



# **Functionality Assessment of Household Tap Connection under National Jal Jeevan Mission - 2022**



**District Report: North Goa, Goa**  
**Survey Duration: March to April 2022**

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## Abbreviations

AWC	Aanganwadi Centre
FHTC	Functional Household Tap Connection
Gol	Government of India
GP	Gram Panchayat
HF	Health Facility
HH	Household
HGJ	Har Ghar Jal
JJM	Jal Jeevan Mission
LPCD	Litres per Capita per Day
MVS	Multi-village Scheme
NJJM	National Jal Jeevan Mission
RC	Residual Chlorine
O&M	Operation and Maintenance
OHT	Over Head Tank
PSU	Primary Sampling Unit
PWS	Piped Water Supply
SVS	Single Village Scheme
VAP	Village Action Plan
VWSC	Village Water and Sanitation Committee
WQMIS	Water Quality Monitoring and Information System

## Glossary

1. **Community** – Group of people living in one particular area or village/habitation
2. **Cross-sectional research** – A cross-sectional study is a type of research design in which data is collected from a relatively large and diverse group of people at a single point in time
3. **Drinking water source** – Groundwater (open well, borewell, tube well, handpump, spring, etc.)/ surface water (river, lake, pond, reservoir, etc.)/rainwater, available for drinking and domestic use
4. **Improved sources** – The following sources as considered improved by the National Family Health Survey definitions: Piped water into dwelling, yard/plot with a tap, piped water connected to public stand-posts, tube well or borewell, Hand pump, dug well–protected, Spring–protected, Rainwater, Water ATM/ Community RO plant/ Community Water Purification Plant (CWPP)
5. **Unimproved sources** – The following sources as considered unimproved by the National Family Health Survey definitions: Unprotected spring, unprotected dug well, cart with small tank / drum, Tanker/ truck, Surface water (river/ dam/ lake/ pond/ canal), and bottled water
6. **Functional Household Tap Connection (FHTC)** – A tap connection to a rural household for providing drinking water in adequate quantity of prescribed quality on regular basis.
7. **Functionality of FHTC** – Functionality of a tap connection is defined as having infrastructure, i.e., household tap connection providing water in adequate quantity, as presented:

Definitions	Fully-functional	Partially-functional	Non-functional
Quantity	$\geq 55$ LPCD	$> 40$ lpcd - $< 55$ LPCD	$< 40$ LPCD
Regularity	12 months or daily basis	9-12 months or $<$ daily basis	$< 9$ months or $<$ daily basis
Quality	Potable	Potable	Non potable

8. **Quantity (in litres)** of water received by households per person per day should meet the service level of 55 lpcd.
9. **Functionality Assessment** – An assessment of the functionality of rural household tap connections based on a sample survey
10. **Fully Regular** – Regularity of water is considered when a rural household receives water for 12 months on daily basis or as per schedule.
11. **Potability** – Potable water is water that is safe to be used as drinking water. Parameters of potable water are mentioned below:

Parameters for potable water tested in the survey	Unit	Acceptable Limit	Permissible Limit in the absence of alternative sources
i. pH (tested on site)	-	6.5 to 8.5	No relaxation
ii. Free residual chlorine (tested on site)	Mg/litre	0.2	1
iii. Turbidity	NTU	1	5
iv. Total hardness	Mg/litre	200	600
v. Total alkalinity	Mg/litre	200	600
vi. Chloride	Mg/litre	250	1000
vii. Ammonia	Mg/litre	0.5	No relaxation
viii. Phosphate	Mg/litre	0.3	1
ix. Iron (in hotspots only)	Mg/litre	1	No relaxation
x. Nitrate	Mg/litre	45	No relaxation
xi. Sulphate	Mg/litre	200	400
xii. Total dissolved solids	Mg/litre	500	2000

xiii.	Fluoride	Mg/litre	1	1.5
xiv.	Arsenic (in hotspots only)	Mg/litre	0.01	No relaxation
xv.	Bacteriological test for Total coliform bacteria and E. coli or thermotolerant coliform bacteria		Shall not be detectable in any 100 ml sample	

12. **Sampling** – Selection of a subset of individuals from within a statistical population to estimate water service delivery among the population. In the current study, households have been sampled to estimate the representation of the village and subsequently of the district as well as of the state.
13. **Types of schemes:** Following are the piped water supply schemes that were assessed
  - a. Mini-solar based piped water supply scheme in isolated/tribal hamlets
  - b. Single Village Scheme (SVS) in villages having adequate groundwater that needs treatment
  - c. Single village scheme (having adequate groundwater/ spring water/ local or surface water source of prescribed Quality)
  - d. Retrofitting of ongoing schemes taken up under erstwhile NRDWP for the last mile connectivity/ retrofitting of completed rural water supply schemes to make it JJM compliant
  - e. Multi-village PWS scheme - with water grids/ regional water supply schemes
14. **Village Action Plan (VAP)** – Plan prepared by Gram Panchayat and/ or its sub-committee, i.e., VWSC/ Paani Samiti/ User Group, etc. based on baseline survey, resource mapping and felt needs of the village community to provide FHTC to every rural household, treat the generated greywater and plan its reuse, undertake surveillance activities, etc. VAP also indicates the fund requirement and timelines for completion of work under the Mission and will be approved by the Gram Sabha. Irrespective of the source of funding, all drinking water-related works in the village are taken up based on the VAP.
15. **Source Sustainability** – includes measures such as aquifer recharge, rainwater harvesting, increased storage capacity of water bodies, reservoirs, de-silting, etc. improve the lifespan of water supply systems
16. **Har Ghar Jal (HGJ)** – An administrative unit wherein all HHs are provided with water supply through FHTCs is called “Har Ghar Jal”.
17. **Public Institutions** – The public institutions in the survey include Aanganwadi Centre (AWC), Health Facilities, Schools, Gram Panchayat, and government buildings.
18. **Working tap connection** – A tap connection supplied water at least one day in the week, preceding of survey
19. **Functional Scheme** – A scheme is said to be functional if it was reported to be working for all 12 months in a year.

## 1. Factsheet

Table 1: District level factsheet

Indicators	State	District
<b>Functionality status of FHTC at households</b>		
Households (HHs) which received water through FHTC at least once in last 7 days (%)	100	100
Fully functional (%)	81	80
Partially functional (%)	17	19
Non-functional (%)	2	1
<b>Quantity of water received by households</b>		
Adequate quantity (>55 LPCD) (%)	97	97
Partially adequate quantity (> 40 LPCD - < 55 LPCD) (%)	1	2
Inadequate quantity (<40 LPCD) (%)	2	1
<b>Regularity of water received by households</b>		
Fully Regular Supply (as per schedule) (%)	93	91
Partially Regular Supply (not as per schedule) (%)	3	4
Irregular Supply (less than 9 months' supply) (%)	4	5
<b>Potable (Quality) water received by households</b>		
Potable (%)	90	91
Non-potable (%)	10	9
Residual Chlorine (RCL) detected with in permissible limits (%)	72	82
<b>Household level indicators</b>		
Households receiving water supply daily-7 days a week (%)	90	82
Daily HH requirement of water being met by FHTC (%)	99	99
Households reported FHTC as a primary source of drinking water (%)	95	90
Households purifying water before drinking (%)	89	85
Households paying water service delivery charges (%)	90	88
Households having coping mechanisms during scarcity (%)	33	40
Households aware of grievance redressal mechanism for reporting problems with FHTC (%)	82	83
Households reported incidence of water-borne diseases in the last year (%)	0	0
Households reported a reduction in time and effort in collecting water (%)	94	90
<b>Overall user satisfaction at the household level</b>		
Regularity (%)	98	99
Overall quality (%)	97	99

