



Apollo Tyres Foundation

IMPACT EVALUATION OF RO PLANT IN
ORAGADAM VILLAGE

Karvy Insights Limited



1.0 Introduction

1.1 Background

India is facing a serious water crisis – its rivers and water bodies are drying up, its dependence on ground water has reached unsustainable levels, and a large number of Indians have no access to safe drinking water. One cause of the current crisis is the deterioration of the country's water bodies. The water bodies of India are the source of water security in the villages and were instrumental in recharging of groundwater in the area. Years of neglect and encroachment have resulted in their deterioration, leading to acute water shortage. There has been a rapid depletion of ground water, resulting in a shortage of water for drinking and agricultural activities. Safe drinking water remains inaccessible for more than 80 percent of India's rural population despite determined efforts by public, private, and non-profit organizations to meet this need in rural communities. The priority of the government is wider piped water access. Multilateral organizations provide support through reform initiatives in the areas of institutional capacity building, social education, and developing public-private partnership models. Social entrepreneurs have adopted varying approaches to treatment, distribution, financing, and community engagement. Although these approaches have significant potential, there has been little cohesion among them, making it challenging to achieve the degree of coordination required to deploy them effectively at scale.

Sustaining the environment is an important focus area of Apollo. The major aim of this initiative is to raise people's awareness and provide a better environment to our stakeholders and communities surrounding our manufacturing locations. This is why at Apollo various projects have been undertaken to combat several environmental problems. One such interventions of note is **access to purified drinking water**. The organisation has set up a purified drinking water RO plant at Oragadam village of Sennakkuppam panchayat from which around 506 households (2024 people) are directly benefited with an average monthly consumption of 67,300 litres of purified water.

Against a RFP floated by Apollo Tyres Foundation, Karvy Insights Limited has conducted an impact assessment of this CSR initiative. This report details out the findings from this exercise.

1.2 Research Objectives

1. Capture community perception regarding the intervention and the observed differences pre and post intervention
2. Assess the impact of the interventions on their lives and environment
3. Evaluate the effect of the RO plant on availability of quality drinking water and its impact on health
4. Prepare a set of recommendations highlighting replication and intensified impact

1.3 Research Design

1.3.1 Data collection methods

We adopted a mix method approach for this research assignment. This included the following:

Adult males (18+)	Questionnaire survey
Adult females (18+)	Questionnaire survey

Mothers	Focus group discussion
Community decision makers	In-depth interview

1.3.2 Sampling framework

Given that the geographical area of investigation is fairly limited and the sampling universe is also small, we used the modified Cochran formula for small sample sizes to arrive at a potential sample size, as follows:

$$n_0 = \frac{Z^2 p(1 - p)}{e^2}$$

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}$$

Where:

- e is the desired level of precision (i.e. the margin of error), taken at 10%
- p is the (estimated) proportion of the population which has the attribute in question, taken at 50% of 0.5
- q is 1 - p.
- Z² is the square of the Z value at 95% level of confidence, i.e. 1.96
- N is the population size (516)

Now, the RO plant is located in Oragadam village which is located in Thiruporur block. The 2011 census estimates that Oragadam has a total of 516 households. Using the Cochran formula for small sample sizes, the requisite number of households to be sampled from Oragadam works out to be 81.

1.4 Project Execution

1.4.1 Estimation of field manpower

For the quantitative survey, deployed one team, comprising of 4 enumerators and 1 supervisor. The four enumerators covered 28 households in one day, thus finishing the fieldwork in 3 days plus two days for to and fro travel from District HQ.

We also engaged a qualitative moderator (fully conversant in Tamil and with experience in undertaking moderation work for social research projects) who conducted the FGD (with 7 mothers) and the IDI with the village president Mr. Pandiyan.

1.4.2 Training

The training for this study took place in Chennai. The participants included 4 enumerators, 1 supervisor, the field executive from Karvy who is in charge of Tamil Nadu, the moderator, and one research personnel responsible for imparting the training. The duration of the training was for two

days, one day of classroom training using pen and paper and one day of mock trials using tablets embedded with the questionnaires in soft form (CAPI).

1.4.3 Tools for data collection

Quantitative data capture format was scripted in CAPI for administration electronically. To ensure we do not face any glitches and time loss at the beginning of the survey due to sub-optimal functioning of the back-end software, we did not commence with fieldwork without having a trial run of the Apps. We undertook a dummy fieldwork where App was tested along with the practice of Assessors and their monitors. Trial run happened on the last day of the training of assessors as a field practice of assessors and these assessors were monitored by their respective monitors. This exercise gave us clear idea of the functional status of the App as well as provide clear understanding of the work to field assessors and in house monitors.

1.4.4 Analysis

All the quantitative analysis for this project was done using SPSS. However, the submission of the raw (validated and cleaned) data will be done in whatever format is preferred by the client. The syntaxes used for the analysis is also be the client's property and will be handed over along with the final submission. All transcripts and content analysis sheets will be handed over to the client as well upon the completion of the project.

