 259 villages including overlap of 10 villages.
- For Sampling in this study, one third of villages across all blocks have been covered proportionately with 35% from phase I and 65% from phase II. Villages with all interventions (RRWH, Water Resource/supply and Sanitation) have been sampled mainly for study.

Figure 2 Distribution of HHs in Study Area

- Total 100 villages (65 from phase II and 35 from Phase I) have been sampled to cover 2000 HHs for water as well as toilet interventions and about 250 for RRWHs. Most villages having all three interventions are shortlisted. Villages are shortlisted to also cover interventions from all implementation agencies.
- Stratified random sampling has been done to sample households from each shortlisted village considering various socio-economic strata in each village.

Table 2 Details of components and districts covered in the study

District	Block	No. of Villages Studied	No. of HHs for Water Supply/WRM	No. of HHs for Toilet	No. of HHs for RRWHs	Name of Implementation Agencies
Amreli	Rajula	10	187	136	44	AKPBSI, VRTI
Bhavnagar	Mahuva	10	140	133	27	AKPBSI
	Talaja	4	204	47	25	Mahiti
Dwarka	Dwarka	6	128	87	22	TCSRD
Gir Somnath	Kodinar	6	163	57	11	ACF
	Sutrapada	11	220	104	11	ACF, GHCL
	Una	4	110	46	11	ACF
	Veraval	6	108	73	19	AKRSPI

Jamnagar	Jamnagar	9	109	145		J V Nariya
	Kalyanpur	1		13	11	TCSRD, AKRSPI
	Khabhaliya	3	40	48	24	J V Nariya
Junagadh	Mangrol	6	130	81	9	AKRSPI
	Maliya	1	24	12	6	AKRSPI
Porbandar	Porbandar	2	24	27		AKRSPI
Kachchh	Abdasa	4	74	37		VRTI
	Lakhpat	3	77	36	20	VRTI
	Mandvi	12	212	139	5	VRTI
	Mundra	3	50	38	5	VRTI
	Total	101	2000	1259	250	

2.5 Socio Economic Classification of Sample

About 62% of respondents belonged to Other Backward Class (OBC), while 21% belonged to General category and 16% were of Scheduled Caste (SC). Scheduled Tribe population was limited to 1%. The district wise breakup is also shown in the following chart.

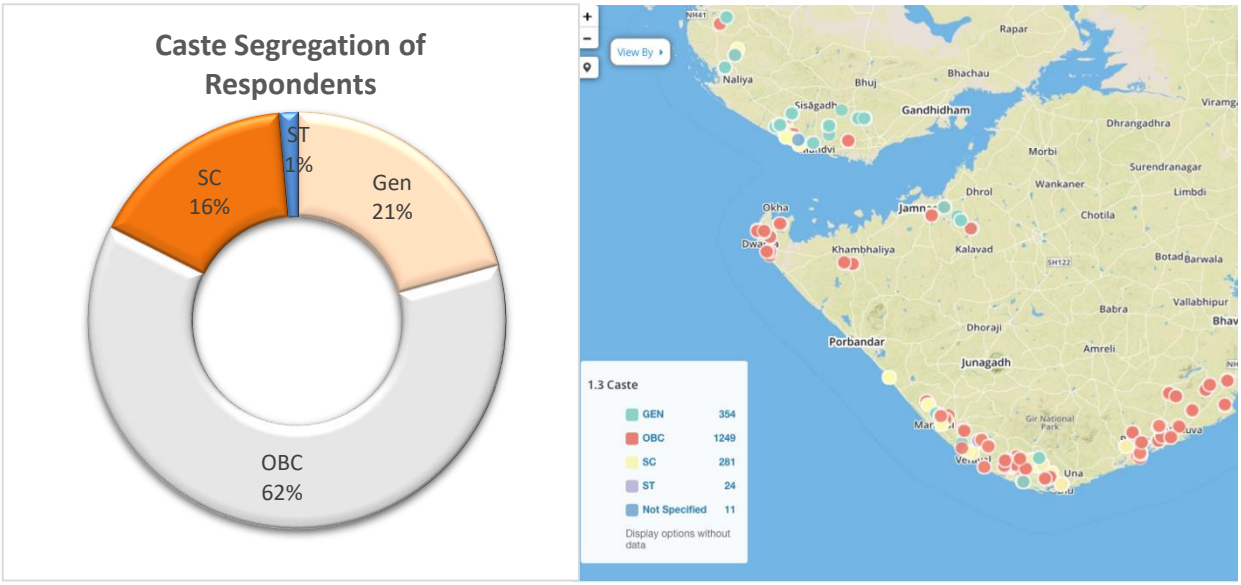


Figure 3 Caste Segregation of Respondents

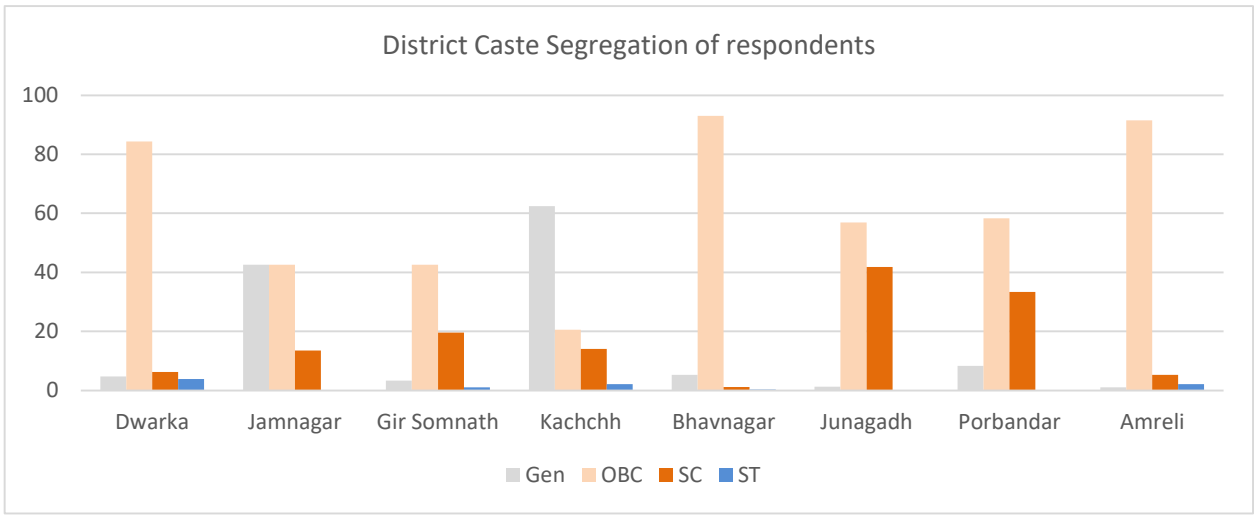
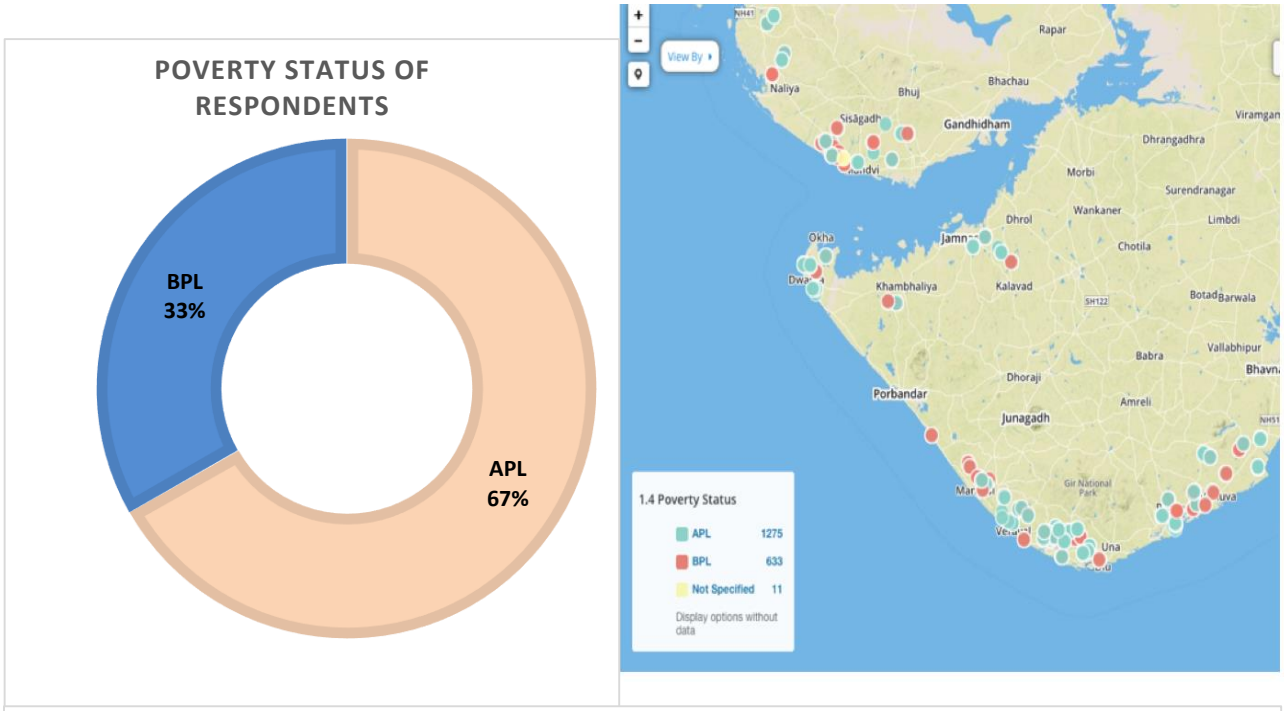


Figure 5 District Wise Caste Segregation of Respondent

Approximately 67% respondents fall in Above Poverty Line (APL), while 33% households were Below Poverty Line (BPL)



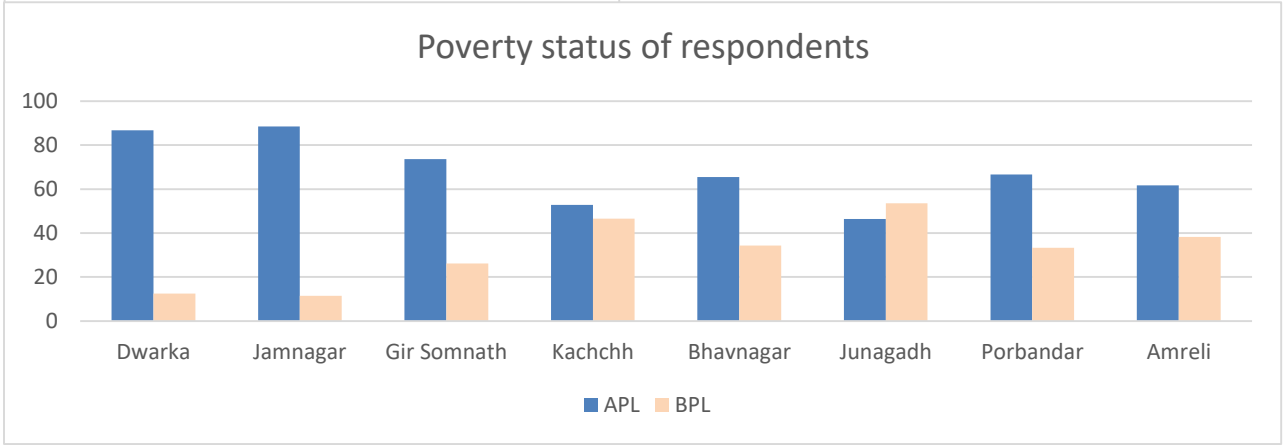


Figure 4 Poverty Status of Repondents

2.6 Indicators for Impact Assessment

- Functional indicators (e.g. access, quality, adaptability/adoption, sustainability)
- Economic indicators (e.g. capital costs, operation and maintenance/ repair cost and cost recovery)
- Environmental indicators (water leakages and wastage, waste disposal system)
- Social-cultural indicators (e.g. community participation, acceptance, institutional strength for sustainability, social -health and other impact)

A. Water supply

Parameter	Indicator	Measuring Unit	
Access	Increased access (Pre-Post)	Quantity per person/family/day	< 5 bucket 5-10 buckets, > than 10 buckets
	Ease in access (Pre-Post)	Reduced distance for fetching	Measured through source of fetching- Tap at house, Handpump, well, Community Stand point Tanker Other
	Time for fetching (Pre-Post)	Minutes in a day	< 10 min, 10-30 min, 30-60 min, > 60 min
	Distance from house (pre-post)		At home,< 200m, 200-500 mt, > 500 mt
	Supply Timing (Pre-Post)	Number of times supplied in day	Morning , evening, both
		Number of minutes supplied in a day	< 15 min, 15-30 min, > 30 min
	Frequency of water supply (Pre-Post)	Number of day in a week	Daily, alternate day, 2-3 days a week, 3-4 day a week
	Seasonal changes in frequency, source and availability (pre-post)		Remains same, reduces in summer, reduces in summer and winter
	Equity in access (post)	Ease and equitable access by all castes	
Quality of water	Pre-Post Quality of supply	Potable/ non potable	Good, Saline, odour hard, muddy other
	Water treatment at home	Type of treatment system	Straining, boiling, chlorination, RO system/other treatment
Operation and maintenance (post	Type of Issues in O & M	Leakages, pipe breakage, irregular valve operations	
	Frequency of issues in O & M	Once a week, once in 15 days, once a month, once in 3 months, once a year, rarely	

project only)	Cost recovery	Percentage houses paying water charges regularly, % collection of yearly total water charges in village	
Institutional accessibility (post project)	Effective functioning of Pani Samiti	Awareness on Samiti and its members, Accessible and responsive Samiti, discussion of issues with Gram sabha, challenge faced from community/government, capacity building of samite, collection of water/sanitation charges	
Water treatment at home (post)	Type of treatment	Present/ Absent	Straining, boiling, chlorination, RO/other filter
Impact on diseases	Level of control on water borne diseases	Frequency	Same, reduced, increased
Social impact	Improved children education, improved livelihood due to saving on time, better support to family,		

B. RRWHS

Parameter	Indicator	Measuring Unit
Storage capacity at home	Increased storage capacity	Size of storage tank
Access	Increased water access	Number of time tank is filled with rain water in a year
Use	Purpose of stored water use	Domestic, drinking, both, irrigation, other
O & M		Tank cleaning, inlet pipe and gutter cleaning tank chlorination
Water treatment needed at home	Type of treatment	Straining, boiling, chlorination, RO/other filter
Impact on diseases	Level of control on water borne diseases	Same, reduced, increased
Social impact	Improved children education, improved livelihood due to saving on time, better support to family,	

C. Sanitation

Parameter	Indicator	Measuring Unit
Access	Type of sanitation system used in village and HH level (pre-post)	HH, community, open
Technology for sanitation at HH level	Type of construction material for super structure (wall and roof	Mud, CC-RCC, stone, asbestos,
	Type of disposal and sub-structure	Only pit, soak pit (single/double), septic tank, connection to gutter
Average construction cost	Amount In Rs.	Own expenditure, subsidy, other (in kind contribution)
Functionality	Family members using	All, Men, Women, Children Old age
	Reasons for non-usage	Water, lack of hygiene, unable to change habit, incomplete, issues with waste disposal
O & M & Repairs	Issues-type	Lack of water availability, overflowing of septic tank/soak pit, high water table etc
	Cost incurred annually	< Rs. 500, 500-2000, > 2000
	Frequency of repairs	Nil, < 3 months, 3-6 months, 6-12 months, > 12 months
Adoption issues at village level		Lack of water supply, lack of skilled human resource, lack of building materials, lack of funds, delays with subsidy release, non availability or lower subsidy
Changes in hygiene practices	Hand wash frequency (pre-post)	After defecation, before eating, after eating, before cooking, never
	Level of hand washing	Only water, sand+ water, soap+ water, ash+ water,
	Children awareness on hygiene practices	Increased children involvement and talk on toilet and hygiene practices
Impact	Improved hygiene, improved privacy, savings on time, improved livelihood due to tie saving, better support to family due to time saving, improved social status	% of HH reposing to the impact
	Changes in vector borne diseases	Remains same, increased, decreased

3. Major Findings- Water Supply

Status and impact of water supply related interventions in CADP project was gauged from household survey of approximately 2000 families across 100 villages and group discussion with Panchayat and Pani Samiti members in 45 villages. The questionnaire used for household survey is given in Annexure II in this report. In group discussion, mainly aspects of process, challenges faced, sustainability aspect, and kind of support received from ISAs and Government were discussed.