Indicators	State	District
<b>Village level indicators (based on village questionnaire)</b>		
Schemes reported to be functional (%)	46	50
Villages with groundwater resource (%)	20	19
Villages having groundwater recharge structure <sup>1</sup> (%)	5	2
<b>Water supply and storage status in villages</b>		
Average no. of times water is supplied in a day	2	2
Villages having OHT/ Sump for storage of water (%)	48	64
<b>Water quality monitoring and surveillance in the villages</b>		
Villages with Field Test Kits (%)	11	11
Villages in which bacteriological test was done in last 1 year by VWSC/ Pani Samiti (%)	17	18
Villages reported to have a mechanism for chlorination (%)	5	8
<b>VWSC/Pani Samiti and PWS signage in villages</b>		
Village reported having presence of VWSC/ Pani Samiti (%)	20	17
Villages in which VWSC/ Pani Samiti is responsible for Operation & Maintenance of PWS schemes (%)	5	7
Villages in which persons are trained to use Field Test Kits (%)	18	19
Villages in which signages about JJM were observed (%)	2	1
<b>Operation and maintenance at village</b>		
Villages levying water service delivery to households (%)	78	75
Convergence of JJM activities with other schemes in the villages (%)	2	3
Villages having skilled manpower for Operation & Maintenance of PWS schemes (%)	30	28
Community monitoring of water wastage in villages (%)	19	16

<sup>1</sup> Out of villages who reported to have groundwater source (N<sub>v</sub>=18)



## 2. Context

Jal Jeevan Mission (JJM) was launched on the 15th of August 2019 with the objective to provide functional household tap connections (FHTCs) to all rural households.

Figure 1: Har Ghar Jal - Objective, Vision, & Outcome



In accordance with the overall objectives as specified in the Operational Guidelines for the implementation of the NJJM, GoI carried out a sample survey to assess the functionality of household tap connections. As part of this endeavour, NJJM, GoI engaged HTA Kantar Public to conduct the 'Functionality Assessment' of the household as well as public institution/ buildings such as schools, anganwadis, gram panchayat buildings, public health facilities, and wellness centers in all the rural districts for the fiscal year 2021-22.

### 2.1. District snapshot: North Goa

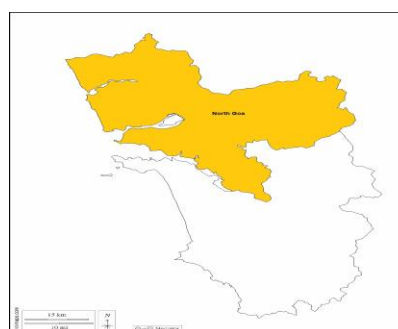
District North Goa of Goa has a population of 7,14,208. The district has 6 blocks. Out of 231 villages in the district, none of the villages are SC dominated and 9 are ST dominated villages. The district lies in West Coast Plains and Hills Region and receives an annual rainfall of 3232.5mm.

Presented here are district level information collated from the DDWS-IMIS:

Figure 2: District IMIS Status & Map

#### IMIS status:

- 231 (100% of all) villages are Har Ghar Jal
- 0 (0% of all) villages are Non-Har ghar Jal
- Non-SC/ST dominated district
- Non JE/AES
- Yes- History of water contamination
- 229 (99% of all) villages with PWS more than 20 FHTC





## 2.2. FHTC Assessment Objectives

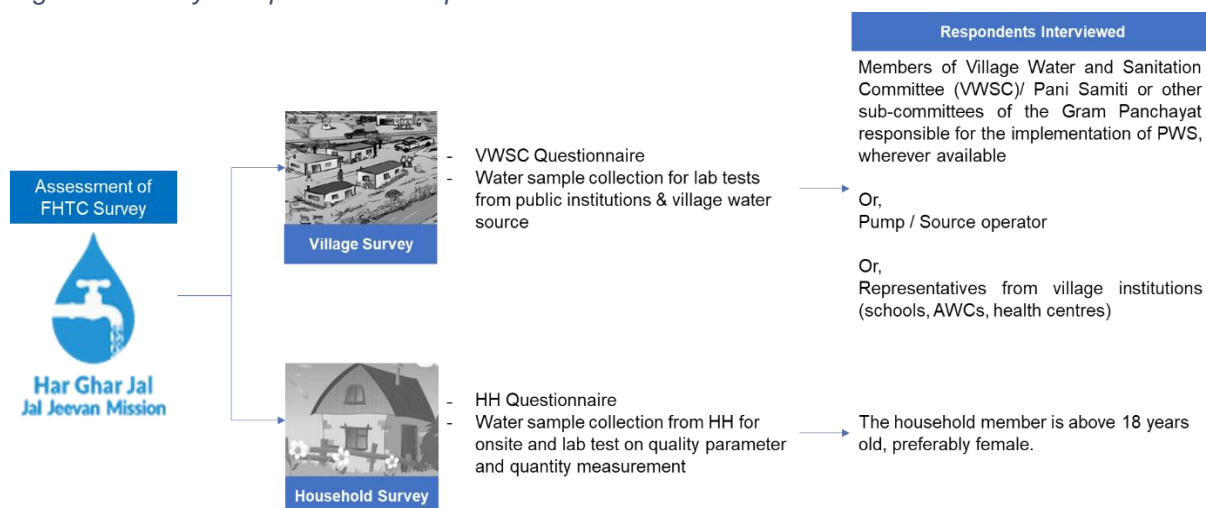
Figure 3: Objectives of Functionality of Tap Connections



## 2.3. Assessment Methodology

A cross-section research design has been used for this functionality assessment study. Quantitative data were collected from villages and households across all states/UTs using the CAPI (Computer Assisted Personal Interviewing) mode. The survey includes two components, village, and household.

Figure 4: Survey Components & Respondents



## 2.4. Sample Size

The sample size was calculated to provide estimates with a 95% confidence interval (CI) and 5% margin of error (MoE) after incorporating the correction factor for a finite population considering the total number of geographic units having FHTCs.

- Village sample is estimated to be representative at the state level
- HH sample estimated to be representative at the district level

- Number of Har Ghar Jal (HGJ) villages were proportionately sampled at the district level
- All PWS schemes (up to 4) were covered per village. Per scheme approximately 9 (3 each from the head, middle, and tail HHs) or 18 households (6 each from head, middle, and tail HHs) were sampled to achieve the desired sample at the district level.

## 2.5. Sampling Methodology

As per the design, all villages having a PWS scheme with 20 or more functional household tap connections were included in the sample frame. The probability proportionate to size (PPS) method was used for village selection in each district. The steps for random selection of villages using PPS are as presented:

Figure 5: Steps for Village Sampling



The key considerations for the village and household sampling were:

Figure 6: Sampling Considerations – Village & Households



The record of all district-wise village replacements is maintained and reported as part of the annexure.

## 2.6. Methodology for Water Quantity Measurement at Households

Figure 7: Steps for Measuring Flowrate from Supply-tap at HHs



The flow rate of the water supply was measured using a container with gradual markings (either 5 litres or 1 litre, based on the flow of the tap) and a stopwatch/timer-watch. The process followed is as described in Figure 7.

In the case of households where the FHTC is connected directly with the storage tank, the following steps were adopted to measure the quantity:

- Assessor first asked and recorded length, breadth, and height.
- Assessor dipped a 5 feet long rod, marked the level of the water table, and calculated the volume – length x breadth x-height of water.
- Next the assessor opened the valve of the connection and allowed the water to flow inside the storage for 10 minutes.
- After 10 mins, the valve was closed, and the assessor again dipped the rod and recorded the new height of the water inside the tank. Based on this new 'height' and the CAPI calculated the changed volume.
- The difference in the volume of water in 10 minutes divided by 10 provided the flow rate of the water supply per minute.

