RURAL MARKETING SURVEY ON SAFE WATER SUPPLY

(FINAL REPORT)

Prepared For:

Japan International Cooperation Agency (JICA)
2nd Floor, Dr. Gopal Das Bhawan
28, Barakhamba Road
New Delhi-110001

Prepared by:

GfK Mode Pvt Limited
BL House, 60/2, First Floor, New Delhi – 110 016
Ph. : 4175.8952 / 53, Fax : 4175.6795
Email: rb.gupta@gfk-mode.com
delhi.social@gfk-mode.com,
Website: www.gfk-mode.com
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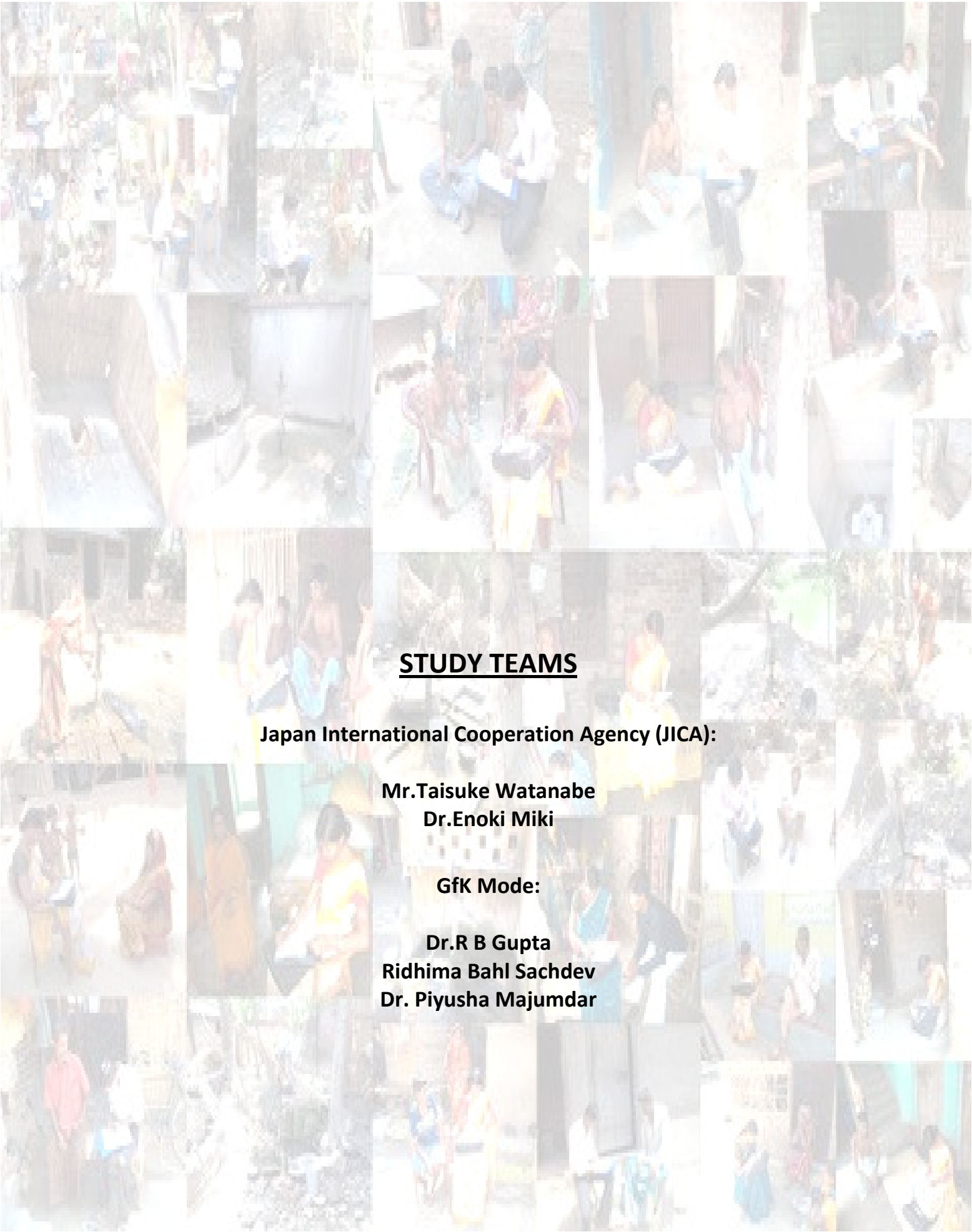

STUDY TEAMS

Japan International Cooperation Agency (JICA):

Mr.Taisuke Watanabe
Dr.Enoki Miki

GfK Mode:

Dr.R B Gupta
Ridhima Bahl Sachdev
Dr. Piyusha Majumdar

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We hope this report would provide important inputs in decision making process for providing safe water to country's vast population at various levels.

Study Team
GfK –Mode
Social Research Unit

ABBREVIATIONS

ACF	AMBUJA CEMENT FOUNDATION
BCM	BILLION CUBIC METERS
BHC	BENZENE HEXACHLORIDE.
BOP	BASE OF THE PYRAMID
CGWB	CENTRAL GROUND WATER BOARD
CERDS	CHAITANYA EDUCATIONAL AND RURAL DEVELOPMENT SOCIETY
NCAER	NATIONAL COUNCIL FOR APPLIED ECONOMIC RESEARCH
NSSO	NATIONAL SAMPLE SURVEY ORGANIZATION
MICS	MULTIPLE INDICATOR CLUSTER SURVEY
RGI	REGISTRAR GENERAL OF INDIA
PPM	PARTS PER MILLION
DDT	DICHLORO-DIPHENYL-TRICHLOROETHANE
EMI	EQUATED MONTHLY INSTALLMENT
GFK	GROWTH FROM KNOWLEDGE
GOPL	GROWING OPPORTUNITY PRIVATE LTD
ISI	INDIAN STANDARD INDEX
IDIS	IN- DEPTH INTERVIEWS
JICA	JAPAN INTERNATIONAL COOPERATION AGENCY
MM	MILLIMETER
N.A	NOT APPLICABLE
NGO	NON GOVERNMENT ORGANIZATION
PHED	PUBLIC HEALTH ENGINEERING DEPARTMENT
RA	RESEARCH ASSISTANT
RO	REVERSE OSMOSIS
SMS	SREEMA MAHILA SAMITI
TDS	TOTAL DISSOLVED SOLIDS
WHO	WORLD HEALTH ORGANIZATION

CHAPTER I

INTRODUCTION AND BACKGROUND

Water is rightly equated with life because life is not possible without water. It is the most essential ingredient in our life for survival. We (humans) can survive for several weeks without food, but without water we cannot survive for even few days. It's essential for all dimensions of life.

Over the past few decades, use of water has increased, and in many places water availability is falling to crisis levels. **More than eighty countries, with forty percent of the world's population, are already facing water shortages**, while by year 2020 the world's population will double[1]. The costs of water infrastructure have risen dramatically. The quality of water in rivers and underground has deteriorated, due to pollution by waste and contaminants from cities, industry and agriculture. Ecosystems are being destroyed, sometimes permanently. Over one billion people lack safe water, three billion lack sanitation and eighty per cent of infectious diseases are waterborne.

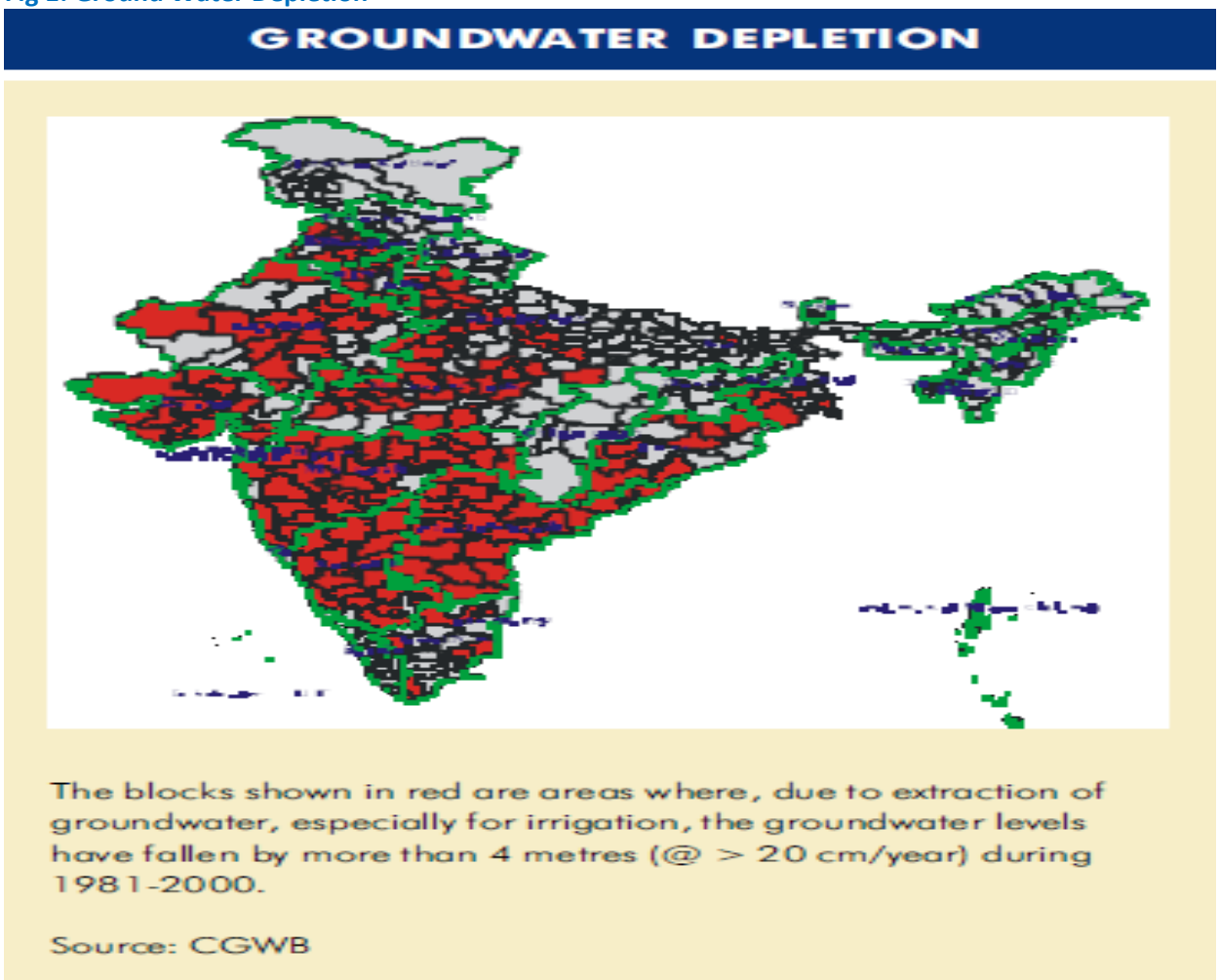
WATER AND SANITATION IN INDIA

Historically, civilizations in India, as around the world, have largely evolved and developed around water bodies as most human activities, including agriculture and industry depend on water. In the five decades since independence**,** India has witnessed phenomenal development of water resources and has largely successfully met the demand of water for many of the diverse uses in the country. Consequently, the country has achieved self-sufficiency in food grains. Investments made during the last fifty years in water related infrastructure in the country have resulted in rapid expansion in the urban, energy and industrial sectors. Infrastructure for safe drinking water has been provided to about 85 per cent of India's urban and rural population.[2] However, there remain significant challenges in providing sustainable services, especially for the poorest and hard to reach. India's irrigated agriculture sector has been fundamental in its economic development and poverty alleviation. The rapid expansion of irrigation and drainage infrastructure has been one of India's major achievements. **However, this achievement has been at the cost of groundwater depletion, water logging and increasing salinity levels affecting large areas.**

[1] Department of Water Resources, Government of Orissa, Worldwide Scarcity of Water, State Portal on World Water Day, Department of Water Resources, Government of Orissa, Bhubaneshwar, 2011, www.orissa.gov.in,,http://www.odisha.gov.in/portal/LIWPL/event_archive/Events_Archives/58World_Water_Day.pdf)

[2] Planning Commission, India; Water Supply and Sanitation, A WHO-UNICEF sponsored study, Planning Commission, Government of India, New Delhi (http://planningcommission.nic.in/reports/genrep/wtrsani.pdf)

Fig 1: Ground Water Depletion



Source: Central Ground Water Board

India's finite and fragile water resources are stressed and depleting, while sectoral demands (including drinking water, industry, agriculture, and others) are growing rapidly in line with urbanization, population increases, rising incomes and industrial growth. At the same time, more importantly, the major areas likely to be adversely affected in terms of water availability are the rural areas around major centers of urban growth. All this has resulted in declining per capita water availability and deteriorating quality. Inter-sectoral allocations, planning and management of increasingly fragile water resources have thus emerged as a major challenge before the nation. National level statistics for water availability mask huge disparities from basin-to-basin and region to region.

Spatially, the utilisable resource availability in the country varies from 18,417 cubic meters in the Brahmaputra valley to as low as 180 cubic meters in the Sabarmati basin. Rajasthan, for instance, with 8 per cent of the country's population has only 1 per cent of the country's water resources[3]. **Thus, while India is considered rich in terms of annual rainfall and total water resources, its uneven geographical distribution causes severe regional and temporal shortages.**

India faces an increasingly urgent situation; its finite and fragile water resources are stressed and depleting while different sectoral demands are growing rapidly. This situation has developed incrementally, but is nevertheless dramatic. At Independence, India's population was less that 400 million and per capita water availability over 5,000 cubic meters per year. Today, fifty years later, population has grown to over a billion and per capita water availability has fallen to hardly more than 2,000 cubic meters per year and the actual usable quantity is around 1,122 cubic meters per year[4].

Environmental problems include water quality degradation from agro-chemicals, industrial and domestic pollution, groundwater depletion, water logging, soil Stalinization, siltation, degradation of wetlands, ecosystem impacts, and various health-related problems. Environmental and health-related issues are less evident than the more visible quantity related problems, but remain critically important to social welfare and resource sustainability. **High extraction of ground water has given rise to compounded Arsenic and Fluoride contamination and Saline Ingress. Where intensive agriculture is practiced, Nitric levels in ground water are high.**

Water infrastructure investments have also enabled the rapid expansion of the urban and industrial sectors and the increased availability of safe drinking water in rural villages. Further, a variety of policies, legislation and institutional initiatives have been taken by India to better manage its water resources as resource constraints have become increasingly apparent. In comparison to most other developing countries, it could be said that India's water resources management initiatives are generally more comprehensive than found elsewhere. The problem, however, is that almost in every country there is need for significant improvement. India's needs are particularly severe because of its rapidly developing water constraints, environmental problems, huge population, regional inequalities in water availability, the federal administrative structure, and rapid demographic and economic growth.

[3] Planning Commission, India; Water Supply and Sanitation, A WHO-UNICEF sponsored study, Planning Commission, Government of India, New Delhi (http://planningcommission.nic.in/reports/genrep/wtrsani.pdf)

[4] Sanjay Rode, Safe and Sustainable Drinking Water Supply: Innovative Ideas Lagging Behind in India, , Working Paper 1/2009, Centre for Development Alternatives, Ahmedabad,2009, www.cfda.ac.in

WATER RESOURCES – SITUATIONAL ANALYSIS

Since freshwater is essential for water supply and sanitation, an examination of the freshwater situation in India is required. As mentioned in the introduction, **freshwater availability is uneven across India, and huge disparities exist, from basin to basin, region to region, state to state, and in many cases, even within states.**

Declining availability

In terms of surface water, of 4,000 BCM of available water from precipitation, the mean flow in the country's rivers is about 1,900 BCM. Out of this, only 690 BCM is utilisable. Assessments of replenishable ground water resources have been made at 431.9 BCM by the *CGWB (Central Ground Water Board)* through a large volume of hydrologic and related data. This is the sum total of potential due to natural recharge from rainfall and due to recharge contributions from canal irrigation. The utilisable ground water resources have been assessed at 395.6 BCM (70.0 BCM for domestic and industrial uses and 325.6 BCM for irrigation).

The CGWB has also assessed the quantum of static ground water resources at 10,812 BCM. Water availability from other sources and through desalinization of sea and ground waters is considered negligible in view of the high cost.[5]

The assessed gross available and utilisable water resources of the country, based on conventional technology, are therefore 2,384 BCM (billion cubic meters) and 1,086 BCM, respectively. With an estimated population of one billion in 2000, the available and utilisable water resources per capita per year are 2,384 BCM and 1,086 BCM respectively against an estimated availability of 6,008 BCM in 1947. This itself, gives a broad indication of the growing resource scarcity in India in the fifty-five years since independence.

Increasing demand

The demand for fresh water has been identified, as the quantity of water required to be supplied for specific use and includes consumptive as well as necessary non consumptive water requirements for the user sector. The total water withdrawal/utilisation for all uses in 1990 was about 518 BCM or 609 BCM per capita per year. The country's total water requirement by the year 2050 will become 1,422 BCM, which will be much in excess of the total utilisable average water resources of 1,086 BCM. At the national level, it would be a very difficult task to increase the availability of water for use from the 1990 level of approximately 520 BCM to the desired level of 1,422 BCM by the year 2050 as most of the undeveloped utilisable water resources are concentrated in a few river basins such as the **Brahmaputra, Ganga, Godavari, and Mahanadi[6].**

[5] Planning Commission, India; Water Supply and Sanitation, A WHO-UNICEF sponsored study, Planning Commission, Government of India, New Delhi (http://planningcommission.nic.in/reports/genrep/wtrsani.pdf)

[6] Planning Commission, India; Water Supply and Sanitation, A WHO-UNICEF sponsored study, Planning Commission, Government of India, New Delhi

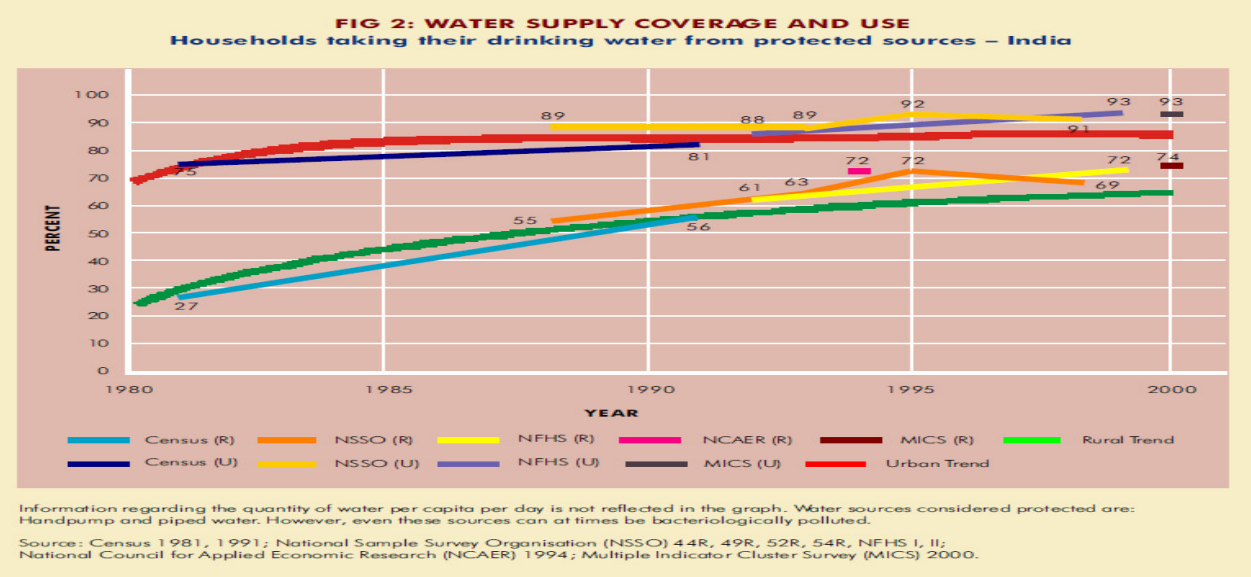
Resource degradation

There is enough evidence to indicate that the **available freshwater resource base is degrading rapidly.** The major rivers of the country have generally retained pristine water quality in the less densely populated upper stretches where the likelihood of getting affected by man's interference is minimal. As the rivers enter the plains, these start getting exploited for irrigation and receiving pollution discharges due to human activities such as intensive agriculture, use of fertilisers and insecticides, domestic sewage, industrial effluents etc. Thus in the middle stretches, **the rivers are most affected both due to increased water requirement for various consumptive and non-consumptive uses, and degraded water quality.** This makes the situation grave especially during the lean flow season when the amount of dilution water available is less.

DRINKING WATER

Rural and urban coverage

Analysis of data from a variety of sources shows that between **69 to 74 per cent of India's rural population take their drinking water from protected sources, leaving an un served population of 26 to 31 per cent (see figure 2 Below).** The same chart also shows that between 91 to 93 per cent of India's urban population take their drinking water from protected sources, leaving a un-served population of between seven to nine percent.



Source: Census 1981, 1991; National Sample Survey Organization (NSSO), National Council for Applied Economic Research (NCAER), Multiple Indicator Cluster Survey (MICS) 2000.

Improved v/s unimproved water sources: The water fetched from the following sources is generally considered as directly drinkable and non-drinkable.