The major findings, inferences and observations are given ahead.

3.1. Source of drinking water

There has been major shift in availability of drinking water at household level in last one and half decade or so. With implementation of Swajaldhara scheme by WASMO and Government of Gujarat, village level infrastructure for storage and distribution has increased tremendously. The main sources of most of the villages still remain ground water through bore-wells, supplied either by external lines of GWSSB or using local sources. The Narmada water supply lines have added to sustainability of sources where local sources were insufficient to cater whole year round. CADP project was envisaged to strengthen the ongoing interventions supported by WASMO through its Implementation Support Agencies (ISAs) with focus on sustainable water supply and drinking water security in coastal villages.

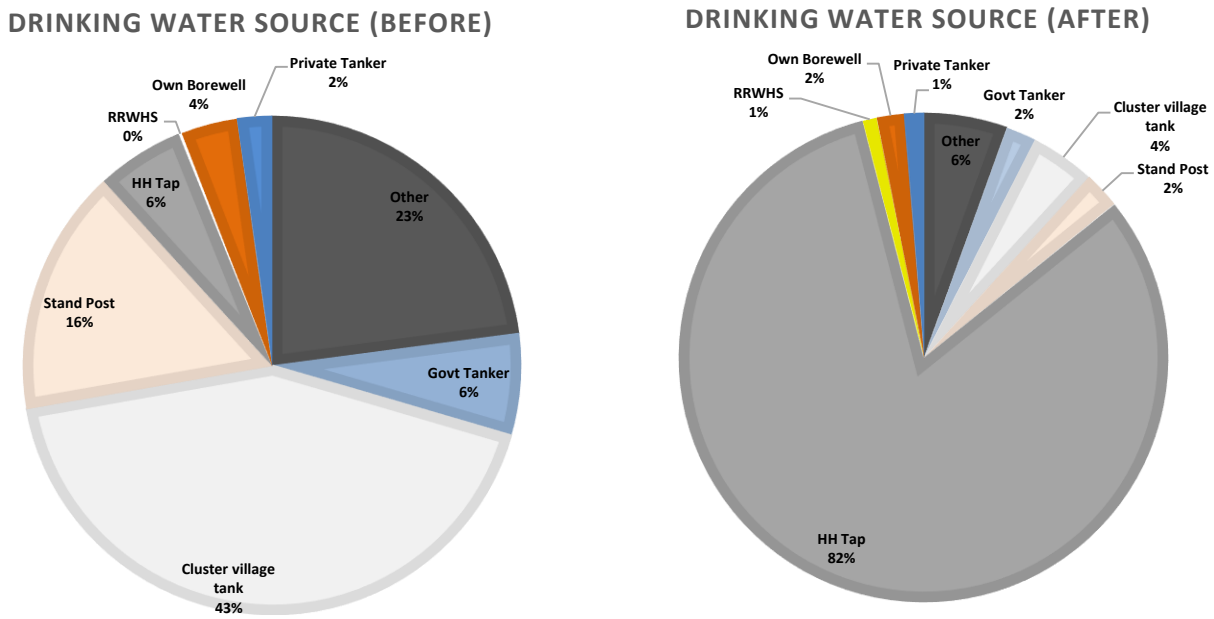
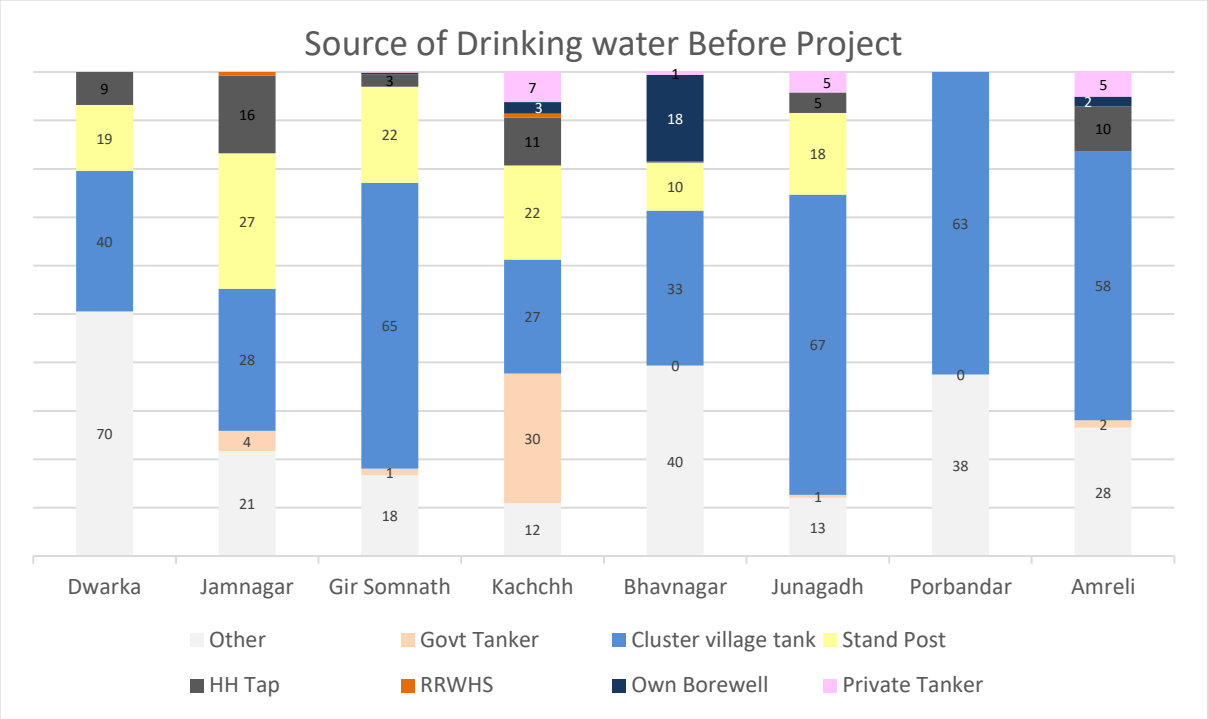


Figure 6 Drinking Water Source



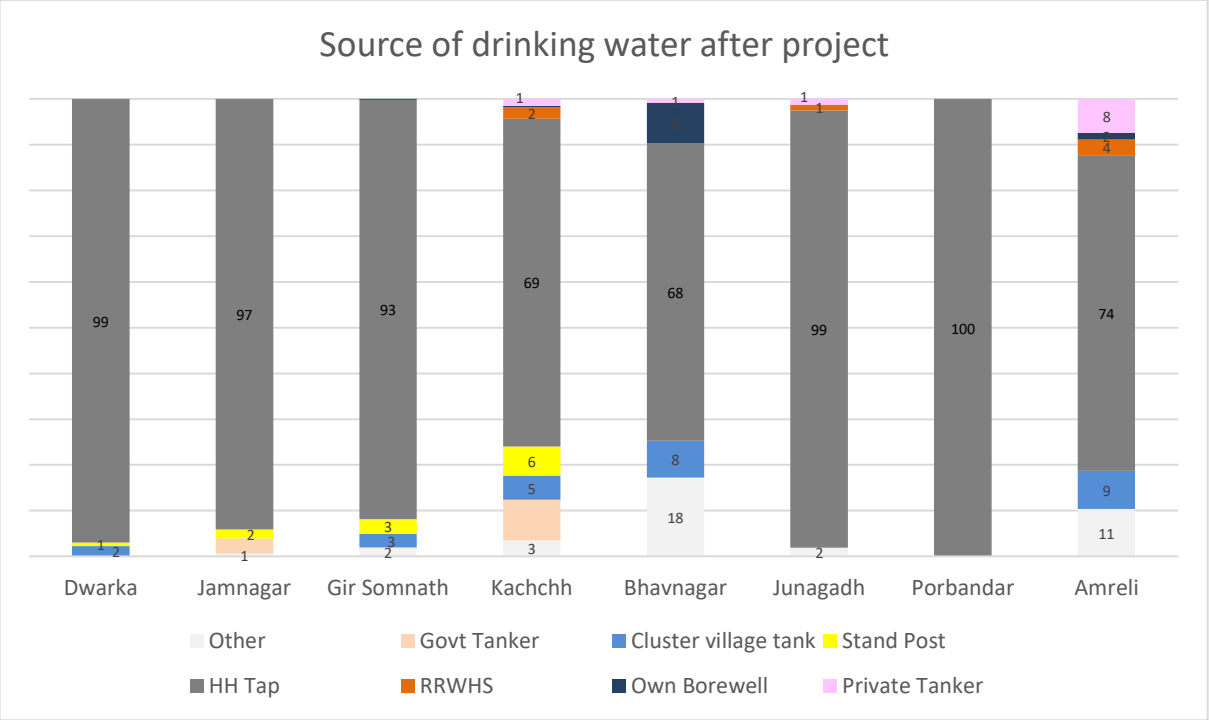


Figure 8 District Wise Drinking Water Source

Study shows that the percentage of households having tap connection has increased from meagre 6% before project to a whopping 83%, after project. This speaks a volume of effectiveness of project, though its role was limited to facilitating Government scheme on ground. All districts have seen major rise in increase in household tap connection. Tanker supply, both Government and Private were mostly found in Lakhpat and Abdasa Taluka of Kachchh. Other than this, private tanker supply was observed in Rampura village of Amreli. Seasonal changes in availability of source of water was reported in Jamnagar, Kachchh and Bhavnagar districts, where depletion of water sources in summers have an impact on water supply. The villages which are facing major problems in piped supply due to incomplete works or connections are: Chamra and Kaner in Lakhpat, Virol in Mangrol, Tad in Una, Chhapri and Visaliya in Rajula.

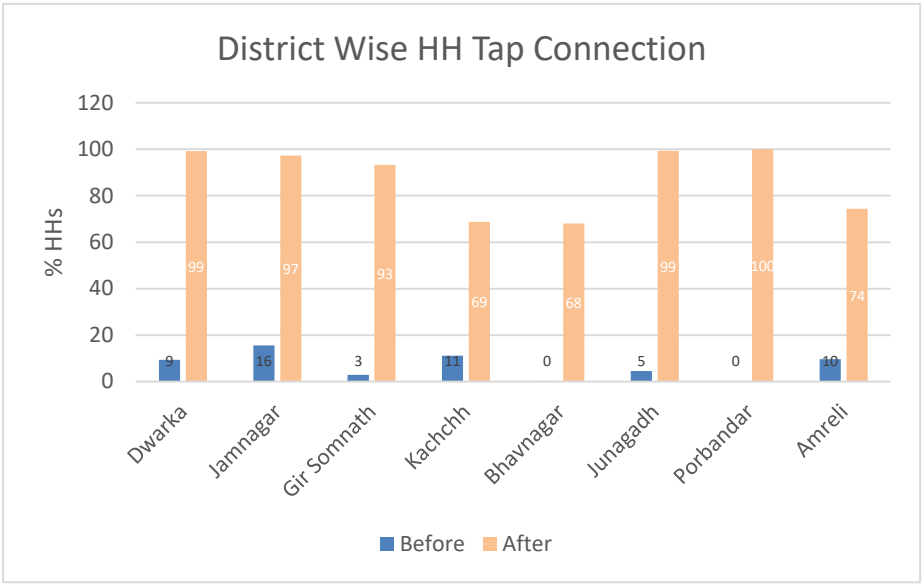


Figure 10 District Wise HH Tap Connection

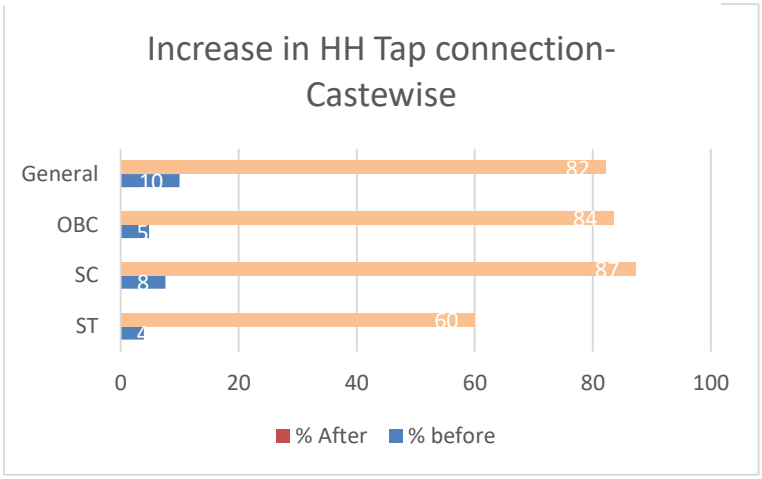


Figure 9 Caste wise increase in household tap connections

However, closer dissection of data in terms of equitable water supply shows that ST households lag behind in getting tap connections due to various socio economic reasons including location of houses. While, all other sections of society enjoy increased tap connections from 5-10% before project to above 80% after project, the schedule tribe families covered under household tap connections rise from 4% before project to 60% after project. This gap in equitable distribution of water can be bridged with more inclusive planning and execution of water supply and giving representation and empowering of ST community members in Pani Samiti and Panchayat.

> "we had always had tasteless or saline water and never thought we could get good drinking water through pipeline in our life time" - Hajrabhai Jusab from Chamra village, Kachchh

3.2. Frequency of drinking water

With advent of piped water supply, the frequency of water supply has been regulated in the villages either suiting to timings of water provided by GWSSB lines or more conveniently, if using their own sources. 40-50% Households surveyed in all districts, except in Porbandar receive water daily. In most of these villages, the water supply is restricted to 1-2 hours daily. However, there were instances where water supply has been given for more than 10 hours in villages of districts of Dwarka, Kachchh, and Junagadh. Aida village of Kachchh receives 24 hour water supply. However, 20-30% of households across all districts receive water supply alternate days. Around 50% of households in Porbandar receive water twice a week. Less than 10% of households said that they receive water only once a week. The comparison of pre and post scenario of this aspect becomes redundant as majority of household were not supplied with piped water earlier and were using all day open sources like wells, water bodies or private bore wells.

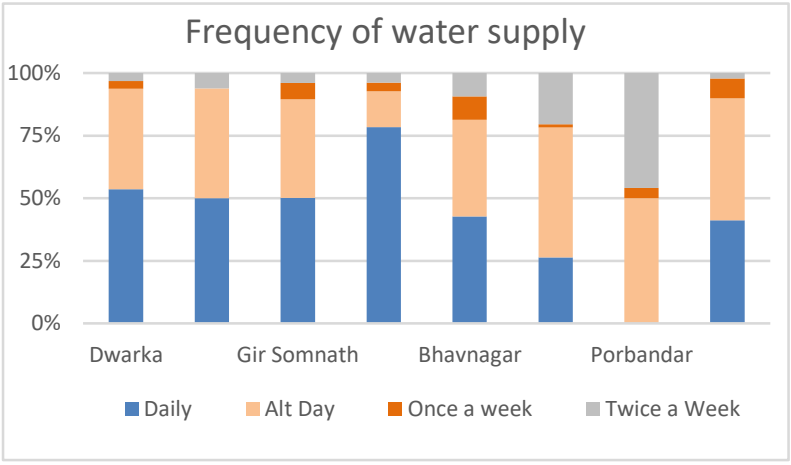


Figure 11 Frequency of water supply

3.3. Quality of drinking water

As majority of villages were (and are still) depended on ground water, it is quite natural to assume that the local sources might have been plagued with major issues of salinity, fluoride and contamination. As seen in Table 3, Central Ground Water Board (CGWB) has designated most of the coastal areas infected with quality issues.