The water flow rate was not measured for village-level public institutions.

## 2.7. Methodology for Water Quality Measurement

Water quality was tested for all public institutions available in the villages, including schools, anganwadis, gram panchayat buildings, public health facilities, and wellness centers, and at the selected households. Two types of quality tests were carried out – a) spot test for pH and free residual chlorine, and b) water sample was collected and transported to labs for testing against 13 quality parameters (total 15) as specified in Figure 8.

Figure 8: On-site & Laboratory Based Quality Test



JJM, with the support of the BMI Division of ICMR, enabled a new interface on the WQMIS portal for “Functionality Assessment (FA) User” to enable seamless harmonization of water sample registration, sample submission for testing, and sharing of results as per the applicable quality parameters.

## 2.8. Project implementation

An overview of the project implementation is as presented:

Figure 9: Broad project implementation framework



A total of 5 teams (comprising 5 supervisors, 30 assessors, and 5 water collection assistants) were recruited, trained, and deployed to complete the survey across the state of Goa. One survey team covered approximately 2 – 3 districts. The state-wise team deployment and fieldwork dates were as presented:

**Table No. 1: State-wise team deployment and data collection start & end dates**

State	Teams deployed	Start date	End date	Total data collection days
Goa	5 Teams	3/5/2022	4/1/2022	26 days

A four-tier quality control (QC) system was put in place. At the ground level, the data collection exercise was done using a computer-aided Personal Interview (CAPI) application which contained all logic and skip-checks inbuilt. Also, 5% of the total samples were accompanied by the supervisors. Sub-targeted QC was done by the state field managers (5%) and the central project management team (5%). Apart from this, the central research team monitored the data trend and as per requirement debriefed data collection teams to improve quality.

## 2.9. Sample coverage

**Table No. 2: Sample covered**

District	Targeted sample		Achieved sample		
	Village	HH	Village	HH	Public Institutions
North Goa	95	1,242	95	1,253	360
Goa	189	2,790	189	2,834	639

## 2.10. Sampled village and household profile

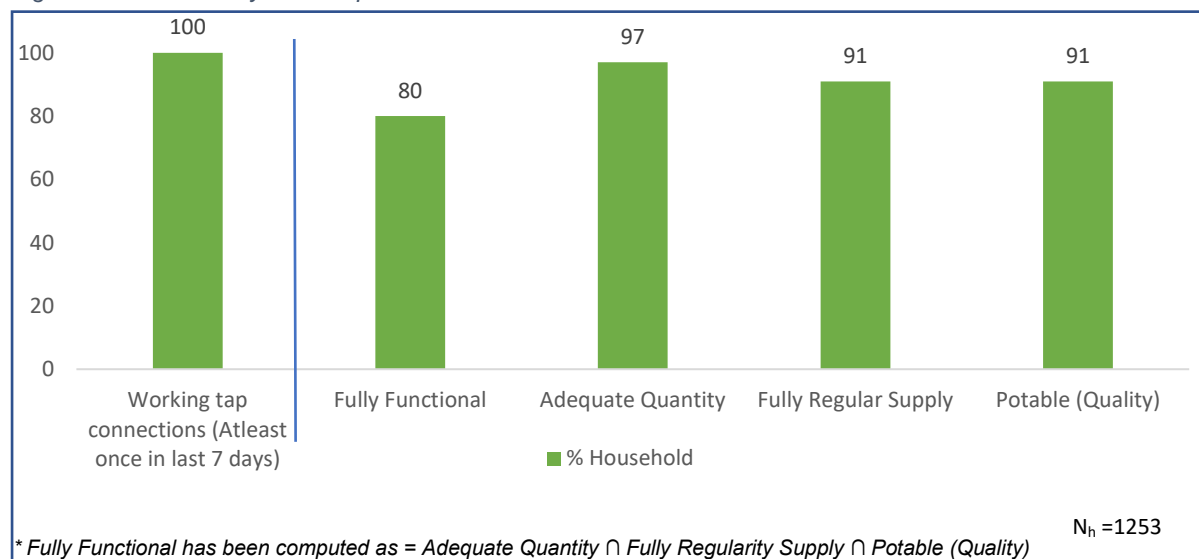
SAMPLED VILLAGES	SAMPLED HOUSEHOLDS
<ul style="list-style-type: none"> <li>Total no. of villages covered in the district – 95</li> <li>Percentage of SC dominated villages covered in the district is 0% (which is equal to the state average, i.e., 0%)</li> <li>Percentage of ST dominated villages covered in the district is 3% (which is slower than the state average, i.e., 13%)</li> <li>Higher proportion of <b>pump operator</b> interviewed at the village level</li> <li><b>Yes</b>, the district reported to have any historical incidence of water contamination</li> </ul>	<ul style="list-style-type: none"> <li>Total no. of households covered in the district – <b>1,253</b></li> <li>Proportion of General - 85%, SC 6%, ST% 2, OBC 7% households</li> <li><b>22%</b> of the FHTC connections are under the name of a female member</li> <li>Average household size – 5</li> <li><b>&gt;75%</b> positive user experience in 5/5 measures</li> </ul>

### 3. Findings

#### 3.1. Functionality status of FHTC at household level

##### A. Overall Functionality\* (in %)

Figure 10: Functionality of HH tap connection



It has been found that 100 percent of the sampled HHs (N=1,253) had working tap connections (i.e., received water at least once in last 7 days). Eight out of ten (80 percent) HHs had fully functional tap connection (i.e., HHs receiving adequate quantity of prescribed quality of water on a regular basis).

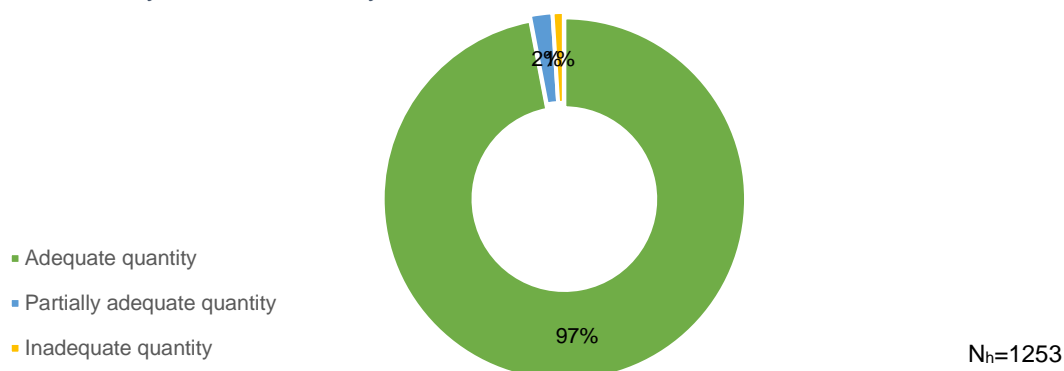
### 3.2. Quantity, Regularity, and Quality of Water

Under JJM, functionality is defined as having infrastructure, i.e., household tap connection providing water in adequate quantity (55 LPCD or more) of prescribed quality on regular basis (every day or as decided by GP and/ or its sub-committee) with adequate pressure. It will also include long-term source and system sustainability. Presented here are the findings in this respect.