2.0 Profile of the sample

2.1 Profile of the study area

Sennakkappam panchayat (comprising of the two villages of Sennakkappam and Oragadam) is not a typical rural panchayat. It is right in the middle of an industrial area located just 8-10 km from Sriperumbudur city. There are many industries here, including Nokia, and ancillary parts manufacturing plant for Samsung, Ford, Daimler, Apollo Tyres, etc. Within the village, there was very limited farming activities going on as most land have been sold to industries. Villagers here either work as salaried personnel in the surrounding industrial area or earn through renting out part of their homes to employees of industries, who are mostly from out of state. Villagers even construct accommodations in their barren land to give out on rent, and this is a major source of earning.

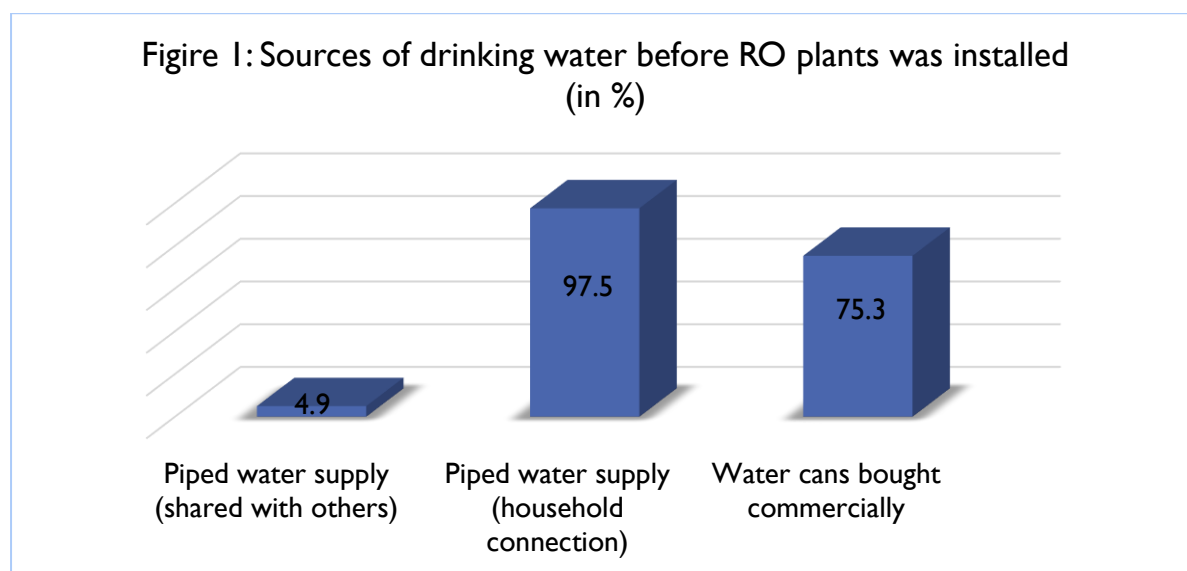
2.2 Profile of respondents

A total of 81 individuals participated in the survey. They were purposively chosen from among those who were currently using the RO water. These 81 people belonged to households that together had 273 people. In line with the economic landscape of the local area, 63 of the households had an earner who earned a salary while 19 had earners who were skilled or semi-skilled job workers. Just three had someone who was running their own business. Not a single household earned through the sale of agricultural produce though one family had a horticulture farm. The mean age of the respondents was 32 years and over 52% had completed their 10th or 12th grades. Most of the respondents were presently married.

3.0 Pre installation scenario

3.1 Sources of drinking water prior to the RO plant

The 81 respondents were asked about their drinking water sources prior to the establishment of the RO plant. 97.5% of them confirmed that they used to use piped water for drinking as the network was up to their home or very close to home. On top of that, this water was for free. 75% also bought canned water as and when required.



The qualitative research revealed more about the available drinking water sources prior to the establishment of the RO plant. There are 3 Syntex tanks constructed in the village where water is pumped out from the nearby water body and stored. The water is then pumped into the pipe network to reach some house to house, some just take from the tanks. It was expressed that the tank water used to be excellent quality at one time but of late - quality has become an issue. The villagers confirmed that it is sometimes muddy and has worms, especially during the rainy months

“If water is stored in a vessel, the mud settles at the bottom; sometimes there are worms also” mother participating in FGD at Oragadam

“During rains when the water becomes un-drinkable, people are forced to buy cans; but some still boil and filter that water and drink” mother participating in FGD at Oragadam

“During rains when the water becomes un-drinkable, people are forced to buy cans; but some still boil and filter that water and drink”.... mother participating in FGD at Oragadam

According to the village president Mr. Pandiyan, the tanks are regularly cleaned with bleaching powder and there is inspection done from the district administration in regular intervals. According to him, there is no water crisis in the village and well water in places are also very clear and drinkable.