Improved sources of Drinking water	Unimproved sources of Drinking water
Household connection	Unprotected well
Public standpipe	Unprotected spring
Borehole	Rivers or ponds
Protected dug well	Vendor-provided water
Protected spring	Bottled water*
Rainwater collection	Tanker truck water

*Bottled water is not considered improved due to limitations in the potential quantity, not quality.

A discussion has been made in the following sections to understand types of impurities existing in available water sources and the major areas of country (states and districts) where such impurities exist.

GROUND WATER CONTAMINATION & ITS IMPACT IN INDIA

Ground water is generally less susceptible to contamination and pollution as compared to surface water. About 85 % of rural population in India is solely depended on ground water, which is depleting at a fast rate. **In India, where groundwater is used intensively for irrigation and industrial purposes, a variety of land and water-based human activities are causing pollution of this precious resource.** The following table presents the main sources of drinking water in different states of India comparing status as on 2001 and 2011.[7]

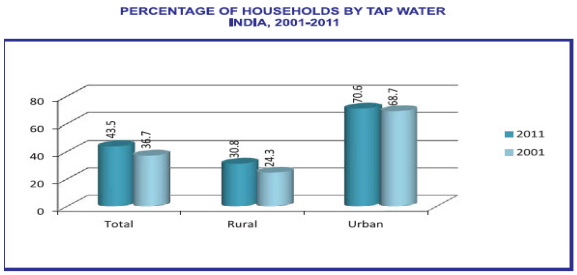
MAIN SOURCE OF DRINKING WATER 2001-2011

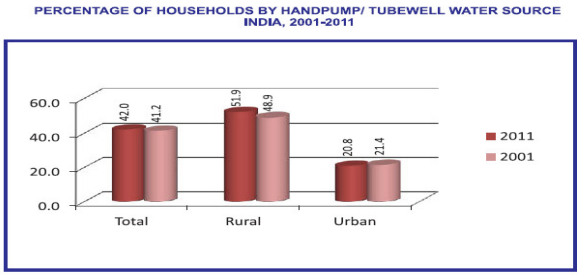
TOTAL																	
State code	India/ State/ Union Territory#	Total households		Tap water		Well water		Handpump/ Tubewell water		Other sources of water		New question in 2011				India/ State/ Union Territory #	State code
												Tap		Well			
		2011	2001	2011	2001	2011	2001	2011	2001	2011	2001	Treated	Un-treated	Covered	Un-covered		
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	2	1
00	**INDIA**	**246,692,667**	**191,963,935**	**43.5**	**36.7**	**11.0**	**18.2**	**42.0**	**41.2**	**3.5**	**3.9**	**32.0**	**11.6**	**1.6**	**9.4**	**INDIA**	**00**
01	Jammu & Kashmir	2,015,088	1,551,768	63.9	52.5	6.5	5.6	12.8	12.7	16.7	29.2	34.7	29.2	1.9	4.7	Jammu & Kashmir	01
02	Himachal Pradesh	1,476,581	1,240,633	89.5	84.1	2.9	4.8	4.2	4.5	3.4	6.6	83.9	5.6	1.5	1.3	Himachal Pradesh	02
03	Punjab	5,409,699	4,265,156	51.0	33.6	0.4	0.8	46.6	64.0	2.0	1.6	41.1	9.9	0.2	0.2	Punjab	03
04	Chandigarh#	235,061	201,878	96.7	91.9	0.1	0.0	2.6	8.0	0.6	0.2	93.7	3.0	0.1	0.0	Chandigarh#	04
05	Uttarakhand	1,997,068	1,586,321	68.2	65.9	1.1	1.2	24.0	20.8	6.7	12.1	53.9	14.3	0.7	0.4	Uttarakhand	05
06	Haryana	4,717,954	3,529,642	68.8	48.1	3.0	11.7	25.0	37.9	3.2	2.2	55.9	12.9	0.7	2.3	Haryana	06
07	NCT of Delhi #	3,340,538	2,554,149	81.3	75.3	0.1	0.0	13.7	21.9	4.9	2.7	75.2	6.1	0.1	0.0	NCT of Delhi #	07
08	Rajasthan	12,581,303	9,342,294	40.6	35.3	10.8	24.0	37.5	32.9	11.1	7.9	32.0	8.5	1.2	9.6	Rajasthan	08
09	Uttar Pradesh	32,924,266	25,760,601	27.3	23.7	4.0	11.6	67.9	64.1	0.9	0.6	20.2	7.1	0.6	3.4	Uttar Pradesh	09
10	Bihar	18,940,629	13,982,590	4.4	3.7	4.3	12.6	89.6	82.9	1.7	0.8	3.1	1.3	0.7	3.7	Bihar	10
11	Sikkim	128,131	104,738	85.3	70.3	0.6	0.1	0.1	0.4	14.1	29.1	29.2	56.1	0.4	0.2	Sikkim	11
12	Arunachal Pradesh	261,614	212,615	65.5	67.8	5.7	4.7	13.1	9.7	15.7	17.8	26.4	39.1	1.4	4.3	Arunachal Pradesh	12
13	Nagaland	399,965	332,050	47.2	42.0	25.7	34.9	6.7	4.5	20.5	18.6	6.1	41.1	6.6	19.1	Nagaland	13
14	Manipur	507,152	397,656	38.6	29.3	7.5	6.4	6.8	7.7	47.1	56.6	25.6	13.0	2.8	4.7	Manipur	14
15	Mizoram	221,077	160,966	58.7	31.9	4.7	2.0	1.7	4.0	34.9	62.0	39.4	19.3	2.0	2.7	Mizoram	15
16	Tripura	842,781	662,023	33.2	24.6	27.4	38.3	34.3	27.9	5.1	9.1	20.3	12.9	2.9	24.5	Tripura	16
17	Meghalaya	538,299	420,246	39.3	34.5	25.4	27.4	5.4	4.4	29.9	33.7	27.8	11.5	6.9	18.4	Meghalaya	17
18	Assam	6,367,295	4,935,358	10.5	9.2	18.9	26.7	59.4	49.6	11.3	14.6	9.2	1.3	1.7	17.2	Assam	18
19	West Bengal	20,067,299	15,715,915	25.4	21.4	6.0	10.0	66.8	67.1	1.7	1.5	21.0	4.4	0.7	5.4	West Bengal	19
20	Jharkhand	6,181,607	4,862,590	12.9	12.6	36.5	51.8	47.3	30.1	3.4	5.6	10.0	2.9	1.9	34.6	Jharkhand	20
21	Odisha	9,661,085	7,870,127	13.8	8.7	19.5	28.6	61.4	55.5	5.2	7.3	10.0	3.9	2.2	17.3	Odisha	21
22	Chhattisgarh	5,622,850	4,148,518	20.7	15.5	11.4	24.6	65.6	55.0	2.3	4.9	12.3	8.4	0.8	10.6	Chhattisgarh	22
23	Madhya Pradesh	14,967,597	10,919,653	23.4	25.3	20.0	29.0	54.6	43.1	2.0	2.6	16.4	6.9	1.1	18.9	Madhya Pradesh	23
24	Gujarat	12,181,718	9,643,989	69.0	62.3	7.1	11.7	21.2	21.8	2.7	4.2	39.8	29.2	2.3	4.8	Gujarat	24
25	Daman & Diu#	60,381	34,342	75.2	72.9	0.7	3.4	23.5	23.4	0.5	0.2	54.6	20.6	0.5	0.2	Daman & Diu #	25
26	D & N Haveli #	73,063	43,973	46.5	28.2	7.2	19.4	45.0	48.8	1.3	3.6	26.0	20.5	1.4	5.7	D & N Haveli #	26
27	Maharashtra	23,830,580	19,063,149	67.9	64.0	14.4	17.8	15.5	15.8	2.1	2.4	56.3	11.6	2.2	12.2	Maharashtra	27
28	Andhra Pradesh	21,024,534	16,849,857	69.9	48.1	6.4	16.5	20.6	32.0	3.1	3.4	49.0	20.9	0.5	5.9	Andhra Pradesh	28
29	Karnataka	13,179,911	10,232,133	66.1	58.9	9.0	12.4	21.5	25.7	3.5	3.0	41.2	24.8	1.0	8.0	Karnataka	29
30	Goa	322,813	279,216	85.4	69.0	11.1	26.1	0.3	1.1	3.2	3.8	82.0	3.4	4.0	7.1	Goa	30
31	Lakshadweep #	10,703	9,240	20.3	3.1	71.7	93.0	2.5	1.6	5.5	2.4	9.1	11.1	6.9	64.9	Lakshadweep #	31
32	Kerala	7,716,370	6,595,206	29.3	20.4	62.0	71.9	4.2	3.0	4.4	4.8	23.4	6.0	14.6	47.4	Kerala	32
33	Tamil Nadu	18,493,003	14,173,626	79.8	62.5	5.1	10.6	12.8	23.0	2.4	3.8	55.8	23.9	1.2	3.8	Tamil Nadu	33
34	Puducherry #	301,276	208,655	95.3	89.3	1.9	2.7	2.5	6.6	0.3	1.4	90.8	4.5	0.1	1.8	Puducherry #	34
35	A & N Islands #	93,376	73,062	85.0	76.2	7.3	16.0	0.5	0.5	7.1	7.3	68.8	16.2	0.7	6.6	A & N Islands #	35

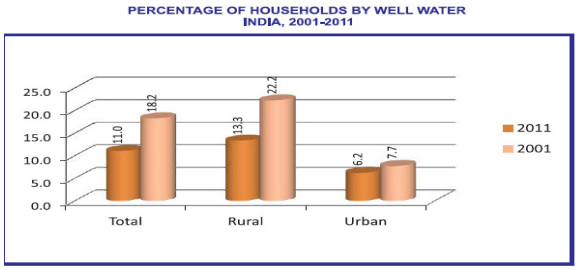
Source: Registrar General, India 2011, Main sources of Drinking Water in different states of India, 2012

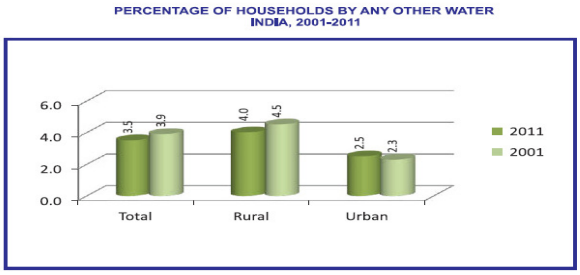
[7] Registrar General, India 2011,Main sources of Drinking Water in different states of India,2012

The following charts also depict the percentage of households using different sources of water in the country









Source: Registrar General, India 2011, Main sources of Drinking Water in different states of India, 2012

High fluoride concentration in ground water, beyond the permissible limit of 1.5 ppm, has come to stay as a major issue affecting a large segment of rural population to the tune of 25 million spread in over more than 200 districts in **17 states (such as; Andhra Pradesh, Bihar, Rajasthan, Tamil Nadu and Uttar Pradesh) in the country.** The population at risk is estimated at around 66 million. **Fluoride in water leads to digestive disorders, skin diseases and dental flurosis.**[8]

Besides, **high level of salinity (inland and coastal)** is reported from the selected states namely **Rajasthan, Uttar Pradesh, Andhra Pradesh, Tamil Nadu and West Bengal. Iron content** above permissible level of 0.3 ppm is found in 23 districts from 4 states, **namely, Bihar, Rajasthan, Uttar Pradesh and West Bengal, and also in coastal Orissa and parts of Agartala valley in Tripura**. Consumption of iron above permissible limit has poisonous effect as it can damage blood tissues. Similarly, high levels of arsenic above the permissible levels of 50 parts per billion (ppb) is found in the **alluvial plains of Ganges covering six districts of West Bengal.**[9]

Presence of heavy metals in groundwater is reported from 40 districts of 13 states, viz., **Andhra Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal, and Delhi**. Arsenic contamination in drinking water causes a disease called arsenicosis, for which there is no effective treatment. Long-term exposure to arsenic also causes cancer of the skin, lungs, urinary bladder, and kidney.

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[8] World Health Organization. India, **Sustainable Development and Healthy Environment, Water Sanitation,** World Health Organization. India, New Delhi

[9] Jaceline Peirrera, **Arsenic Exposure- Carcinogen**, December 2011

(http://www.sosarsenic.net/english/contamin/index.html)

There can also be skin changes such as lesions, pigmentation changes and thickening (hyperkeratosis) if such polluted water is consumed for longer period.[10]

Intensive use of chemical fertilizers in farms and indiscriminate disposal of human and animal waste on land result in leaching of the residual nitrate causing high nitrate concentrations in groundwater. Nitrate concentration, above the permissible level of 45 ppm, has been reported in **11 states namely Bihar, Andhra Pradesh, Uttar Pradesh, Rajasthan, Tamil Nadu, West Bengal, Haryana, Himachal Pradesh and Delhi**. It causes Methamoglobinemia (Blue Baby disease) where the skin of infants becomes blue due to decreased efficiency of hemoglobin to combine with oxygen. It may also increase risk of cancer. Similarly use of pesticides like DDT, BHC, Carbamate, Endosulfan, etc also pollute the ground water and it causes reproductive and endocrine damages.[11]

The industrial effluents and municipal waste in water bodies, also is one of the major source of groundwater pollution. A survey undertaken by Central Pollution Control Board in 1995 identified 22 sites in 16 states of India as critical for groundwater pollution, the primary cause being industrial effluents. **A recent survey undertaken by Centre for Science and Environment in Rajasthan, Andhra Pradesh and Uttar Pradesh** reported **traces of heavy metals such as lead, cadmium, zinc and mercury, mainly due contamination of industrial waste. Presence of heavy metals causes damage to nervous system, kidney, and other metabolic disruptions.**

Besides **water contamination**, there are certain behavioral practices like defecation on the boundary of drinking water sources, open drains and disposal of solid waste near sources of water lead to bacteriological contamination. **There are various religious practices that revolve around and in the sources of water like immersion of idols & other offerings on the surface water, and disposing human remains, which highly degrades the portability of drinking water.**

Some of the **major issues that need urgent attention are**: As a result of excessive extraction of ground water to meet agriculture, industrial and domestic demands, drinking water is not available during the critical summer months in many parts of the country. About 10 per cent of the rural and urban population does not have access to regular safe drinking water and many more are threatened. Most of them depend on unsafe water sources to meet their daily needs. Moreover, water shortages in cities and villages have led to large volumes of water being collected and transported over great distances by tankers and pipelines. **Chemical contaminants namely fluoride, arsenic and selenium pose a very serious health hazard in the country.** It is estimated that about **70 million people in 20 states are at risk due to excess fluoride and around 10 million people are at risk due to excess arsenic in ground water. Apart from this, increase in the concentration of chloride, TDS, nitrate, iron in ground water is of great concern for a sustainable drinking water programme.**[12] All these need to be tackled holistically. With over extraction of groundwater the concentration of chemicals is increasing regularly.

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10 World Health Organization, Arsenic in Drinking-water, Background document for development of WHO Guidelines for Drinking-water Quality, WHO India, New Delhi (http://www.who.int/water_sanitation_health/dwq/chemicals/arsenic.pdf)

11 M. Dinesh Kumar and Tushaar Shah, Groundwater Pollution and Contamination in India: The Emerging Challenge, New Delhi, 2005 (http://www.indiawaterportal.org/sites/indiawaterportal.org/files/ground-pollute4_FULL_.pdf)

12 WHO India, **Drinking water quality in India**, WHO Report, India (http://www.whoindia.org/LinkFiles/SDEWorkshop_Water_Quality_In_India_MOH.pdf)

Ingress of seawater into coastal aquifers as a result of over-extraction of ground water has made water supplies more saline, unsuitable for drinking and irrigation.

Pollution of ground and surface waters from agrochemicals (fertilizers and pesticides) and from industry poses a major environmental health hazard, with potentially significant costs to the country.

A direct relationship exists between water, sanitation, health, nutrition, and human wellbeing. Consumption of contaminated drinking water, improper disposal of human excreta, lack of personal and food hygiene and improper disposal of solid and liquid waste have been the major causes of many diseases in developing countries like India. The health problems associated with inadequate water and sanitation go far beyond avoidable child deaths. Water related illness accounts for about 5% of the global burden of disease. Diarrhoea claims some 450,000 lives annually in India—more than in any other country.[13] Apart from health outcomes, sanitation has a bearing on education, privacy and the dignity of women. Many studies have pointed out that one of the reasons for high dropout rates among adolescent girls in our country is lack of sanitation facilities at school. Better sanitation facilities in schools will translate into greater learning opportunities for adolescent girls. Not having access to toilets adversely affects the health and safety of women.

If we look at the present scenario, we are leading towards crisis. In the urban areas though about 60% of the population is depended on surface water sources, the availability and quality are questionable. It has been recently estimated that by 2017 India will be `water stressed'.[14] Some areas receive slight rainfall, whereas others experience monsoon conditions, which often result in flooding, loss of life and increased poverty. The situation concerning industrial supplies is even more difficult to analyze.

In this modern life (and polluted environment) it is important to drink and use safe water. But unfortunately safe drinking water is not available for consumption. There is a huge demand for safe water supply for the **'Base of the Pyramid' (BOP)** or poor people, especially in rural areas of India. But safe water resource is limited and people have to spend money or spend several hours to get water. Or even in the case where there is a well near-by, groundwater could be contaminated by arsenic, fluorine or heavy metals. To address the potable water needs, several measures/products are devised to make water free from pathogenic microorganisms as well as from polluting chemicals. These water purification products use **platinum-titanium plates for alkalization of water, which are very thick and produce water for use.** Also to reach the rural people, sales and delivery channel are developed in line with products/services.

[13] Benny George, **Nirmal Gram Puraskar: A Unique Experiment in Incentivising Sanitation Coverage in Rural India**, *International Journal of Rural Studies (IJRS*), Vol. 16 no. 1 April 2009, www. ivcs.org.uk (http://www.vrionline.org.uk/ijrs/April2009/incentivising%20sanitation%20coverage%20in%20rural%20india.pdf)

[14] India Water Foundation, **Drinking Water Stress in India by 2017**, India Water Foundation, New Delhi , (http://indiawaterfoundation.org/DataMaster.aspx?DM=203)

OBJECTIVE OF THE STUDY

The study intended to clarify the approach for **"Base of Pyramid" (BOP)** or poor people in rural areas to get safe water supply in affordable way.

The Main Objectives of the study are:

- To understand the products of safe water supply for the rural people
- To explore the usage of these source/products among consumers
- To investigate the efficacy of service providers in providing safe water supply to rural areas

GEOGRAPHIC COVERAGE AND SAMPLE SELECTION:

F**ive states**, two states each from Northern and Sothern parts of country and one from Eastern India with existence of high level of water contamination were selected. Number of studies has shown that the major reasons of water contamination are the presence of pollutants, type of terrain and uneven rainfall. The impurities, mostly sited which are responsible in contaminating the drinking water include; **Salinity and contents of Flouride, Heavy Metals, Iron, Manganese, Arsenic, Chloride, Zinc, Nitrate etc.**

With these considerations below mentioned criteria were adopted for States' selection:

- States where the ground water is contaminated by arsenic, fluorine or heavy metals.
- Where water sources are far such as a few hours walking from the community.
- Where water sources are limited to rain water (groundwater is not available).
- Where available water is very muddy/scanty.
- Represent two fro North, two from South and one from Eastern India

The five selected states with adoption of afore discussed criteria were **Rajasthan, Uttar Pradesh, Tamil Nadu, Andhra Pradesh and West Bengal. West Bengal** was mainly included due to existence of high water contamination in the river belt and its proximity of with Bangladesh, where water contamination is a major problem.

Below mentioned table shows the number of pollutants in the selected states -

Pollutants	Salinity	Fluoride	Iron	Manganese	Arsenic	Nitrate	Chloride	Zinc	Heavy Metals	All
States										
Rajasthan	√	√	√			√	√	√	√	**7**
Uttar Pradesh	√	√	√	√		√			√	**6**
Andhra Pradesh	√	√				√		√	√	**5**
Tamil Nadu	√	√				√			√	**4**
West Bengal	√	√	√		√	√	√		√	**7**

Source: Census 1981, 1991; National Sample Survey Organization (NSSO), National Council for Applied Economic Research (NCAER), Multiple Indicator Cluster Survey (MICS) 2000.