#### A. Water quantity measured as LPCD (Litres per Capita per Day)

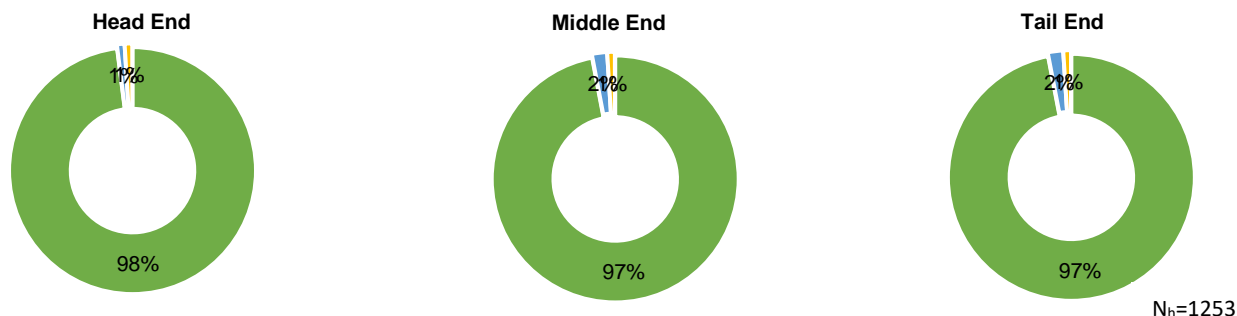
**97% HHs** reported receiving adequate quantity of water

Figure 11: Quantity of water received by households



#### Quantity of water received across head, middle, and tail end HHs

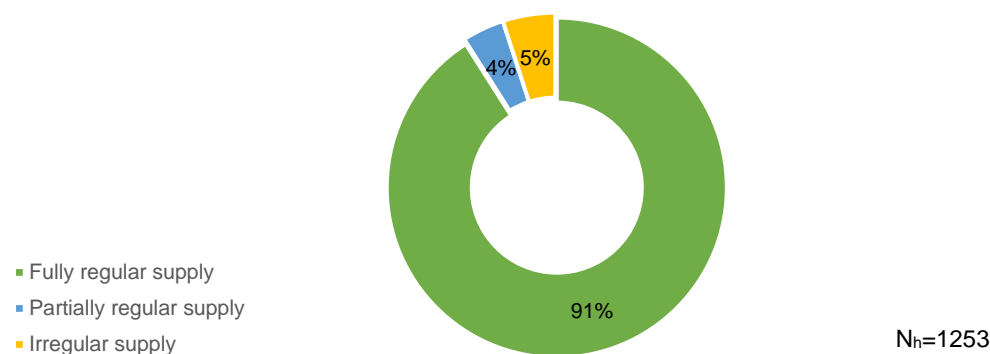
Figure 12: Quantity of water received across head, middle and tail end households



#### B. Regularity of water supply to households

**91% HHs** receive a regular supply of water (as per agreed schedule)

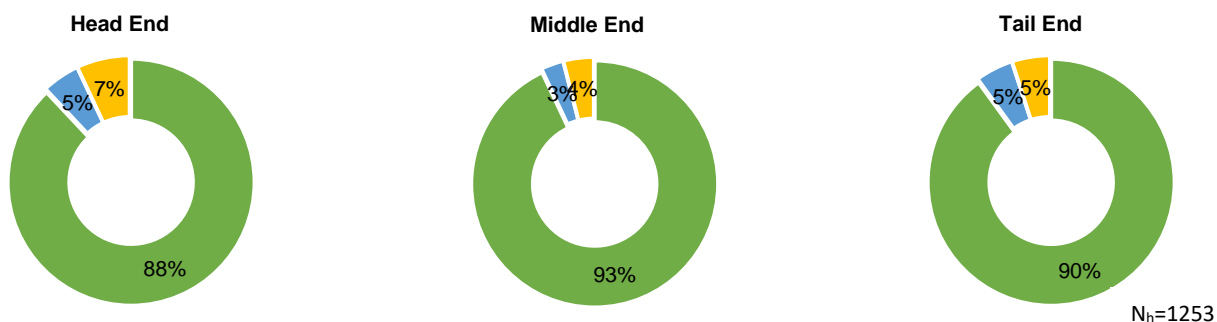
Figure: Regularity of water received by households





### Regularity of water received across head, middle, and tail end

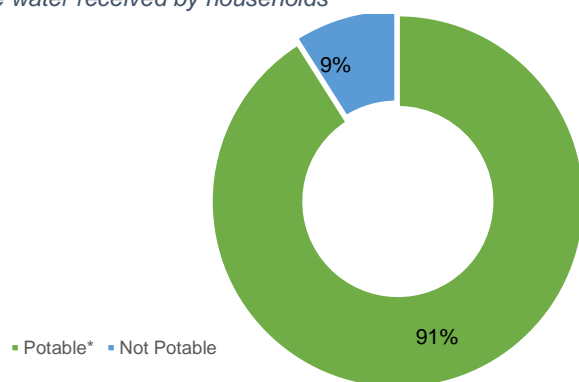
Figure 13: Regularity of water received across head, middle and tail end households



N<sub>h</sub>=1253

### C. Water quality – Potability

Figure 14: Potable water received by households



N<sub>h</sub>=1253

\*Potable water has been considered basis testing of water samples through laboratory tests for physical, chemical, and bacteriological as given in Table 4 parameters (within acceptable/ permissible range) and onsite testing of pH. The details of laboratory test are mentioned in the table given above in the glossary.

**Table No. 3: Village quality parameters reported within permissible range (% sample within permissible range)**

Quality Parameters (NV=95)	Water Samples Tested from Public Institutes			
	Anganwadi Centre	Health Facility	Schools	Others
pH (on-site)	94	92	90	
Turbidity	99	100	99	99
Total Hardness	100	100	100	100
Total Alkalinity	100	100	100	100
Chloride	100	100	100	100
Ammonia	Not tested			
Iron	No history			
Nitrate	Not tested			
Sulphate	Not tested			
Total Dissolved Solids	100	100	100	100
Bacteriological Test	100	100	100	100
Fluoride	Not tested			
Arsenic	Not tested			

**Table No. 4: Household water quality parameters reported within permissible range (in % sample within permissible range)**

Quality Parameters	No of samples tested	% Households
pH (on-site)	1253	91
Turbidity	1227	99
Total Hardness	1184	100
Total Alkalinity	1223	100
Chloride	1138	100
Ammonia	Not tested	
Iron	8	100
Nitrate	Not tested	
Sulphate	Not tested	
Total Dissolved Solids	991	100
Bacteriological Test (Presence/Absence)	659	100
Fluoride	Not tested	
Arsenic	Not tested	

### **Safeguarding piped water supply for unforeseen bacteriological contamination- Presence of Residual Chlorine (RC)**

The Residual Chlorine (RC) in the North Goa district was found in 82% samples. Also, 8% samples were having RC outside range and 10% samples had no RC. It may be mentioned that 100% of water samples passed the bacteriological contamination test but to assure the protection against bacteriological contamination, addition of RC is must in PWS system.

The Residual Chlorine in piped water supply is one of the most important preventive actions to assure quality of water against bacteriological contamination from source to consumption. The presence of residual chlorine within permissible limits is indicator of well-maintained and healthy piped water supply system.

It is advised that behavioural change communication campaigns on appropriate dosage of residual chlorine is held in all villages and monitoring system for chlorine dosing is established. The FTK must have residual chlorine testing facility for effective WQM&S.