“When there is function at home we also use RO water” Pandiyan, village president, Sennakkappam

Consumption of canned water was also occasion based as well as during rainy months, for otherwise, it is an expensive proposition. The piped drinking water is supplied between 6 and 7 am while water for other purposes are fetched locally.

3.2 Need for purification of water from tanks and wells

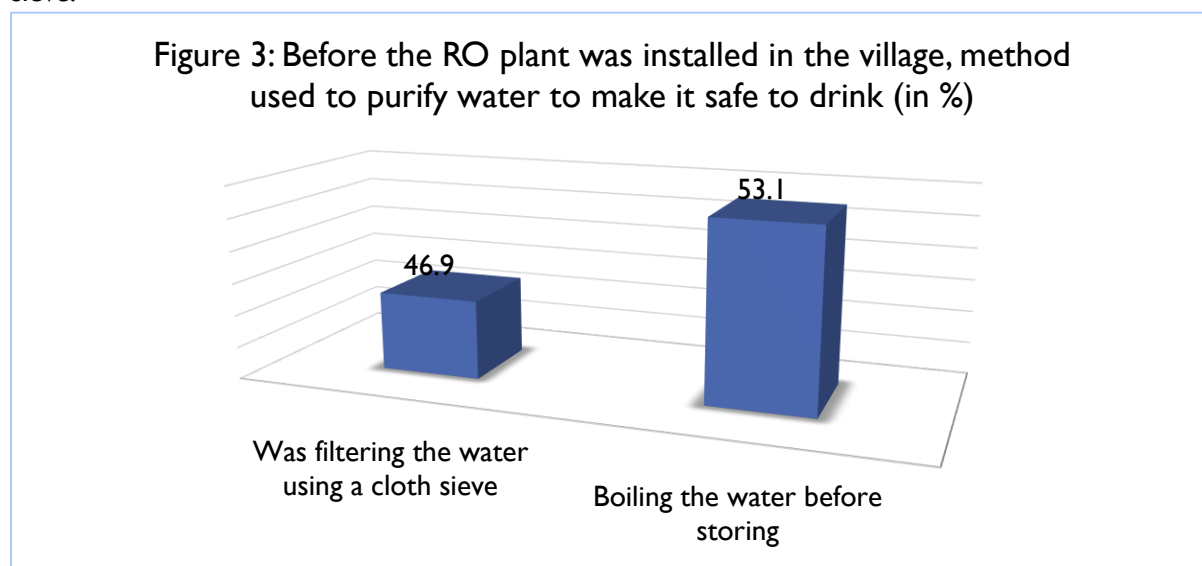
A long time ago, the villagers used to just drink water from anywhere. Later, it is believed, when companies came and established their factories, the local water sources got polluted.

“There was a time when we used to get water from streams which flow from the forests. The water used to be so pure we used to just take it in our hands and drink” ... Pandiyan, village president, Sennakkappam

According to the village president, every street had wells and the well water used to be very good in quality. People were using it for so many years for drinking 15-20 years ago when villagers used it to extract water from the wells and ponds and even drink directly. But, according to him, all of this changed when SIPCOT (State Industries Promotion Corporation of Tamil Nadu Ltd) decided to open an industrial complex in the area. The advent of many industries and with it, the in-migration of outsiders seem to be the principal reasons why water sources became polluted.

“In our village, there are around 2000 people and most of the houses have been rented out to people from other states. These tenants are not maintaining cleanliness and we are not able to explain to them as they don’t understand our language and we don’t know their language. We are sending notice to the house owners but they don’t tell them. The main issue is they dump garbage anywhere. Pandiyan, village president, Sennakkappam