Table 3 Districts affected by contaminants in ground water

Contaminants	**Districts affected (in part)** (Study areas highlighted)
Salinity (EC > 3000 µS/cm at 25 ° C)	Ahmedabad, Amreli, Anand, Bharuch, Bhavnagar, Banaskantha, Dahod, Porbandar, Jamnagar, Junagadh, Kachchh, Mehsana, Navsari, Patan, Panchmahals, Rajkot, Sabarkantha, Surendranagar, Surat, Vadodara
Fluoride (>1.5 mg/l)	Ahmedabad, Amreli, Anand, Banaskantha, Bharuch, Bhavnagar, Dohad, Junagadh, Kachchh, Mehsana, Narmada, Panchmahals, Patan, Rajkot, Sabarkantha, Surat, Surendranagar,Vadodara
Chloride (> 1000 mg/l)	Ahmedabad, Amreli, Bharuch, Bhavnagar, Banaskantha, Porbandar, Jamnagar, Junagadh, Kachchh, Dohad, Patan, Panchmahals, Sabarkantha, Surendranagar, Surat, Vadodara, Rajkot
Iron (>1.0 mg/l)	Ahmedabad, Banaskantha, Bhavnagar, Kachchh, Mehsana Narmada
Nitrate (>45 mg/l)	Ahmedabad, Amreli, Anand, Banaskantha, Bharuch, Bhavnagar, Dohad, Jamnagar, Junagadh, Kachchh, Kheda, Mehsana, Narmada, Navsari, Panchmahals, Patan, Porbandar, Rajkot, Sabarkantha, Surat, Surendranagar,Vadodara,

Source: cgwb.gov.in

However, study showed that while quality of local sources were depleting, most of the households were able to find safe drinking water sources even before the project. Having said that, it was not as easy as to get tap water for these families and the issues of drudgery and time consumed in fetching water was a big issue, which is discussed in later sections. So the result of pre- post condition on quality of drinking water available to household does not show major difference.

Potable water was available to around 86-87% of household in the study areas, which remained constant before and after project. However (as seen in figure 13), there has been decrease in salinity in available drinking water to households in Porbandar. In other districts, the quality of water has remained more or less same. With increased use of external piped supply by GWSSB and Narmada, the quality of available drinking water was not degraded with increase in household tap connections. As per Central Ground Water Board (CGWB) data, most of the coastal areas are infected with quality issue. Issues of salinity and fluoride in local water sources is yet to be addressed, particularly in Amreli, Gir Somnath, Bhavnagar and Kachchh districts.

Regular testing of water samples is also not done in most of the villages. Out of 45 villages where FGD were done with Panchayat, only four villages had water testing kit of their own and only in two villages panchayat members were trained to use this kit. In other 20 villages, Panchayat members said that GWSSB took samples of water one or two times a year, but they had never seen the test results.

Some of the villages with water quality issues are listed ahead

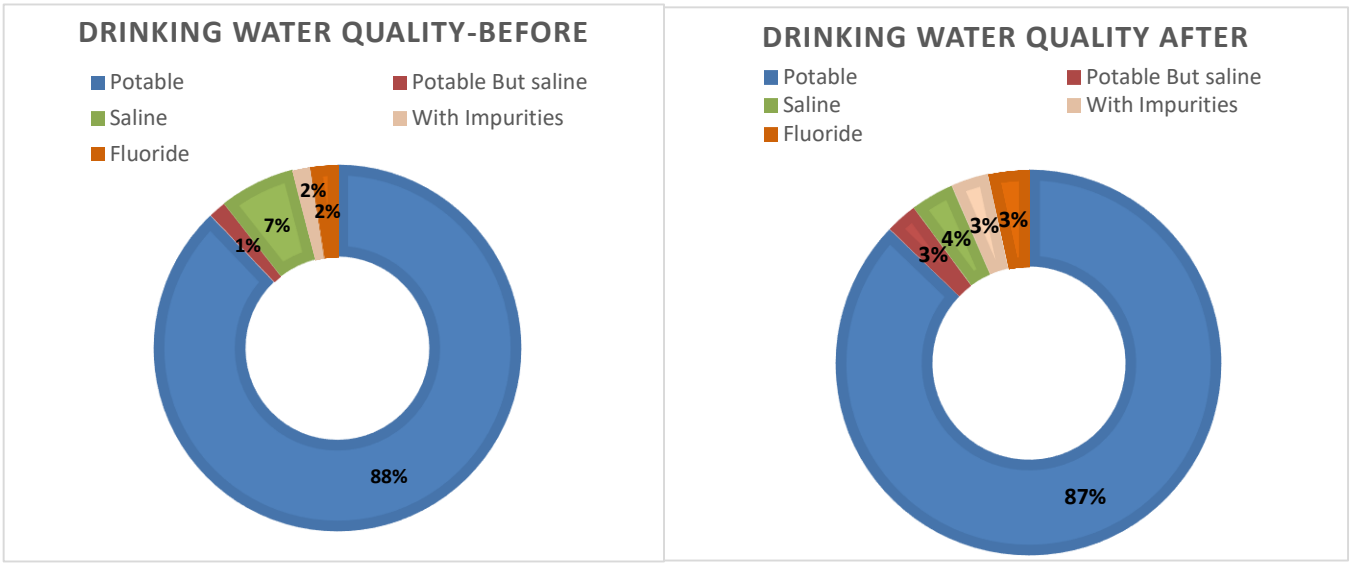
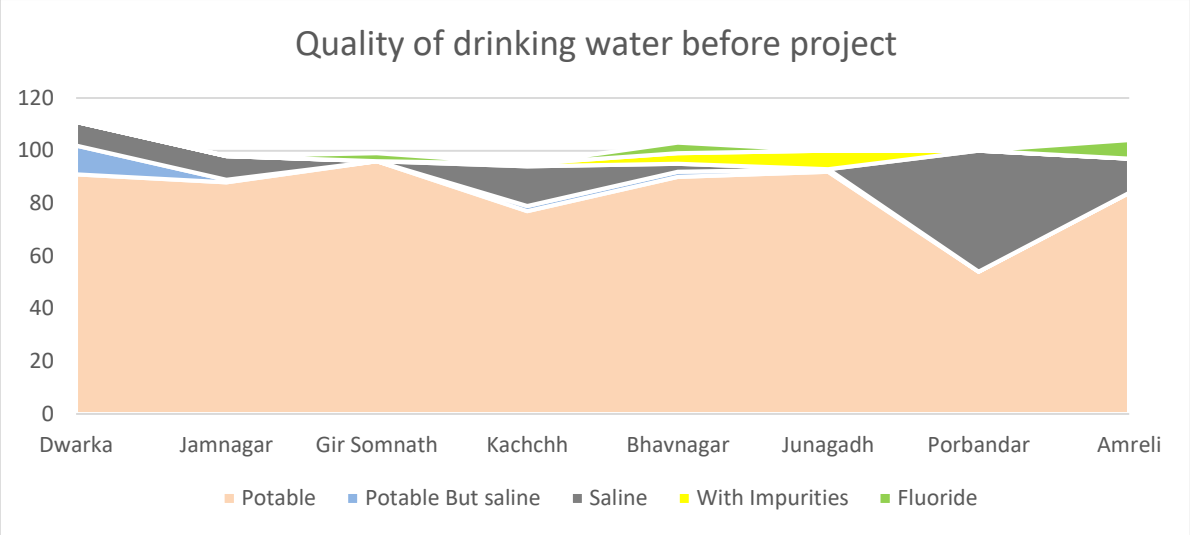


Figure 12 Quality of drinking water



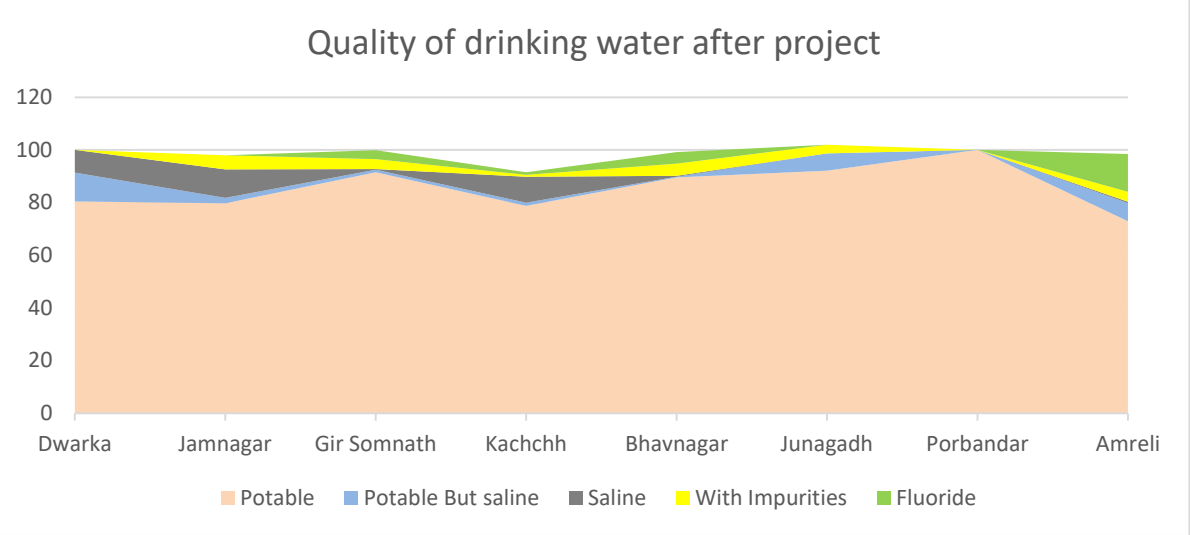


Figure 13 District Wise Water Quality (Pre-Post)

Table 4 Villages with water quality issues

District	Villages with water quality issues	
	Phase I	**Phase II**
Dwarka	Salinity: Shivrajpur	Salinity: Baradiya,
Jamnagar	Salinity: Jaga, Khimliya, Sumri, Shekhpat	
Gir Somanath		Salinity: Sugala, Fluoride: Padruka Impurities: Madhiya, Sugla, Kadvar, Ukadiya
Kachchh		Fluoride: Mindhyari, Mapar Salinity + Impurities: Kaner
Bhavnagar		Salinity: Beda, Belda, Fluoride: Bhalar
Junagadh		Salinity: Kotda, Sultanpur
Porbandar		None
Amreli	Fluoride: Rampara Salinity: Navi Mandardi, Rampara	Fluoride: Rampara Salinity: Navi Mandardi, Rampara

3.4. Adequacy of water supply

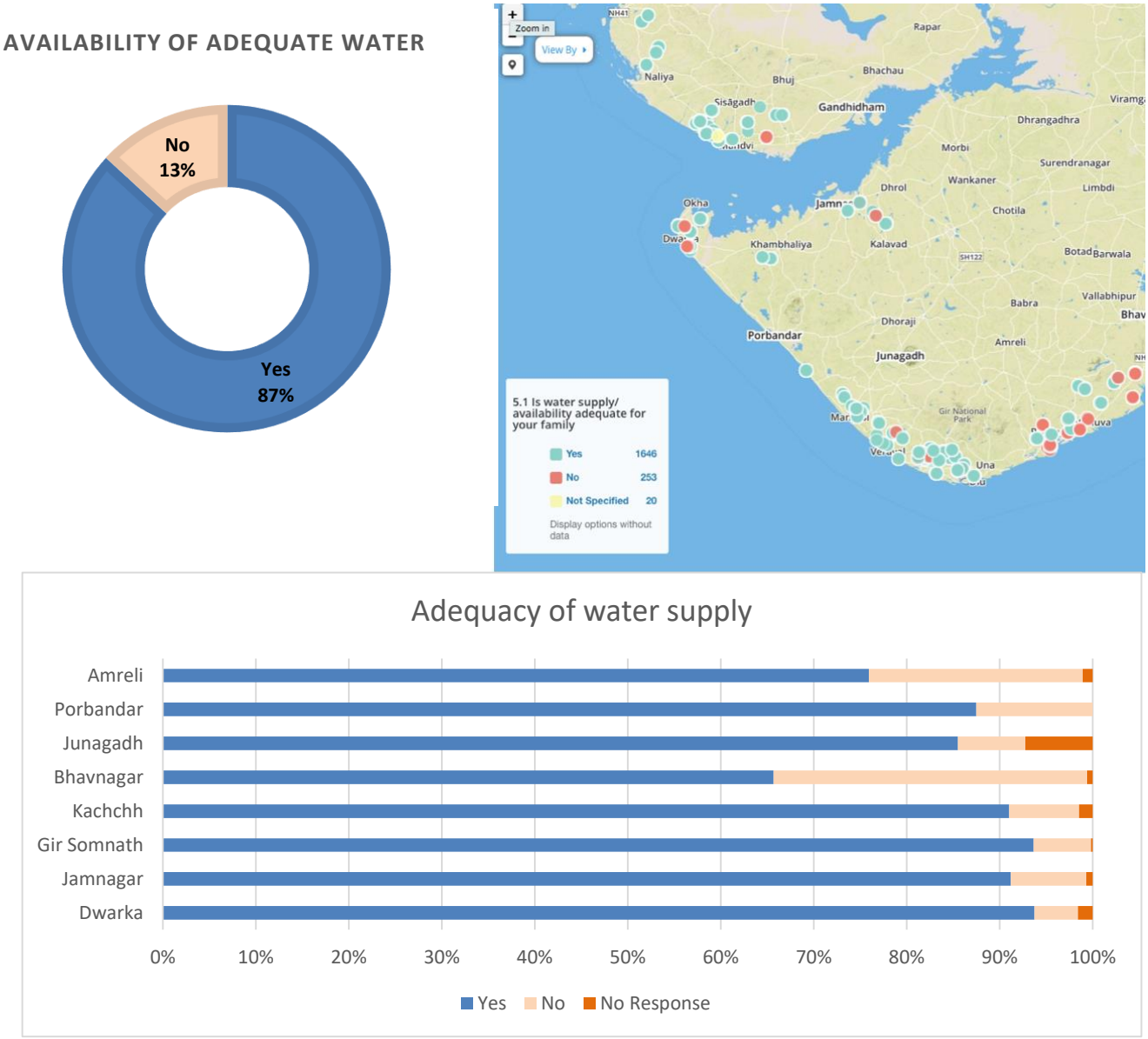


Figure 14 Adequacy of water supply

Perception of adequacy of water is important to know the satisfaction level of the beneficiaries and hence this question was asked just to know people's perception without quantifying it in terms of litres of water per person per day or any other measure. It is natural that consumption of water increases with increased availability. In most of the villages where new sump or Elevated Surface Reservoir (ESR) has been constructed under Swajaldhara, it is designed for 70-100 lpcd (instead of 30lpcd which was benchmark for rural areas earlier), which also shows that the per capita consumption of water in on rise. Over 86% respondents have said that water availability is adequate to them. However, in Bhavnagar the percentage is quite less to around 60%.

Table 5 Villages with inadequate water supply

District	Villages with inadequate water supply	
	Phase I	Phase II
Dwarka		Baradiya, Vasai
Jamnagar	Shekhpat, Jaga, Sumri, Khimaliya	
Gir Somanath		Uchadi, Bhuvatimbi, Padruka
Kachchh		Kaner, Moti Khakhar
Bhavnagar	Khadsaliya	Madhiya, Tavida, Belda
Junagadh	Virol	Gorej, Sultanpur,
Porbandar		Ratiya
Amreli	Rampara, Mandardi, Vishaliya	Morangi

3.5. Distance of fetching water

With availability of household taps, the distance to fetch water has decreased substantially. Earlier, there were 2-4 villages in each district, where people had to travel more than 500 mt for fetching water. With increase in coverage of household tap connection, this numbers have reduced considerably. Thus, drudgery of women has reduced to a great extent. This has also allowed family members to save time and use it for productive engagement. However, few families in villages of Padruka (Gir Somanath), Madhiya and Belda in Bhavnagar, and Rabhda, Rampara, Morangi and Visaliya have to still travel more than 500 mts for fetching water. These are the families who do not have piped supply and are still depended on local water sources.