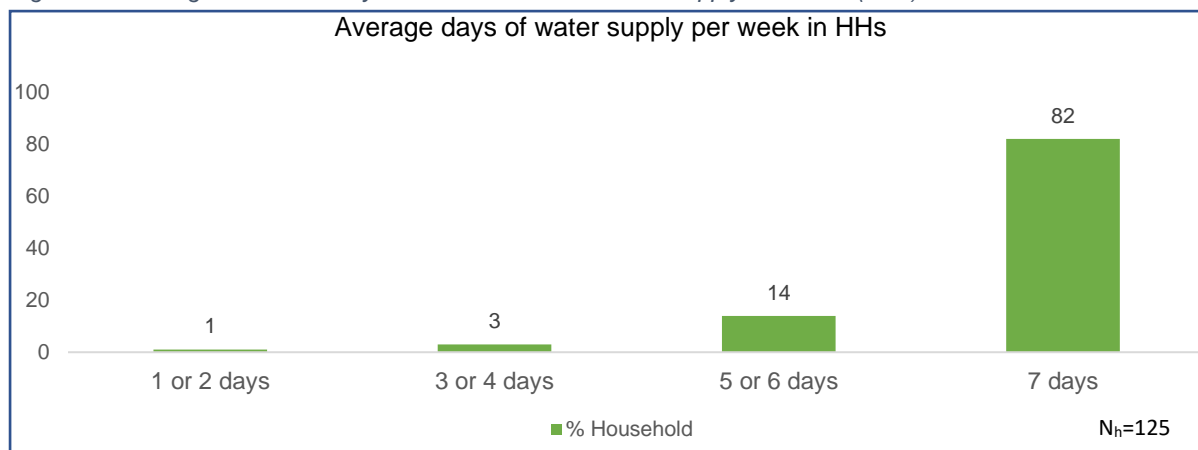
### **Comment on functioning of District Lab:**

The district lab tested water samples for 7 water quality parameters. 1,613 water samples were submitted, and 1,558 water samples were tested, and reports made available. The turnaround time for testing was more than 48 hours in most cases.

The labs did not have any issue with testing the number of water samples submitted nor had any issues with human resource, reagents etc.

### 3.3. Average water supply days in a week

Figure 15: Average number of days households receive water supply in a week (in %)

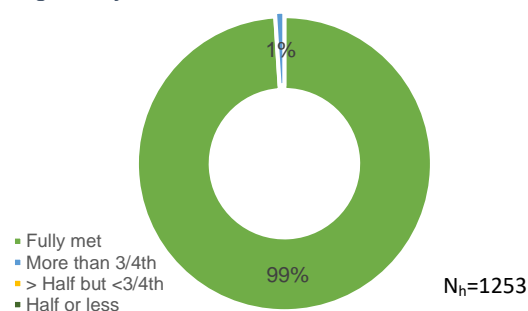


### 3.4. Household utilization of water for drinking and other activities

#### Fulfilment of requirement

**99% HHs** reported that their daily requirement of water is being met by FHTCs

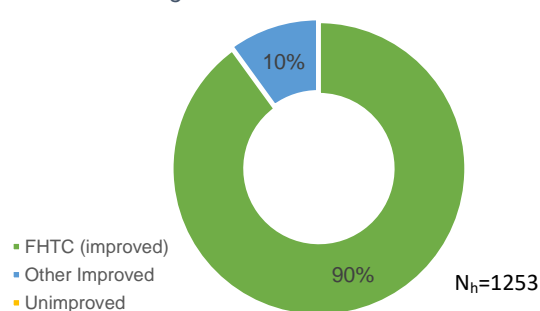
Figure 17: Daily household's requirement of water being met by FHTC



#### Primary source of drinking water

**90% HHs** reported HH tap connection as their primary source of drinking water

Figure 18: Households reported FHTC as primary source of drinking water



### 3.5. Status at HH level (Nh=1253)

% HHs purifying water before drinking	% HHs paying water service delivery charges	% HHs with booster pumps	% HHs having coping mechanism during scarcity
85%	88%	31%	40%
% HH aware of grievance redressal mechanism for reporting problems with FHTC	Channel for registering grievance (Nh=1253*)	Key problems for reporting grievances (N=1253)	% Reported complaints resolved (Nh=92)
83%	Pump-operator	Pipeline Leakage	27%

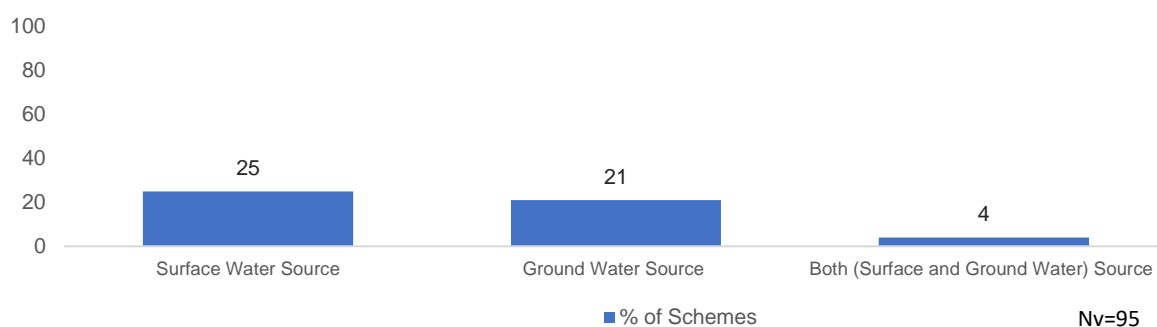
\*HHs who reported complaints in last 1 year

### 3.6. Source sustainability at the village level

#### Schemes based on surface and ground water

25% of schemes are reported to be based on surface water and 21% ground water.

Figure 19: Schemes based on water source in village

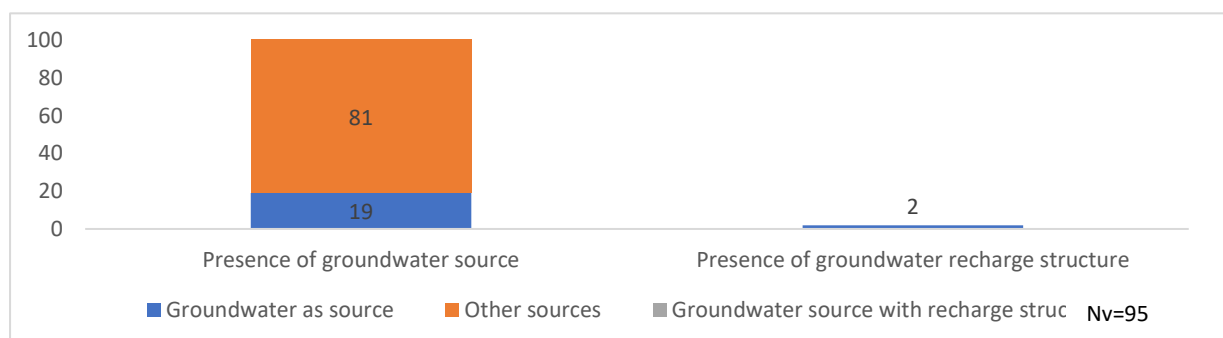


\*'Surface Water Source' is Stream, Spring, Glacier, River, lake, pond etc. and Groundwater Source is open well, borewell, tube well, handpump, spring, etc

#### Villages reported having presence of a groundwater source

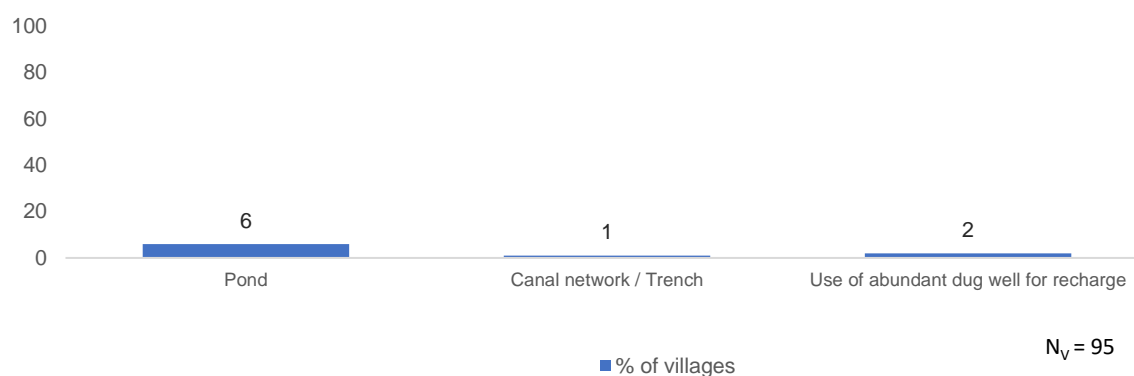
19% of villages reported the presence of groundwater sources like improved dug wells and borewells and 2% were supported by recharging structures.