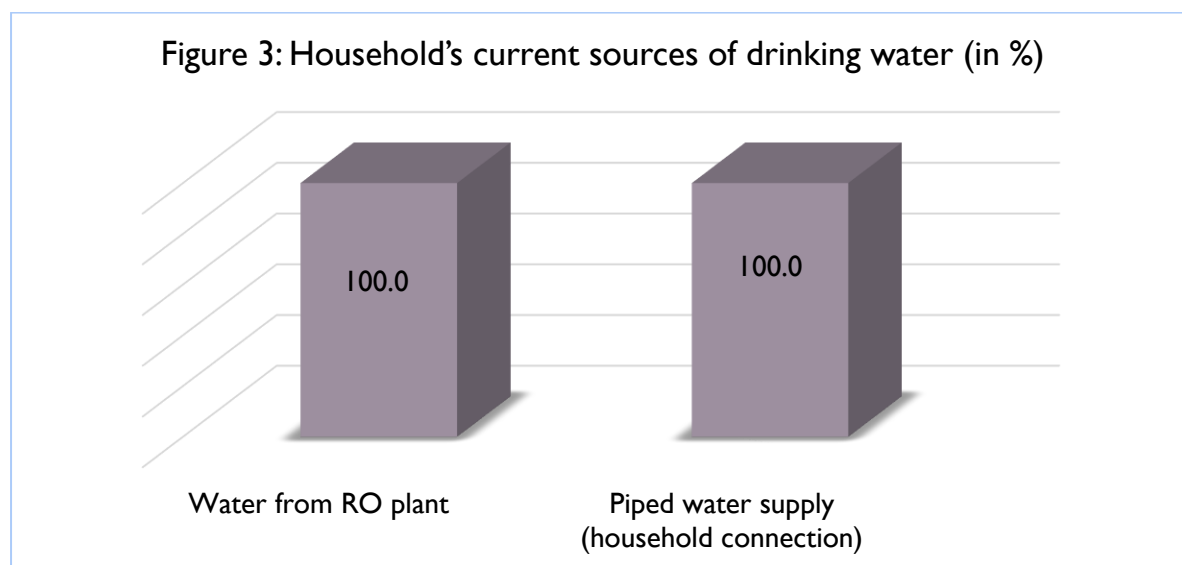
Because of the deteriorating water quality, most people could no longer directly drink the water from wells and ponds; they had to either boil the water before storing or filter the water using a cloth as sieve.



4.0 Post installation scenario

4.1 Household’s current source of drinking water

As mentioned earlier, all 81 survey participants were chosen purposively from households that buy RO water. The survey data reveals that all of these households also consume tank water supplied through piped network.

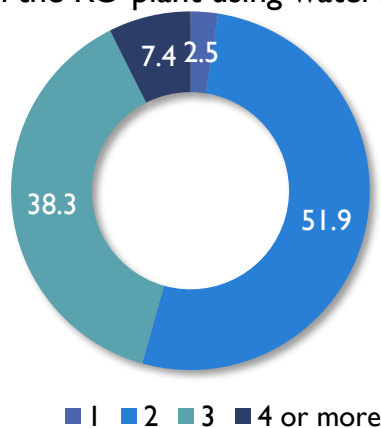


Qualitative investigations revealed that in the village, majority of the households are still using bore water and tap water, because they are free. According to some, RO water is used by around 50% of households but this number is increasing rapidly (the village president believes that around 80% of the households at some point or the other have used the RO water for drinking). But the common opinion was that there were no families in the village who consume only RO water. It is a supplementation for water available through the piped network or even buying canned water during the rains. Despite the fact that canned water is far more expensive than RO water, why people continue to buy canned water has been discussed further down in the report. Households that continue to buy canned water typically will buy around 4 cans a week. But they will also consume tap water.

4.2 Frequency of purchase of RO water

Nearly 52% of the 81 survey participants bought RO water around twice a week while 38% brought it thrice a week. The respondent base was regular users of RO water. There would be households who purchase less (because they purchase only during occasions), as well as some bigger households (joint families) who purchase up to 5 x 20 litres a week.

Figure 4: Usual number of times during the week buying water from the RO plant using water ATM (in %)



4.3 Comparative of expenditure pre and post installation

As per estimates of the ATF team, the RO plant is directly benefitting around 506 households (2024 people) with an average monthly consumption of 67,300 litres of purified water. This works out to be $((67,300L/20L) \times Rs.7)/506 = Rs. 23,555/506 = Rs.46$. This means on an average, a household spends Rs.46 per month on buying RO water. The median value of average expenditure as elicited through the survey has been worked out to be Rs.55 per household. We have already seen that the mean number of times water is bought from the plant is 2. This means an expenditure of $Rs.7 \times 8 = Rs.56$ per month.

The qualitative investigations also revealed that most households who consumed RO water recharged for around Rs.50 per month.

Against this, we also looked at expenditure of households who bought canned water. The median spend per month on purchasing drinking water before the RO plant was installed was Rs.225.

4.4 Issues with purchase of RO water

So the real question is, why do some people still continue to buy canned water when it is obviously far more expensive than RO water? Here we need to understand that one of the consistent arguments against RO water consumption was that there is no doorstep delivery. The RO water has to be filled in 20 litre jars from the plant and then that needs to be carried back to home. The weight is considerable and this is why fetching RO water is almost exclusively done by the adult male of the household. It also takes around 20 minutes to fill the water and get it some. For homes that do not have adult males readily present, they just cannot avail of the plant water as the weight is too heavy for the ladies. FGD participants felt that if door-step delivery is introduced, more people will switch to RO water.