> "Earlier we had to fetch water from well in farm. Now we get it at our home. This is a big relief" Vajragbha Jagabha from Bardiya, Dwarka

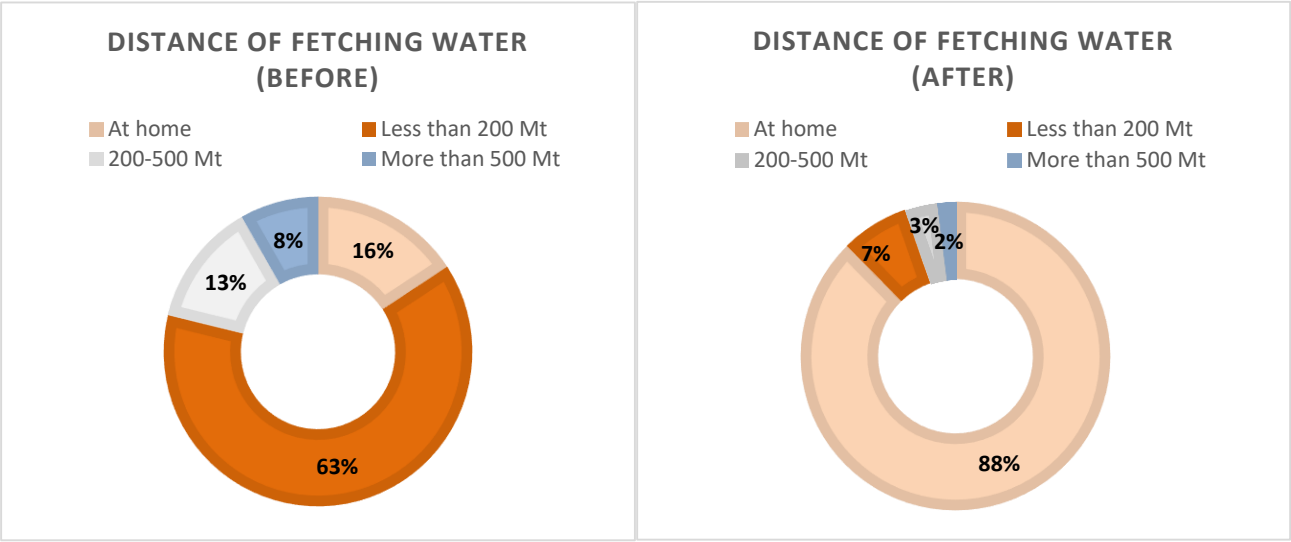


Figure 15 Distance on Fetching Water

3.6. Time to fetch water

Again, with increased household tap connections, the time consumed in fetching water has reduced considerably. This has directly impacted the productivity of family members, which has resulted in more savings and income for them. The villages in which still few families have to spent more than three hours fetching water are: Madhiya in Bhavnagar and Visaliya in Amreli.

3.7. Impact on diseases

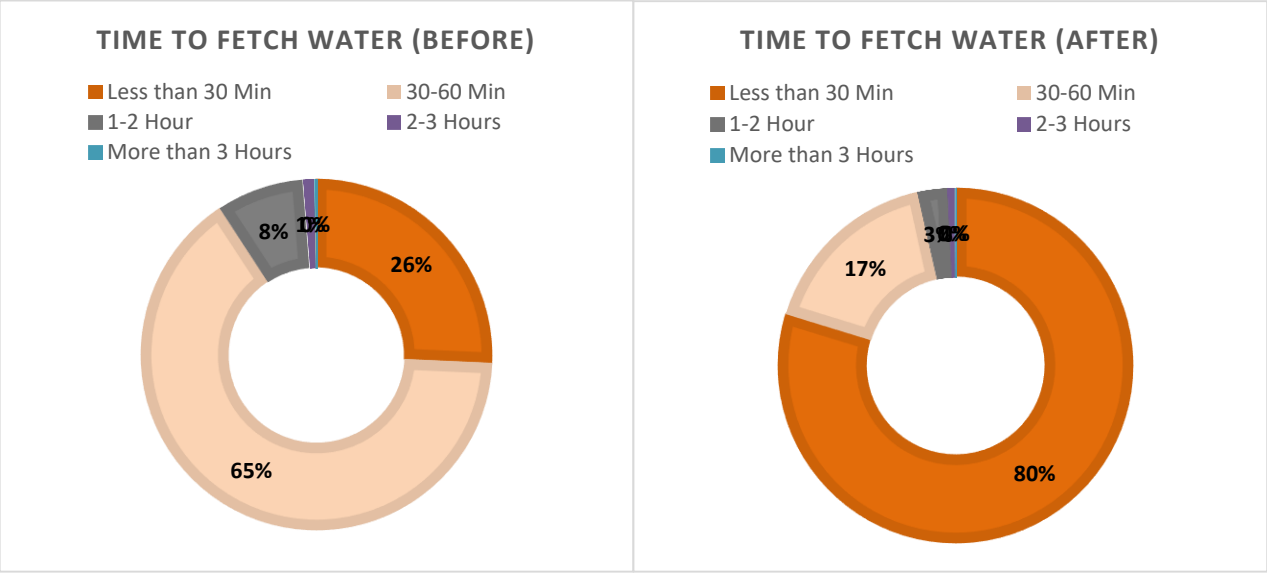


Figure 16 Time to Fetch Water

Availability of safe drinking water and adequate water supply is supposed to reduce the burden of water borne and other diseases in the community. Nearly 50% of the respondents have stated that post project, the water related diseases have decreased. About 30% said that there has been no major change, while 16% said that frequency of diseases have increased lately. The reason for increase was attributed to unhealthy surroundings and rise in cases of vector borne diseases. Thus, it is emphasized that unless we create a hygienic environment, the occurrence of water and vector borne diseases cannot be controlled effectively. However, this is also perception based inquiry and corresponding secondary data to validate it is not available for at sub regional level[2]. At state level, there are very few number of studies which actually shows trend of water and vector borne diseases. One of such study as referenced above shows steady decline in cases of Diphtheria, while cases of Cholera and Chickungunya have declined after 2009. However, cases of enteric fever and hepatitis is on rise but much lower than national average.

[2] Refer https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3962030/ for state level information on burden of infectious diseases in Gujarat

3.8. Medical Expenses

Another indicator of reduction of diseases in population is reduction in medical expenses corresponding to relevant diseases. The study shows that medical expenses related to water related diseases have reduced marginally. Although, the reduction on medical expense have not been reduced substantially, but it clearly shows that majority of families have to spend less than what they have been spending before the project.

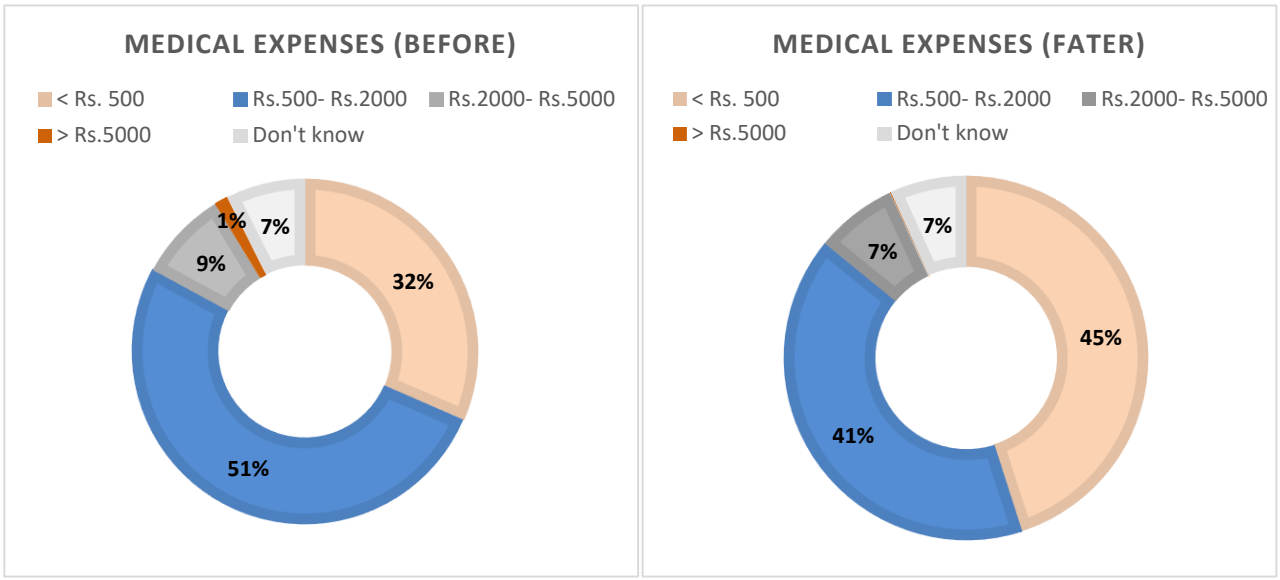


Figure 17 Impact on Medical Expenses per family per year

3.9. Impact on children education, especially girl child

> " Earlier I had to ask my elder daughter to stay home, while I went for fetching water. Now she can go to school daily"
>
> **Garviben Savdas Kathar, Kalej, Mangrol**

Availability of safe and adequate water impacts several different aspects of well being including health and education. Several studies show that availability of safe drinking water and sanitation can have very positive impact on students' enrolment of school and quality of learning. For this study purpose, the families were asked to state their perception on impact of improved water availability on children's education, especially girl child. About 63% of respondents (with children going to school) agree on positive impact on overall well being of children and their education stating that health have improved in recent years. However, it is difficult to quantify it in terms of tangible benefits.

3.10. Increased Savings

More than 50% of the respondents have said that improved water supply have helped them in saving and increased income as they save on time and expenses related to travel, buying water and medical costs. As this was also perception based question, the study does not go into quantification of this aspect but most of the respondents agree to 10-20% increase due to peripheral costs of fetching water, loss of productive days and reduction in medical expenses.

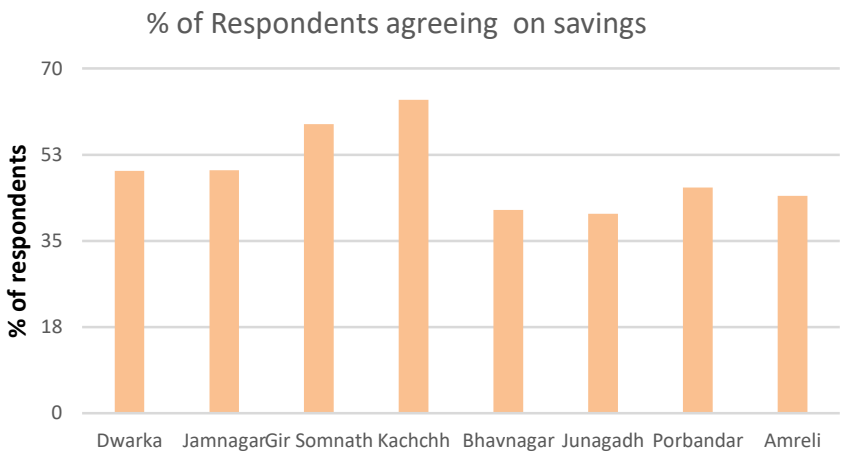


Figure 18 Savings due to improved water supply

In villages Kaner village, Kachchh, women had to walk 1-2 kilometre to fetch water and family had to spend money for water tankers frequently. with advent of piped supply, they are saving Rs. 500-2000 per month on water related expenses.

3.11. Water Resource Management (WRM) Structures

Table 6 Capacity of WRM Structures

Villages	Total water harvesting capacity
Vindh	1.84 MCFt
Mapar	3.82 MCFt
Kervandh	2.31 MCFt
Source: VRTI, Mandvi	

The Swajaldhara scheme supported provision of activities which can enhance sustainability and revival of local water sources. A sample study of three WRM structures in Kachchh district in villages of Vindh, Kervandh and Mapar demonstrates a promising practice to conserve and develop local water resources, when many villages have adopted external piped supply as their only source of water.

These are basically open wells constructed in middle of a local pond or lake, which acts percolation well as well as lagoon for safe water. When pond or lakes dries up after 3-4 months of rains, the water is available in well almost throughout the year. Along with wells, strengthening of earthen bunds is also taken up in these villages. The water bodies where these structures are made are regulated for minimal use and prohibited for washing clothes and cleaning utensils and vehicles inside the pond by villagers and local body.

These structures have helped a lot by providing water in summers for cattle and for domestic use, when surface water dries up. In case of failure of piped supply, these structures can also be used as alternative source for drinking water. Thus these structures have proved cost effective solution for contingencies.

Figure 19 WRM Structures

3.12. Conclusions and recommendations

To summarize this section, let us look at the positive aspects and learning points as observed during the study

Table 7 Summary of findings for Water Supply section

Positive takeaways	Learning points and recommendations
Exponential increase in household tap connections have ensured water security to large extent and also addressed equity issue for water availability.	Sustainability of operation and maintenance of water supply needs to be ensured by enhanced water dues collection and ensuring that operational costs are covered.
Quality of drinking water supplied by Panchayat is largely good, with some exceptions of few villages across all districts.	Panchayats across all districts needs to be provided with water quality testing kits and to be trained to carry out regular tests, mainly for local water resources.
Majority of families in study area gets adequate water supply for their household needs.	There is need of designing comprehensive project to ensure effective and efficient operation and maintenance of water supply, covering technical, managerial and financial aspects.
Majority of families agree on reduction of water related diseases, expenses related to it. Number of productive days has also increased with adequate water supply, as time and expenses incurred in fetching water has reduced.	Training on water budgeting for panchayats and Pani samiti members can also be considered. Also project on conservation and revival of local water sources, conjunctive use of water sources and enhancing rainwater harvesting at village level and at household level can be useful. (Issues of institutional sustainability are discussed in next section)

4. Institutional Sustainability

Water supply, operation and maintenance and ensuring quality of drinking water provided to the villagers are joint functions of local authorities (Gram Panchayat, Pani Samiti) and government agencies (GWSSB). One of the objectives of the study was to inquire about the sustainability of these functions as a part of institutional sustainability, which also depends on how well these institutions perform at ground level. Pani samitis were formed and trained with an anticipated role and function of effectively managing water supply (distribution) system at village level. It was a unique experiment to strengthen community managed services, which was also showcased as successful model to other states and even recognized internationally. This section discusses the perception of villagers about Pani Samitis based on household survey and reveals insight on issues of sustainability as discussed with Panchayat members in 45 villages.

4.1. Who Operates and Maintains Water supply

While, Pani Samitis were formed in all the villages under CADP, over the years, these Samitis have become redundant in many villages, as water supply system is managed by Panchayat. The study showed that in nearly 37% of the Panchayat directly manages the system and there is no role of Pani Samitis. There are different reasons on why the Pani Samitis have become redundant. The most common ones is change in Panchayat body and Pani Samiti members. Also the factors like cooperation of community, interest of original members and political disputes in the villages also play important role in this matter. This is not to say that Panchayat cannot directly handle the matters of water supply effectively (many Panchayats are doing it well), but the purpose of Pani Samiti as an institution is lost in this scenario. Panchayat body handles more than 20 government schemes and so the focus on water related issues is obviously diluted in absence of Pani Samiti.

4.2. Institutional Sustainability of Pani Samiti

Institutional sustainability of Pani Samiti can be gauged by its active involvement in operation and maintenance of water supply and regular collection of water dues in the village. Villages, where Pani Samiti have managed to collect the dues on regular basis, have enjoyed good quality of regular water supply. However, where Pani Samiti have been taken over by Panchayat body, which does not collect water dues separately, are struggling to enhance water supply, operate and maintain distribution system and improve quality of water. In 45 villages where FGDs were taken up with Panchayat and Pani Samiti members, revealed that only 63% of villages had functional Pani Samitis. FGDs with Panchayat and Pani Samiti members in 45 village revealed that in 70% of villages where Pani Samiti is active, Panchayat was able to operate and maintain water supply from the water charges collected in the village. This is the huge indicator on sustainability of institution as well as water supply system.

4.3. Perception of People

To assess the performance of Pani Samitis, perception of people in terms of their accessibility, transparency of working and effectiveness in solving problems was taken from household survey. Besides this, a general awareness on functions of Pani Samiti and perception on how well water supply system is being maintained in the village was also taken in the survey.