Figure 20: Villages reported the presence of groundwater sources and among those how many reported to have a recharge structure



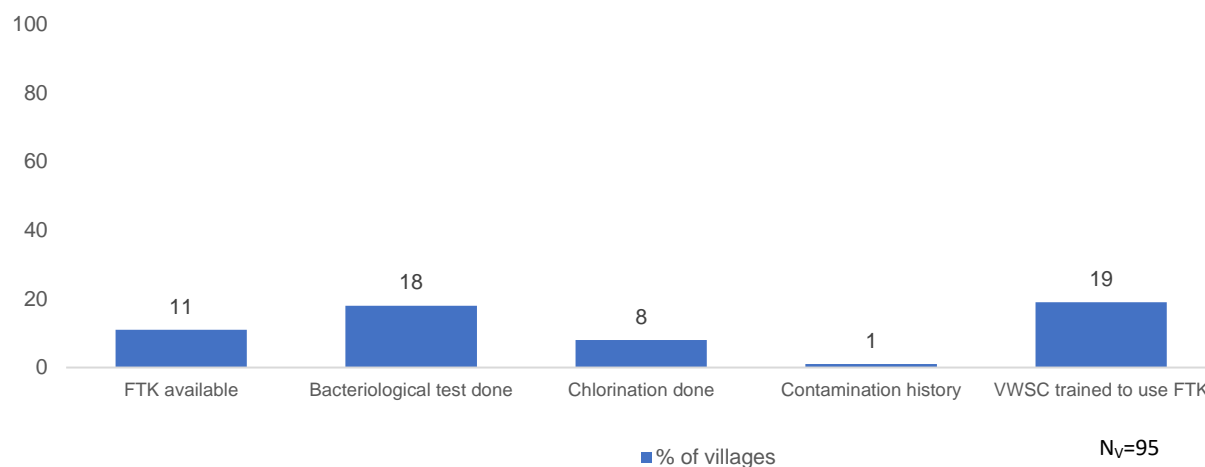
#### The top 3 other source sustainability measure taken by villages

Figure 21: Villages reported having taken other source sustainability measure



### 3.7. Water quality monitoring and surveillance in the villages

Figure 22: Water quality monitoring and surveillance by villages



### 3.8. Status of JJM

#### A. VWSC/Pani Samiti and PWS signage in villages (N<sub>v</sub>=95)

Presence of VWSC/Pani Samiti	VWSC/Pani Samiti responsible for O&M	% Villages – VWSC/PO trained to use FTKs	% Villages with PWS signages
17%	7%	19%	1%

#### B. Water supply, storage and operation & maintenance at village level (N<sub>v</sub>=95)

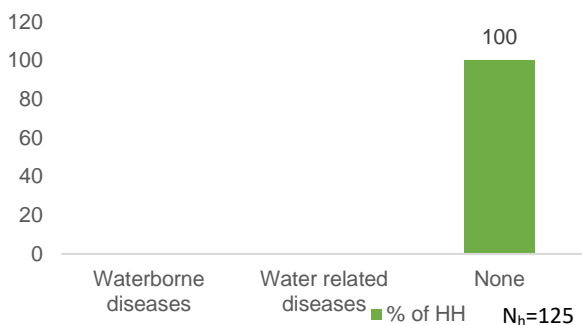
Average no. of supply in a day	% Villages levying water service delivery to HH	% Villages having skilled manpower for O&M for PWS	Community monitoring of water wastage in villages
2	75%	28%	16%
% Villages having OHT/ Sump	% Villages having faced O&M challenges	Primary points for reporting grievances	Key problems for reporting grievances
64%	1%	Other	Pipeline leakage

### 3.9. Perception of HHs on Outcome Indicators

#### a. Health

##### Incidence of water borne diseases at HH level in last one year as reported

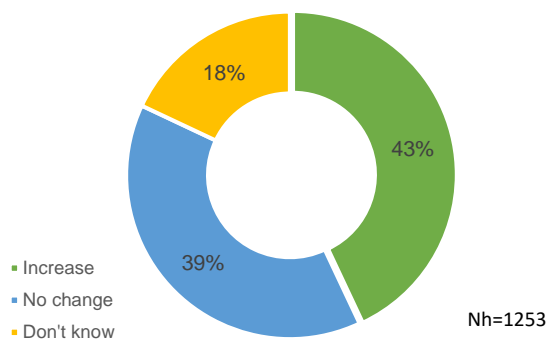
Figure 23: Household reported incidence of water borne diseases in last one year



#### b. Economic Income

##### Change in employment days since FHTC programmes/schemes

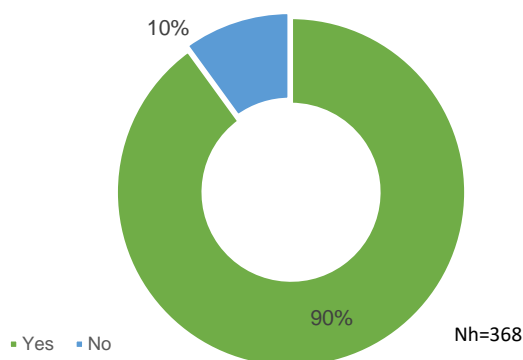
Figure 24: Household reported a change in employment days since FHTC programmes /schemes








#### c. Drudgery

##### Reduction in time and effort in collecting water

Figure 25: Households reported reduction in time and effort in collecting water



## 3.10. User satisfaction

<b>Table No. 5: User satisfaction - more than 75% happy with FHTC services</b>			
<b>S. No.</b>	<b>Parameter (N<sub>h</sub>=1,253)</b>		<b>In %</b>
1	Regularity		99
2	Overall quality		99
3	Colour		99
4	Taste		99
5	Odour		99

Note:

Base (N<sub>v</sub>)=95 means all villages sampled and covered in North Goa district

Base (N<sub>H</sub>)=1,253 means all households sampled and covered across the 95 villages in North Goa district

Base (N<sub>H</sub>)=1,253 means all households where female members used to fetch water before HH tap connection



## 4. Annexures

### 4.1. Summary of villages

<b>Table No. 6: Village summary</b>						
<b>S.No.</b>	<b>Name of sample village</b>	<b>Sample HHs</b>	<b>Actual sample HHs (achieved)</b>	<b>No. of scheme</b>	<b>No of source of surface water</b>	<b>No of source of Ground water</b>
1	Total	1242	1348	107	56	24
2	Talaulim	9	10	1	1	
3	Neura-O-Grande	9	10	1		
4	Mercurim	9	10	1		
5	Mandur	9	10	1		
6	Ella	18	19	1	1	
7	Cumbarjua	9	10	1		
8	Corlim	9	10	1		
9	Chorao	9	10	1		
10	Carambolim	9	10	1		
11	Tivim	9	10	1	1	
12	Sircaim	9	10	1		
13	Sangolda	9	10	1		
14	Salvador Do Mundo	9	10	1		
15	Revora	9	10	1	1	
16	Pomburpa	18	19	1	1	
17	Nerul	9	10	1		
18	Parra	9	10	1	1	
19	Oxel	9	10	1	1	
20	Nadora	9	10	1	1	
21	Nachinola	9	10	1	1	
22	Moitem	9	10	1	1	
23	Moirra	9	10	1	1	
24	Marra	9	10	1		
25	Marna	9	10	1	1	
26	Corjuem	9	10	2		
27	Camurlim	9	10	1		
28	Bastora	9	10	1	1	
29	Assonora	9	10	1	1	
30	Arpora	9	10	1	1	
31	Anjuna	27	28	1	1	1
32	Virnora	18	19	1		
33	Varconda	18	19	1		
34	Torxem	18	19	1		
35	Querim	9	10	1		1
36	Poroscodem	18	19	1	2	
37	Paliem	9	12	1		
38	Morgim	9	10	1		
39	Mandrem	18	19	1		
40	Ibrampur	18	19	1		
41	Dargalim	18	19	1		
42	Corgao	18	19	1		
43	Chandel	9	10	1		
44	Arambol	18	19	1		
45	Agarvado	9	10	1		
46	Velguem	9	10	1		
47	Vaiguinim	9	10	1		
48	Salem	18	19	1	5	
49	Mulgao	9	10	1		1
50	Maem	18	19	2		4
51	Latamarcem	27	28	1	1	1