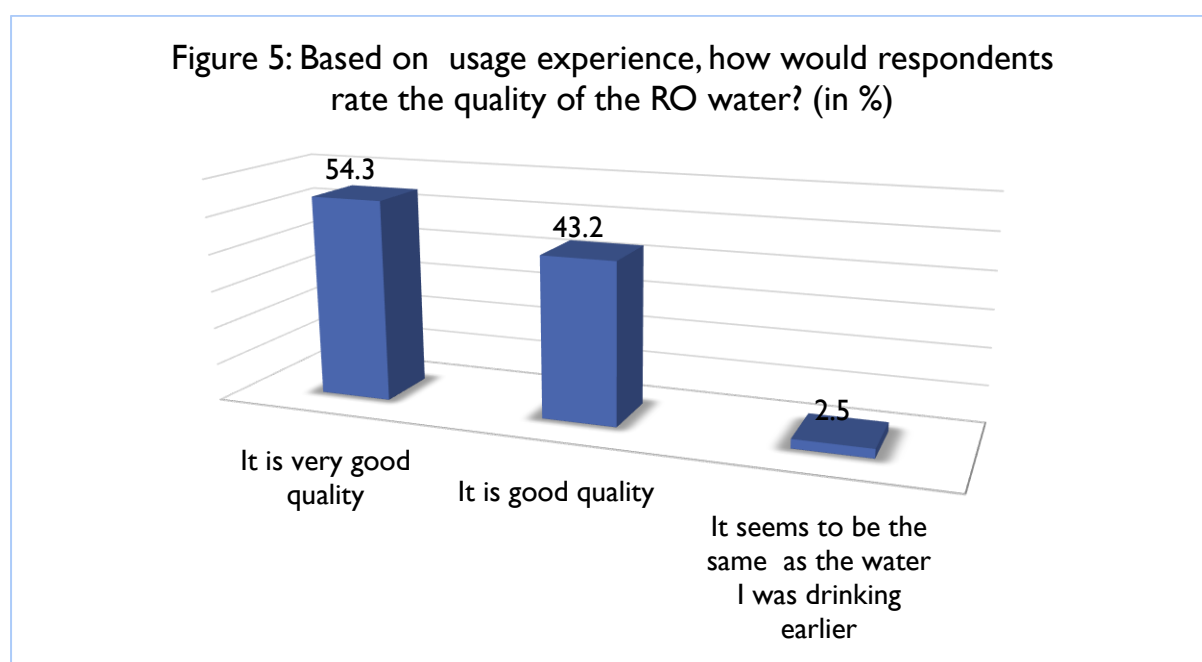
On the other hand, the canned water, which costs Rs.30 per can, is delivery at door-step. For those who usually consume piped water and only occasionally need purified water, getting a can delivered at doorstep albeit at a higher cost is less of a hassle. In any case, tap water is free, so many homes still prefer it over buying water.

It was also confirmed that people who have means of transport can actually go to the junction and buy the canned water at Rs.12, but either way, it is still more expensive than the RO water.

The FGD also revealed that sometimes there was an issue with the ATM card recharge because there was no personnel available at the plant who looked after this transaction. However, it was later revealed that this absence was really a one-off incidence and more of an exception than the rule.

4.5 Quality of the RO water

A little over half of the users of RO water agreed that the water quality was very good while 43% felt it was good. Only around 2.5% had reported that they felt it was the same as the water they were drinking earlier.



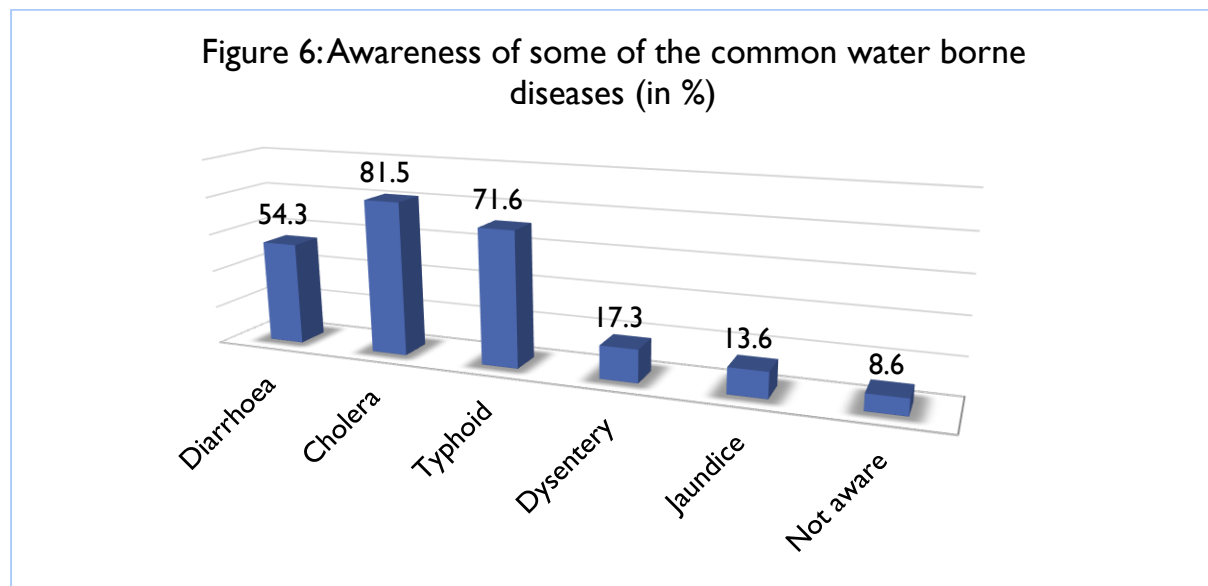
Nearly 2 in 3 respondents held the opinion that the quality of RO water was consistently good throughout the year but about a third did mention that it was good most of the time. Further probing into the matter revealed that there was some quality issues with the taste when the plant was undergoing maintenance.