Considering the following table (which also has been used in selecting the states) the **districts in the above mentioned states were selected (Highlighted below).**

Type of Pollutant	State in India	Places of Occurrence
Salinity (Inland)	**Bihar**	**Begusarai**
	Delhi	**Najafgarh, Kanjhawala, and Mehrauli Blocks**
	Haryana	**Karnal, Sonepat, Rohtak, Hissar, Sirsa, Faridabad, Jind, Gurgaon, Bhiwani, Mahendragarh**
	Madhya Pradesh	**Gwalior, Bhind, Morena, Jhabua, Khargaon, Dhar, Shivpuri, Shajapur, Guna, Mandsor, Ujjain**
	Maharashtra	**Amravati, Akola**
	Punjab	**Bhatinda, Sangrur, Faridkot, Firozpur**
	Rajasthan	**Barmer, Jaisalmer, Bharatpur, Jaipur, Nagaur, Jalore, Sirohi, Dungarpur, Jodhpur**
	Uttar Pradesh	**Agra, Mathura, Unnao, Mainpuri, Banda**
Salinity (Coastal)	**Andhra Pradesh**	**Vishakapatnam, East Godavari, West Godavari, Krishna, Guntur, Prakasam**
	Gujarat	**Junagarh, Kachch, Varahi, Banskanta, Surat, Bharauch, Mehsana ,Ahmedabad, Surendranagar, Kheda,Jamnagar**
	Karnataka	**Bijapur, Raichur, Bellary, Dharwar**
	Kerala	**Ernakulam, Trichur, Alleppey**
	Pondicherry	**Pondicherry**
	Orissa	**Puri, Cuttak, Balasore**
	Tamil Nadu	**Karaikal, Nagapattanam, Pudukottai, Ramananthapuram, North Arcot ,Ambedkar, Dharampuri, Salem,Trichy, Coimbatore**
	West Bengal	**Haldia and 24 Parganas**

Flouride	Andhra Pradesh	Cuddapah, Guntur, Nalgonda, Prakasam, Nellore, Anantapur, Rangareddy, Adilabad
	Bihar	Giridih, Jamui, Dhanbad
	Gujarat	Banskanta, Kachch, Amreli, Surendranagar, Rajkot, Ahmedabad, Mehsana, Sabarkantha
	Karnataka	Tumkur, Kolar, Bangalore, Gulbarga, Bellary, Raichur
	Haryana	Hissar, Kaithal, Gurgaon, Rohtak, Jind, Bhiwani, Mahendragarh, Faridabad
	Kerala	Palaghat, Ananipur, Nellore, Chittoor.

Type of Pollutant	State in India	Places of Occurrence
	Madhya Pradesh	Bhind, Moerana, Guna, Jhabua, Chhindwara, Seoni, Mandla, Raipur, Vidisha
	Maharashtra	Bhandara, Chandrapur, Nanded, Aurangabad
	Orissa	Bolangir, Bijapur, Bhubaneshwar and Kalahandi
	Punjab	Jalandhar, Amritsar, Bhatinda, Faridkot, Ludhiana & Sangrur
	Rajasthan	Barmer, Ganganagar, Jalore, Nagaur, Pali, Dungarpur, Sirohi, Ajmer & Bikaner
	Tamil Nadu	Dharampuri,Salem, North Arcot, Viluppuram, Pudukottai, Cheng alput, Madurai and Tiruchirapalli
	U.P.	Bulandshahar, Unnao, Agra, Aligarh, Mathura, Ghaziabad, Meerut, and Rai Bareilly
	West Bengal	Birbhum, Nadia
Sulphide	Orissa	Balasore, Cuttak, and Puri
Iron	U.P.	Mirjapur, Unnao
	Assam	Darrang, Jorhat, Kamrup, Northern Bank of Brahmaputra
	Orissa	Parts of Coastal Orissa, Bhubneshwar
	Bihar	E. Champaran, Muzaffarpur, Gaya, Mungher, Deoghar & Madubani, Patna, Palamau, Nalanda, Nawada, Banka
	Rajasthan	Bikaner, Alwar, Bharatpur, and Dungarpur

	Tripura	Dharmnagar, Amarpur, Agartala, Kamalpur, Khowai, and Parts of Agartala Valley
	West Bengal	Midnapur, Howrah, Nadia, Hoogly and Bankura,
Manganese	Orissa	Bhubaneshwar
	U.P	Moradabad, Basti, Rampur, and Unnao
Arsenic	West Bengal	Malda, Murshidabad,Nadia, Malda,South-24 Paraganas, Hoogly, Bardhaman, and Howrah
Nitrate	Bihar	Patna, East Champaran, Gaya, Nalanda, Nawada, Banka, and Bhagalpur.

Type of Pollutant	State in India	Places of Occurrence
	Andhra Pradesh	Vishakapatnam, East Godvari, Krishna, Prakasam, Nellore, Chittoor, Anantapur, Cuddapah, Kurnool,Guntur,Nalgonda, Mehboobnagar, Rangareddy, Medak, Adilabad, and Khammam.
	Delhi	Naraina, Shahadara (Blocks)
	Haryana	Ambala, Sonepat, Jind, Gurgaon, Faridabad, Hissar, Sirsa, Karnal, Kurukshetra, Rohtak, Bhiwani, Mahendragarh
	Himachal Pradesh	Kulu, Solan, Una
	Uttar Pradesh	Jhansi, Lalitpur, Faizabad, Sultanpur, Maharajganj, Gorakhapur, Deoria ,Orai and Unnao
	Karnataka	Bidar, Gulbarga, and Bijapur
	Madhya Pradesh	Sehore, Bhopal, and West & Central part of state
	Maharashtra	Thane, Jalna, Beed, Nanded, Latur, Osmanabad, Solapur, Satara, Sangli, Kolhapur, Dhule, Jalgaon,Aurangabad, Ahmednagar, Pun e, Buldana, Amravati, Akola, Nagpur, Wardha, Bhandara, Chandr apur,Gadchiroli
	Punjab	Patiala, Faridkot, Firozpur, Sangrur & Bhatinda
	Rajasthan	Jaipur, Churu, Ganganagar, Bikaner, Jalore, Barmer, Dungarpur, Bundi, and Sawai Madhopur

	Tamil Nadu	Coimbatore, Periyar, and Salem
	West Bengal	Midnapur, Howrah, Murshidabad, Nadia, Bankura, Purulia Uttar Dinajpur, Malda, and Birbhum
	Delhi	Shahadara and Mehrauli Blocks
Chloride	Karnataka	Dharwad, Belgaum
	Madhya Pradesh	Bhind, Shajapur and Sehore
	Maharashtra	Solapur, Satara, Amravati, Akola, and Buldana
	Rajasthan	Barmer, Jaisalmer, Jodhpur, Dungarpur, and Jalore
	West Bengal	Digha, Haldia

Type of Pollutant	State in India	Places of Occurrence
Zinc	Andhra Pradesh	Hyderabad, Osmania University campus
	Delhi	R.K. Puram
	Rajasthan	Udaipur
Chromium	Punjab	Ludhiana
Heavy Metals	Andhra Pradesh	Anantapur, Mehboobnagar, Guntur, Prakasam, Visakhapatnam, Cuddapah, Nalgonda
	Assam	Digboi
	Bihar	Dhanbad, Muzaffarpur, Begusarai
	Haryana	Faridabad
	HimachalPradesh	Purwanoo, Kalaamb
	Karnataka	Bhadrawati
	Madhya Pradesh	Bastar, Korba, Ratlam, Nagda
	Orissa	Angul, Talcher
	Punjab	Ludhiana, Mandi, and Gobindgarh
	Rajasthan	Pali, Udaipur, Khetri, Dungarpur
	Tamil Nadu	Manali, North Arcot, and Salem
	Uttar Pradesh	Singrauli, Basti, Kanpur, Unnao, Jaunpur, Allahabad,

		Saharanpur, Aligarh
	West Bengal	**Durgapur, Howrah, Murshidabad, and Nadia**
	Delhi	**Alipur, Kanjhawala, Najafgarh, Mehrauli, and Shahdara Blocks**

While the selected states have been highlighted in black, the selected districts within each state have been marked in light blue

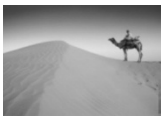
Source: Census 1981, 1991; National Sample Survey Organization (NSSO), National Council for Applied Economic Research (NCAER), Multiple Indicator Cluster Survey (MICS) 2000.

A list of major pollutants of water in different states/districts of India

Pollutants	Salinity	Fluoride	Iron	Manganese	Arsenic	Nitrate	Chloride	Zinc	Heavy Metals	All
Districts										
Rajasthan (DUNGARPUR)	√	√	√			√	√		√	6
Uttar Pradesh (UNNAO)	√	√	√	√		√			√	6
Andhra Pradesh (GUNTUR)	√	√				√			√	4
Tamil Nadu (SALEM)	√	√				√			√	4
West Bengal (NADIA)		√	√		√	√			√	5

Source: Census 1981, 1991; National Sample Survey Organization (NSSO), National Council for Applied Economic Research (NCAER), Multiple Indicator Cluster Survey (MICS) 2000.

One district has been identified from each of the selected state with existence of maximum number of water pollutants. The identified districts and blocks (Our field teams selected one block from each of the selected district after visiting the district headquarters with existence of high water pollution) are given in the Table below-

STATE	DISTRICT	BLOCK
UTTAR PRADESH	UNNAO	GANJ MORADABAD
RAJASTHAN 	DUNGARPUR	SAGWARA
ANDHRA PRADESH	GUNTUR	BOLAPILLI
TAMIL NADU	SALEM	GANGA VALLEY
WEST BENGAL	NADIA	CHAPRA

<u>In the following sections, the background of selected states & districts and the water contamination status has been discussed in detail:</u>

UTTAR PRADESH (UP):

UP is located in northern part of India. With a population of over 200 million people, it is India's **most populous state.** Uttar Pradesh has more than 31 large and small rivers; of them, the **Ganges, Yamuna, Sarayu and Ghaghara.** Rainfall in the state ranges between 1,000–2,000 mm (39–79 in) in the east to 600–1,000 mm (24–39 in) in the west. The state of Uttar Pradesh consists of 75 districts, which are grouped into eighteen divisions: Agra, Aligarh, Allahabad, Azamgarh, Bareilly, Basti, Chitrakoot, Devipatan, Faizabad, Gorakhpur, Jhansi, Kanpur, Lucknow, Meerut, Mirzapur, Moradabad, Saharanpur and Varanasi.[15] For the purpose of study, **GfK selected Unnao district**. The district is mainly drained by river Ganga and its tributaries Kalyani, Khar, Loni and Marahai in the West and by Sai River in the East of the district. All these rivers are perennial in nature. The district receives a normal annual rainfall of 837.80 mm. Ground water pollution due to excess of heavy metals, nitrate, salinity, fluoride and iron has been reported in the district; and also in Unnao City area due to existence of tanneries. The higher consumptive water use associated with the existing cropping system has resulted in decline in water table in most regions of Uttar pradesh. The faulty water management practices for higher water requiring crops like rice and wheat has also resulted in nitrate pollution problems in few pockets. The recent modification in the pest's population is also a matter of concern. In some parts of UP, the introduction of additional rice crop in the summer season has caused ground water depletion at relatively faster rates. Soil physical environment associated with puddling of soil for rice crop also creates soil structural problems. As the consequences water table has depend and resulted in drinking water contamination and shortage. **Besides, in several districts of Uttar Pradesh and Rajasthan groundwater is of poor quality (i.e. either saline or alkali) which makes the water undrinkable.**

STATE	DIVISION	DISTRICT	BLOCK
UTTAR PRADESH	LUCKNOW	UNNAO	GANJ MORADABAD

[15] http://en.wikipedia.org/wiki/Uttar_Pradesh

RAJASTHAN:

Rajasthan is the largest state of India in terms of area; and is located in the north-west of the country. The state is divided into 33 districts and seven divisions. This state is known for its scanty water resources, with large part of state covered under Thar Desert and also mountainous terrain. It has only 1.16% of surface water and 1.70% of the ground water of the of the total water resources in the country. Average rainfall is 531 mm against national average of 1200 mm. Gross annual draft of ground water in the state is 13 *BCM (Billion Cubic Meters*) against recharge of 10.4 BCM.[16] While five to six districts of Rajasthan are desert districts (Thar Desert), with scanty rain fall, some districts are mountainous (Aravali range) with ground water being scanty.

In order to meet the needs, Rajasthan Government's Public Health Engineering Department (PHED) has installed over 10,700 new hand-pumps and bore-wells in the State's urban as well as rural areas this past January under a contingency plan for supply of drinking water. Due to tremendous use of ground water for irrigation and other purposes, it has resulted in sharp decline of ground water levels and brought about adverse changes in the geochemistry of ground water.

Natural contaminates such as fluoride, nitrate, and chloride salts are increasing in ground water making it unfit for drinking and posing risk to health. In Rajasthan, currently major four towns get drinking water supply once in 96 hours, eleven towns get once in 72 hours, and 60 towns get the supply once every alternate day. This is the situation prevailing in Rajasthan. 11 districts in the state have been put under critical group where water crisis is on worst. **Dungarpur**, Pali, Rajsamand, Barmer, Nagaur, Jhalawar are some of the districts where drinking water is supplied by tankers. Besides, **the state is full of mineral resources including copper and iron ores resulting in to existence of industrial complexes**. **The effluent from these industries are discharged in to small water resources which further contaminate the ground water making it highly polluted and unsafe for drinking purposes.**

For the purpose of study, Gfk selected **Dungarpur District** where the average annual rainfall in Dungarpur district is approximately 750 mm, because of the highly undulating terrain, the retention capacity is low; hence there is perpetual shortage. The district is also mineral rich, making the water contaminated with nitrate and chloride, which is unsuitable for drinking. Next, the water reservoirs cannot effectively cater to the population as the settlements are scattered. Mostly women (who usually fetch drinking water for the family) have to travel long distances, spending 2-3 hours daily to fetch about 10 liters of water and that too contaminated with mineral residues. In summer situation worsens, with scarcity and increase in water contamination.

STATE	DIVISION	DISTRICT	BLOCK
RAJASTHAN	UDAIPUR	DUNGARPUR	SAGWARA

[16] Tata Energy Research Institute**, Rajasthan State Action Plan on Climate Change**, Govt. of Rajasthan, action plan prepared by TERI, Supported by GIZ, New Delhi

(http://210.212.96.131/rpcb/ReportsAndPaper/ClimateChange_15_12_2011.PDF)

ANDHRA PRADESH (AP)

Andhra Pradesh is the fourth largest state by area and fifth largest by population. It is situated on the country's southeastern coast. Andhra Pradesh has the second-longest coastline of 972 km (604 mi) among the states of India. Two major rivers, **Godavari** and **Krishna**, run across the state. Ground water in A.P. is contaminated by presence of nitrates, fluoride, salinity and heavy metals. **In A.P., GfK** selected **Guntur District** for the purpose of study. It comprises of 57 mandals/blocks under administrative control of 3 divisions namely Narasaraopet, Guntur and Tenali. The district has 729 villages and 1036 hamlets. The average annual rainfall of Guntur district is 889mm against national average of 1200 mm. Mainly Krishan and Gundlakamma Rivers with its important tributaries drain the district. There are a total of 512 protected water supply schemes and 4868 bore wells, 1540 open wells and 182 other wells for drinking water supply. Around 166 villages are having fluoride problem in ground water and about 3 villages are having brackish ground water. There are in total 68 problematic villages so far as drinking water is concerned in 9 mandals. Main pollutants found in the water in Guntur district of AP are- Salinity, Nitrate and heavy metals.[17]

STATE	DISTRICT	BLOCK
ANDHRA PRADESH	GUNTUR	BOLAPILLI

There are varying degrees of pollutants in Andhra Pradesh because of the multiple varieties of effluents flowing into the sea. A comparative study was done on the impacts of harvesting on the regeneration of bamboo Dendrocalamus-strictus (Nees) in the Eastern Ghats of Andhra Pradesh at two harvest sites viz. sites allocated to Forest Department and ITC–BPL (Tobacco production companies). Data pertaining to the structure of the bamboo stands and harvesting strategies adopted resulted in to low regeneration at ITC – BPL sites and is attributed to lack of management practices including not able to control the polluted extractions in to river waters. Though harvest rate was higher at Forest Dept. Site and regeneration was better, appropriate strategies are required to make the water safe and drinkable in the whole of the Eastern Ghats of Andhra Pradesh. Further, the existence of cement industries and the mines used as raw material for cement manufacturing has contaminated the ground water with the presence of heavy metal contents.

[17] Central Ground Water Board, **Ground water Information for Guntur District, Andhra Pradesh, Southern Region** , Central Ground Water Board, Ministry of Water Resources , Government of India, Hyderabad, August, 2007
(http://cgwb.gov.in/District_Profile/AP/Guntur.pdf)

TAMIL NADU (TN)

Tamil Nadu is the eleventh largest state in India by area and the seventh most populous state. Tamil Nadu lies in the southernmost part of the **Indian Peninsula** and is bordered by the union territory of Pondicherry, and the states of Kerala, Karnataka, and Andhra Pradesh. There are total 32 districts of Tamil Nadu. Tamil Nadu is heavily dependent on monsoon rains, and thereby is prone to droughts when the monsoons fail. The climate of the state ranges from dry sub-humid to semi-arid. The normal annual rainfall of the state is about 945 mm (37.2 in) of which 48% is through the North East monsoon, and 32% through the South West monsoon. Since the state is entirely dependent on rains for recharging its water resources, monsoon failures lead to acute water scarcity and severe drought. **In Tami Nadu, GfK selected Salem** district for study. Salem is located in the North Central part of the state, about 340 kilo meters (211 mi) south-west of the state capital, **Chennai** and 200 kilo meters (124 mi) south of Karnataka's state capital, Bangalore. Salem in general is characterized with scanty rainfall and a dry climate. Salem has moderate-dry weather throughout except during the monsoon season. The main pollutants found in water of Tamil Nadu's Salem District are- Salinity, Flouride, Nitrate and Heavy Metals. [18]

STATE	DISTRICT	BLOCK
TAMIL NADU	SALEM	GANGAVALLEY BLOCK/ YERCAUD BLOCK

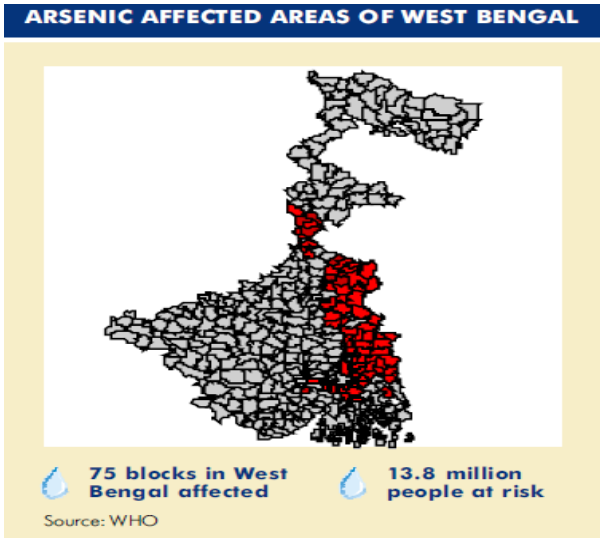
From all the South States of India, GfK selected Andhra Pradesh and Tamil Nadu states; the later because of existing uneven rainfall and muddy water, resulting in large scale pollution in available drinking water. The major causes of water quality degradation include, discharge of toxic chemicals, long range transport of atmospheric pollutants and contamination of river water. The Tamiraparani river basin is one of the most important and perennial river basin in Tamil Nadu. The geochemistry of the river water shows alkaline nature. Water resources are affected by the saline water encroachment along the northeastern and Southern coastal regions. Water is muddy, containing very high Sodium and high Salinity. Phosphorus was found to be the controlling nutrient in this river basin. **Two main problems** have been identified based on the biogeochemistry of this river:

i) Effect of damming, which significantly restricts not only water movement but also nutrient fluxes from the upstream to the Bay;
ii) Non-point sources such as agricultural runoff, largely affects the surface water quality.

[18] http://en.wikipedia.org/wiki/Geography_of_Tamil_Nadu

WEST BENGAL

West Bengal is a state in the eastern region of India and fourth most populous state of the nation. The **Ganges** is the main river, which divides Bengal in to two parts. One branch enters Bangladesh as **Padma,** while the other flows through West Bengal (India) as the **Bhagirathi/ Hooghly River**. The Ganges delta and the Sundar bans area have numerous rivers and creeks. Pollution of the Ganges from indiscriminate waste dumped into the river is a major problem. **Damodar River,** another tributary of the Ganges and once known as the "Sorrow of Bengal" (due to its frequent floods), has several dams under the **Damodar Valley Project**.[19]



The presence of excess Arsenic in ground water has been reported from West Bengal. Nearly 13.8 million people in 75 blocks are reported at risk. It is also reported that around 0.2 million people in West Bengal have arsenic related skin manifestations. Other water quality problems in India include varying iron levels in groundwater (which restricts water utility owing to color, turbidity and taste), especially in northeastern India, heavy metals such as Chromium, Lead, Nickel, Zinc, Copper, and Manganese (especially around industrial towns – however, extensive surveys have yet to be carried out), nitrates, and bacteriological contamination (widespread owing to reasons including poorly maintained or non-existent hand pump platforms, inadequate or no drainage, and poor hygiene around drinking water sources). At least nine districts in the state suffer from arsenic contamination of groundwater, and an estimated 8.7 million people drink water containing arsenic above the World Health Organization recommended limit of 10 µg/L. Out of 19 districts in west Bengal, during 1993, cases of arsenic dermatoid was reported from six districts, namely; Malda, Murshidabad, North 24 Paraganas, South 24 Parganas, and **Nadia**.[20]

GfK selected **Nadia District** for the study. Nadia is one of the nine districts where level of arsenic is above the permissible limit of WHO. The concentration of arsenic exceeds 10mg/l in many districts including Nadia.