**Table No. 6: Village summary**

S.No.	Name of sample village	Sample HHs	Actual sample HHs (achieved)	No. of scheme	No of source of surface water	No of source of Ground water
52	Curchirem	9	10	1	1	
53	Cudnem	18	19	1		1
54	Aturli	9	10	1		
55	Amone	9	10	1		
56	Velguem	9	10	1	1	
57	Xelopo-Buzruco	9	10	1		1
58	Ravona	9	10	1		1
59	Poriem	9	10	1		
60	Ansolem	9	10	1		
61	Morlem	9	10	1	1	
62	Guleli	9	10	1	1	
63	Sonus-Vonvoliem	9	10	1		1
64	Usgao	27	28	1		
65	Siroda	27	29	1	1	
66	Savoi-Verem	27	28	1		1
67	Querim	27	29	3	2	1
68	Priol	18	19	1	2	1
69	Ponchavadi	27	28	1		1
70	Orgao	18	24	1	1	
71	Nirancal	18	18	1	2	2
72	Marcaim	9	10	1	1	
73	Candola	18	20	2	1	
74	Candepar	27	28	1		
75	Borim	18	20	2		
76	Boma	18	19	1	2	1
77	Betora	18	19	2	1	2
78	Chimbel	9	10	1	1	
79	Taleigao	9	10	1		
80	Goa Velha	9	10	1	1	
81	Bandora	27	28	4	6	1
82	Curti	27	29	1		
83	Calangute	9	10	1	1	
84	Aldona	9	10	1		
85	Penha De France	9	10	3		2
86	Guirim	9	10	1	2	
87	Colvale	9	10	1	1	
88	Candolim	9	10	1	1	
89	Siolim	9	10	1	1	
90	Socorro	9	10	1		
91	Saligao	9	10	1		
92	Carapur	9	10	1		
93	Pale	9	10	1		
94	Bambolim	18	19	1	1	
95	Calapor	9	10	1		
96	Cujira	18	19	1		

## 4.2. Functionality – 55 LPCD vs regularity vs potability vs working tap connection

<b>Table No. 7: Functionality of HH tap connection</b>						
<b>S. No.</b>	<b>Village</b>	<b>Fully Functional* (% HH)</b>	<b>Adequate Quantity (% HH)</b>	<b>Fully Regular Supply (% HH)</b>	<b>Potable (Quality) (% HH)</b>	<b>Working tap connections (%HH)</b>
1	Total	79.9	97.0	90.5	90.8	100.0
2	Talaulim	100.0	100.0	100.0	100.0	100.0
3	Neura-O-Grande	100.0	100.0	100.0	100.0	100.0
4	Mercurim	100.0	100.0	100.0	100.0	100.0
5	Mandur	100.0	100.0	100.0	100.0	100.0
6	Ella	100.0	100.0	100.0	100.0	100.0
7	Cumbarjua	100.0	100.0	100.0	100.0	100.0
8	Corlim	100.0	100.0	100.0	100.0	100.0
9	Chorao	100.0	100.0	100.0	100.0	100.0
10	Carambolim	77.8	100.0	100.0	77.8	100.0
11	Tivim	100.0	100.0	100.0	100.0	100.0
12	Sircaim	100.0	100.0	100.0	100.0	100.0
13	Sangolda	100.0	100.0	100.0	100.0	100.0
14	Salvador Do Mundo	88.9	100.0	100.0	88.9	100.0
15	Revora	100.0	100.0	100.0	100.0	100.0
16	Pomburpa	94.4	100.0	100.0	94.4	100.0
17	Nerul	100.0	100.0	100.0	100.0	100.0
18	Parra	0.0	100.0	77.8	0.0	100.0
19	Oxel	11.1	22.2	100.0	77.8	100.0
20	Nadora	66.7	66.7	88.9	100.0	100.0
21	Nachinola	66.7	100.0	100.0	66.7	100.0
22	Moitem	100.0	100.0	100.0	100.0	100.0
23	Moirra	100.0	100.0	100.0	100.0	100.0
24	Marra	100.0	100.0	100.0	100.0	100.0
25	Marna	55.6	55.6	100.0	100.0	100.0
26	Corjuem	77.8	100.0	100.0	77.8	100.0
27	Camurlim	66.7	100.0	88.9	66.7	100.0
28	Bastora	77.8	100.0	100.0	77.8	100.0
29	Assonora	100.0	100.0	100.0	100.0	100.0
30	Arpora	0.0	100.0	100.0	0.0	100.0
31	Anjuna	100.0	100.0	100.0	100.0	100.0
32	Virnora	100.0	100.0	100.0	100.0	100.0
33	Varconda	38.9	100.0	100.0	38.9	100.0
34	Torxem	94.4	100.0	100.0	94.4	100.0
35	Querim	100.0	100.0	100.0	100.0	100.0
36	Poroscodem	100.0	100.0	100.0	100.0	100.0
37	Paliem	100.0	100.0	100.0	100.0	100.0
38	Morgim	100.0	100.0	100.0	100.0	100.0
39	Mandrem	100.0	100.0	100.0	100.0	100.0
40	Ibrampur	100.0	100.0	100.0	100.0	100.0
41	Dargalim	100.0	100.0	100.0	100.0	100.0
42	Corgao	94.4	100.0	94.4	100.0	100.0
43	Chandel	77.8	100.0	88.9	88.9	100.0
44	Arambol	94.4	100.0	94.4	100.0	100.0
45	Agarvado	100.0	100.0	100.0	100.0	100.0
46	Velguem	0.0	100.0	100.0	0.0	100.0
47	Vaiguinim	100.0	100.0	100.0	100.0	100.0
48	Salem	100.0	100.0	100.0	100.0	100.0
49	Mulgao	44.4	100.0	100.0	44.4	100.0
50	Maem	94.4	100.0	100.0	94.4	100.0
51	Latambarcem	100.0	100.0	100.0	100.0	100.0
52	Curchirem	100.0	100.0	100.0	100.0	100.0
53	Cudnem	83.3	100.0	100.0	83.3	100.0
54	Aturli	88.9	100.0	100.0	88.9	100.0
55	Amone	88.9	100.0	100.0	88.9	100.0