4.6 Morbidity awareness and impact on incidence

Clean water is the single most important resource that all societies are entitled to. Our lives revolve around water – from drinking to cooking to bathing. But millions of people, especially in poor and developing countries don't have access to safe drinking water. Poor sanitation and unhygienic conditions breed micro-organisms that spread waterborne diseases, causing outbreaks of diseases that has the ability to affect a whole community. Diseases by water can affect us anytime, anywhere. Therefore it's important to be vigilant, keep our environment clean, and practice good hygiene at all times. Some of the most common water borne diseases in India are:

- Malaria
- Typhoid
- Cholera
- Giardiasis
- Amoebic Dysentery
- Amoebiasis
- Hepatitis A
- Shigellosis

The survey revealed that most (close to 92%) of the survey participants were aware of some of the common water borne diseases.



One of the intended outcomes of the establishment of the RO plant was that it would reduce the incidence of morbidity due to consumption of contaminated water in the village. In the 12 months prior to RO plant being installed, there were 4 households (out of the 81) who have had at least one member falling sick due to a stomach infection caused by water borne bacteria. On the other hand, after they had started to consume RO water, Not a single adult or child (out of the 273 members in the 81 sampled households) have fallen ill due to water borne infection.

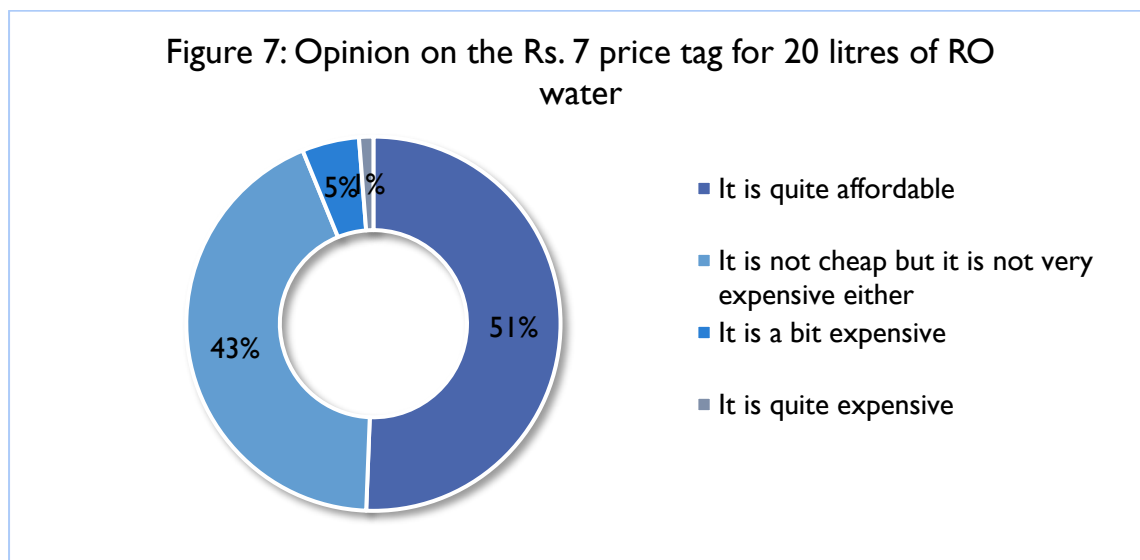
People believe that morbidity due to water-borne diseases was and still is caused by consuming canal water which has mosquitoes breeding in the stagnant water. They also blame outsiders who have settled in the village for this general decline in quality of water in the area. But it was reiterated by the FGD participants that homes that consume RO water and even can water have very little morbidity incidence due to water borne diseases - because the water from the plant is absolutely pure.

But at the same time, Apollo must also be wary of false news.

“My son had a stomach ache and we went to the hospital. They said do not drink RO water because it causes kidney stones”..... mother participating in FGD at Oragadam

4.7 The cost of water

For half of the survey participants who were all consumers of RO water, the Rs.7 price tag for 20 litres was deemed to be quite affordable while for 43%, it was not cheap but not very expensive either.