STATE	DISTRICT	BLOCK
WEST BENGAL	NADIA	CHAPRA

[19] http://en.wikipedia.org/wiki/West_Bengal

[20] Department of Economic Affairs, **Position Paper on Water and Sanitation Sector**, Department of Economic Affairs, Govt. of India, Oct 2009

(http://www.pppinindia.com/pdf/ppp_position_paper_water_n_sanitation_102k9.pdf)

CHAPTER II

METHODOLOGY AND SAMPLE COVERAGE

The study was conducted in **5 states of India viz. Andhra Pradesh, Tamil Nadu, West Bengal, Rajasthan and Uttar Pradesh**. In **each State one district** was identified and from each district **one block** was selected for the study with existence of high level of water contamination. (As described in the table above) In each Block, **2 Villages** were chosen for the study. (Refer to the table below) :

State	District	Block	Village 1	Village 2
Rajasthan	Dungarpur	Sagwara	Mavai	Mandav
Andhra Pradesh	Guntur	Bolapilli	Ravulapuram	Gandiganumal
West Bengal	Nadia	Chapra	Bahirgachhi	Ichhapur
Uttar Pradesh	Unnao	Ganj moradabad	Maholiya	Haraipur
Tamil Nadu	Salem	Gangavalli	Kadambur	Krishnapuram

The sample size covered in all the selected states-

Consumers –General Population covered	50 per state (Total- 250)
NGOs covered	(Total- 5)
Local Manufacturers covered	1 per state (Total 5)
Distributors covered	1 per state (Total 5)
MFI s covered	(Total 2)

As instructed, the **Researcher (Supervisor) in each state visited both the selected villages** and **collected the household list from the Panchayat**. Then the **total number of households in both the villages was collated to get the absolute number.** Say- in Village 1: There were total **200 Households** and in Village 2 there were **175 Households**. Total Number of households in both villages**: 200 + 175 = 375**. Later the **Total Number of households in both the villages was divided by 50 to get the interval** = 375/50 = 7.5 (take it as **8)**. The Researcher then started the **survey by randomly picking the first house and then every 8th Household was chosen by following the right hand rule.** In the case of Locked households, the adjoining (left or right) household was selected.

PRODUCTIVITY

As per the methodology, one interviewer (Research Assistant) covered 5 interviews of General Population (Consumers) per day. That means in one day 10 **interviews was conducted by one team of 2 interviewers.** Interviews of NGO personnel, Manufacturers, Distributors and MFI's was conducted on different dates, after taking an appointment from them.

TARGET GROUP

- **Product Maker/ Distributor –**
  Person who is involved in making and distributing the water purification product and system like water purifier, purifying tablet/ water and water treatment system.

- **Consumers-**
  Head of the Household (Male/ Female) in the age group of 18- 59 years.

- **Mediator/ Supporter**
  People working in NGO/NPO / MFI working for providing water supply in rural areas.

TEAM SIZE

Team of **1+2** was recruited in each state, comprising of one Supervisor (Researcher) and Two Investigators (Research Assistants).

- **Field Managers – Five**
- **Total Researchers (Supervisors) – Five**
- **Total Research Assistants (Investigators) – Ten**

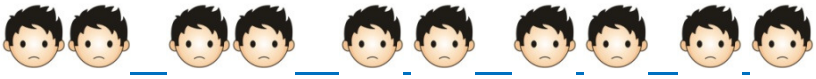
Team Leader- Dr. RB Gupta

Project Coordinator- Ridhima Bahl/ Piyusha Majumdar

Field Managers

Harvinder Kaur (RAJASTHAN)
ANK Narasimhan (TAMIL NADU)
Mithu Ganguly (WEST BENGAL)
Kainat (UTTAR PRADESH)
Saraswathi (ANDHRA PRADESH)

Supervisors (Researchers)



Investigators (Researcher Assistants)

STUDY DESIGN

It is a combination of qualitative and quantitative study in order to understand the market of safe water for base of Pyramid (BOP) or poor people. The combination of techniques was conducted as a part of research exercise among different category of target respondents.

The core activities included

(a) Secondary research (Desk review)
(b) Quantitative study among consumers
(c) Qualitative study among Product maker/Distributor and Mediator/supporter working to provide safe water to the rural people.

RESEARCH TOOLS

Standardized questionnaires, open **ended questions for the In-depth Interviews** were used in the study (See appendix 1). Five different questionnaires/IDIs were prepared for different categories of target respondents-

- **General Population QRE**
- **NGO Questionnaire**
- **Manufacturer QRE**
- **Distributors QRE**
- **Micro Finance Institutions QRE**

The overall content and format of questionnaire was finalized by GfK Mode in consultation with JICA. Keeping in view objectives of the study, additions and modifications were made to the model questionnaire after extensive discussion. The General Population Questionnaire was largely pre-coded/structured with fixed response categories, and was translated in Telegu, Hindi, Tamil and Bengali.

RECRUITMENT AND TRAINING

The supervisors in the team were selected from the pool of field personnel retained by GfK-Mode. The basic qualification of field staff (investigators) was bachelor's degree with thorough understanding of the local languages in the states.

Training of Field staff is one of the most important aspects of the fieldwork. It was conducted at the central level for all the Field Managers and later at the local level at selected states, GfK's field offices.

Representative from JICA was also present during the training at the Central Level in Delhi. The queries of Gfk Field Managers were solved by Researchers at Delhi. Two day training course consisted of instruction in interviewing techniques and field procedures for the survey, a detailed review of each item in the questionnaire and mock interviews between participants in the classroom.

The training at the Central and Local Levels provided orientation and clarity of study objectives, and data collection methodology. Research Assistants who performed satisfactory in the local level training programme were selected as interviewers for the main survey. Adequate care was taken to ensure recruitment of investigators/ RA (Research Assistants), who meet the profile with regard to language and communication.

The fieldwork was carried out under the guidance of well-experienced professionals having rich expertise in quantitative and qualitative surveys.

Main survey was carried out by 5 teams in 5 states, each team consisting of two investigators (Research Assistants) and one Supervisor (Researcher).

FIELDWORK AND DATA ANALYSIS

The Fieldwork in all the states started in second week of April 2012. Each team took around a week to complete the fieldwork. One Team worked independently in one district covering 2 villages. The main duty of the supervisor (Researcher) was to examine the completed questionnaires in the field for completeness, consistency and legibility of the information collected and to ensure all necessary corrections were made. Special attention was made to missing information and skip instructions. Throughout the survey, the GfK researchers in *Delhi* maintained a close contact with all the teams through direct communication. The objective was to provide support and advice to the staff in the field and to enhance data quality and efficiency of interviewers. This objective was accompanied by communicating data problems and possible solutions to the interviewing teams, reminding interviewers about proper probing techniques and examining the fieldwork of supervisors.

One data entry operator was involved in data entry of quantitative data. Data was fed into the computer package known as Fox Pro and the analysis of the entered data was performed in Quantum. Computer based checks were done to clean the data and remove inconsistencies.

A tabulation plan was prepared and shared with JICA, on the basis of which the tables were prepared. All the tables were prepared by states and also for total. Thereafter relevant tables were presented, as discussed in the following chapters.

CHAPTER III

PRODUCT –SIDE SURVEY

The Chapter III presents **in-depth interview with Water purifier Manufacturers and Distributors. Some of the general observations have also been discussed in the chapter.**

Drinking water is most essential for livelihoods and for other consumptions. Water is a natural resource, fundamental to life, livelihood, food security and sustainable development. It is also a scarce resource. In India, water problems are man-made and has become very complex. People's health condition in any region, can be directly related to the quality of water. Hence it is very important to state the availability of "safe drinking water to all". Supply of safe drinking water and provision of sanitation are the important contributing factors for improving the health of the people in any country. As per a World Health Organization (WHO) report 80 per cent of the diseases are due to unhygienic conditions and unsafe drinking water ***in India***. It is estimated that every year about 1.5 million children under five years die in India of water related diseases.[21]

Over time many studies have been carried out into the safety of drinking water and the way it is affecting health. There is a vast amount of contaminations and pollutants within the sources and most of these pollutants cause a vast amount of damage to our health. One way to have a safer drink is to **use Purifier System** or **any Filtration method** to remove / reduce the level of contaminations, which people are consuming.

With more and more Indians becoming aware of the hazards of drinking impure water, the demand for effective water purifiers is growing rapidly. The majority of intestinal disorders and infections are caused by water borne micro organisms. **As a result, the number of consumers looking for reliable purification options is increasing not only in the metros but also in towns across India**. **Boiling** is one of the oldest methods of purifying water and is said to kill most micro organisms. **Candle water filters** (*made of ceramic material*) are also used in many households across India, as an initial modern method. However, the pace of life in urban India has quickened so incredibly over the last decade or so only a few households now have the time to treat water manually. Also, **mechanized water purification systems are often considered more reliable as far as eliminating micro organisms is concerned.**

[21] Indian Institute of Mass Communication, **Water and Sanitation, A Baseline Study**, *Indian Institute of Mass Communication, on behalf of Rajiv Gandhi National Drinking Water Mission,* January, 1998 (http://ddws.gov.in/sites/upload_files/ddws/files/pdf/IIMC_Report.pdf)

Perceived Safe Drinking Water:

Generally people consider the water they use for drinking and cooking as clean and safe. Mostly people consider clear water as safe water. The water which is visibly clean, but otherwise would have been contaminated is also considered as safe by the general public/consumers. 'Tastes good' is also considered as an attribute of safe water. But, very often water considered as clean is not safe and it contains more harmful things than we possibly can perceive.

Data collected among General Population revealed that 62% of the respondents believed that the water is not safe for drinking while 38% had no complaints with the quality of water. In the IDIs with Water Purifier Distributor it was mentioned that "Unclean / unsafe water can create health problems" was known to majority of the people in all the selected states. And, Majority of the people understood the importance of drinking pure/safe water.

The discussions held with different people, directly involved, revealed that consumers have started prioritizing safe drinking water. Concerns were firstly related to physical properties of water such as taste, odor, appearance but now large proportion of people are aware of water borne diseases, they prefer boiled water and also use filter to get safe water. It is also clear that many efforts need to be done to educate people about bad effects of contaminated water and how it can be purified, both at household level and by using different type of affordable water purifiers.

Two important issues thus emerge of the above discussion:

- Generation of awareness about existence of contamination in drinking water and need for purifying the same before drinking, and
- Viable options available for the community to purifying water using different available products.

In the following section, based on prevailing practices of purifying drinking water and availability of different products, an attempt has been made to explore the different alternatives available for people to opt from for drinking water purification. The discussion is mainly based on the in-depth discussions held with product distributors and manufacturers besides the information available from secondary sources.

A list of the distributors and manufacturers who were contacted at five selected sites of the study is given below:

List of Manufacturers and Distributors of Water Purification Products Interviewed

RESPONDENT TYPE	UTTAR PRADESH	RAJASTHAN	ANDHRA PRADESH	TAMIL NADU	WEST BENGAL
NAME OF THE PERSON INTERVIEWED	SANDHYA SINGH	MR. KAUSHIK BHATT	V.NAGI REDDY	AP GANESHAN	PULAK CHAKRABORTY
NAME OF LOCAL MANUFACTURER	HBS	ROYAL NATURAL PRODUCTS	CHAITNAYA RUPA ENTERPRISES	RAINBOW WATER	DOMIT BRAND RENANIKLAL CERAMIC PVT.LTD.
TYPE OF WATER PURIFIER	WATER BOTTLING PLANT	SPRINKLATE	WATER BOTTLING PLANT AND AQUA KARE WATER PURIFIER	BORNE CHINA CANDLE PRODUCTS	BORNE CHINA CERAMIC CANDLE PRODUCTS
PRICE OF WATER PURIFIER	RS.5/- PER 10 LITERS	RS.3500/- PER PIECE	RS.3/- PER 10 LITERS & RS.4500/- PER PIECE	RS.1000-1500/- PER PIECE	RS.1000/- PER PIECE
NAME OF THE PERSON INTERVIEWED	VIKAS KUMAR	YASHWANT JAIN	V.NAGI REDDY	SELVA KUMAR	RAJIB SINHA MANAGER
NAME OF THE DISTRIBUTOR	KRISHNA ELECTRONICS	MAHAVEER AGENCY	CHAITNAYA RUPA ENTERPRISES	-	ALIP MITRA

Different products available in the market for Water Purification

The water purification business in India is undergoing major changes, not just in terms of technology, but also in terms of pricing and competition. The drivers include scarcity of clean drinking water, low penetration of water purifiers, increasing urbanization, and waterborne diseases, while challenges faced are the lack of standards and low awareness levels. As per World Bank, 80 percent of communicable diseases in India are water related. Due to over exploitation of ground water, the levels of mineral contaminants such as arsenic and fluoride in water drawn from wells have increased dramatically. About 50 million people in West Bengal are presently affected by arsenic poisoning while an additional 70 million people are affected in neighboring Bangladesh, which according to the World Health Organization (WHO) is the largest mass poisoning in human history. In addition, about 60 million people across India, mainly in Rajasthan and Andhra Pradesh, consume water with high fluoride content. Given the gravity of the situation, there is an urgent need for deploying technologies for removing microbiological, arsenic, and fluoride contamination from drinking water before it is consumed.[22]

[22] ADI Media Publication, **TV VEOPAR JOURNAL**, Annual Issue, APRIL 2012

As discussed usually **two types of methods are being followed for drinking water purification in large number of Households who care for safe drinking water. The options are as follows:**
Different types of Water Purification methods/products available/followed in India:

Type of Methods/ Products	Manufacturers/ Product Brand
A. Traditional • Boiling • Use of Cloth • Steering • Use of Alum • Carbon Absorption • Others	- N.A
***B.* Modern**	
• Candle: Electrical and non electrical	Pure Classic Usha Pure Domit Artware Sprinkalte
• ROs	Kent RO Aqua fresh Dolphin RO System Eureka Forbes Nasaka Zero B Emerald Zero B Ultimate Zero B Kitchenmate Whirlpool Genpure Surya Product Aquapuro Nimbus RO Kenstar Orpat
• Community based plants	Nandi Foundation Community Plant Chaitanya Rupa Community Plant
• Large plants manufacturing water bottles (different sizes)	Bisleri Kinley QUA H20

There is a large number of purification products available in the market that claim to provide the purest water, from filtration systems, distillation units to bottled water. Distillation is probably the oldest method of water purification. Carbon absorption is a widely used method of home water filter treatment because of its ability to improve water by removing disagreeable tastes and odors, including objectionable chlorine. Reverse osmosis (RO) is the most efficient method of removing 90% to 99% of all contaminants.

Despite of availability of large number of water purifiers in the market, and many options available, still in rural areas people are not using water purifiers, mainly because of low awareness, non affordability and lack of information, both about contaminated water as well as the need and sources of purifying the drinking water. These issues have clearly surfaced out during our discussions:

As per Distributor in Tamil Nadu "People in rural areas mostly filter at home. They use herbal leaves and boil water with Jeera (Spice)."

Photo taken by Gfk field in Tamil Nadu

Rajib Sinha, Distributor of Alip Mitra, West Bengal quoted "Candle filters and UV (Eureka Forbes) were very popular. Even brands like Hindustan Liver has come up with a product on Chlorine Technology with price range of 2000-2200/-. In last couple of years RO (Reverse Osmosis) is well-liked by many and has reduced the market for Candle filters"

As informed by **Manufacturer of Royal Natural Products Manufacturing, Sprinkalte**, **Rajasthan** "Many products are available in the market for water purification. Non-Electric Purifiers cleans only the dust, Electric water purifier with UV removes bacteria and the latest technology RO, helps to get rid of all water contaminations. However being expensive most people prefer using home based filtration methods only"

In the words of Distributor of Mahaveer Agency, Rajasthan – "The chief manufacturers of water purifiers in India depending on their market share and volume are: Kent, Zero B, Eureka Forbes, Kenstar, and Orpat etc. Now there is lot of competition and thus people have more choice. We however need to penetrate in the rural areas with cheaper products."

Pureit Water Purifier Intella

Aqua Treat Industry

Luxury RO Water Purifier

Aqua Secure RO

The afore discussed analysis thus brings out that even though now large number of people are aware of the health risks involved in consuming of impure drinking water, **only a few opt for filtered water**. A need for awareness generation with cheaper and affordable filtration products was clearly mentioned by most respondents. Tap water is generally disinfected using chlorine which not only tastes unpleasant but leads to vigor troubles. More over in rural areas generally even the tap water supply is directly done without undergoing the filtration process. Many effective products are available for home use that improves water quality however being expensive; people are looking for buying different brands/ types of water filters available in the market at affordable cost.

Available popular water purification products

More Indians are buying mechanized home water purifiers than ever before. Those who previously boiled or filtered tap water are now switching to electrical or chemical based purification systems. Boiling is manual and time consuming whereas candle water filters also need regular servicing without which they are not necessarily 100 percent effective.

Besides, those who previously drank untreated or partially treated water are now opting to purify water having either become aware of or suffered the consequences of drinking water straight from the tap. After all, why run the risk of being ill with cholera, diarrhoea, amoebic dysentery, typhoid, jaundice and other diseases when all one has to do is to install a non manual purification system at home. Reverse osmosis systems are known to render raw water 100% microbe free and approximately 90% TDS (total dissolved solids) free on average. Reverse osmosis systems have become steadily popular in areas where water is salty and muddy. RO is a process by which impure water is mechanically forced to flow through a semi permeable membrane to free it of impurities and dissolved solids.

In the **words of Water Purifier's Distributor from West Bengal,** "By looking at the sale records of water purifier, we can say that people are now understanding the health issues caused due to unclean water and thus opting for water filtration products, the sale of which has increased many fold in last two years". Similar observations were **made by Mr. A P Ganeshan**, the **Water Purifier's Manufacturer,**

Rainbow Water, from Tamil Nadu, "People's behavior is according to the area they are living in, as in Aathur Area of Salem district, people suffer from kidney problems because of drinking the contaminated water. They however continued to do so. With lots of persuasions, now many of them have realized and started purifying their drinking water. Some have even started buying mineral water bottles"

In the words of **distributor of West Bengal** "The UV filter is most popular in both urban and rural areas because of its price range which is just Rs.2200/-. People in urban areas are however are also buying RO filters." **Manufacturer in WB** informed that in rural areas cheap priced candle filters are very common while in urban areas Ceramic Candle Filter, UV filters are popular.

When asked about popular water filter products available in the market, **Distributor of Water Filter in Tamil Nadu** quoted that people in that area, especially rural area are still using Vilva Leaves (Amla Tree) to purify the water. In Urban area, people are now heading towards Filters and Cans.

Thus, there is an overwhelming amount of drinking water purification products available in the market today due to the discovery of all the ugly facts about our drinking water system. Many brands are popular but people in rural areas are still adopting the local filtration processes like Boiling, Cloth Filtration, Safe storage etc. or low cost filters, if available locally, to purify the unclean water.

Distribution Channel of the Products

Traditionally the water purifiers were sold through the direct sales route, where the sales man would make direct sale calls to the consumers and sell the product. At one point in time Eureka Forbes use to be seen as a training ground for budding sales professionals, but now the companies are moving out of the direct sales model. The main reasons are- increased awareness on the part of the consumers in terms of water purifier as a category. In the initial days the selling process also required educating the consumer in terms of waterborne diseases and product benefits, which may not be that essential part of the sales process today, more so in urban and semi urban areas. The consumers might find it far easier and convenient to go and purchase from a retailer than a direct sales person coming to his/her home, second, the emergence of competition has also lead to change in the dynamics of the industry. And last but not least, would the emergence and growth of organized retail in the country, which provides the water purifiers with a right contact point to reach its consumers. **It may however be noted that the major responsibility of publicizing and marketing of the product remains with the manufacturers.**

In the words of **Vikas Kumar**, **Distributor in Uttar Pradesh "**The retailer buys the product from us and sells further to the customers. Sometimes, to our known people we deliver the product on our own."

As quoted by **Distributor of Alip Mitra, West Bengal"** The water purifier company delivers the product to us, then we further distribute the products to different outlets at the district level in both urban and rural areas"

Selva Kumar, Distributor in Tamil Nadu and **Manufacturer of Chaitanya Rupa Enterprises, Andhra Pradesh** sells the water purifiers to the customers directly. As quoted by the latter, "we get two days training to operate & install the product and thus directly deal with the customers".
Distributor of Mahaveer Agency, Rajasthan, explained the distribution channel as follows: **Manufacturer → Distributor → Dealer/ Retailer → Customers.**

After Sale Services offered:

Customer service is the provision of service to customers before, during and after a purchase. Customer service is a series of activities designed to enhance the level of customer satisfaction – that is, the feeling that a product or service has met the customer expectations. Current trends in development of consumer markets show a tendency towards active organization of the after-sale phase of exchange pursuing long-term commitment with consumers by fully satisfying their demands. This responsibility again mainly carried out by the manufacturers, who fix some service outlets for after sale service.

As quoted by **Distributor of Chaitanya Rupa Enterprises, in Andhra Pradesh** "After the purchase of the product we give 1 year warranty, and four free services to our customers"

In the words of Selva Kumar, Distributor of Water purifier in Tamil Nadu, "As a distributor they advice people from time to time about, how to clean their product on their own. While the responsibility is of manufacturers, as a deal, in some areas distributors are made responsible both for product publicity and after sale service."

Distributor in West Bengal stated "the Company for which they sell the product sends its representatives / sales person to provide the information to the customers regarding the product and if after sale, customer faces any problem, company's sales person visit the customer within 24hrs".