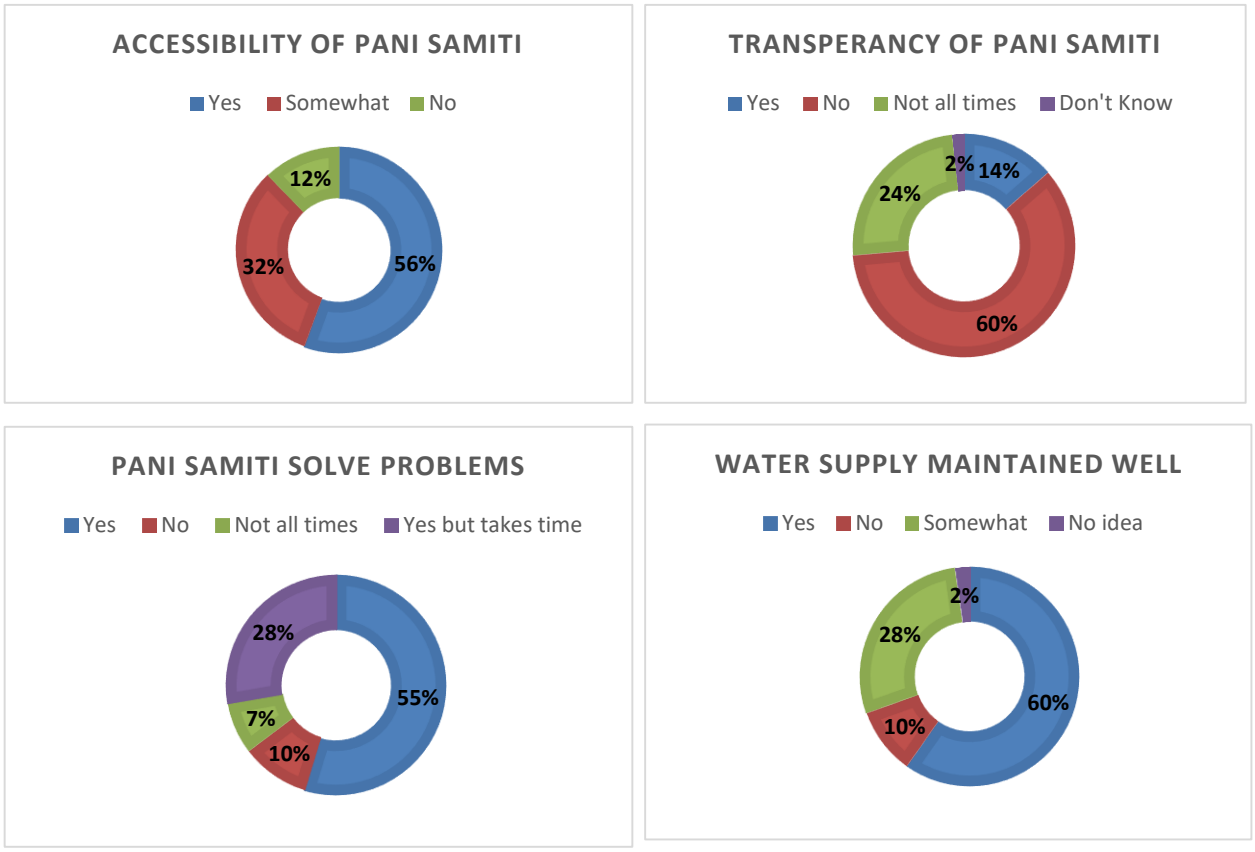


Figure 20 Perception of Pani Samiti among people

More than 72% respondents were aware of existence and functions of Pani Samiti in the village. About 53% respondents said that Pani Samiti members were accessible, while 12% said that they were not accessible. About 32% respondent said that the members were somewhat accessible, i.e. not all the time.

The idea of how the perception of Pani Samitis have been degraded over the time, comes out in the study as only 14% respondents say that Pani Samitis operate in a transparent manner. The decisions related to work and expenditure are not known to most of the respondents. About 57% respondent clearly tell that Pani Samiti lacks transparency. About 53% respondents say that Pani Samiti members do solve their water related problems. Another 27% respondents say the same, but add that it takes time for them to address the problem. However, 9% respondents say that Pani Samiti members do not solve their problems and 7% say that members address some problems and do not respond to others. In a final overall assessment of working of Pani Samiti, 59% respondent say that Pani Samiti maintains water supply system well. 28% say that they somewhat maintain the system and 10% say that samite does not maintain system well

Water testing kits were given to a number of villages across all districts, but effective use of testing kit is hardly seen in any village.

Table 8 District Wise Perception on Pani Samiti

Perception of Households on Pani Samiti									
		Dwarka	Jamnagar	Gir Somnath	Kachchh	Bhavnagar	Junagadh	Porbandar	Amreli
Awareness of Pani Samiti		88	74	85	57	56	73	83	69
Transparency	Yes	23	13	7	23	11	8	8	12
	No	55	49	62	47	68	44	54	63
	Not all times	20	32	30	13	17	38	33	20
	Don't Know	0	5	1	0	3	2	4	4
Pani Samiti solves problem	Yes	56	50	59	57	15	42	63	51
	No	3	0	4	4	25	2	4	21
	Not all times	9	7	7	4	3	16	17	7
	Yes but takes time	0	41	28	23	25	30	8	17
Maintenace of Water Supply by Pani Samiti	Yes	73	59	66	64	45	48	63	49
	No	2	1	4	5	29	2	4	22
	Somewhat	26	39	29	23	24	41	33	24
	No idea	0	1	0	7	1	1	0	4
Accesibility to Pani Samiti	Yes	54	51	59	64	46	49	58	53
	Somewhat	44	47	34	27	24	46	38	21
	No	2	1	8	9	29	5	4	26

Table 9 Villages with poor rating of Pani Samiti

District	**Poor rating of Pani Samitis**	
	Phase I	**Phase II**
Dwarka	Shivrajpur, Vachu, Samlasar	Baradiya, Vasai
Jamnagar	Shekhpat, Jaga, Sumri, Khimaliya	
Gir Somanath		Arethiya, Bhuvatimbi, Sugala, Rangpur
Kachchh		Kaner, Chamra, Goyla Moti Khakhar
Bhavnagar	Khadsaliya	Madhiya, Tavida, Belda, Kokaliya
Junagadh	Virol, Kalej, Lambora	Gorej, Sultanpur, Moti Dhanej,
Porbandar		
Amreli	Rampara, Vishaliya, Barpatodi	

4.4. Recovery of Water Dues

Water dues recovery is high in districts like Jamnagar, Porbandar, Dwarka, Gir Somnath, Junagadh with more than 70% villages having recovery of 75-100% of total dues. Districts like Amreli and Kachchh have 50-60% villages having high recovery. While recovery of water dues in Bhavnagar is poor with more than 40% villages having 0-25% recovery of water dues only.

Table 10 District Wise Recovery Status of Water Dues

District	% villages			
	0-25% recovery	25-50% recovery	50-75% recovery	75-100% recovery
Amreli	43	0	0	57
Bhavnagar	44	11	11	33
Dwarka	0	0	17	83
Gir Somnath	15	4	8	73
Jamnagar	0	0	0	100
Junagadh	14	14	0	71
Kachchh	5	10	24	62
Porbandar				100

4.5. Capacity Building and IEC

Shirva sets an example for successful operation and maintenance of RO water Plant

Shirva village of Mandvi, Kachchh is a shining example of how Pani Samiti has been successful in addressing need of safe and affordable drinking water. Pani Samiti manages RO plant in the village and offers safe drinking water at Rs. 0.40 per litre (Rs. 8 for 20 litre can)

Participation of community and local body was one of the core tenets of CADP project and Swajaldhara programme to ensure sustainability of works done under this project. Various trainings and sensitisation programmes were conducted by ISAs for capacity building of Pani Samitis and developing leadership qualities among Panchayat and Samiti members. Also use of various IEC (Information, education and communication) materials like wall paintings, slogans, pamphlets; behaviour change communication methods like group

exercises, skits, documentaries were used by ISAs on varying scale for sensitisation of communities to participate and contribute to water supply schemes. Though assessing impact of these initiatives in tangible terms is difficult, but Pani Samiti members do endorse the usefulness of these activities in mobilising the community and taking forward works allotted to Pani Samiti smoothly in most of the villages.

To summarize this section, let us look at the positive aspects and learning points as observed during the study

Table 11 Summary of findings on Institutional Sustainability

Positive takeaways	Learning points and recommendations
Pani Samitis have played pivotal role in transforming the water supply management scenario at village level. The induction of these Samitis by WASMO and ISAs have helped to build and maintain sustainable water supply systems to the large extent.	Discussions with Panchayat, Pani Samitis and ISAs point to need of having greater autonomy of taking decisions regarding procurement, design and implementation of water supply system at village level by local body. This was evident in areas where there have been delays in technical and financial sanctions due to lack of flexible approach and coordination between various agencies, which could have been avoided if the decisions were left to local bodies.
The process and guidelines to build capacities of Pani Samitis have been appreciated by all ISAs.	Many Pani samitis have become redundant and Panchayat by default have taken over the operation and maintenance of the water supply systems. There is need of having a revival project to infuse new life, define new objectives and priorities and work with new approach for these next generation Pani Samitis.
In most of the villages where Pani Samitis are active, the recovery of water dues has been good enough to maintain the system.	Issues like service delivery model for maintenance of infrastructure, quality assurance etc are the emerging needs across all the coastal areas, and can be addressed by Pani Samiti effectively. There is need of block level water testing laboratory to monitor water quality of major source at regular intervals

5. Roof Top Rain Water Harvesting

Rooftop rainwater harvesting was implemented under CADP project with twin aim of addressing drinking water quality issues of salinity and fluoride, and enhancing water security at household level. A household survey of 250 families across around 40 villages show that construction of storage tanks have definitely given some sort of water security for beneficial families, as it reduces the drudgery and stress to fetch water daily from distant source. This was evident from talks with women in the study area, who consider RRWHS as one of the most useful asset in the house. Most of the families use the system for storing the water, collected from tap connection or bought from tanker. The benefit of family level asset has trickled down to larger well-being of the family with improved health, reduced drudgery and reduction in cost of fetching water. With additional water sources available at household level, the objective of harvesting rain water has become secondary for beneficiaries. The PVC gutters collecting water from the roof and pipes conveying water to the tank are either broken or taken off in most of the cases. The elementary filter, designed to be part of system is either non-existent or not functional in most of the cases.

5.1. Storage Capacity of RRWH Tank

More than 50% HHs across all districts have RRWH storage tank capacity of 7500-10000 litres, which is sufficient to cater drinking water needs of a family of 5-7 people.

18% HHs have storage capacity up to 7500 litres, while 22% have storage capacity of more than 10000 litres. People have invested substantial amount of money to make larger tanks as per their requirements.

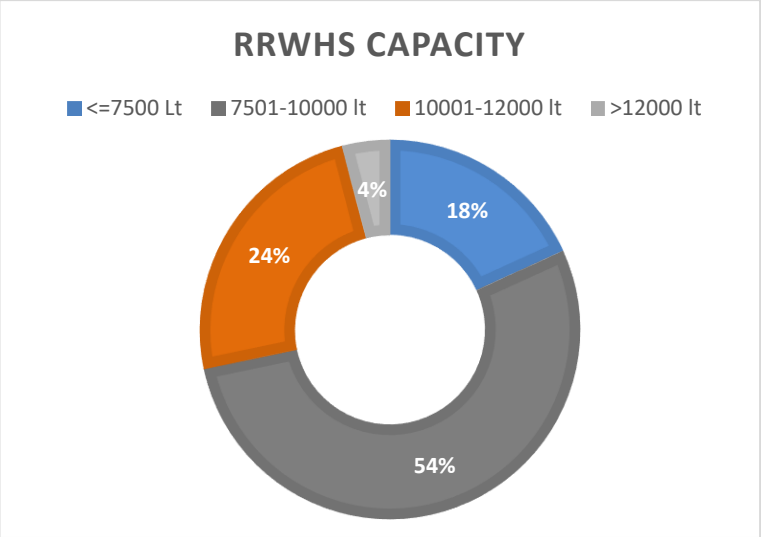


Figure 22 RRWHS Capacity

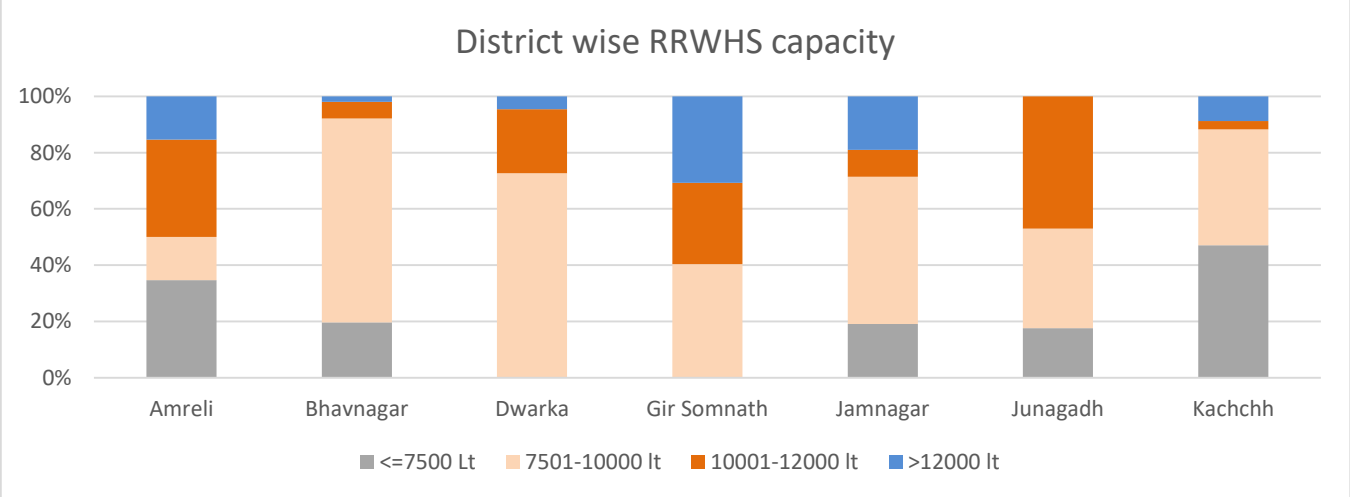


Figure 21 District wise RRWHS capacity

Figure 23 RRWHS

5.2. Status of Filter System

The recommended design of RRWHS had basic filter system to avoid dust entering into the tank. However, more than 50% HHs do not have this filter chamber with RRWHS. Only 10% households have functional filter, while 38% households surveyed have filter, but they are not functional as of now. The main reason of not having a filter chamber was either lack of knowledge and guidance on construction or cutting of cost by contractor.

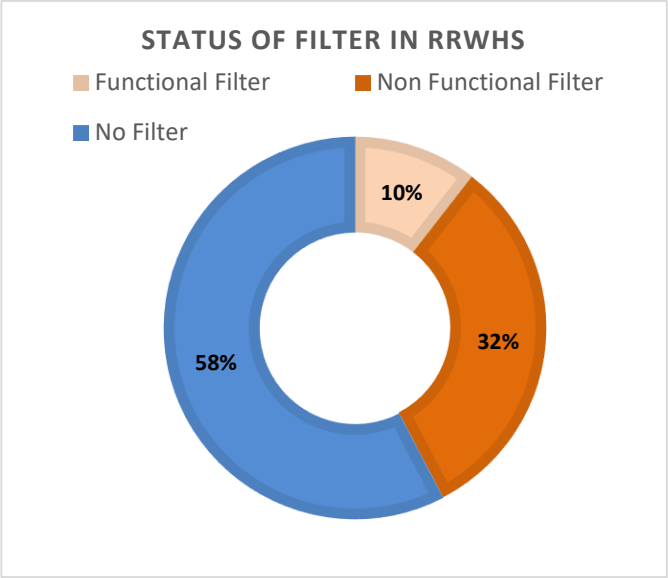


Figure 24 Statu of Filter in RRWHS

5.3. Use of Harvested Rain Water

As discussed earlier, most of the families have alternate source for drinking water and hence use RRWHS as storage tank rather than harvesting rainwater for drinking purpose. Only 7% families use rainwater all the year round. Approximately 65% families harvest rainwater in varying quantities, but only 18% are able to use it beyond three months. Almost 90% families refill their tanks from external source. The usage pattern of water collected/ stored in the tanks show that 42% families use collected/stored water mainly for drinking, while others use it for domestic purpose as well as as for providing drinking water for cattle. 7% HHs refill the tanks less than 3 times a year, 33% HHs refill 4-6 times a year, 28% refill tank 6-12 times a year, while 20% refill more than 12 times a year.