But this was not the popular opinion among all in the village. There are also several households who challenged the idea of paying for RO water. They want it free, or reduced significantly because they believed industries who have polluted the environment have to display a philanthropic intent which goes beyond basic economics. The popular opinion seems to have been a price tag of Rs.5 per 20 litres but door-to-door delivery.

According to the village president, majority of the village folks want free water, they don't wish to pay and buy water. He claimed that while in this village they have to pay Rs.7 per 20 litres, there is another RO plant which has been set up where they get at a lesser rate. Unlike in the FGD, Mr. Pandiyan believes the ideal rate which people expect is Rs.2.

Mr. Pandiyan was pragmatic about the whole thing,

“You can't get water cheaper than Rs.7. But the locally available water here is of good quality. The bore water will be as clear as the RO water in some places. So people have options” Pandiyan, village president, Sennakkappam

The president also confirmed that the RO plant water is of good quality. It is the same quality throughout the year, as they are changing the filters regularly. On top of that, sewage water does not mingle with the RO water at any level. However, even though his personal opinion is that villagers cannot be provided RO water for free because the plant has its running expenses, including electricity charges and maintenance costs, he believes tap water is still an alternative and it is of fairly good quality and it's still for free.

5.0 Perception mapping

A series of sentence constructs were read out to the survey participants one after the other and they had to listen to the statements carefully and consider them in the context of their own household.

They had to then let us know whether they agreed or disagreed to some or all of these statements and to what degree did they agree or disagree.

Table I: Perception mapping

		Totally agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Totally disagree
A	Prior to the establishment of the RO plant in our village, the drinking water we were using was not very safe and healthy for human consumption	68%	27%	4%	1%	0%
B	In comparison to the RO water, buying water in cans is an expensive affair	46%	52%	1%	1%	0%
C	It sometimes proves to be difficult to transport 20 litres of water from the plant to our home	37%	60%	1%	1%	0%
D	The water available from local sources is not of a quality that keeps household cooking utensils stain-free	48%	46%	6%	0%	0%
E	The RO plant in our village has significantly reduced the time the women in the household had to spend on fetching drinking water and then purifying the same before storing	63%	33%	3%	1%	0%
F	The taste and smell of RO water is definitely better than the drinking water from other sources which we used to use earlier	49%	49%	2%	0%	0%
G	Availability of RO water in the village has not really had a great deal of impact on incidence of water borne diseases in our village	51%	47%	2%	0%	0%
H	The RO plant has ensured that we have perennial availability of safe drinking water all year round	58%	39%	3%	0%	0%
I	I do not have any idea of the RO process but I am assuming that the RO water that we buy is very safe to drink	44%	54%	1%	0%	0%

		Totally agree	Somewhat agree	Neither agree nor disagree	Somewhat disagree	Totally disagree
J	Almost everyone in this village is now buying the RO water for drinking	47%	52%	1%	0%	0%
K	The primary reason why I switched to RO water after the plant became functional in our village is for the sake of the health of the children	58%	41%	1%	0%	0%
L	The amount that my household is spending to buy RO water to totally value for money	52%	47%	1%	0%	0%
M	I am extremely grateful that ATF has established this RO plant in this village	63%	36%	1%	0%	0%

Two out of three people totally agree to the fact that prior to the establishment of the RO plant, the drinking water that was available in the village was not very healthy for human consumption. They also agree that in comparison to the RO water, buying canned water was an expensive affair. However, a lot of the people had validated the opinion the transport of 20L of water from the RO plant to home is a difficult proposition. Regarding washing of household and utensils, the local water it was agreed was not of the quality that keeps them clean. The common opinion also seems to have been the taste and smell of the RO water is definitely better than water from other sources.

Nearly all the respondents held the opinion that the availability of the RO water in the village has not had any significant impact on the incidence of waterborne diseases in our village. This is perhaps due to the fact that the local water available prior to the plant being established was not a very bad quality, especially the water that was being made available through the piped water network. However villagers did agree to the fact that the RO plant has ensured that villagers have access to save drinking water throughout the year. Not everybody agreed that everyone in this village is presently buying RO water for drinking but the majority did agree to this. It was also stated that the primary reason why most people switched to RO water is that they could understand that it is good quality water that would keep their children healthy. A little over half of the survey participants totally agreed that the amount that the house will be spending to buy RO water is value for money. A similar number was somewhat in agreement to the statement. Two out of three respondents admitted that they are extremely grateful to Apollo Tyres for establishing this auto plant in the village.

6.0 The way forward

It is our view that the question of asking for free of highly subsidised supply of water is not a substantive issue. We say this because on an average, a households in this village earns close to Rs.150,000 per annum. Therefore, spending Rs.45-Rs.60 per month on water should not be an issue. The only reason why a portion of the villagers are taking a stand on paying for the RO water is that they believe it is the corporate social responsibility of industries like Apollo to give back to the community whose land they have set up industries and whose air is being polluted.