Manufacturer of Domit Artware, Rajanikhlal Ceramic Pvt.Ltd, West Bengal mentioned that "with every product a brochure is given for customer's convenience, in which how to fix & clean the candle from time to time is demonstrated properly in three languages- Hindi, English and Bengali. So there is not much need for after sale service. If the instructions in the brochure are properly followed then product never causes any problem". In the words of **Manufacturer of Royal Natural Products - Sprinkalte in Rajasthan,** "Whether there is complaint or not, but they visit their customers homes after every fourth month to check the Water Purifiers"

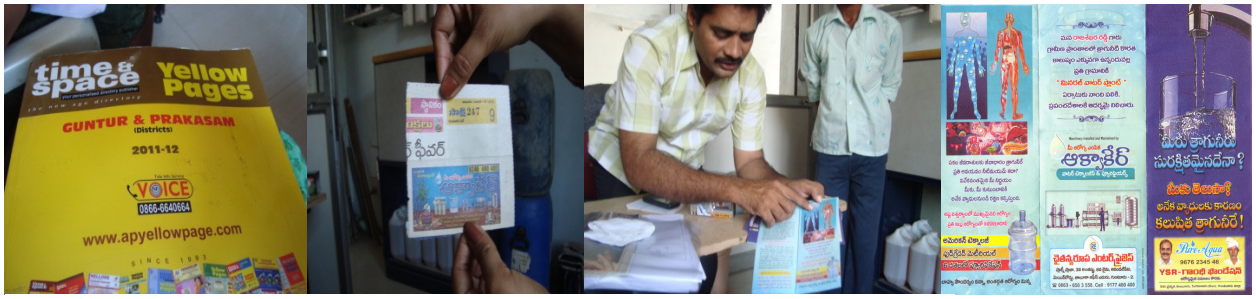
Brochure of Sprinklate Water System in West Bengal

The analysis thus suggests that the responsibility of after sale services lies with the manufacturers, who either carry out such works through their service outlets or sometimes assign the responsibility to the local distributors.

Strategies adopted to popularize the product (incl. the product design)

Selling of such products, whose usefulness is not that visible, is not easy, and requires special efforts with knowledge related to customers' requirements and shopping desires. Promotion is one of the market mix elements. These elements are personal selling, advertising, sales promotion, direct marketing, and publicity. There are different ways to promote a product in different areas through media. Promoters use internet advertisement, special events, endorsements, and newspapers to advertise their product. Many times with the purchase of a product there is an incentive like discounts, free items, or a contest.

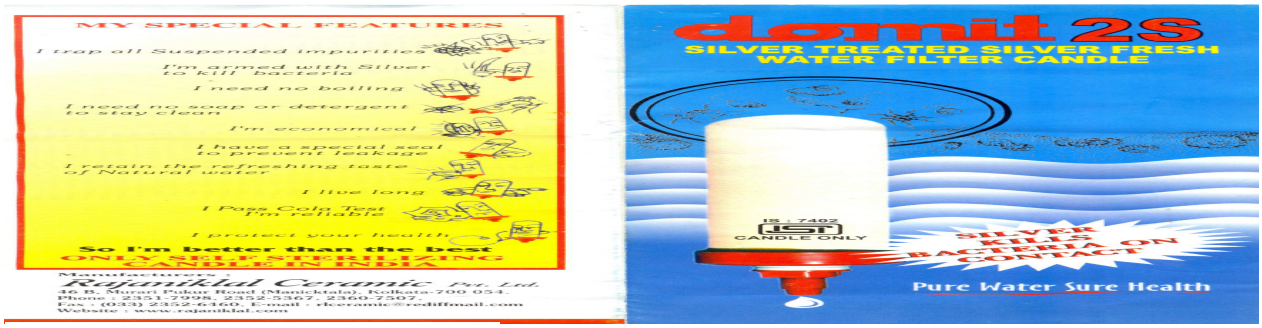
When asked about the **marketing strategies adopted by Mr. V. Nagi Reddy, Water purifier Distributor, who is also manufacturer of the product in Andhra Pradesh,** we got to know that he popularized **Aqua Kare products** *through Yellow Pages, brochures and newspaper advertisements*. When he started his business in this sector he spent almost 10 lakhs on publicity of the product and now every month he spends about Rs.2000/- for the publicity of Aqua Kare.



Marketing strategies adopted by Water purifier Distributor in Andhra Pradesh

Similarly **Distributor in Rajasthan** stated that he popularized his products through Television Ads only (Ads on the local cable network).

As mentioned by **Distributor in West Bengal** "Generally the product is promoted by inter-personal communication and by distributing leaflets".



Brochure of Domit Product, West Bengal

In the opinion of **Distributors in Rajasthan, Tamil Nadu and Uttar Pradesh**, there is no need to popularize the product. If need is generated, then people themselves opt for the product. Both cost and popularity of the product however are considered while making a choice. Similar views were also expressed by **Product Manufacturer in West Bengal, Mr. Phulak Chakraborty.** He also mentioned that the outer attraction of the product hardly has any relevance in the eyes of a customer.

Affordability to buy Water Purifier

Safe drinking water is a scarce resource in many countries and water-borne diseases are life-threatening. Despite of this realization, the priority and affordability remain top issues while opting for a product which may not be so important for a customer. It is thus necessary to make people realize the importance of safe drinking water and making this available at the affordable price.

In the opinion of Distributor of Mahaveer Agency, Rajasthan "Only five percent people of rural areas and 10 percent of urban areas can afford modern water filters available in the market"

Distributor, from Tamil Nadu, felt that ," People of this area can maximum afford Rs.3000-Rs.4000/- for the water purifier. But generally the good purifiers are above Rs.10000/- so they prefer Cans over purifiers."

Manufacturer in Tamil Nadu mentioned that they have already taken steps to make the safe water affordable to rural masses by providing 20 liters of safe drinking water at Rs. 20, i.e just one rupee per litre. He however felt that this could be made available at further reduced cost if higher percentage of people starts opting for.

In **Andhra Pradesh, Distributor of Chaitanya Rupa Enterprises** was also running a local established water purification plant. The Plant was established in a cluster of 8-10 villages and **purified drinking water was being supplied at the cost which was quite low; 2-3 rupees per bucket of 10 liters.**

Photos of the Local Water Purification Plant in Andhra Pradesh, given below:

Distributor of West Bengal felt that per month expense of water purifier after making initial investment of about 3000-4000 rupees comes out to be Rs.100 which is easily affordable to the people. The initial payment could however subsidized or taken on cheaper loans.

Similarly, in the words of Manufacturer of Royal Products Manufacturing, Brand Sprinkalte, Rajasthan "It's reasonable and quite affordable for the poor people, the Maintance cost is just Rs.50/- per month. Even the RO price is reduced from last few months to increase its sale "

Distributor, of Krishna Electronics, Uttar Pradesh, felt that it's affordable for everyone, but those who are really underprivileged still drink from the wells without purifying"

How Much Are Consumers Willing To Pay?

The initial payment for purchasing of product is the main problem which people at large are not willing to spend; as also this is neither on their priority nor they can afford. This is also reflected in what Selva Kumar and Yashwant Jain felt:

Distributor, Selva Kumar of Ganga Valley, Tamil Nadu felt that "people in their area are still incapable to buy & meet the expense of Maintenance cost". **Similar opinion was of Distributor of Mahaveer Agency, Rajasthan** who mentioned that "people buy purifier/ RO only when they can also afford to bear the monthly maintenance cost, and such people are very few".

Distributor in West Bengal however felt that, "looking at the sale records of water purifiers it's clear that people have started understanding the importance of safe drinking water, and education has played a major role in spreading the awareness. The recurring expense of our product is about Rs.100 per month, and people are willingly spending this amount".

Manufacturer of Rainbow Waters, Tamil Nadu opined that everyone needs clean drinking water but village people still can't afford silver candles so they purchase cheap filters or take on local purification methods. "The product which we sell in the market is approved by ISI (Indian Standard Index) and hence it's expensive. The people who understand the importance of clean water and can afford, buy it, others don't. And such people in rural areas who can afford are very few."

Mr. Kaushik Bhatt, Sprinkle Brand Manufacturer in Rajasthan quoted that they have "reduced the price of their product to increase its sale and make it affordable for maximum people. Now their product is reasonably priced as compared to others and thus suitable for even poor people. When asked about the **willingness to pay the maintenance cost** among people in Rajasthan, he quoted that the Maintenance cost comes out to be Rs.50/- so it's not much for even poor people to afford. "

Manufacturer, Pulak Chakraborty of Domit, in West Bengal said that "the Change of candle in the filter is required after 1 year, which cost Rs.200/- and for the areas where iron content is high in water, the change is needed after 8-9 months, so the maintenance cost is not much and easily affordable."

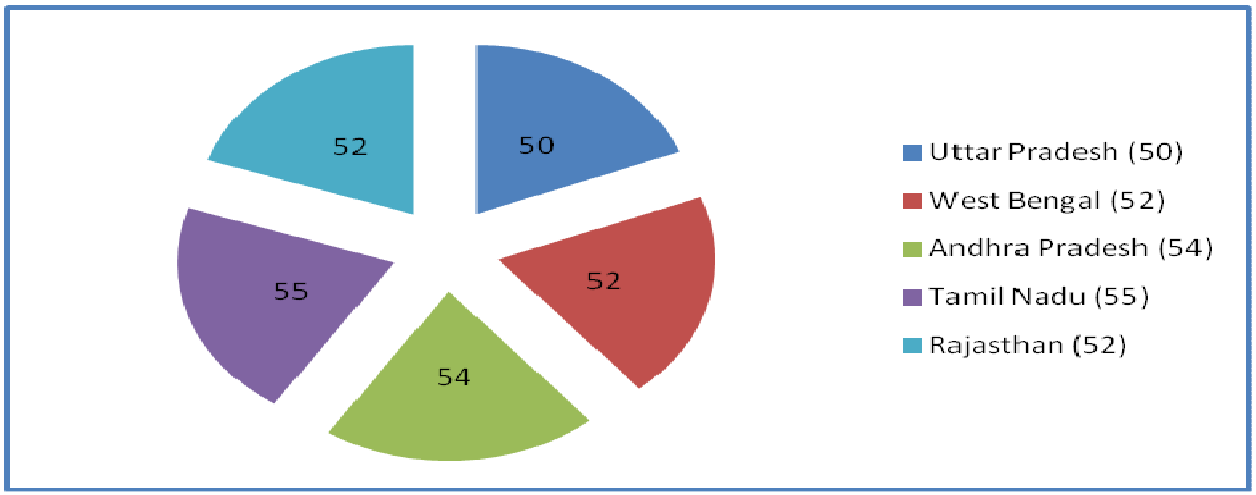
This shows that even though the products have become cheaper, the affordability remains major issue for majority of people to opt for water purifiers. The cheaper supply through indigenous plants on day to day basis is what people still seem preferring due to its affordability and not feeling any burden of repayments.

CHAPTER IV

CONSUMER–SIDE SURVEY

This chapter presents a profile of the socio economic characteristics of the household and individual respondents, their knowledge and practice for safe drinking water, and felt need for modern water purification products. GfK surveyed a **total number of 263 respondents in five selected states. A Tabulation and Analysis Plan** was prepared and shared with JICA, On the basis of which the following analysis has been attempted and presented.

The sample size covered from different states has been shown in the pie diagram as below:



Household Characteristics

In the following chapter socio economic characteristics of 263 interviewed respondents has been presented.

Table 3.1 (a) depicts the **General Socio Economic profile** of the respondents. About 42.2% of the interviewed respondents were females and 57.8% were males. It varied from state to state, viz; In West Bengal, Andhra Pradesh and Rajasthan more males were interviewed as compared to Uttar Pradesh and Tamil Nadu where more number of females were interviewed. About 42.2 percent of the covered respondents were in the age group of 35-49 yrs while 25.1 percent were in age group of 25-34 yrs. The mean age of the respondents was 38.92 yrs. Nearly 29.7 percent of the respondents had no formal schooling (illirate), just 6.8 percent were graduates, As expected in these states, majority (89%) were Hindus.

Table 3.1 (a) - General Socio- Economic Profile of Respondents /Household

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Sex of the respondent (%)						
Male	24	80.8	92.6	12.7	78.8	57.8
Female	76	19.2	7.4	87.3	21.2	42.2
Age of the respondent (%)						
15-24 years	6	3.8	7.4	30.9	7.7	11.4
25-34 years	22	17.3	35.2	34.5	15.4	25.1
35-49 years	50	48.1	40.7	30.9	42.3	42.2
More than 50 yrs	22	30.8	16.7	3.6	34.6	21.3
Mean	**40.06**	**41.94**	**36.72**	**31.44**	**44.98**	**38.92**
Education of the Respondents(%)						
Illiterate	28	26.9	59.3	9.1	25	29.7
Literate but no formal education	0	13.5	13	1.8	7.7	7.2
Less than Primary	6	9.6	13	10.9	25	12.9
Primary but less than Secondary	18	32.7	5.6	30.9	15.4	20.5
Secondary but less than Senior Secondary	28	3.8	3.7	27.3	9.6	14.4
Senior Secondary but not Graduate	16	7.7	3.7	9.1	5.8	8.4
Graduation & above	4	5.8	1.9	10.9	11.5	6.8
Religion(%)						
Hindu	100	55.8	96.3	92.7	100	89
Muslim	0	32.7	0	7.3	0	8
Christian	0	11.5	3.7	0	0	3
Caste or tribe(%)						
SC/ST	42	28.8	44.4	18.2	38.5	34.2
General	6	26.9	11.1	1.8	17.3	12.5
OBC	52	42.3	42.6	25.5	44.2	41.1
Other	0	1.9	1.9	54.6	0	12.2
BASE : All respondent	**50**	**52**	**54**	**55**	**52**	**263**

Economic Profile of Households

Table 3.1 (b) depicts that majority of the respondents were involved in Agriculture (Cultivators). Most of the women respondents were house-wives (27.8%), very few (1.9%) were students. On an average each household in all the 5 states comprised of more than 04 members. In about 92.4% households, atleast 1-2 members were earning. The average monthly income of the respondents was around Rs.6303/-, varied from State to State. Like in West Bengal, the average monthly income was around Rs.4675.93/- while in Uttar Pradesh it Rs. 9645/-. Average expenditure on Water was around Rs.227/- per month.

Table 3.1 (b) - General Socio- Economic Profile of Respondents /Household

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Primary Occupation(%)						
Wage laborer	2	15.4	29.6	10.9	21.2	16
Skilled worker	18	3.8	0	12.7	5.8	8
Self employed	4	0	11.1	9.1	0	4.9
Service (Govt. & Private	0	1.9	0	9.1	5.8	3.4
Business	0	15.4	3.7	1.8	15.4	7.2
Agriculture/cultivator	16	48.1	55.6	3.6	30.8	30.8
Unemployed/ Student	0	0	0	1.8	3.8	1.9
House wife	60	15.4	0	47.3	17.3	27.8
Members in the Household(%)						
Less than 5 members	40	61.5	44.4	74.5	34.6	51.3
5-7 members	54	32.7	53.7	23.6	59.6	44.5
More than 7 members	6	5.8	1.9	1.8	5.8	4.2
Average	**4.94**	**4.5**	**4.69**	**4.11**	**5.27**	**4.69**
Children under 6 yrs of Age(%)						
'1-2	34	40.4	50	30.9	38.5	38.8
'3-4	2	0	1.9	3.6	3.8	2.3
Average	**1.44**	**1.19**	**1.57**	**1.58**	**1.36**	**1.44**
Earning Members in the Household(%)						
'1-2	90	92.3	81.5	100	98.1	92.4
'3-4	10	5.8	16.7	0	1.9	6.8
'More than 4	0	0	1.9	0	0	0.4
Average	**1.44**	**1.33**	**2.09**	**1.35**	**1.19**	**1.48**
Monthly Income of the Household(%)						
<3000	14	32.7	0	3.6	5.8	11
3001-5000	10	57.7	74.1	18.2	34.6	39.2
5001-7500	12	7.7	22.2	50.9	36.5	26.2
7501-10000	18	1.9	3.7	18.2	11.5	10.6
10001-15000	16	0	0	5.5	0	4.2
15,001+	30	0	0	3.6	11.5	8.7
Average monthly income	**9645**	**3937.5**	**4675.93**	**6836.36**	**6581.73**	**6303.23**

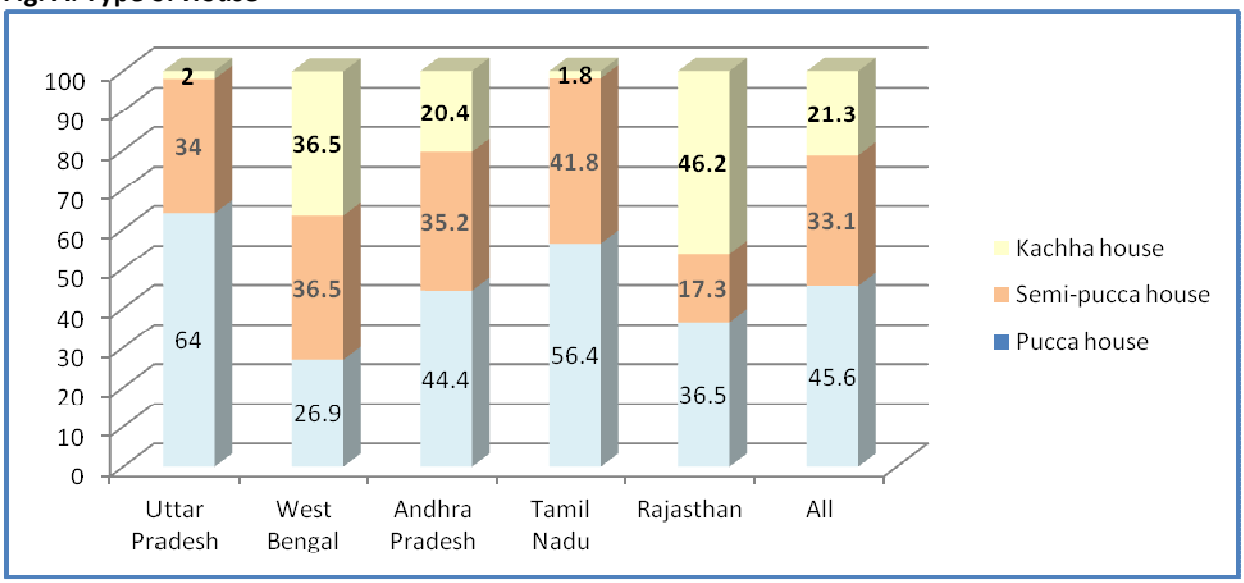
	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Average Expenditure on various Items of the Household(%)						
Food (Average)	3132	1882.69	2342.59	2181.82	3173.08	2532.32
Water (Average)	**0**	**225.67**	**218.3**	**255.58**	**166.25**	**227.31**
Cloths (Average)	476.26	243.51	393.31	494.87	841.55	488.9
Electricity (Average)	367.14	140.38	237.83	201.64	440.26	261.12
Transport (Average)	367	291.76	297.65	470.31	469.61	386.8
Education (Average)	390.69	452.11	327.91	498.71	486.65	444.85
Entertainment (Average)	82.38	121.11	235.89	126.63	438.64	184.28
Health (Average)	730.61	548.68	522.96	464.47	1137.88	680.62
Other (Average)	0	530.71	5000	100	358.88	567.54
BASE : All respondent	**50**	**52**	**54**	**55**	**52**	**263**

Figure below (Fig.A) depicts the type of houses in each selected state. A **Kuchcha house** is made up of mud or hay stack or tin roof, which can't withstand harsh weather. Whereas a **pucca house** is the one made up of red bricks wall and roof, it's the dwelling that is designed to be solid and permanent. **Semi Pucca houses** are the Temporary roofs that could be with cemented floor & wall or any one of it.

Type of House	
Item	**Description**
Pucca House	Flooring, roof & walls should be cemented/Concrete etc.
Semi-Pucca House	Temporary roofs could be with cemented floor & wall or any one of it.
Kachha House	Thatched roofs, mud walls with no floorings

It was observed that about 21.3 percent of the respondents were staying in Kuchcha houses, while 45.6% and 33.1% were staying in Pucca and Semi –Pucca Houses. Maximum number of Pucca houses were found in Uttar Pradesh (64%), least found in West Bengal (26.9%).

Fig. A: Type of House



Housing Condition of General Population:

Table 3.2 shows the **Housing Condition of the General Population**. Crowded conditions may affect the health as well as quality of life of members of the household. About 76 percent of the houses had 1-2 rooms. About 53.6% had separate room for Kitchen in their house.

Sanitation is an important component both for health care and clean surroundings, and is equally important that of water. A lack of proper sanitation services not only breeds disease, it can rob people of their basic human dignity. **Regarding the sanitation facilities,** only 6.8 percent of Households have a ventilated improved pit latrine, 19 percent have a pit toilet with slab, and Majority of the households (57.4%) had no toilet facility at home, Open defecation. Nearly 97 percent were the owner of their house while just 3 percent were on rent. Total Electrification in all the states seems to achieve 73.4 percent.