5.4. Filtration & Tank Maintenance

Awareness on maintenance and cleaning of RRWHS is high among the beneficiaries. About 98% households carry out cleaning of tank once or twice a year. Most of the families apply simple straining before using stored water. Surprisingly 53% families also use chlorine tablets provided by WASMO/GWSSB to drinking water at household level. Use of hand pump for fetching water from the tank is also common among the households with RRWHS.

To summarize this section, let us look at the positive aspects and learning points as observed during the study

Table 12 Summary of findings for RRWHS

Positive takeaways	Learning points and recommendations
RRWHS is a great asset for the family, providing them with ample storage of water and relaxation from daily drudgery and tension to fetch water	As of now not many families maintain the system to harvest rainwater. A little bit of more sensitisation to continue harvesting rainwater in the system will go a long way for benefiting the family.
Use of small hand pump to fetch water from tank is well adopted. This has reduced chances of contamination of collected water. Also awareness and use of chlorine tablet has increased remarkably.	However, the concept of conserving rainwater by not opening the lid often and protecting it from direct sunrays, which was the basic purpose of having a hand pump is not embedded in practice.
Families have invested their own money to construct RRWHS larger to suit their own needs.	RRWHS should be promoted in coastal areas, so that the households can adopt the idea even without any subsidy.

6. Sanitation & Hygiene

Sanitation has been in sharp focus since last few years, with greater impetus from government through various projects. However, the focus of government projects building toilets rather than bringing about sustained change in safe sanitation practices. No doubt, increase in individual household latrines (IHHL) or toilets, do trickle down and impact sanitation practices, but cannot ensure 100% ODF and behaviour change. A household survey of 1259 families across 100 villages has revealed that CADP project has not only contributed to increase availability of household latrines in rural areas but have also impacted behaviour change in some villages. However, there is still long way to achieve sustained safe sanitation environment and practices at rural level. The greatest beneficiaries of increased toilets at household level have been women, children, old age and disable people. Drudgery of women has reduced and women have greater privacy and dignity after construction of HH toilets. However, only 35% of villages surveyed have 100% functional toilets[3]. But few cases of open defecation are still prevalent in most of the villages and thus cannot be claimed to be ODF.

Figure 25 Household toilet Photos

[3] More detailed description is provided in section 6.9

Some of the major findings of household survey are as follows:

6.1. Type of Toilet structure

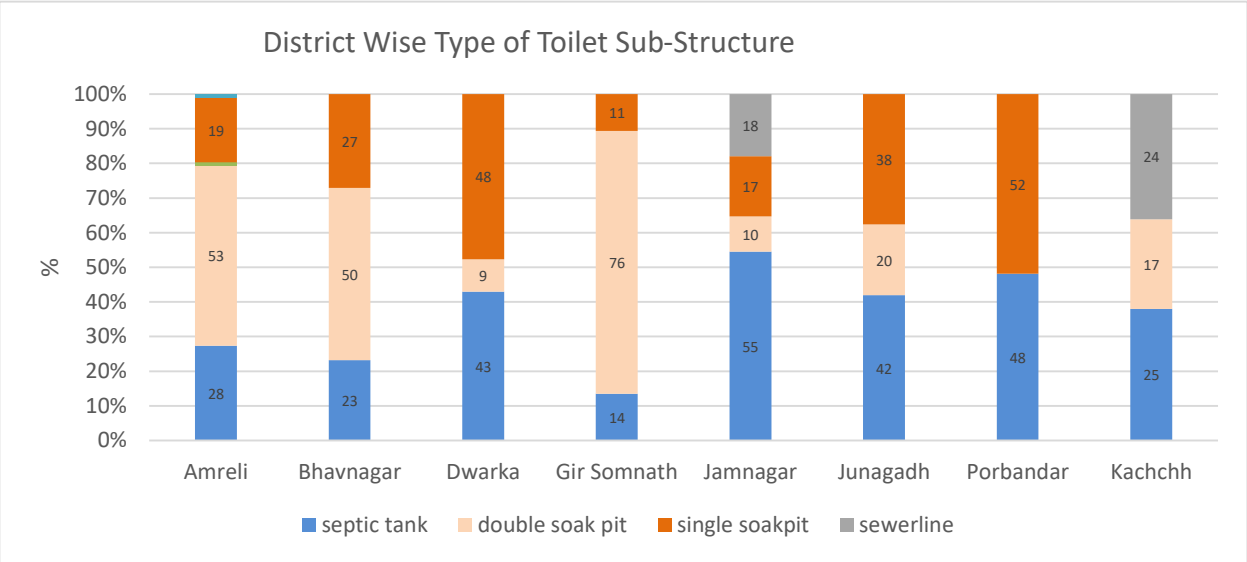


Figure 26 Type of sub structure of toilets

Super structure mainly consists of brick masonry, stone, cement blocks and pre fab materials, while more importantly the disposal system or the sub structure of toilet were very different in different districts. 40-50% of toilets in Dwarka, Junagadh and Porbandar comprise of single soak pits. Sewer connections are found mainly in Jamnagar (18%) and Kachchh (24%). Only two villages – Mapar in Kachchh and Shivrajpur in Gir Somnath, where FGD were conducted have sewer line connections with toilets. However, none of them have treatment plants to ensure safe disposal of wastewater. So rural areas of Gujarat are still predominantly relying on onsite disposal solutions like soak pits and septic tanks, and offsite solutions like sewer lines also do not help safe disposal. This will be a big issue and threat for health in near future if not addressed immediately.

6.2. Bathing Unit

It was surprising to find that nearly 52% of households had bathing unit along with toilet. This means that more than half of the households have actually invested substantially in construction of toilet and bathroom rather than just depending on government subsidy. About 41% HHs have facility of bathing unit along with toilet in Bhavnagar, while in other

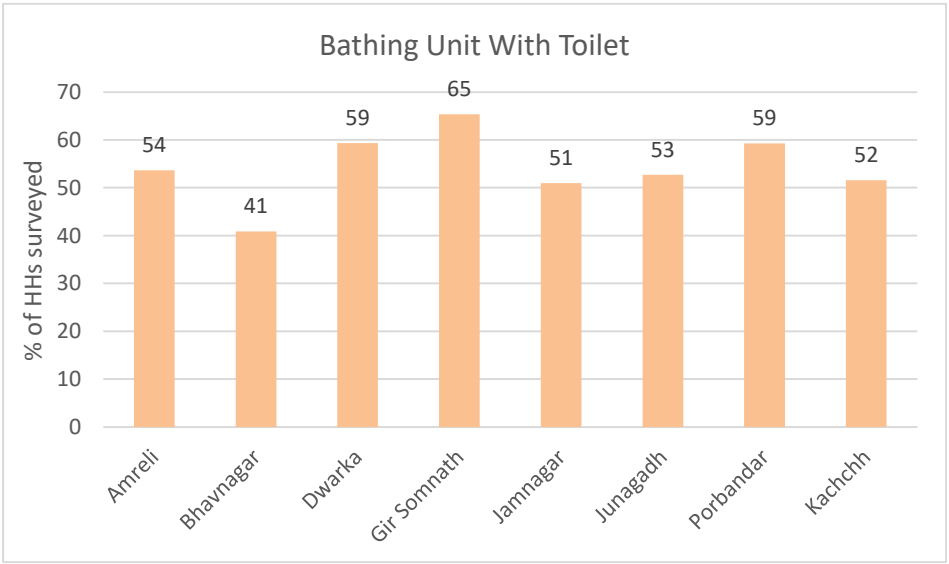


Figure 27 Provision of bathing unit

districts about 50-60% HHs have this facility. 65% HHs in Gir Somnath have bathing unit in their household along with toilet unit.

6.3. Subsidy release and time of completion of toilets

It was observed that one of the main reasons for incomplete toilets in the villages was non availability of funds for construction. So timeframe of release of subsidy and construction of toilet was needed to study. Study showed that more than 70% HHs have received subsidy within 6 months in all district except Jamnagar & Kachchh. In these two districts, 18-19% HHs have received subsidy in a year's time. In Porbandar and Dwarka, about 8-10% HHs have received subsidy after year. Total 4.2% HHs have still not received subsidy, mainly in Kachchh, Bhavnagar Districts

In all districts, construction of majority of toilets has been completed in less than 3 months. 11% structures in Porbandar, 6% in Kachchh, 5% in Jamnagar, 4% in Bhavnagar and 1% in Amreli, Dwarka as well as Gir Somnath are still not complete. Major reasons stated for non-completion are lack of timely release of fund for construction.

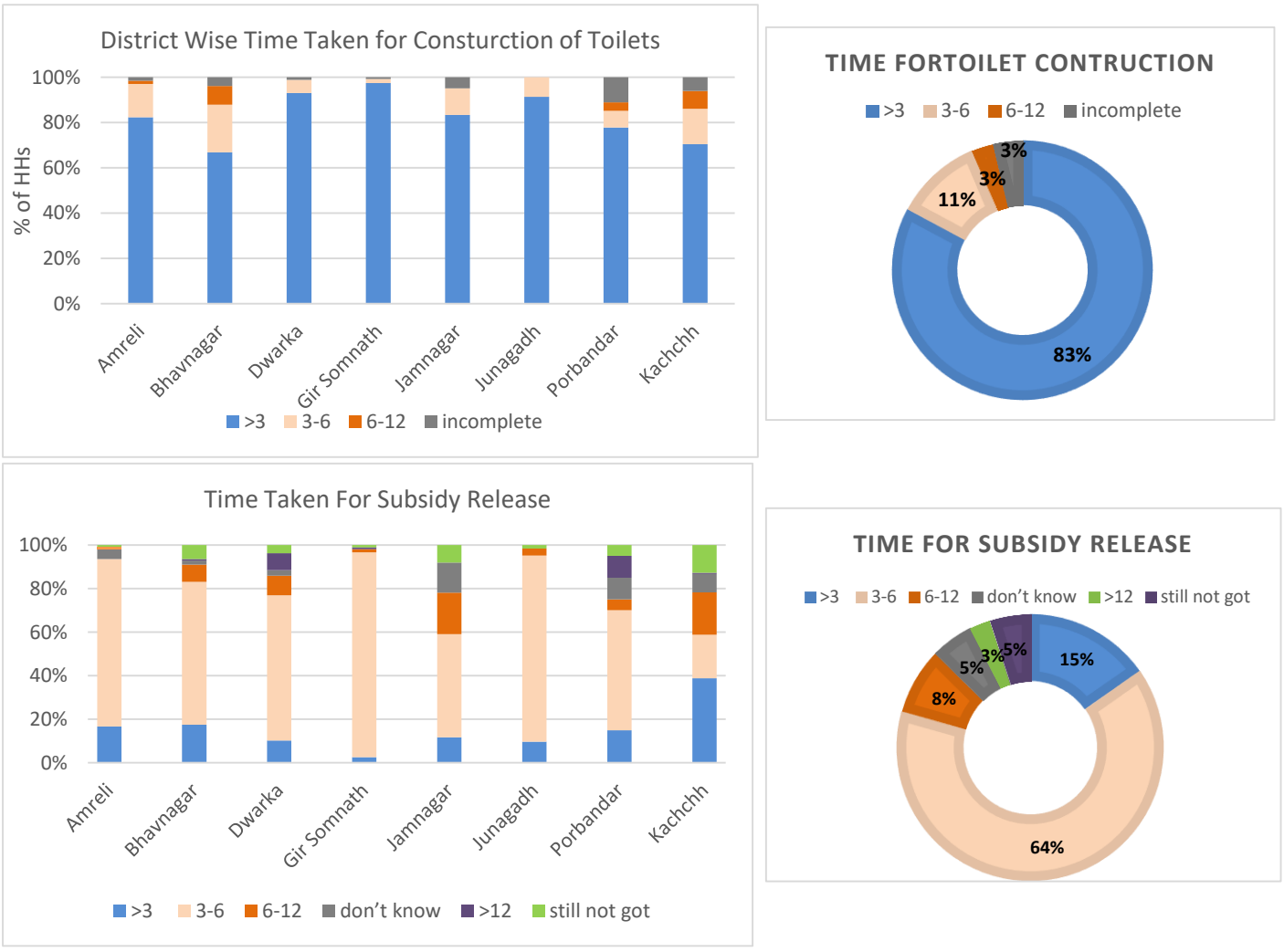


Figure 28 Time for subsidy release and completion of toilets

6.4. Beneficiary Contribution for Toilet Construction

People have put in considerable investment in construction of toilets at their house. This is evident with the survey that shows that 70% of the families have contributed in cash or kind for construction of toilet. The segregated data on contribution through cash, labour and material shows high material contribution in Jamnagar, Porbandar and Kachchh. While labour contribution is high in Amreli, Bhavnagar and Gir Somnath. Cash contribution was high in Junagadh and Dwarka. More than 40% HHs have contributed through labour in all districts except Kachchh. Overall, more households have contributed in cash, followed by labour and then in material.

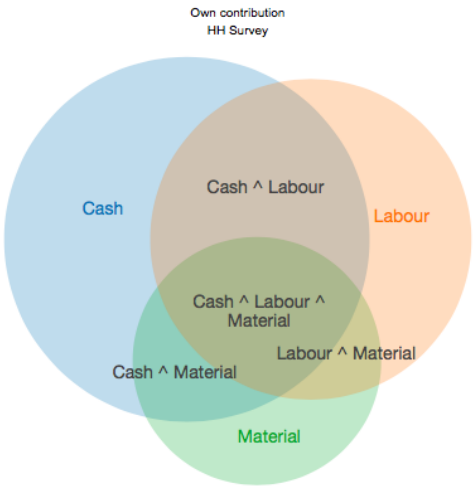


Figure 29 Beneficiary contribution for toilet

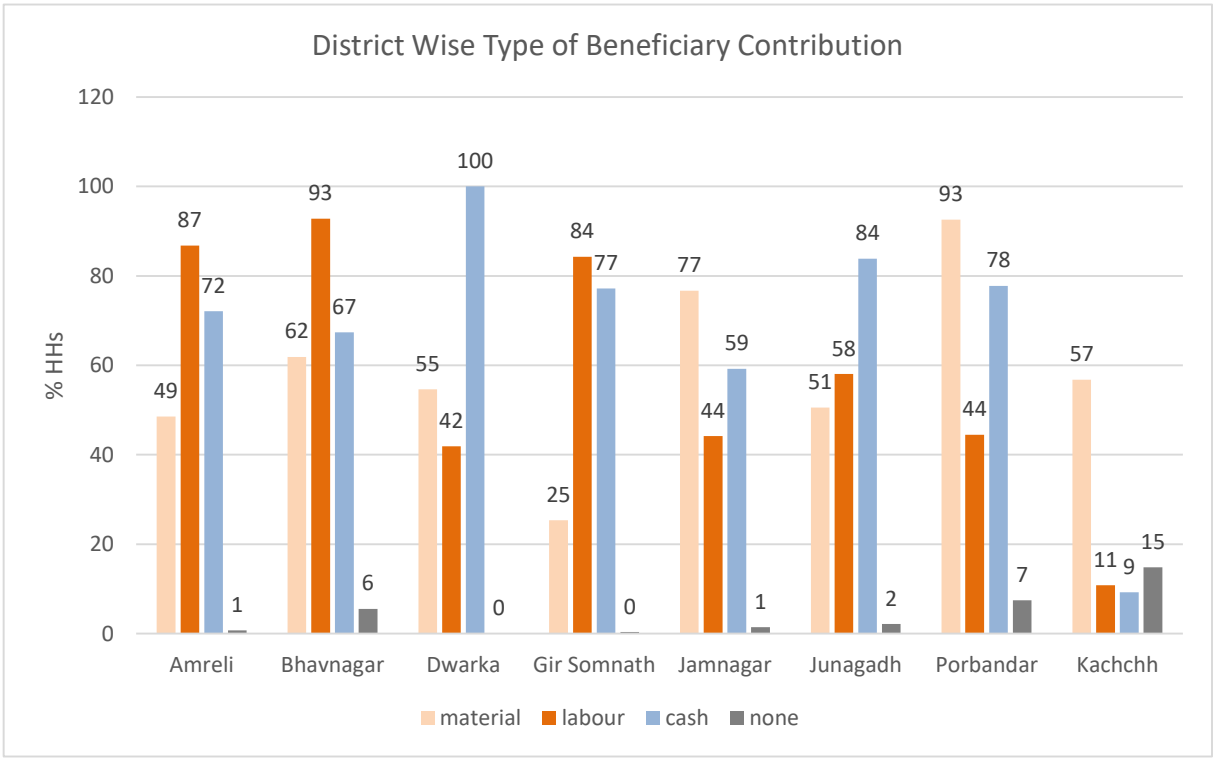


Figure 30 District wise contribution of beneficiaries for toilet

6.5. Construction Management

Construction Labour was managed through various sources in these districts. Less than 20% families have undertaken labour work on their own across all districts, except Jamnagar where it was around 40%. Overall, more than 40% households were dependent on Panchayat appointed contractors except for Kachchh and Jamnagar.