<b>Table No. 7: Functionality of HH tap connection</b>						
<b>S. No.</b>	<b>Village</b>	<b>Fully Functional* (% HH)</b>	<b>Adequate Quantity (% HH)</b>	<b>Fully Regular Supply (% HH)</b>	<b>Potable (Quality) (% HH)</b>	<b>Working tap connections (%HH)</b>
56	Velguem	100.0	100.0	100.0	100.0	100.0
57	Xelopo-Buzruco	0.0	100.0	100.0	0.0	100.0
58	Ravona	11.1	100.0	100.0	11.1	100.0
59	Poriem	100.0	100.0	100.0	100.0	100.0
60	Ansolem	0.0	100.0	100.0	0.0	100.0
61	Morlem	77.8	100.0	100.0	77.8	100.0
62	Guleli	100.0	100.0	100.0	100.0	100.0
63	Sonus-Vonvoli	0.0	100.0	100.0	0.0	100.0
64	Usgao	100.0	100.0	100.0	100.0	100.0
65	Siroda	46.4	100.0	46.4	100.0	100.0
66	Savoi-Verem	100.0	100.0	100.0	100.0	100.0
67	Querim	32.1	96.4	32.1	100.0	100.0
68	Priol	88.9	94.4	94.4	100.0	100.0
69	Ponchavadi	100.0	100.0	100.0	100.0	100.0
70	Orgao	56.5	100.0	56.5	100.0	100.0
71	Nirancal	88.2	100.0	88.2	100.0	100.0
72	Marcaim	88.9	100.0	88.9	100.0	100.0
73	Candola	10.5	100.0	10.5	100.0	100.0
74	Candepar	100.0	100.0	100.0	100.0	100.0
75	Borim	42.1	100.0	42.1	100.0	100.0
76	Boma	94.4	100.0	94.4	100.0	100.0
77	Betora	55.6	100.0	55.6	100.0	100.0
78	Chimbel	0.0	0.0	88.9	100.0	100.0
79	Taleigao	100.0	100.0	100.0	100.0	100.0
80	Goa Velha	100.0	100.0	100.0	100.0	100.0
81	Bandora	7.4	55.6	7.4	100.0	100.0
82	Curti	100.0	100.0	100.0	100.0	100.0
83	Calangute	77.8	100.0	100.0	77.8	100.0
84	Aldona	100.0	100.0	100.0	100.0	100.0
85	Penha De France	100.0	100.0	100.0	100.0	100.0
86	Guirim	100.0	100.0	100.0	100.0	100.0
87	Colvale	0.0	100.0	100.0	0.0	100.0
88	Candolim	100.0	100.0	100.0	100.0	100.0
89	Siolim	100.0	100.0	100.0	100.0	100.0
90	Socorro	100.0	100.0	100.0	100.0	100.0
91	Saligao	100.0	100.0	100.0	100.0	100.0
92	Carapur	100.0	100.0	100.0	100.0	100.0
93	Pale	88.9	100.0	88.9	100.0	100.0
94	Bambolim	100.0	100.0	100.0	100.0	100.0
95	Calapor	100.0	100.0	100.0	100.0	100.0
96	Cujira	100.0	100.0	100.0	100.0	100.0

\* Fully Functional has been computed as = Adequate Quantity  $\cap$  Fully Regularity Supply  $\cap$  Potable (Quality)

## 4.3. Villages not meeting the quality parameters

Table No. 8: Quality parameters dissatisfied at village level						
1. pH (Acceptable Range- 6.5 to 8.5)						
S.No.	Block Name	Panchayat Name	Villages	No. of HHs outside the acceptable range		
1	Bardez	Aldona	Corjuem	1		
2		Arpora-Nagoa	Arpora	9		
3		Bastora	Bastora	2		
4		Calangute	Calangute	2		
5		Camurlim	Camurlim	3		
6		Colvale	Colvale	9		
7		Nachinola	Nachinola	2		
8		Oxel	Oxel	2		
9		Parra	Parra	9		
10		Salvador Do Mundo	Salvador Do Mundo	1		
11	Bicholim	Amone	Amone	1		
12		Cudnem	Cudnem	3		
13		Maem-Vaiguinim	Maem	1		
14		Mulgao	Mulgao	5		
15		Velguem	Velguem	9		
16	Pernem	Chandel-Hasapur	Chandel	1		
17		Varcond-Nagzor	Varconda	11		
18	Satari	Birondem	Ansolem	9		
19		Nagargao	Xelopo-Buzruco	9		
20		Onda	Sonus-Vonvoliem	9		
21		Querim	Ravona	8		
22	Tiswadi	Carambolim	Carambolim	2		
2. Free residual chlorine (Acceptable Range- 0.2 to 1 PPM)						
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permisible range	HHs with no chlorine	
1		Anjuna-Caisua	Anjuna	3	0	
2		Nadora	Nadora	9	0	
3		Sangolda	Sangolda	0	4	
4	Bicholim	Amone	Amone	0	6	
5		Pale-Cotombi	Pale	0	9	
6		Salem	Salem	0	1	
7		Casne-Amere-Poroscodem	Poroscodem	12	0	
8		Ibrampur	Ibrampur	12	0	
9		Varcond-Nagzor	Varconda	0	10	
10		Virnora	Virnora	13	0	
11	Ponda	Bandora	Bandora	0	27	
12		Bethora-Nirankhal-Conxem-Codari	Nirancal	9	0	
13		Betki-Khandola	Candola	2	0	
14		Borim	Borim	3	1	
15		Panchawadi	Ponchavadi	1	0	
16		Querim	Querim	0	28	
17		Shiroda	Siroda	2	0	
18		Tivrem-Orgao	Orgao	5	1	
19		Veling-Priol-Cuncolim	Priol	13	0	
20		Verem-Vaghurem	Savoi-Verem	3	1	
21		Cotorem	Velguem	0	4	
22		Nagargao	Xelopo-Buzruco	0	9	
23		Onda	Sonus-Vonvoliem	0	9	
24		Poriem	Poriem	9	0	
25		Querim	Ravona	0	9	
26		Tiswadi	Azossim-Mandur	Mandur	0	3
27			Chodan-Madel	Chorao	0	2

Table No. 8: Quality parameters dissatisfied at village level					
28		Neura	Neura-O-Grande	0	1
3. Turbidity (Acceptable Range- 1 to 5 NTU)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
1	Bardez	Aldona	Corjuem	1	
2		Nachinola	Nachinola	1	
3		Pompurpa	Pomburpa	1	
4	Bicholim	Maem-Vaiguinim	Aturli	1	
5	Pernem	Torxem	Torxem	1	
6	Satari	Nagargao	Xelopo-Buzruco	8	
4. Total hardness (Acceptable Range- 200 to 600 Milligram/litre)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
NA	NA	NA	NA	NA	
5. Total alkalinity (Acceptable Range- 200 to 600 Milligram/litre)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
NA	NA	NA	NA	NA	
6. Chloride (Acceptable Range- 250 to 1000 Milligram/litre)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
NA	NA	NA	NA	NA	
7. Ammonia (Acceptable Range- 0.5 Milligram/litre)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
NA	NA	NA	NA	NA	
8. Iron (Acceptable Range- 1 Milligram/litre)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
NA	NA	NA	NA	NA	
9. Nitrate (Acceptable Range- 1 Milligram/litre)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
NA	NA	NA	NA	NA	
10. Sulphate (Acceptable Range- 200 to 400 Milligram/litre)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
NA	NA	NA	NA	NA	
11. Total dissolved solids (Acceptable Range- 500 to 2000 Milligram/litre)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
NA	NA	NA	NA	NA	
12. Bacteriological test (Presence)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
1	Satari	Birondem	Ansolem	1	
2		Morlem	Morlem	2	
13. Fluoride (Acceptable Range- 1 to 1.5 Milligram /litre)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
NA	NA	NA	NA	NA	
14. Arsenic (in hotspots) (Acceptable Range- 0.01 Milligram /litre)					
S.No.	Block Name	Panchayat Name	Villages	HHs outside the acceptable/permissible range	
NA	NA	NA	NA	NA	