It is our view that such posturing need not be given too much of importance because over time, more and more people are starting to use the RO water. In fact, one of the feedback from the qualitative research was that households who have started consuming RO water can rarely go back to other sources. We believe, with time the usage of RO water will surely become universal in the village as more and more household accepts that the RO water is value for money. And people agree that quality is not the issue, and perhaps the price tag is not as big a deal as it is being made out to be.

“Even people from Senthamangalam come to take water from here - they recharge Rs.500 at a time and carry water to their village where it is sold at Rs.30 per 20 litres” mother participating in FGD at Oragadam

What ATF needs to do going forward is launch a door-to-door outreach campaign which highlights the benefits of consuming RO water, the price advantage over canned water, and stress on the health benefits for the vulnerable segments, especially little children. The company already has a strong brand equity in the village. Residents know that Apollo has built the RO plant and they have also done a lot of good work for the local community, like rejuvenating ponds, building toilets, and even collect garbage regularly. We got the impression that the popular sentiment is that the company is good for this village and that negative perceptions as a polluter is more of a minority. ATF needs to ride on this sentiment and take the message to the people, and they will listen.



7.0 Management summary

7.1 Pre-installation phase

- Nearly all of the survey participants used to use piped water for drinking as the network was up to their home or very close to home, and because it was free.
- 75% also bought canned water as and when required.
- There are 3 Syntex tanks constructed in the village where water is pumped out from the nearby water body and stored. The tanks are regularly cleaned with bleaching powder and there is inspection done from the district administration in regular intervals.

- Tank water used to be of excellent quality at one time but of late - quality has become an issue. The villagers confirmed that it is sometimes muddy and has worms, especially during the rainy months
- Consumption of canned water was occasion-based as well as during rainy months, for otherwise, it is an expensive proposition.
- People blame the advent of industries on deteriorating groundwater quality.

7.2 Post installation phase

- All households who consumed RO water also consumed tank water supplied through the piped network.
- According to some, RO water is used regularly by around 50% of households but around 80% of the households would be using it at some point or the other)
- Nearly 52% of the survey participants bought RO water around twice a week while 38% brought it thrice a week.
- The median value of expenditure on RO water as elicited through the survey has been worked out to be Rs.55 per household per month.
- The qualitative investigations also revealed that most households who consumed RO water recharged for around Rs.50 per month.
- Against this, the median spend per month on purchasing drinking water before the RO plant was installed was Rs.225.
- The reason why some people continue to buy canned water when it is obviously far more expensive than RO water is that Rs.30 per can gets you doorstep delivery, unlike RO water. The 20 litres weight is considerable and this is why fetching RO water is almost exclusively done by the adult male of the household.
- Almost every user agreed that the RO water quality is good or very good and 2 in 3 respondents held the opinion that the quality of RO water was consistently good throughout the year. There was some quality issues with the taste when the plant was undergoing maintenance.
- In the 12 months prior to RO plant being installed, there were 4 households (out of the 81) who have had at least one member falling sick due to a stomach infection caused by water borne bacteria. On the other hand, after they had started to consume RO water, not a single adult or child (out of the 273 members in the 81 sampled households) have fallen ill due to water borne infection.
- For half of the survey participants who were all consumers of RO water, the Rs.7 price tag for 20 litres was deemed to be quite affordable while for 43%, it was not cheap but not very expensive either.
- But this was not the popular opinion among all in the village. There were several households who challenged the idea of paying for RO water. They want it free, or reduced significantly (Rs.5 per 20 litres) but door-to-door delivery.
- Two out of three people totally agree to the fact that prior to the establishment of the RO plant, the drinking water that was available in the village was not very healthy for human consumption.
- They also agree that in comparison to the RO water, buying canned water was an expensive affair.
- However, a lot of the people had validated the opinion the transport of 20L of water from the RO plant to home is a difficult proposition.
- The common opinion also seems to have been the taste and smell of the RO water is definitely better than water from other sources.

- Villagers did agree to the fact that the RO plant has ensured that villagers have access to save drinking water throughout the year.
- A little over half of the survey participants totally agreed that the amount that the house will be spending to buy RO water is value for money while the rest
- Two out of three respondents admitted that they are extremely grateful to Apollo Tyres for establishing this auto plant in the village.

7.3 Way forward

- The question of asking for free of highly subsidised supply of water is not a substantive issue because on an average, a households in this village earns close to Rs.150,000 per annum.
- The only reason why a portion of the villagers are taking a stand on paying for the RO water is that they believe it is the corporate social responsibility of industries like Apollo to give back to the community whose land they have set up industries and whose air is being polluted.
- What ATF needs to do going forward is launch a door-to-door outreach campaign which highlights the benefits of consuming RO water, the price advantage over canned water, and stress on the health benefits for the vulnerable segments, especially little children.
- The company already has a strong brand equity in the village for their CSR work ATF needs to ride on this sentiment and take the message to the people, and they will listen.