Table 3.2 -Housing Condition

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Rooms in the House(%)						
'1-2	64	92.3	90.7	63.6	69.2	76
'3-4	32	7.7	9.3	34.5	25	21.7
'More than 4	4	0	0	1.8	5.8	2.3
Average	**2.2**	**1.7**	**1.6**	**2.4**	**2.4**	**2.1**
Separate Room for Cooking(%)						
Yes	66	55.8	33.3	83.6	28.8	53.6
No	34	44.2	66.7	16.4	71.2	46.4
Toilet Facility(%)						
Ventilated improved pit latrine	0	0	0	1.8	32.7	6.8
Pit latrine with slab	2	78.8	11.1	0	3.8	19
Composting toilet	12	0	0	0	0	2.3
Flush or pour-flush to elsewhere	6	1.9	0	43.6	0	10.6
Pit latrine without slab or open pit	6	7.7	0	1.8	0	3
Bucket, hanging toilet or hanging latrine	0	1.9	0	0	0	0.4
No facilities or bush or field (open defecation)	72	9.6	88.9	52.7	63.5	57.4
Any Other (Specify)	2	0	0	0	0	0.4
Own the House(%)						
Yes	100	100	98.1	90.9	96.2	97
No	0	0	1.9	9.1	3.8	3
Have Electricity(%)						
Yes	36	59.6	90.7	100	76.9	73.4
No	64	40.4	9.3	0	23.1	26.6
BASE: All respondent	**50**	**52**	**54**	**55**	**52**	**263**

Common Diseases prevalent in the Society:

Table 3.3 depicts the **common diseases prevalent in the society**. Majority of them quoted Diarrhea (56.3%), Vomitting (29.7%), Malaria (30.4%) and Typhoid (20.2%) as prevailing diseases. Majority of the respondents were aware about the causes, symptoms and remedies of Diarrhea. About 60.1% quoted unclean water as the major cause for Diarrhea. Almost all the respondents were aware about Hygiene practices and were even practicing the same. 100% were aware about Washing of hands before and after handling Food & covering the drinking water with lid, 98.1% were practicing it. About 91.3% were aware about drinking boiled/ filtered water; just 14.4% were practicing it.

Table 3.3 – Health and Hygiene

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Most Diseases specified by the percentage of Respondents (Rank 1) (%)						
Diarrohea	12	30.8	5.6	18.2	17.3	16.7
Blood or mucus in faeces	0	0	1.9	0	0	0.4
Vomiting	6	0	7.4	0	1.9	3
Malaria	6	3.8	5.6	0	38.5	10.6
Cholera	0	0	1.9	0	0	0.4
Typhoid	0	0	29.6	1.8	7.7	8
Dental Flurosis	2	0	5.6	0	32.7	8
Skin Disease	2	1.9	0	0	0	0.8
Any Other	54	59.6	27.8	36.4	0	35.4
No Response	**18**	**3.9**	**14.6**	**43.6**	**1.9**	**16.7**
Most Diseases specified by the percentage of Respondents (Rank 1+2+3) (%)						
Diarrohea	60	69.2	22.2	41.8	90.4	56.3
Blood or mucus in faeces	0	0	5.6	0	1.9	1.5
Vomiting	46	19.2	33.3	3.6	48.1	29.7
Malaria	44	3.8	20.4	1.8	84.6	30.4
Cholera	6	0	1.9	0	3.8	2.3
Typhoid	0	3.8	64.8	12.7	17.3	20.2
Dental Flurosis	16	1.9	24.1	0	51.9	18.6
Skin Disease	6	5.8	18.5	7.3	0	7.6
Any Other	64	100	64.8	49.1	0	55.5
No Response	**18**	**3.9**	**14.6**	**43.6**	**1.9**	**16.7**

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Disease in the last 6 months in the Family (Yes %)						
Diarrohea	32	36.5	27.8	14.5	42.3	30.4
Blood or mucus in faeces	12	5.8	1.9	0	3.8	4.6
Vomiting	36	40.4	13	3.6	44.2	27
Malaria	40	3.8	13	0	63.5	23.6
Cholera	18	0	0	0	0	3.4
Typhoid	8	9.6	27.8	0	34.6	16
Dental Flurosis	38	25	35.2	0	92.3	37.6
Skin Disease	14	23.1	14.8	5.5	44.2	20.2
Any Other	0	34.6	16.7	27.3	0	16
Diarrohea in last 15 days in their Family (%)						
Yes	12	11.5	1.9	12.7	26.9	12.9
No	88	88.5	98.1	87.3	73.1	87.1
BASE: All respondent	**50**	**52**	**54**	**55**	**52**	**263**
Who Suffered in the Family? (BASE- the Ones who answered YES in the above Question) (%)						
Male	66.7	83.3	0	14.3	35.7	44.1
Female	66.7	0	0	85.7	78.6	61.8
Child below 6 yrs	50	16.7	100	0	14.3	20.6
BASE	**6**	**6**	**1**	**7**	**14**	**34**
Remedy, if anybody suffers from Diarrhea(%)						
Give ORS solution	20	9.6	0	12.7	21.2	12.5
Give salt and sugar solution	62	86.5	1.9	18.2	71.2	47.1
Give plenty of fluids	14	9.6	1.9	9.1	3.8	7.6
Give medicine	90	21.2	7.4	38.2	32.7	37.3
Take to doctor/ANM	4	82.7	90.7	78.2	100	71.9
Other Total	16	21	0	14.5	9.6	12.2
Don't know	0	5.8	5.6	5.5	0	3.4
Major Reasons of Diarrhea (%)						
Dirty Surrounding	14	13.5	59.3	20	17.3	25.1
Bad Food	74	88.5	1.9	69.1	61.5	58.6
Unsafe /Unclean water	72	17.3	44.4	76.4	90.4	60.1
Mosquitoes	2	7.7	46.3	7.3	25	17.9
Lack of hand washing practice	4	3.8	3.7	3.6	13.5	5.7
Others	0	28.8	3.7	5.5	9.6	9.5

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Don't know/No response	0	1.9	22.2	12.7	0	7.6
Base : All respondent	**50**	**52**	**54**	**55**	**52**	**263**
Awareness and Practice to Ensure Good Health and Hygiene(%)						
Wash hands before and after handling food						
Aware (Yes)	100	100	100	100	100	100
Practice (Yes)	98	96.2	100	100	96.2	98.1
Cover the food with lid						
Aware (Yes)	100	100	100	100	100	100
Practice (Yes)	100	98.1	98.1	100	98.1	98.9
Eating fresh foods						
Aware (Yes)	100	100	100	100	100	100
Practice (Yes)	94	69.2	100	100	96.2	92
Drink boiled/filtered water						
Aware (Yes)	100	98.1	61.1	98.2	100	91.3
Practice (Yes)	4	3.8	5.6	49.1	7.7	14.4
Cover the drinking water						
Aware (Yes)	100	100	100	100	100	100
Practice (Yes)	98	96.2	100	100	96.2	98.1
Bathe daily						
Aware (Yes)	100	100	100	100	100	100
Practice (Yes)	100	100	100	100	100	100
Wash hands after defecation						
Aware (Yes)	100	100	100	100	100	100
Practice (Yes)	100	100	94.4	100	100	98.9
Cut nails						
Aware (Yes)	100	100	94.4	100	100	98.9
Practice (Yes)	100	100	94.4	100	100	98.9
Brush teeth daily						
Aware (Yes)	100	100	100	100	100	100
Practice (Yes)	100	100	100	100	100	100
Base : All respondent	**50**	**52**	**54**	**55**	**52**	**263**

Source of Drinking Water and its Accessibility:

The types of **water and sanitary facilities are important determinants of the health status of household members, particularly children**. The seriousness of major childhood diseases such as Diarrhoea and respiratory infections can be reduced by proper hygienic practices. The consummation of contaminated water would lead to serious diseases, like diarrhea and RTIs. The source of water where from the households fetch their drinking water therefore plays an important role. Regarding the source of drinking water 36.1 percent have access to improved source of drinking water, public tap/stand pipe. About 22.8 percent of them have access to tube well/bore well for drinking, and about 22.8 percent get water from hand pump. For about 65% of the households the distance of water source from household was less than 1 km. Not everyone or anyone in the family fetches water. Mostly it is **adult women** who fetch water in majority of the states (75.7%). For 35.9%, the time taken to collect the water from the nearest source was less than 5 minutes while 33.7% quoted 5-15 minutes spend at the water source. About 67.7% of the respondents considered the water as clean/somewhat clean. (Table 3.4(a))

Table 3.4 (a) – Existing Water Supply

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Main source of drinking water(%)						
Piped water into dwelling, plot or yard	0	0	1.9	1.8	17.3	4.2
Public tap/stand pipe	0	3.8	92.6	78.2	0	36.1
Tube well/borehole	0	96.2	0	5.5	13.5	22.8
Protected dug well	4	0	1.9	0	0	1.1
Hand pump	96	0	0	0	23.1	22.8
Unprotected dug well	0	0	0	0	46.2	9.1
Bottled water (if it is not accompanied by another improved source)	0	0	3.7	0	0	0.8
Any Others (Specify)	0	0	0	14.5	0	3
Distance of Water Source from Household(%)						
Within house	32	63.5	7.4	16.4	38.5	31.2
Less than 1 km	68	34.6	92.6	69.1	59.6	65
1-2 km	0	1.9	0	10.9	1.9	3
More than 5 Km	0	0	0	3.6	0	0.8
Member of Household who fetches the water(%)						
Men	50	10.5	24	0	3.1	17.7
Women	44.1	89.5	76	82.6	90.6	75.7
Children	5.9	0	0	0	6.3	2.2
Supplier/Can water	0	0	0	13	0	3.3
Other	0	0	0	4.4	0	1.2

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Time Taken to collect the Water from the nearest source(%)						
Less than 5 minutes	94.1	52.6	0	21.7	40.6	35.9
5-15 minutes	5.9	21.1	32	56.5	40.6	33.7
15-30 minutes	0	21.1	26	15.2	18.8	16.6
More than 30 minutes	0	5.3	42	6.5	0	13.8
Time Taken in the Queue at Water Point(%)						
No queue at all	91.2	68.4	0	32.6	65.6	44.2
5 - 15 minutes	8.8	21.1	24	28.3	34.4	23.8
15 - 30 minutes	0	5.3	24	32.6	0	15.5
More than 30 minutes	0	5.3	52	6.5	0	16.6
Quality of Water used for Cooking(%)						
Very clean	16	40.4	25.9	40	1.9	25.1
Somewhat Clean	20	40.4	14.8	52.7	84.6	42.6
Not very clean	58	19.2	33.3	7.3	11.5	25.5
Dirty	6	0	25.9	0	1.9	6.8
Base : All respondent	**50**	**52**	**54**	**55**	**52**	**263**

Table 3.4 (b) **depicts the condition of existing water supply in the selected areas**. Universal access to clean drinking water is the basic human right, and an essential step towards improving living standards worldwide. About 62.4 percent of the respondents considered the source of drinking water as unsafe. They felt that water supplied at their home is yellow in color and has sour taste (67.1%); they even believed that after drinking it, they fell ill (44.5%). About 50.6 percent of the respondents held that the water supplied to them is Black/Brown/ yellow in color. About 43.9% felt that the water is muddy.

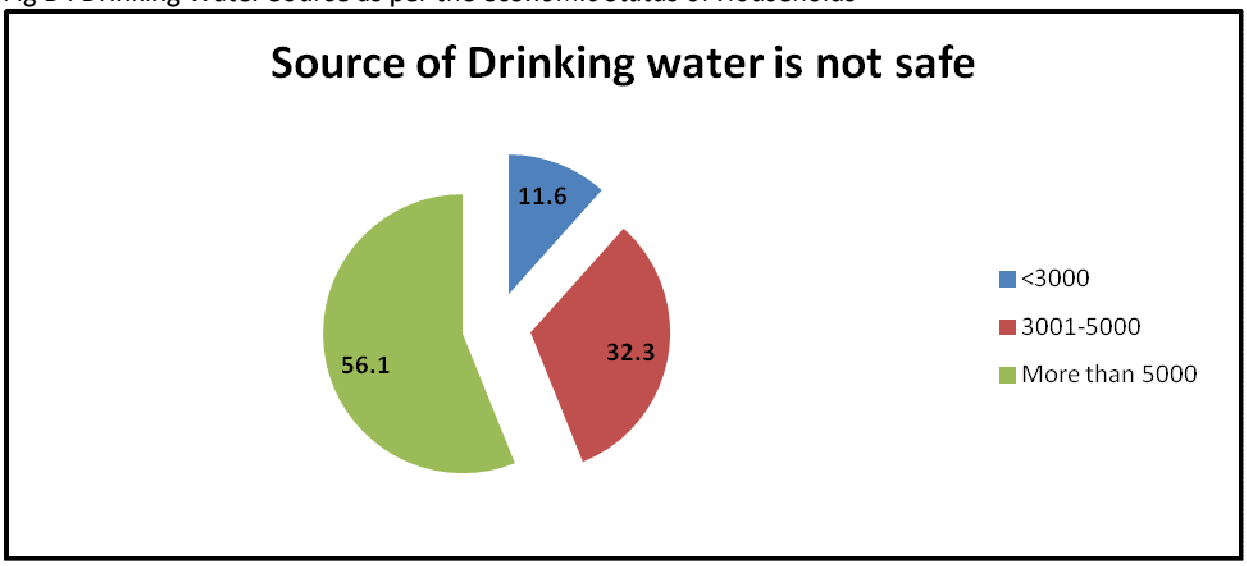
Table 3.4 (b) – Existing Water Supply

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Is the source of Drinking Water Safe? (%)						
Yes	32	67.3	42.6	43.6	1.9	37.6
No	68	32.7	57.4	56.4	98.1	62.4
Base : All respondent	**50**	**52**	**54**	**55**	**52**	**263**
Verbatim (BASE : The Ones who said that drinking water is Safe for drinking)						
Water is Clean and has good taste and color	87.5	57.1	78.3	16.7	0	56.6
Hand pump is deep rooted and thus we get Clean water	6.3	11.4	17.4	70.8	100	27.3
Water is fine; our health is fine after drinking it. We do not fall ill, no contamination	6.3	71.4	0	20.8	0	31.3
No reply	0	0	4.3	0	0	1
BASE	**16**	**35**	**23**	**24**	**1**	**99**
Verbatim (BASE : The Ones who said that drinking water is NOT Safe for drinking)						
Water is not clean, is yellow in color, has bad / sour and bitter taste, smells bad	100	41.2	38.7	100	51	67.1
Water is contaminated and we suffer from many health problems after drinking it	0	88.2	58.1	3.2	76.5	44.5
Source from where water is supplied is polluted and unclean	0	0	9.7	6.5	0	3
Reasons/ Criteria for not considering water safe for drinking(%)						
Muddy water	8.8	70.6	51.6	58.1	45.1	43.9
Strong pungent smell	0	17.6	0	16.1	0	4.9
Water contain some black particle	11.8	0	0	16.1	11.8	9.1
Black /Brown/ yellow in color	41.2	82.4	0	19.4	96.1	50.6
Others	38.2	23.5	41.9	74.2	2	32.9
No Response	0	0	12.9	9.7	0	4.3
BASE	**34**	**17**	**31**	**31**	**51**	**164**

Drinking Water Source as per the economic Status of Households

Following Figure B depicts that about 56.1% of the respondents earning more than Rs.5000/- per month and 11.6% earning less than Rs3000/- believed that source of drinking water is not safe. Excessive amounts of microbes or chemicals derived from human and animal wastes, agricultural runoff, industrial chemicals, and even natural pollutants, make water unsafe to drink and thus causes water-related diseases. If water sources are not protected, or are unexpectedly contaminated for any reason, the quality of drinking water suffers.

Fig B : Drinking Water Source as per the economic Status of Households



Existing practices for purifying the Drinking Water:

Table 3.4 (c) shows **practice of cleaning the contaminated drinking water among the selected Respondents**. Contamination can occur at the source of the water both at the surface and in the ground. Once the water is in the distribution system, there are additional opportunities for drinking water to be contaminated. If pipes are not successfully protected from contaminants, the quality of drinking water Suffers. Improper storage can also result in unsafe drinking water.

About 93.9 percent believed to clean the unsafe water before drinking. About3/4th of the respondents had the knowledge about cleaning the contaminated water. About 73% quoted Boiling as one of the method to clean the unclean water. 19.8% said to use purifier for cleaning; about 15.2% had the knowledge of adding bleaching powder to the unclean water. The main source of information regarding water purifier was Interpersonal Communication (35%), Health workers (23.3%), Television (11.7%), and Radio (8%).

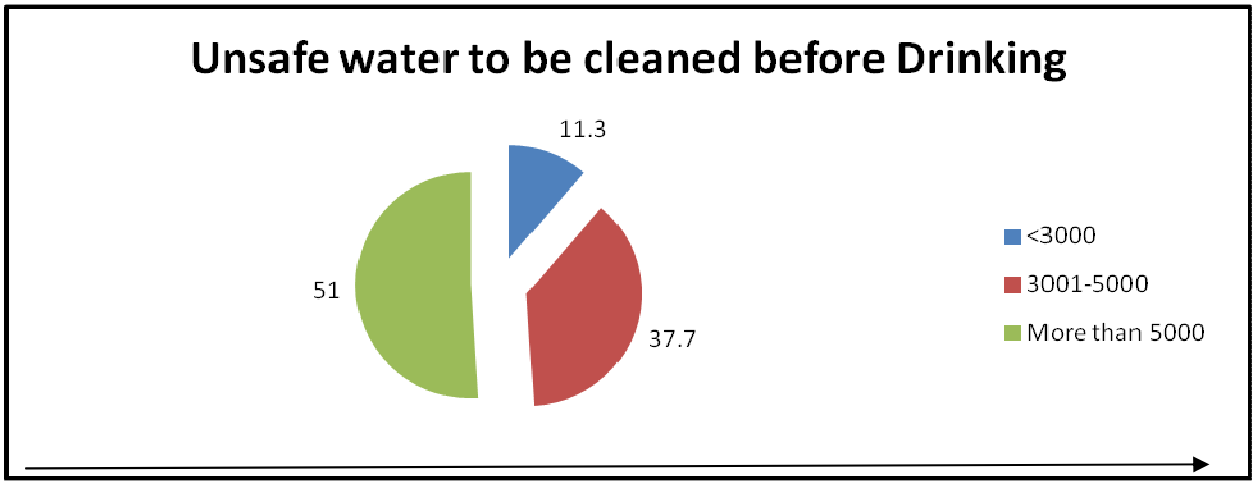
Table 3.4 (c) – Existing Water Supply

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Opinion to clean Unsafe Water before Drinking(%)						
Yes	100	94.2	77.8	100	98.1	93.9
No	0	5.8	14.8	0	1.9	4.6
Don't know	0	0	7.4	0	0	1.5
Knowledge about technique/ Methods to clean the Contaminated water(%)						
Boil	92	63.5	50	85.5	75	73
Alum	16	5.8	0	1.8	9.6	6.5
Add Bleaching Powder/Chlorine	6	13.5	13	12.7	30.8	15.2
Strain through a cloth	62	13.5	20.4	36.4	100	46
Mud particles are allowed to settle for some time and then the container is changed	2	11.5	0	9.1	28.8	10.3
Use water filter ceramic/sand/composite	6	30.8	1.9	16.4	26.9	16.3
Use Electric Purifier	6	9.6	1.9	52.7	26.9	19.8
Use RO	0	0	0	1.8	19.2	4.2
Use Bottled water	0	0	27.8	1.8	28.8	11.8
Others	56	7.7	0	1.8	0	12.5
Don't Know	0	19.2	20.4	0	0	8
Information received regarding Purification of water(%)						
Yes	96	26.9	24.1	90.9	73.1	62
No	4	73.1	75.9	9.1	26.9	38
Base : All respondent	**50**	**52**	**54**	**55**	**52**	**263**
Main source of information regarding water purification(%)						
Radio	20.8	7.1	0	4	0	8
TV	4.2	0	23.1	18	13.2	11.7
Newspaper	0	0	0	0	5.3	1.2
Interpersonal Communication	54.2	28.6	46.2	2	52.6	35
Health workers	2.1	35.7	0	50	18.4	23.3
Meetings/seminars organized by NGOs	0	0	0	4	0	1.2
Posters/Hoardings /Billboards	0	0	0	0	2.6	0.6
Person selling water purifier	0	0	7.7	10	5.3	4.9
Local NGO	0	7.1	0	2	0	1.2
Any other (specify)	18.8	21.3	23.1	10	2.6	12.8
BASE: The Ones who said Yes in information Received on Purification of Water	**48**	**14**	**13**	**50**	**38**	**163**

Perception about Safe Drinking Water by Economic Status of Households

Figure below (Fig:C) depicts that respondents having monthly income more than Rs 5000/- believed that unsafe water is to be cleaned before drinking in comparison to 11.3% respondents earning less than Rs.3000/- per month.

Fig C: Perception about Safe Drinking water by Economic Status of Households



Since water is an important component to our physiology, the quality of the water is as important as the quantity. Drinking water should always be clean and free of contaminants to ensure proper health and wellness.

Table 3.4 (d) shows that about 59.3 percent of the respondents treated the water before drinking. State wise variations were seen , In Uttar Pradesh around 98% of the respondents were treating the water before drinking, while in West Bengal just 11.5% were treating the water. When asked about the method adopted to treat the water, maximum 35.3% quoted strain through cloth, 30.8% quoted that they cover the water with lid, and about 19.9% were boiling the water for the whole family.