Private contractors were hired for labour works in all districts with very high proportion except In Bhavnagar (Mahuva) & Dwarka, where it was limited to about 10% of households. Some of them have reported to have taken support from SHGs and Federation for labour work.

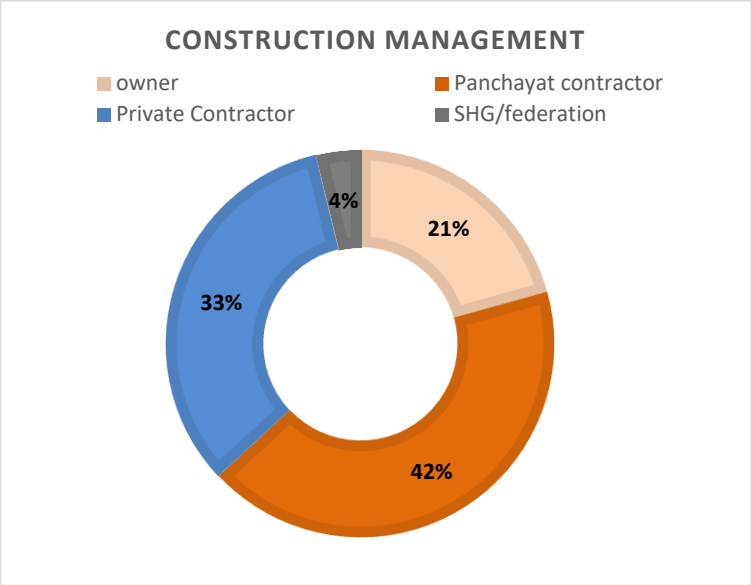


Figure 31 Construction Management for toilets

However, looking at the data, there is no specific pattern emerging in terms of usage and maintenance issue related to the categories of 'construction management'. All type of toilets have more or less similar maintenance problem and usage pattern. However, need of structural repairs was unusually high at around 50% in households opting for private contractors, while in other two categories (owner driven and Panchayat appointed contractor), it was limited to 5-10%.

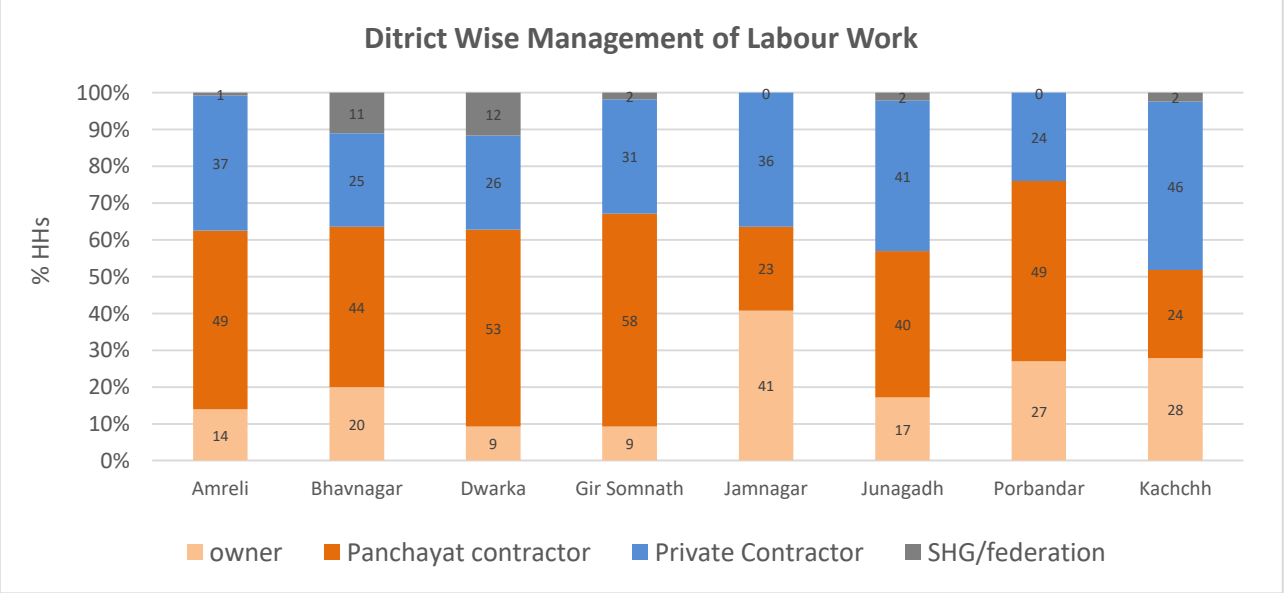


Figure 32 District wise construction management for toilets

6.6. Issues of Usage and Non Usage

It is evident that construction of toilet structure itself induces the higher usage among communities. In 95% of the families where open defecation was common practice, have now started using household toilets. While, most of the families agree that all family members do use toilets, but there are more instances of men and old age people going for open defecation compared to women. Use of toilets among children is also very high.

"we cannot use our toilet as it is very near to the temple and we have to sit with back facing temple, which is not acceptable to us"- **Mankorba of Kaner, Kachchh** explains why her family does not use toilet

However, there are several villages where despite of construction of toilets, the usage has been low, mainly due to reasons like incomplete toilet, doors missing and habitual practice of going in open etc. Availability of water was not a major issue and most of the families with toilet had separate storage for flushing toilet.

On an average the households not using toilets is less than 5% across all districts.. Non usage of toilets was high in Kachchh, in villages of Goyla, Kaner, Bada, Mota Goniyasar, Moti Khakhar. The major reason being incomplete or non functional toilets.

Small repairs in structure, damaged or missing doors and overflowing of septic tank and soak pits are the main maintenance issues related to toilets. About 71% households have reported to spend money more than once on maintenance of toilets in last two years. Many of the households have reported need of desludging soak pits and septic tanks every 6-12 months.

6.7. Impact

As stated earlier, the single largest benefits of construction of household toilets goes to women, as availability of toilets at house has drudgery and enhanced privacy, dignity and safety. Nearly 95% of families with toilets have moved from open defecation to use of toilets now. This has reduced practice of open defecation to large extent in the villages. 65- 80% households across all districts have reported to have improved personal hygiene. On an average, 10% of HHs have reported to have impact through getting productive time due to toilet facility at home.

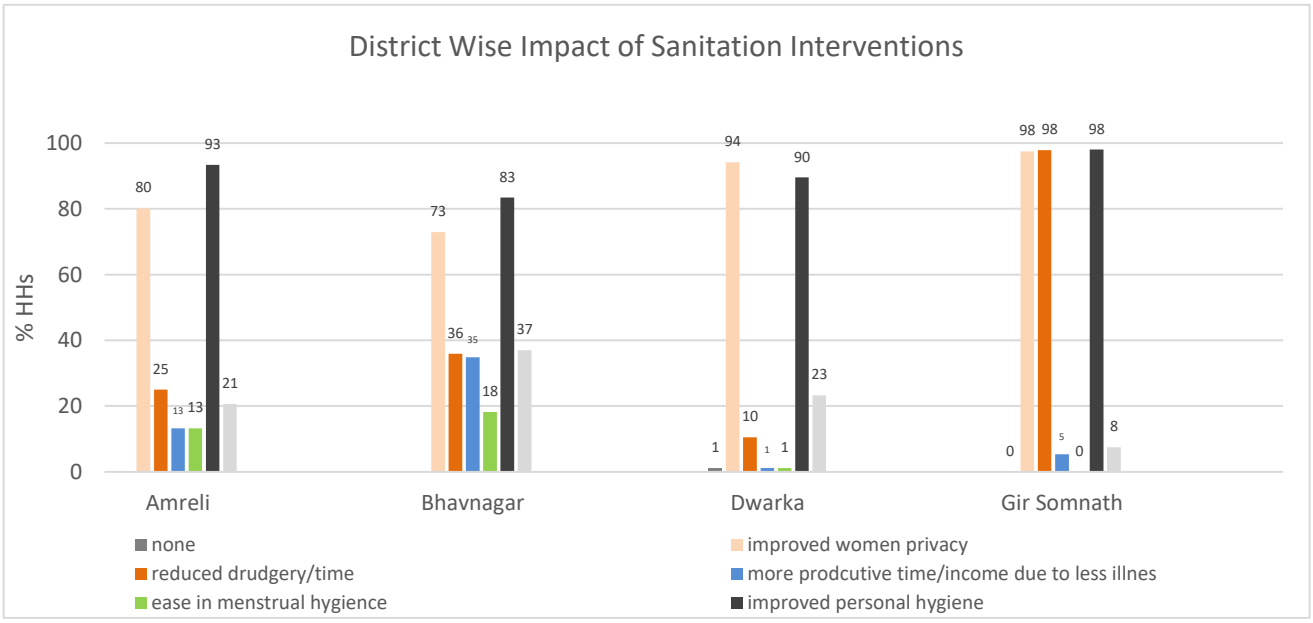


Figure 33 District wise impact of toilet availability at household level- Part 1

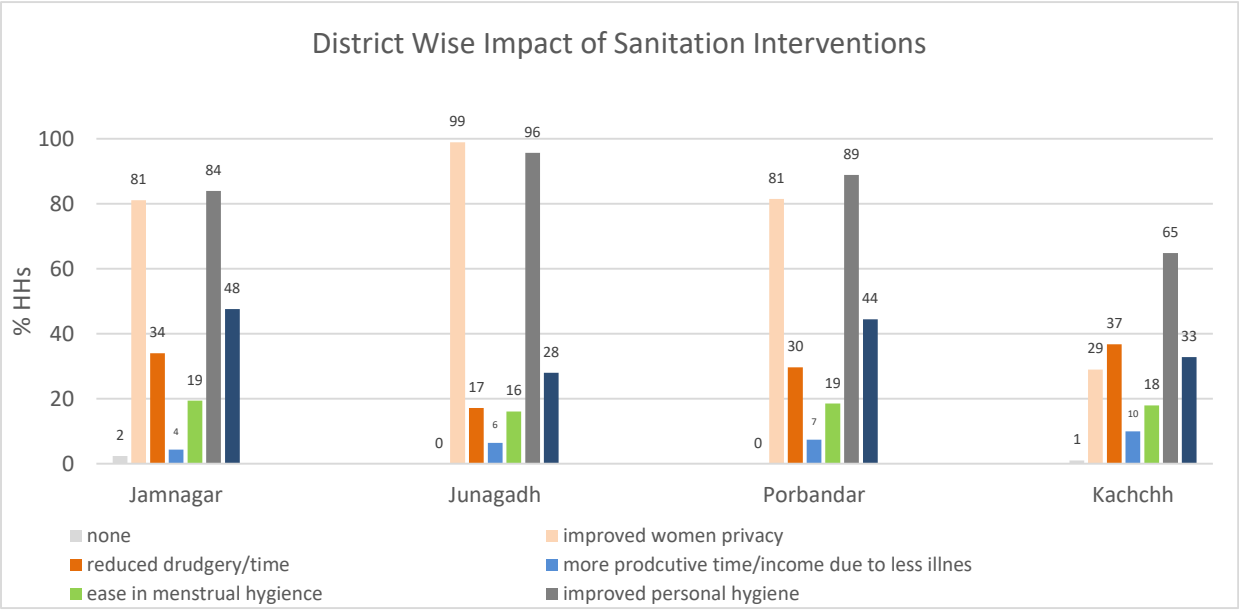


Figure 34 Figure 30 District wise impact of toilet availability at household level- Part 2

The study shows that around 22% families have reported reduction in vector related diseases after construction of toilets. Besides, people have reported reduction in vectors (Mosquitoes and Flies) near their house in varying degrees due to reduction in open defecation.

"construction of household toilet have given them great relief from walking to the bushes in darkness. It has not only provided much needed privacy but also added dignity and safety for women members of the family"

Naguben Bhupatbhai Dabhi, Kadsaliya, Mahuva

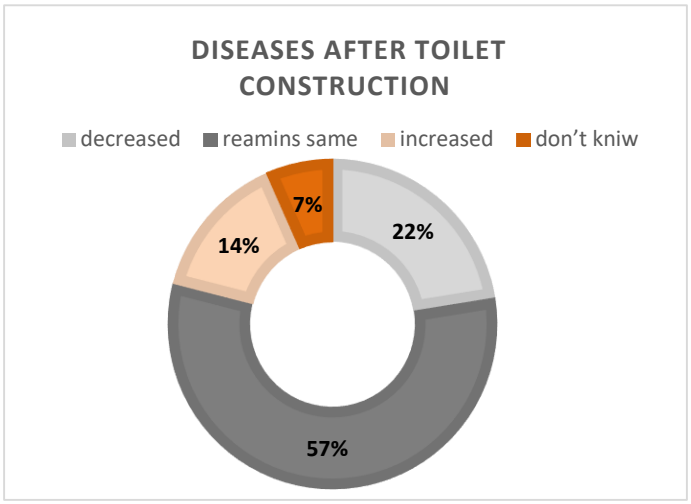


Figure 35 Impact on diseases after toilet construction

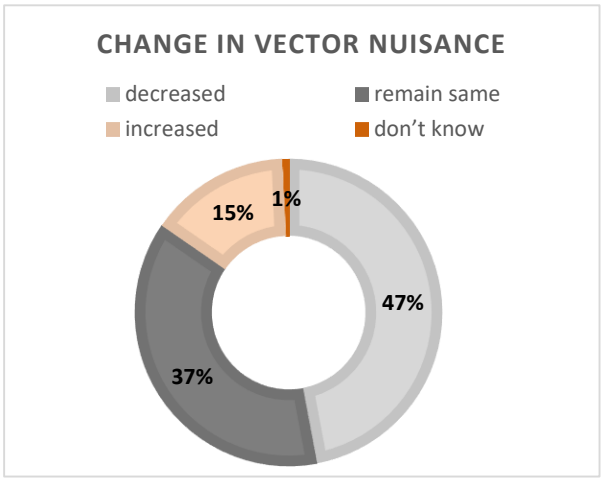


Figure 36 Impact on vector nuisance after construction of toilet

6.8. Hygiene Practices

Safe hygiene practices like hand washing (before eating and after defecation and disposal of stool of children in toilet) were well adopted by most of the households across all districts. Nearly 82% of households use soap and water for hand washing, other 13% use ash or mud while only 5% use only water for hand washing. Use of ash was observed more in Kachchh, Junagadh and Bhavnagar districts.