Table 3.4 (d) – Existing Water Supply

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Treat water before Drinking(%)						
Yes	98	11.5	24.1	65.5	100	59.3
No	2	88.5	75.9	34.5	0	40.7
Base : All respondent	**50**	**52**	**54**	**55**	**52**	**263**
Method adopted to Treat Water(%)						
Boiling for family	0	33.3	15.4	69.4	3.8	19.9
Boiling only for children	0	0	0	8.3	0	1.9
Alum	0	0	0	2.8	0	0.6
Add Bleaching Powder/Chlorine	0	16.7	15.4	5.6	0	3.2
Strain through a cloth	0	0	23.1	5.6	96.2	35.3
Mud particles are allowed to settle for some time and then the container is changed	2	0	0	0	3.8	1.9
Cover	98	0	0	0	0	30.8
Use Filter /RO/Purifier or Can/Bottled water	2	66.7	38.5	22.2	9.6	14.7
No response	0	0	7.7	0	0	0.6
BASE : **The ones who said YES for treating water before Drinking**	**49**	**6**	**13**	**36**	**52**	**156**

Practice of Safe Drinking Water as per their Economic Status:

Figure below (Fig.D) depicts that 62.2% of the respondents earning more than Rs.5000/- were treating the water before drinking while just 8.3% earning less than Rs.3000/- were cleaning /treating the water. It clearly depicts that economically better off Household were treating their drinking water as compared to poorer Household.

Fig D: Practice of Safe drinking water as per their Economic status

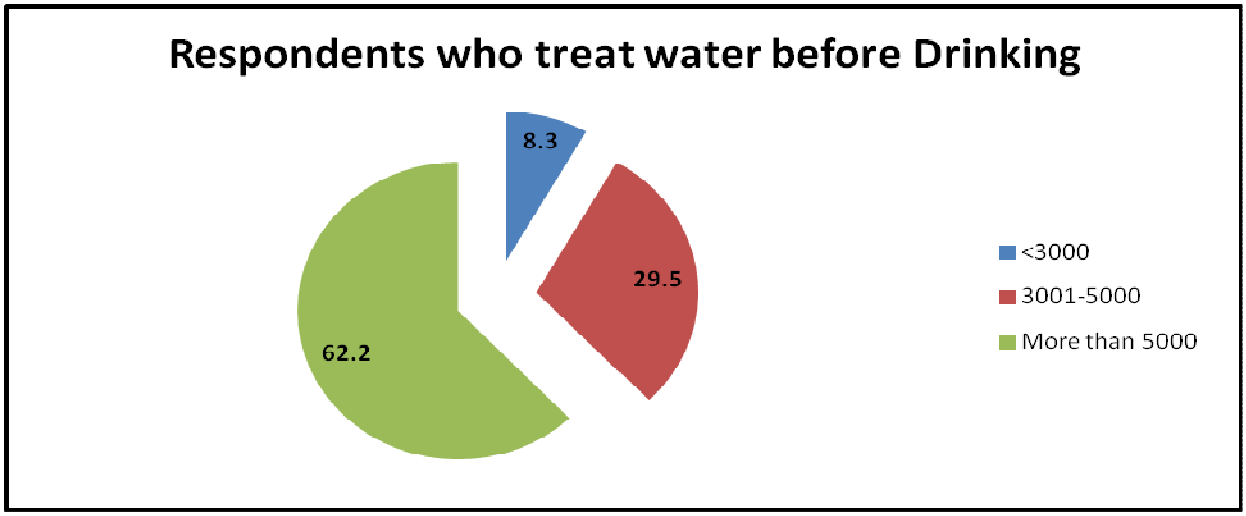


Table 3.4 (e) shows the **practice of purifying water** among covered respondents. All sources of our drinking water, including municipal water systems, wells, lakes, rivers, contain some level of contamination. Contaminants range from naturally-occurring minerals to man-made chemicals and by-products. About 67.9% of the respondents were purifying the water for more than 5yrs. It varied from State to State, Like in Uttar Pradesh , 98 percent were treating the water for long (more than yrs), while in Tamil Nadu just 25% were treating, and None of the respondent was treating the water for more than 5 yrs in West Bengal.

Table 3.4 (e) – Existing Water Supply

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Since how long water has been purified(%)						
Less than 1 year	0	16.7	7.7	2.8	3.8	3.2
1-5 year	2	83.3	46.2	72.2	13.5	28.8
More than 5 years	98	0	46.2	25	82.7	67.9
Base : All respondent	**50**	**52**	**54**	**55**	**52**	**263**

Awareness about different methods of Water Filtration:

Water is essential for life, so the widespread pollution of raw water sources poses a problem for everyone. Millions of people die each year from consuming contaminated water; almost all drinking water requires some type of purification, whether it comes from the municipal water supply through your taps, in bottles or is purified at home. Water purification is a critical part of returning water to the environment.

Figure E shows Knowledge about different methods of Water Filtration among selected respondents. Maximum respondents (73.1%) were aware about different methods of water filtration in Uttar Pradesh. Least (31.5%) were aware about it in Andhra Pradesh.

Fig E : Awareness about Different Methods of Water Filtration

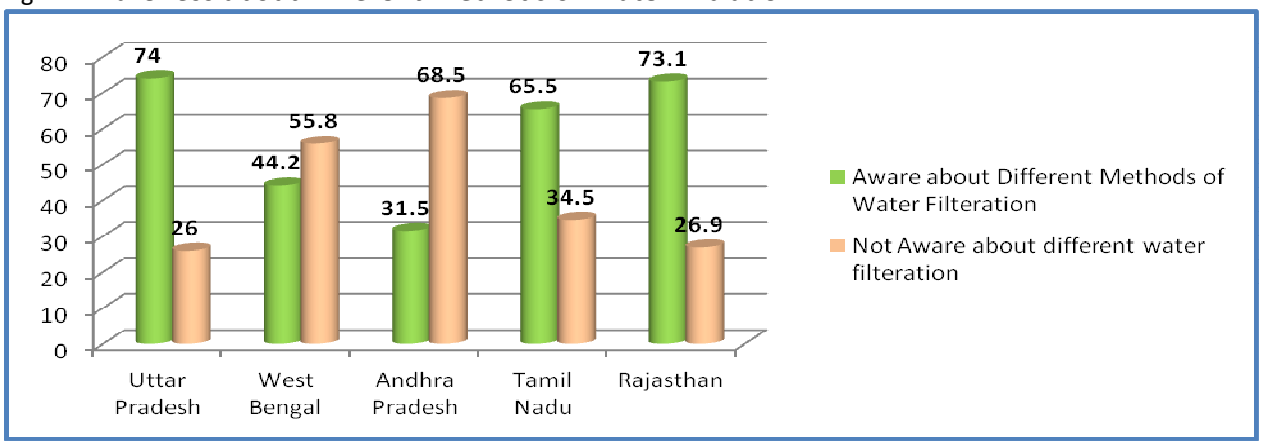


Fig F: Knowledge about Methods of Water Purification

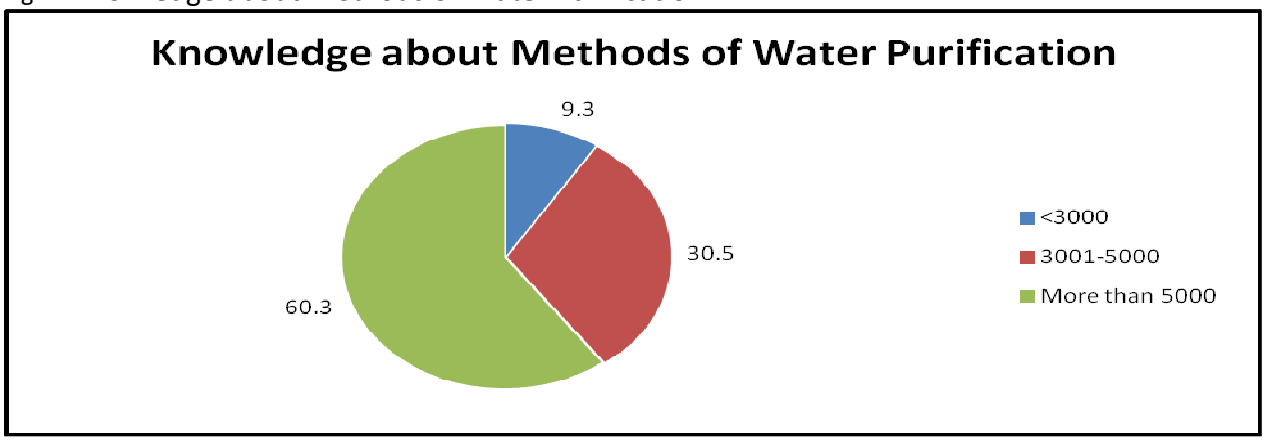


Figure above (Fig.F) shows that about 60.3% of the respondents earning more than Rs.5000/- a month, and about 9.3.% earning less than Rs. 3000/- had knowledge of water purification. It clearly depicts that economically better off households had knowledge about methods of water purification as compared to poorer households.

Practice of different methods of Water Filtration:

There is nothing more life-sustaining and important than clean water. If water is not treated before it is distributed, it **must be treated at the point of use** to ensure the quality of the water does not cause illness.

Table below (Table 3.5a) shows practice of several simple and inexpensive methods of water purification among respondents. One traditional method of treating water widely used worldwide is boiling water to remove contaminants. About 28.5% were boiling the water to clean it. About 81% filtered by cloth/RO/Mineral water/Purifier. It was seen that filtration by **Reverse Osmosis System (RO) / Cloth/ Local Purifier was done by maximum, and was probably** the finest system for cleaning toxic contaminants out of the water.

Table 3.5 a – Type of Filtration

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Methods of Filtration(%)						
Filter by Cloth /RO/ Mineral Water /Purifier	113.5	38.9	41.2	66.7	105.4	81
Close lid	13.5	4.3	0	0	0	4
Boiling	18.9	65.2	29.4	5.6	36.8	28.5
Alum	2.7	8.7	0	0	0	2
Bleaching powder	0	13	11.8	0	2.6	4
Lime is used to clean water	0	4.3	0	0	0	0.7
Water plant	0	0	17.6	0	0	2
No response	2.7	0	0	5.6	23.7	7.9
BASE : The ones who said YES in awareness about different methods of Water Filter	**37**	**23**	**17**	**36**	**38**	**151**

Explanation on Filteration Methods

Item	Description
Traditional	
Boil	Boiling removes temporary hardness of water and it kills all bacteria, spores, cysts, ova and yields sterilized water.
Alum	Adding coagulation chemicals such as alum will increase the rate at which the suspended particles settle out by combining many smaller particles into larger flock, which will settle out faster.
Add Bleaching powder/Chlorine	Use of chlorine to treat drinking water. Chlorine may be in the form of liquid sodium hypo chlorite, solid calcium hypo chlorite, or bleaching powder
Strain through the clothes	Pouring water through a cloth which acts as a filter for collecting particulates from the water
Modern Methods	
Use water filter ceramic/sand/composite	The water flows through a medium to remove particles and at least some microbes from the water. Media used in filtering systems may include ceramic, sand and composite.
Use Electric Purifier	It's a water treatment technology that removes dissolved minerals in water electronically.
Use RO	Reverse Osmosis method
Use Bottled Water	Water that is bottled and sold to the household in bottles.

Table3.5b depicts preferred filtration method. More than 51 percent of the respondents preferred low cost filtration. 17.5% were drinking water bottles, 12.2% believed that there was no need for water filtration. Just 2.7 percent were adopted local purification methods like boiling, filtration by cloth etc.

Table 3.5 b – Methods of Filtration

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Preferred Filtration Method(%)						
Use of simple Sachets	2	3.8	5.6	0	3.8	3
Drinking Water Bottles	14	7.7	40.7	3.6	21.2	17.5
A low cost filtration	46	55.8	3.7	96.4	51.9	51
Local Purification Methods Like Boiling, Filtration by Cloth etc.	4	5.8	3.7	0	0	2.7
Don't Know	2	3.8	40.7	0	21.2	13.7
No need for water filter	32	23.1	5.6	0	1.9	12.2
BASE : All Respondents	**50**	**52**	**54**	**55**	**52**	**263**

Table 3.5c depicts that about 49.8% of the respondents earning more than Rs.5000/- preferred different types of filtration. Majority of them (59%) were using low cost filter, 37.5% were using simple sachets.

Table 3.5 c – Type of Filtration and Willingness to Pay

Preferred Filtration Method							
	Base : All respondent	Use of simple Sachets	Drinking Water Bottles	A low cost filtration	Local Purification Methods Like Boiling, Filtration by Cloth etc.	I do not know	No need for water filter
Monthly Income of the Household **(%)**							
<3000	**11**	25	2.2	10.4	28.6	8.3	21.9
3001-5000	**39.2**	37.5	52.2	30.6	42.9	61.1	31.3
More than 5000	**49.8**	37.5	45.7	59	28.6	30.6	46.9
Base : All respondent	**263**	8	46	134	7	36	32

Willingness to pay for Water Filtration Product:

The section below shows the households behavior, willingness to pay for quality of drinking water. Table 3.5d depicts that more than half of the respondents wanted to pay for the filtered water on daily basis. About 46.7% wanted one time investment for the purifier.

Table 3.5 d– Type of Filtration and Willingness to Pay

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Criteria for Selection of Purifier (%)						
One time Investment	60.6	21.1	51.7	23.6	87.5	46.7
Daily Basis	36.4	73.7	48.3	74.5	12.5	51.3
Others	3	2.6	0	1.8	0	1.5
Free	0	2.6	0	0	0	0.5
BASE : All those who prefer any method of filtration	**33**	**38**	**29**	**55**	**40**	**195**
Willingness to pay for a single use of Sachet(%)						
One rupee for two packets	0	100	33.3	0	100	62.5
2 rupees for a packet	0	0	33.3	0	0	12.5
3-5 rupees for a packet	100	0	33.3	0	0	25
BASE : All Those who said Simple Sachet in the Preferred Filtration Method	1	2	3	0	2	8
Willingness/Capacity to pay for a 10 litre bucket(%)						
Less than Rs 5	47	55	64.7	92.7	94.1	73.6
More than Rs. 5	0	40	0	7.3	0	8.7
Do not want to Pay	52.9	5	35.3	0	5.9	17.7
BASE: All those who preferred any method of Filtration	**34**	**40**	**51**	**55**	**51**	**231**

Table 3.5e depicts that about 53.8 percent of the respondents earning more than Rs.5000/- preferred one time investment for buying a water purifier while just 6.6% earning less than Rs.3000/- were willing to pay one time for the purifier. It clearly depicts that economically better off households were willing to pay one time investment as compared to poorer households

Table 3.5 e – Type of Filtration and Willingness to Pay

Criteria of selection of Purifier(%)					
	Base : All those prefer any method of filtration	One time Investment	Daily Basis	Others	Free
Monthly Income of the Household					
<3000	**9.7**	**6.6**	**12**	**33.3**	**0**
3001-5000	**36.4**	**36.3**	**37**	**0**	**100**
More than 5000	**53.8**	**57.1**	**51**	**66.7**	**0**
Base : All respondent	195	91	100	3	1

Table 3.5(f1) depicts that maximum (32.8%) of the respondents want to pay Upto Rs.500/- for the filter product. Just 4.5% were willing to pay more than Rs.5000/-

Table 3.5 (F1) – Type of Filtration and Willingness to Pay

	Uttar Pradesh	**West Bengal**	**Andhra Pradesh**	**Tamil Nadu**	**Rajasthan**	**All**
Affordability for low cost filtration Product(%)						
Upto Rs. 500	43.5	72.4	50	11.3	22.2	32.8
Rs. 501 - 1000	8.7	20.7	50	30.2	44.4	27.6
Rs.1001 - 3000	4.3	6.9	0	35.8	7.4	17.9
Rs. 3001 - 5000	0	0	0	15.1	18.5	9.7
Rs. 5001 +	0	0	0	7.5	7.4	4.5
No Response	43.5	0	0	0	0	7.5
BASE : All those use low cost filtration product	**23**	**29**	**2**	**53**	**27**	**134**

Table 3.5(f2) depicts that about 59% of the respondents earning more than Rs.5000/- per month were willing to pay for the water purifier. Among them all were fine for paying above Rs.5000/- for the purifier while none of the respondents earning less than Rs5000/- was interested to buy filtration product more than 5000/-. It clearly depicts that economically better off households can afford more as compared to poorer households.

Table 3.5 (F2) – Type of Filtration and Willingness to Pay

Affordability for low cost filtration Product(%)							
	Base : All those use low cost filtration product (3,4,5 coded in q41)	Upto Rs. 500	Rs. 501 - 1000	Rs.1001 - 3000	Rs. 3001 - 5000	Rs. 5001 +	No Response
Monthly Income of the Household							
<3000	10.4	20.5	5.4	0	7.7	0	20
3001-5000	30.6	40.9	35.1	25	30.8	0	0
More than 5000	59	38.6	59.5	75	61.5	100	80
Base : All respondent	134	44	37	24	13	6	10

Willingness to pay for the maintenance cost of Filtration:

Table 3.5(g) depicts that about 64.8% of the respondents were ready to give maintenance cost of filtration (One Time Investment). State wise variations were observed, like In Tamil Nadu, 100% of the respondents were willing to pay the maintenance cost while in Andhra Pradesh just 26.7% were willing to pay.

Table 3.5 (g) – Type of Filtration and Willingness to Pay

	Uttar Pradesh	**West Bengal**	**Andhra Pradesh**	**Tamil Nadu**	**Rajasthan**	**All**
Ready to give maintenance cost of filtration, (one time investment) (%)						
Yes	45	87.5	26.7	100	74.3	64.8
No	55	12.5	73.3	0	25.7	35.2
BASE: All those who preferred One time Investment for Purifier	**20**	**8**	**15**	**13**	**35**	**91**

Figure below (G) depicts that amongst the respondents who were willing to pay the one time maintenance cost for the filter, About 54.2% of them were earning more than Rs.5000/- a month, about 39 percent were earning between Rs3000/- to Rs.5000/- and just 6.8 % were earning less than Rs.3000/-

Fig G: Respondents willing to pay the Maintenance cost of Filter

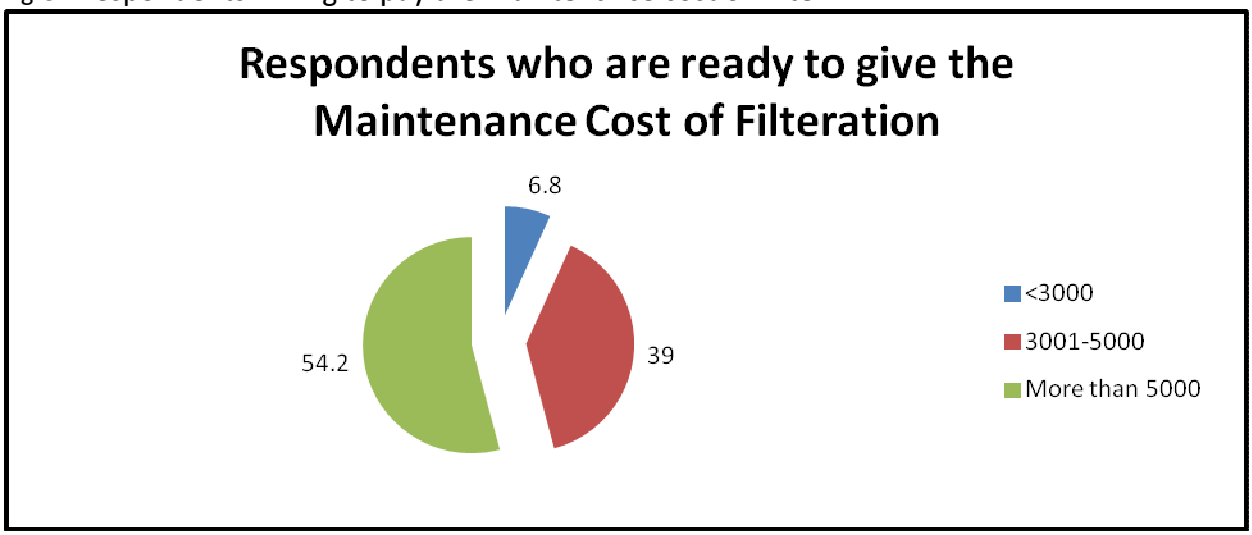


Table 3.5(h) depicts that most of the respondents (about 64.5%) were willing to pay multiple installments for buying the purification product while just 15.2% were interested in giving one time installment. About 58.9 percent had preference for loan/ installment. Just 5.9% of the respondents in UP were interested in getting loan / installment, though in Tamil Nadu and Rajasthan 76.5% had preference for loan.

Table 3.5 (h) – Type of Filtration and Willingness to Pay

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Choice of payment for buying Purification Product (%)						
One Installment	2.9	25	19.6	18.2	7.8	15.2
Multiple Installment	20.6	70	54.9	76.4	86.3	64.5
Subsidiary Rates	23.5	5	5.9	5.5	3.9	7.8
Any Other	52.9	0	19.6	0	2	12.6
Preference for Loan or Installment(%)						
Yes	5.9	67.5	51	76.4	76.5	58.9
No	91.2	32.5	49	21.8	21.6	39.8
Don't know	2.9	0	0	1.8	2	1.3
BASE : All those prefer any method of Filtration	**34**	**40**	**51**	**55**	**51**	**231**

Table 3.5(i) shows that more than half of the respondents earning more than Rs5000/- per month were willing to pay one time installment while just 5.7% earning less than Rs.3000/- per month were willing to give one time installment.