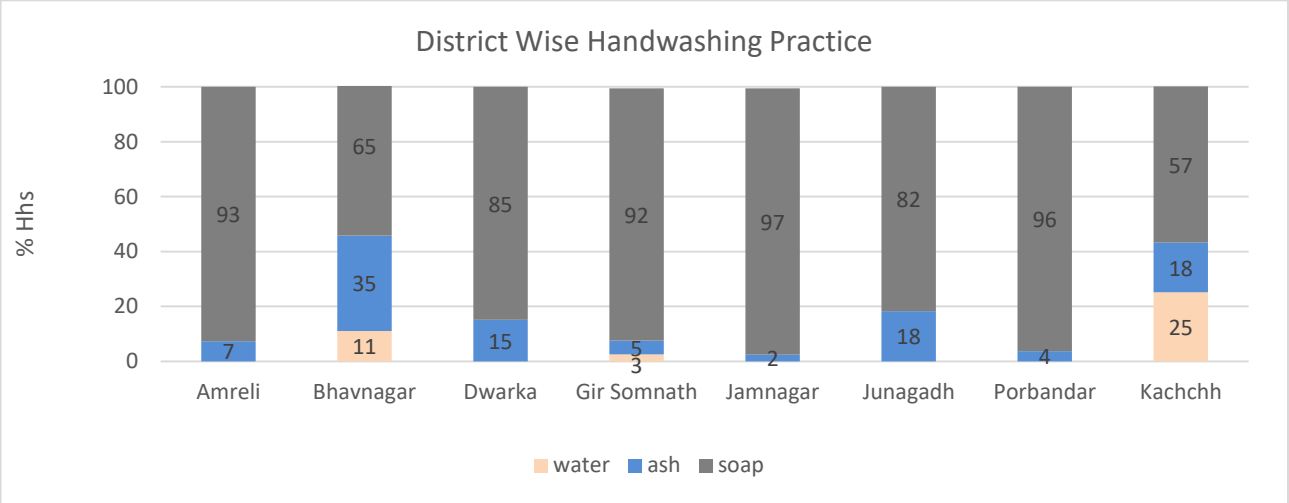


Figure 37 District wise hand washing practice

6.9. ODF villages

Rural areas of Gujarat have been declared Open Defecation Free (ODF) on 2nd October 2017 Hon. President of India. However, the household survey and FGD with 45 village Panchayats reveals that only 35% villages had availability of 100% household toilets. Most of these are declared ODF and usage of toilets is nearly 100%. However, even in these villages, few members of 5-10% household still go for open defecation.

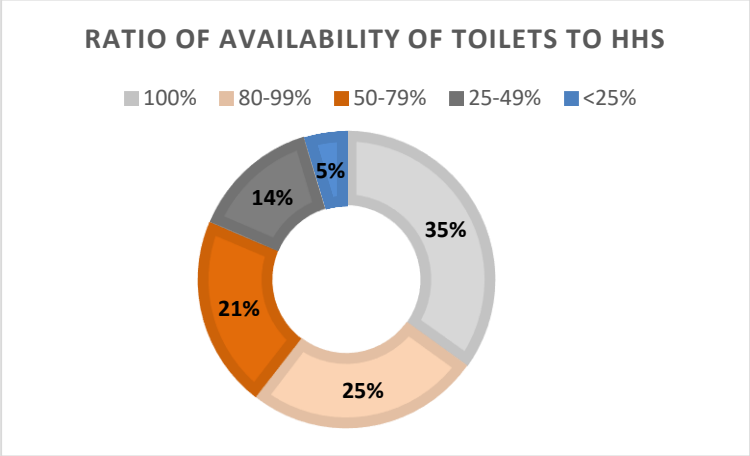


Figure 38 Ratio of toilets to households

In the discussion with Panchayat members and others, it was confirmed that in rest Another 25% villages had above 80% households with toilets, 21% of villages had 50-80%, another 14% villages had ratio of HH toilet availability between 25% to 50%; and rest 5% villages had less than 25% of households having toilets. Even if it is assumed, as reported that the usage of toilets is 100%, where available, still there are considerable gaps to mark the village or a district as Open Defecation Free. Also the point to note that 5-10% of people across all villages were not using the toilet even if it was available at their house due to reasons like habit of open defecation, unclean toilets, broken doors and even vicinity of toilet to worship place.

Figure 39 Pictures of household toilets

The practice of open defecation is still prevalent in most of the villages, due to one or other reasons. The environment sanitation in many villages is poor, with loads of garbage, spilling of wastewater and unhygienic conditions. There is a need of intensive behaviour change communication projects.

Use of various IEC (Information, education and communication) materials like wall paintings, slogans, pamphlets; behaviour change communication methods like group exercises, skits, documentaries were used by ISAs on varying scale for promoting safe sanitation practices in the villages. Programmes with Panchayat, Nigrani Samitis (especially in villages of Jamnagar, Amreli and Bhavnagar) and community groups generated awareness and sensitisation among people to construct toilets and adopt it to use as a safe sanitation practice. However, despite all these efforts, there were villages where open defecation was practiced widely. Some of these villages where open defecation was reported more than 35% of households (as discussed with Panchayat members) are listed here. (However, the study does not verify it beyond the correlation of data obtained from household survey indicating that not all members in the family use toilets in case of more than 35% of respondents)

Table 13 Villages with high rate of open defecation

District	Villages with major issue of open defecation	
	Phase I	Phase II
Dark		Samlasar
Jamnagar	Jaga, Sumri	Pipaliya
Gir Somanath	Chikhali, Tad, Lerka, Hasnavadar, Ukadiya	Arithiya, Devalpur, Bhvavada

Kachchh		Chamra, Kaner, Kervandh, Goyla, Mindhiyari
Bhavnagar	Nani Jagadhar	Chhapriyali
Junagadh	Moti Dhanej	
Porbandar		Chingariya, Virol
Amreli	Visaliya	

To summarise this section on Sanitation and Hygiene practices lets us look at positive takeaways and learning points

Table 14 Summary of observations for Sanitation section

Positive takeaways	Learning points and recommendations
Availability of household toilets has increased use of toilets and reduced open defecation to large extent	Focus on building toilets and target based projects are not enough to bring about a sustained change in sanitation practices. Behaviour change issues and sensitisation needs to be taken up effectively
People have invested considerable money and other resources in construction of their own toilet and bathroom units and have not been entirely dependent on government subsidy	Involving NGOs, CBOS, Schools and other stakeholders is essential of an effective project on sanitation. Panchyats should be sensitized to develop a mechanism to ensure that every new house constructed must have toilet whether privately constructed or under government program/scheme.
Hygiene practices like hand washing is widely practised in rural areas	NGOs role in sensitising and mobilising communities on sanitation issues should not be ignored and insistence of target (number of toilet constructed) base approach should be reduced for sustained results.
All schools have sanitation units and the use of toilets by students and young children is on the rise	Awareness and education on technological options including low cost sanitation solutions should be enhanced at rural level
	Contracting out construction of toilets to private contractors on large scale in the villages should not be encouraged unless agreed upon by communities at large.
	Service delivery models for repair and retrofitting of constructed toilets will be in demand in rural areas in future.
	Need to work on safe disposal of waste water as onsite solutions of septic tank and soak pits are environmentally hazardous and can lead to health hazards also. Systems like Decentralised Wastewater Treatment System (DEWATS), combined with offsite measures like sewer lines at cluster or village level can ease the problem of environment degradation, reduce health hazards from wastewater and also contribute to conservation of water by reusing it.

7. Way Forward

Considering the wide scope and enormous outreach of CADP project, it can be deduced from the impact assessment study that the project has been fairly successful in achieving its objectives of enhanced water security and greater influence on sanitation practices. Some of the important insights derived from discussion with ISAs are explained below.

- Strategy to work with Pani Samitis, building their capacities and sensitising community to develop strong community managed water supply has been fairly successful. Working with strong guidelines developed by WASMO yielded desired results. Overall, the freedom and autonomy to work under the project was well received by partner agencies. Also, the support provided by CSPC was largely appreciated. Support from agencies like WASMO and district administration in this regards was fruitful.
- However, with passage of time, change in Pani Samiti structure and members, the efficiency and effectiveness of management system has diluted a bit. Also, in few instances, district administration's efforts to restrict autonomy of Pani Samitis to take management and technical decisions at local level was not very well taken by Samiti members.
- ISAs feel that their legitimate partnership with government helped them play crucial role in implementation of projects in first phase. However, in second phase when their role was diluted, especially in sanitation project, they had little say over monitoring quality of construction and equity, which led to compromising project objectives.

To summarise recommendations given at the end of each section broadly, following potential works can be taken up in next phase in line with overall project objectives

- Sustained refresher courses and induction projects can be taken up for Pani Samiti members, especially new members who are not exposed to guidelines of Pani Samiti roles and functions and concept of community managed water supply concept.

- A comprehensive capacity building project on emerging challenges in operation and maintenance of water supply systems, quality control, water budgeting, conservation of local water sources, rainwater harvesting, conjunctive use of water etc can be developed and implemented with Pani Samitis. Develop service delivery models for operation and maintenance of water supply systems in rural areas.

- Interventions for Improving environment sanitation, including building demonstration models for sustainable solid waste management and waste water recycling systems can be taken up. Social and Behaviour Change Communication (SBCC) programs can be taken up for adoption of safe sanitation practices, including abolishing open defecation.

- There is need of block level water testing laboratory to monitor water quality of major source at regular intervals.

- Panchayats should be sensitized to develop a mechanism to ensure that every new house constructed must have toilet whether privately constructed or under government program/scheme.

Annexure 1 Village Wise Details of Study Sample

Sr. No	District	Block	Village	Water Supply HHs	Sanitation HHs	RRWH HHs
1	Amreli	Rajula	Barpatoli	32	18	7
2	Amreli	Rajula	Jinjka		21	
3	Amreli	Rajula	Kadiyadi	30	7	12
4	Amreli	Rajula	Mandal		17	
5	Amreli	Rajula	Morangi	36	10	4
6	Amreli	Rajula	Moti Kherali		21	
7	Amreli	Rajula	Navi Mandardi	27	14	12
8	Amreli	Rajula	Rabhda	18	12	9
9	Amreli	Rajula	Rampara	22	5	
10	Amreli	Rajula	Visaliya	22	11	
11	Bhavnagar	Mahuva	Beda	31	3	8
12	Bhavnagar	Mahuva	Chhapariyali	32	11	6
13	Bhavnagar	Mahuva	Kadsaliya	35	20	
14	Bhavnagar	Mahuva	Kantasar		19	
15	Bhavnagar	Mahuva	Madhiya	23	5	5
16	Bhavnagar	Mahuva	Nana Jagdhara		32	
17	Bhavnagar	Mahuva	Ratiya		23	
18	Bhavnagar	Mahuva	Ratol		10	
19	Bhavnagar	Mahuva	Sundarnagar		4	
20	Bhavnagar	Mahuva	Tavida	19	8	8
21	Bhavnagar	Talaja	Bhalar	60	9	3
22	Bhavnagar	Talaja	Belda	51	11	9
23	Bhavnagar	Talaja	Ghantarvala	29	12	6
24	Bhavnagar	Talaja	Unchadi	64	15	7
25	Dwarka	Dwarka	Baradiya	26	13	8
26	Dwarka	Dwarka	Dhasanvela	19	14	
27	Dwarka	Dwarka	Samlasar	22	12	
28	Dwarka	Dwarka	Shivrajpur	17	13	8
29	Dwarka	Dwarka	Vachu	29	14	6
30	Dwarka	Dwarka	Vasai	15	21	
31	Gir Somnath	Kodinar	Arethiya	26	8	
32	Gir Somnath	Kodinar	Bodva	22	11	2
33	Gir Somnath	Kodinar	Pipli	30	12	5
34	Gir Somnath	Kodinar	Sogada	25	11	4
35	Gir Somnath	Kodinar	Vithalpur	31	15	
36	Gir Somnath	Kodinar	Devalpur	29		
37	Gir Somnath	Sutrapada	Alindra	23	5	
38	Gir Somnath	Sutrapada	Bhuvada	26	9	

39	Gir Somnath	Sutrapada	Devalpur		10	
40	Gir Somnath	Sutrapada	Kadvar	21	10	
41	Gir Somnath	Sutrapada	Khera	9	4	
42	Gir Somnath	Sutrapada	Padruka	21	12	
43	Gir Somnath	Sutrapada	Pranjali	22	11	
44	Gir Somnath	Sutrapada	Rangpur	25	9	5
45	Gir Somnath	Sutrapada	Sara	24	11	
46	Gir Somnath	Sutrapada	Solaj	27	11	
47	Gir Somnath	Sutrapada	Bhuvatimbi	22	12	6
48	Gir Somnath	Una	Chikali	30	12	5
49	Gir Somnath	Una	Lerka	35	12	
50	Gir Somnath	Una	Paladi	21	11	
51	Gir Somnath	Una	Simasi	24	11	6
52	Gir Somnath	Veraval	Tativela	22	13	5
53	Gir Somnath	Veraval	Bhevala	20	15	
54	Gir Somnath	Veraval	Chhatroda	19	11	4
55	Gir Somnath	Veraval	Hasnavadar	16	14	
56	Gir Somnath	Veraval	Sidokar	9	8	5
57	Gir Somnath	Veraval	Ukadiya	22	12	5
58	Jamnagar	Jamnagar	Fachariya		11	
59	Jamnagar	Jamnagar	Jaga	29	12	
60	Jamnagar	Jamnagar	Kharavedha		35	
61	Jamnagar	Jamnagar	Khimaliya	26	14	
62	Jamnagar	Jamnagar	Khimrana		24	
63	Jamnagar	Jamnagar	Medi		17	
64	Jamnagar	Jamnagar	Nagedi		18	
65	Jamnagar	Jamnagar	Sumari	25	14	
66	Jamnagar	Jamnagar	Shekhpat	29		
67	Jamnagar	Kalyanpuur	Ran		13	11
68	Jamnagar	Khambhaliya	Habardi		20	10
69	Jamnagar	Khambhaliya	Keshod	26	21	6
70	Jamnagar	Khambhaliya	Pipaliya	14	7	8
71	Junagadh	Maliya	Moti Dhanej	23	12	6
72	Junagadh	Mangrol	Gorej	20	11	3
73	Junagadh	Mangrol	Kalej	19	15	
74	Junagadh	Mangrol	Lambora	25	13	
75	Junagadh	Mangrol	Nana kotda	22	17	
76	Junagadh	Mangrol	Sultanpur	24	14	
77	Junagadh	Mangrol	Virol	20	11	6
78	Porbandar	Porbandar	Ratiya	24	17	

79	Porbandar	Porbandar	Chingariya		10	
80	Kachchh	Abdasa	Aida	21	10	
81	Kachchh	Abdasa	Goyla	22	15	
82	Kachchh	Abdasa	Kervandh	20	6	
83	Kachchh	Abdasa	Koravat	11	6	
84	Kachchh	Lakhpat	Chamra	25	4	5
85	Kachchh	Lakhpat	Kaner	28	19	9
86	Kachchh	Lakhpat	Mindhiyari	24	13	6
87	Kachchh	Mandvi	Bada	20	13	
88	Kachchh	Mandvi	Bharapar	22	11	
89	Kachchh	Mandvi	Bhisara	17	9	
90	Kachchh	Mandvi	Hasnavadar		1	
91	Kachchh	Mandvi	Kokaliya	20	12	
92	Kachchh	Mandvi	Kotdi	23	10	5
93	Kachchh	Mandvi	Mapar	24	23	
94	Kachchh	Mandvi	Mota Goniyasar	20	10	
95	Kachchh	Mandvi	Nana Goniyasar	19	10	
96	Kachchh	Mandvi	Nanalayja	20	12	
97	Kachchh	Mandvi	Shirva	12	11	
98	Kachchh	Mandvi	Vindh	16	15	
99	Kachchh	Mundra	Babiya	7	11	5
100	Kachchh	Mundra	Moti Khakhar	19	12	
101	Kachchh	Mundra	Tapar	24	15	
			Total	**2000**	**1259**	**250**

Annexure 2 Questionnaires used for study

(Attached separately)