Table 3.5 (i) – Types of Filtration and Willingness to Pay

How to pay for a purification product(%)						
	Base : All those prefer any method of filtration	One Installment	Multiple Installment	Subsidiary Rates	Any other	No Response
Monthly Income of the Household						
<3000	**9.5**	5.7	11.4	5.6	0	8.3
3001-5000	**40.3**	37.1	42.3	33.3	60	33.3
More than 5000	**50.2**	57.1	46.3	61.1	40	58.3
Base : All respondent	231	35	149	18	5	24

Preference for Loan/ Installment for Buying Water Purifier:

Table 3.5(j) depicts that just 13.2 percent were willing to pay entire amount as a loan to purchase the water purifying product. It varied from State to State, viz in Uttar Pradesh 50% were willing to pay the entire payment though in Andhra Pradesh just 3.8% were willing. About 69.1% were willing to pay up to Rs.100/- as a monthly installment. Just 5.9% were interested in paying more than Rs.200/-. More than half of the respondents (59.6%) wanted up to one year time to pay the installments. Just about 11.8% wanted to pay back the loaned amount in 3 months. For about 98.5% of the respondents safe water was a priority. About 88.6% gave more preference to safe water in comparison to General Sanitation and Toilet facility. Effective water purifying product was most important for about 29.3 percent of the respondents, about 19.8% felt regular availability of the water product was most important.

Table 3.5 (j) – Type of Filtration and Willingness to Pay

	Uttar Pradesh	West Bengal	Andhra Pradesh	Tamil Nadu	Rajasthan	All
Willingness to take entire amount as loan or to pay 10-20% as initial payment for purchase of the product(%)						
Entire amount	50	18.5	3.8	0	28.2	13.2
10%	50	40.7	53.8	59.5	17.9	42.6
20%	0	37	38.5	40.5	53.8	42.6
Any Other (specify)	0	3.7	3.8	0	0	1.5
Amount prefer to pay back as monthly installments(%)						
Upto Rs. 100	100	92.6	96.2	47.6	56.4	69.1
Rs.101- Rs. 200	0	3.7	3.8	45.2	33.3	25
Rs.201- Rs. 500	0	3.7	0	7.1	10.3	5.9
Time preferred to pay the Installments(%)						
Upto 3 Months	0	18.5	3.8	0	25.6	11.8
Upto 6 Months	0	18.5	53.8	7.1	25.6	23.5
Upto One year	0	55.6	34.6	90.5	48.7	59.6
Can't Say	100	7.4	7.7	2.4	0	5.1
BASE: All those who preferred any method of filtration and said YES for Preference for Loan	**2**	**27**	**26**	**42**	**39**	**136**
Is safe water a priority(%)						
Yes	100	100	92.6	100	100	98.5
No	0	0	7.4	0	0	1.5
Verbatim						
Clean water prevents from Diseases and gives healthy Body	100	100	88.9	96.4	98.1	96.6
Water is Life	0	1.9	5.6	7.3	0	3
No response	0	0	5.6	3.6	1.9	2.3
Priority (Rank Wise) RANK 1						
Safe Water	90	86.5	87	85.5	94.2	88.6
General Sanitation	10	3.8	7.4	1.8	5.8	5.7
Toilet Facility	0	9.6	5.6	12.7	0	5.7
What is more important for any safe water product(%)						
Easy Availability	48	57.7	37	9.1	25	35
Regular Availability	6	9.6	42.6	1.8	38.5	19.8
Cheaper Product	34	7.7	9.3	1.8	19.2	14.1
Effective Product	10	25	3.7	87.3	17.3	29.3
Give free water	2	0	7.4	0	0	1.9
BASE : All Respondents	**50**	**52**	**54**	**55**	**52**	**263**

Figure below (Fig: H) depicts that about 46.3% of the respondents earning more than Rs.5000/- per month preferred Loan/ Installment for buying water purifier in comparison to just 10.3% of respondents earning less than Rs.3000/- per month.

Fig H: Respondents who prefer Loan / Installment for buying Water purifier

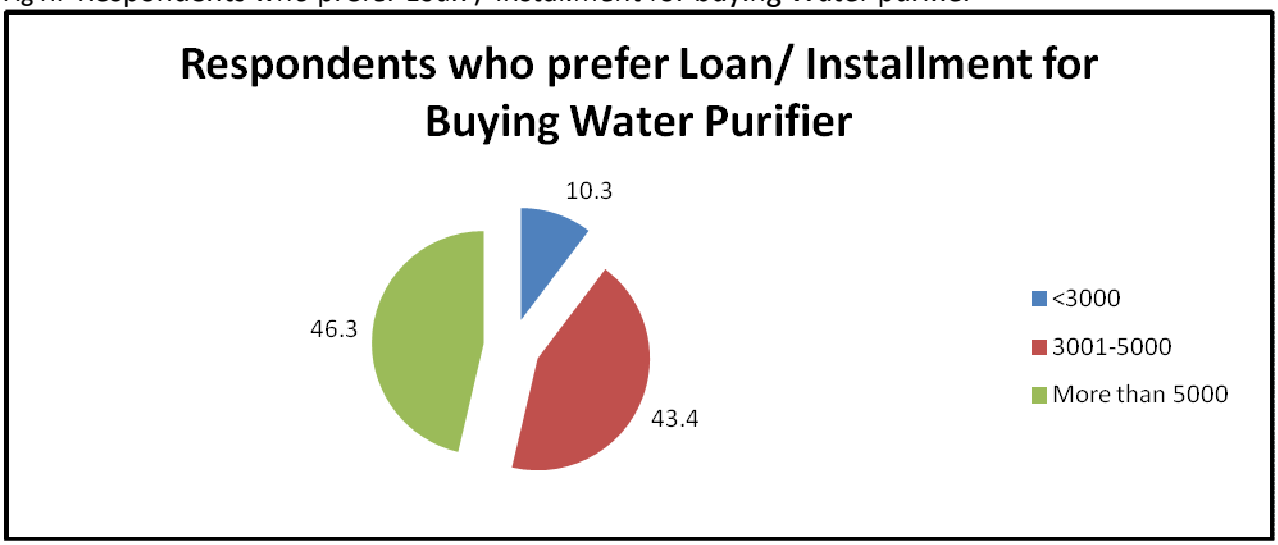


Table 3.5(k) depicts that about 46.3% of the respondents earning more than Rs.5000/- were willing to pay entire amount in comparison to respondents earning less than Rs.3000/- (16.7 percent). It clearly depicts that economically better off households can afford more as compared to poorer households.

Table 3.5 (k) – Type of Filtration and Willingness to Pay

Willingness to take entire amount as loan or to pay 10-20% as initial payment for purchase of the product(%)					
	Base : All those prefer any method of filtration and 1 code in Q48	Entire amount	10%	20%	Any Other (specify)
Monthly Income of the Household					
<3000	**10.3**	16.7	12.1	5.2	50
3001-5000	**43.4**	38.9	37.9	50	50
More than 5000	**46.3**	44.4	50	44.8	0
Base : All respondent	136	18	58	58	2

Table 3.5(l) depicts that about 46.3% of the respondents earning more than Rs.5000/- per month were willing to pay more than Rs. 200/- as a monthly installment in comparison to just 12.5% earning less than Rs.3000/-

Table 3.5 (l) – Type of Filtration and Willingness to Pay

Amount prefer to pay back as monthly installments(%)				
	Base : All those prefer any method of filtration and 1 code in Q48	Upto Rs. 100	Rs.101- Rs. 200	Rs.201- Rs. 500
Monthly Income of the Household				
<3000	**10.3**	11.7	5.9	12.5
3001-5000	**43.4**	50	26.5	37.5
More than 5000	**46.3**	38.3	67.6	50
Base : All respondent	136	94	34	8

Table 3.5(m) depicts that about 51.9% of the respondents earning more than Rs.5000/- per month wanted up to one year to pay the installments. About 18.8% of the respondents earning less than 3000/- were interested to pay the installments in 3 months.

Table 3.5 (m) – Type of Filtration and Willingness to Pay

How long, would like to pay the installments(%)						
	Base : All those prefer any method of filtration and 1 code in Q48	Upto 3 Months	Upto 6 Months	Upto One year	Can't say	No Response
Monthly Income of the Household						
<3000	**10.3**	18.8	3.1	9.9	16.7	100
3001-5000	**43.4**	37.5	59.4	38.3	50	0
More than 5000	**46.3**	43.8	37.5	51.9	33.3	0
Base : All respondent	**136**	**16**	**32**	**81**	**6**	**1**

The foregone analysis thus reveals that while most of respondents (about 62%) felt that the source of drinking water is contaminated and not clean and thus there is need of safe drinking water, about 94% believed that they should clean the unsafe water before drinking. Only about 60% of the respondents were treating the water before drinking by using localized purification procedures. It is of interest to notice that local methods like boiling, filtration by cloth, use of alum, simple sachets, bleaching powder, were most popular among the respondents. About 12 percent of the respondents felt that there was no need for a water filter or any purification method. More than 50 percent of the respondents preferred low cost filtration system. Among those preferred, more than 50 percent wanted to pay for filtered water on daily basis. About 46% wanted one time investment for the purifier. However only 4% were willing to pay more than Rs.5000/- for such water purifiers.

CHAPTER V

NGO/ MFI SURVEY

In India, numbers of local and national NGOs have been addressing issues related to water & sanitation and are **important** stakeholders group working towards citizens' access to safe water and proper sanitation. Gfk found while conducting the IDIs, the NGOs, working for water issues have accumulated important and valuable capacity of practical knowledge about the local situations developed the experience on independent research of local water and health problems.

List of NGOs and MFIs Interviewed in selected states:

FIELD PLAN	UTTAR PRADESH	RAJASTHAN	ANDHRA PRADESH	TAMIL NADU	WEST BENGAL	TOTAL INTERVIEWS CONDUCTED
NAME OF THE PERSON INTERVIEWED	MAZHAR RASHIDI	MOHABAT SINGH	V.RAMA RAJ N.SRINIVASA RAO	-	JYOTIMOYEE SARASWATHI	
NAME OF THE NGO	PRATINIDHI NGO	SWACHCHH NGO	AMBUJA CEMENT AND CHAITANYA EDUCATIONAL AND RURAL DEVELOPMENT SOCIETY (CERDS)	-	SREEMA MAHILA SAMITI	05
LOCATION OF NGO OFFICE	TAKROHI INDIRA NAGAR, LUCKNOW	UDAIPUR ROAD, NEAR GANDHI ASHARAM, DUNGARPUR	AMBUJA CEMENT FOUNDATION , 10-651,NEAR RAILWAY STATION, NARAYANA PURAM, DACHEPALLY,GUNTUR DISTRICT,A.P-522414 CERDS NGO H.NO: 3-68/1, 5TH LANE, CHILAKALURIPET, GUNTUR DISTRICT, ANDHRA PRADESH - 522616		VILLAGE POST OFFICE DUTTAPULIA, PIN 741504, DISTRICT NADIA.	
NAME OF THE PERSON INTERVIEWED	-	-	K.RAMA RAO		D. EBINASAR	02
NAME OF THE MFI	-	-	SHARE MICRO FIN LIMITED		GROWING OPPORTUNITY (INDIA) PVT. LTD.	
LOCATION OF THE MFI			1-224/58, RAJEEV NAGAR, NACHARAM-500076, ANDHRAPRADESH, INDIA,040		NO 14/133A, GANDHI PURAM, NARASINGAPURAM TOWN, ATHUR(TK), SALEM(DT).	

Present Situation

When asked about the biggest challenge faced by the people of selected areas, **Srinivasa Rao of Chaitanya Educational and Rural Development Society** (CERDS), **Andhra Pradesh** held that "For the last one decade, the people are suffering very badly for want of drinking water in many communities particularly where poor people are dwelling. This is more so in the non-irrigated dry-land regions of the district where the people have to depend on Krishna River water, 150kms away. The quality of water available from the source is not potable; Water sample analysis carried out in bore well hand pumps in the village reveals higher concentration of fluoride and presence of excess nitrate. Most of the resources existing in the village are not properly maintained. Improper maintenance of the resources resulted in the damages of structures and wear and tear of the pumps. Mostly the containers that are used for water collection and storage are accessible to animals and children."

In the words of **Head of Sreema Mahila Samiti NGO in West Bengal** "The condition of water in Bengal is quite bad and causes diseases like diarrhea, loose motions etc. But now people in Nadia understand the importance of pure drinking water, they are even aware of iron contents present in the water which causes various health problems. However not many of them care to purify it before drinking"

Head of ACF (Ambuja Cement Foundation), in Andhra Pradesh quoted "Earlier people were not aware about necessity of safe drinking water, but after initiation of Ambuja Foundation in 11 states of India including AP, lot of awareness has been spread through campaigns, demonstrations, meetings, pamphlets, street plays etc., and quite sizeable proportion of people have become aware of safe drinking water importance due to our efforts". However it needs to be done much more to make people aware of the bad effects of drinking contaminated water before people adopt safe drinking habits.

Representative of Pratinidhi NGO, Unnao District, Uttar Pradesh quoted that they "educate and make people aware about safe drinking water by showing documentaries, which contain bad effects of drinking unsafe water and also as how to make the water drinkable"

Health Educator of NGO Swachchh, Rajasthan felt that "people understand the importance of clean water but are careless. Though inter-personal education carried out by our Organization for group of people, has contributed a lot in spreading awareness about safe drinking water and better health, still many people are consuming the bore well water directly."

Affordability for Water Purification

This section deals with the willingness and affordability of people to pay for improved water quality and reliability of supply. Present Study tried to assess monetary value that households are able and willing to attach for an improved water supply. The quantitative data analysis revealed that as high as 50% of the interviewed respondents, those earning more than Rs.5000/- per month, preferred safe drinking water and thus was willing to pay for the filtration product. This means in all about one fourth of respondents were interested to have a filtration product for their safe water needs.

According to the perception on the willingness of people to pay for the safe Water, **NGO head of Ambuja Cement in Andhra Pradesh** also felt that "people do understand the ill effects of contaminated water and thus are willing to pay for the safe water. But many in rural areas cannot afford to pay for modern filtration product, thus they adopt local methods like Boiling, Bleaching, use of alum, cloth filtration etc."

Jyotimoyee Saraswati of Sreema Mahila Samiti, West Bengal mentioned that "safe drinking water is everyone's priority and people in West Bengal are very much willing to use safe water even if they have to take loans for the same. Most well-known product used here is **Pure It**. The ones who are really underprivileged are provided with Bleaching powder, chlorine tablets, alum etc. by NGOs like us. We mainly provide such powders etc. during monsoon, as water gets further contaminated and a large number of people fall sick because of water borne diseases."

Mohabat Singh, Health Educator in Swachchh NGO, Rajasthan felt that "while people in towns and cities are willing to pay Rs. 200-250/- per month for safe water, most in rural areas do not understand the importance of safe water because of lack of education and knowledge and are not willing to spend any money on purified water".

Both, lack of awareness and affordability are the major reasons for peoples' reluctance, especially in rural areas, for buying a water purification product. In urban areas however more and more people have started realizing the importance of safe water and are opting for a product which is affordable. Efforts on educating people and also bring out affordable safe water products are required. In rural areas, more people would opt for a daily basis supply by buying 5-10 liters of safe water costing at about Rs.2-5.

Preference for Loans / Installment for Buying Water Purifier, Its Sources

*In the words of **Sociologist Adam Smith** "Man is rich or poor according to the degree in which he can afford to enjoy the necessaries, conveniences and amusements of human life"*

In India, 37.2% of people are below poverty line (United Nation Development programme, 2010), and are deprived of basic necessities such as food, safe drinking water, electricity and sanitation. Even today, majority are dependent on tube wells & unprotected water source because of their inability to afford water connections, leave aside the modern filtration products available in the market. To bring the poor people up to the par with the rest of the society, the **concept of Loan started.** A **loan** is a type of debt which entails the redistribution of financial assets over time, between the lender and the borrower. Typically, the money is paid back in regular *installments*, or partial repayments.

The **quantitative data analysis revealed** that about 60 percent of the interviewed respondents preferred for loan/ installment to buy water filtration product. More than half of the respondents wanted up to one year time to pay the installments. Just about 12% wanted to pay back the loaned amount in 3 months.

According to the perception on taking loans for the Water Purifier, Selva Kumar, Distributor in Tamil Nadu informed that "as most people in the area are unable to buy filtration product so they prefer loan. About 60% of the total cost of the product is available for loan, and 20% is paid as initial payment"

Distributor of Mahaveer Agency, Rajasthan, felt, "Most people prefer to take loan from Government institutes like Banks & Cooperative Societies for this purpose. The Private institutes do not give small loans and are not much preferred; especially for the low priority products like water filtration product (The beneficiaries consider it as low priority for taking loans)"

Head of Growing Opportunity Private Ltd, Micro Financing Institute, Tamil Nadu quoted that "people in rural areas now understand the importance of clean drinking water. While till recent past, they were drinking water directly fetched from rivers/ lakes because of which they were suffering from many water specific diseases.

With lots of persuasions and initiatives, now they are moving towards water purification methods. We would get in to financing such purifiers, if large number of people accepts it. Right now we give individual loans for small scale business, and for buying household possessions preferably more than Rs.10000/-. We are **not giving loans for water purifiers in particular**, but **have no objection if anybody buys it under 'household belongings' loan**."

When asked about any micro financing institute giving loan for water purifiers, we got to know that there is **no MFI in the entire area** which gives **loans for this in specific,** at present. Mostly loans are taken for construction of house or establishing of small scale business. The loans taken locally are for emergency purposes such as, hospital treatments, marriages or any festival/deaths in the household. **The heads of MFIs (K. Rama Rao, Andhra Pradesh) felt that the government should arrange for such loans and also should provide some subsidy to buy such products.**

Head of Share Micro Fin Limited, Andhra Pradesh quoted that they don't give loans for water filters to individuals but can **give loan for Community water treatment plant**. They mainly work for society as a whole not to meet individuals' needs. The range of the loan is from Rs.5000/- to Rs.30000/- which is mainly given for rural development or women income generation activities. **He however added, "**We have no issues in giving loans for Water treatment plants, but have never come across any request from the general public for this"

Thus we can conclude by saying that No micro financing institute gives loans exclusively for water purifiers, loans are given to generate income capacity of people or rural development. But "**no financing institution will mind giving the loan for water purifier as long as it's repaid on time**" as informed by **D. Ebinasar, Head of Growing Opportunity Private Ltd.**

Suggestions to improve the Drinking Water Situation in the Community

It's an irony that India being surrounded by water bodies on three sides, house of 13 major rivers, largest river island, highest rainfall and many other facts which reflect India's dominance in water resources, yet we face shortages of water and further **water contamination**, at source and during household storage, is a major cause of enterically transmitted infections in India.

When asked about the suggestions to **improve the drinking water situation** in the Community, we got diverse replies-

Jyotimoyee Saraswathi, NGO head, Sreema Mahila Samiti, West Bengal felt that "***first of all***, provision of safe drinking water is the responsibility of the government. Safe water is the right of every citizen; it should be free of cost. ***Secondly*** care should be taken while installing tube well. Tube wells should be deep enough underground so that pure water comes out; moreover they should be installed on high platform and should be well-plastured." **Same opinion** was held by **Head of Growing Opportunity Private Ltd, Micro Financing Institute, Tamil Nadu.**

Chief of CERDS NGO in **Andhra Pradesh** quoted "increasing demand of water by industry, agriculture, urbanization and population growth results in depletion and decline in per capita availability of water. Local initiatives and community participation to improve drinking water condition can certainly help. NGOs like us can facilitate in giving information and knowledge about ill effects of contaminated water and thus need of the hour to work collectively towards this concern"

In the words of **Distributor** of **Mahaveer agency, Rajasthan**," RO should be compulsorily installed in all villages and monthly bills should be enforced, this is the only way to force people for safe water, otherwise they would take it lightly.

We can conclude by saying that Water depletion and water crisis are becoming serious and alarming and thus the need of the hour is to have concern about the situation and to find out appropriate solutions for the same.

To inform about water problems and the water – related health risks is not enough now. Usually the local communities and authorities have no idea and information about the possible technical solutions and alternatives to improve the situation at local level. NGOs and their networks can certainly help in this situation as they have valuable experience in the implementation of good practices for water resource management, including water sources protection. They have expertise on implementation of low cost, environmentally sustainable, and efficient technologies. Many NGOs working on drinking water and sanitation issues have demonstrated examples of fruitful steps towards the improvement, the access to safe water. At present, even though micro financing institutes do exist in rural areas, are mainly providing loans for purchase of agriculture equipments, construction of private and community toilets, installation of hand pumps etc, where either community is involved and loan recovery is easy, or being subsidized through government schemes. As mentioned these institutes are ready to provide loans, if more and more people come forward for such products, which would make loan recovery

easier. MFIs would also agree to loan for community plants, “as through those, the loan recovery would be easy and viable”, pointed out one of the MFI representative interviewed. Some of the NGOs working for providing information and knowledge to community about safe drinking water are also trying to persuade local MFIs to provide loans, at least to those who are in relatively higher income bracket, as they are both willing and also can afford to pay back the loaned amount for water purification products.

CHAPTER VI

ANALYSIS

FACTS: QUANTITATIVE ANALYSIS

Based on the data analysis, some of the highlights of the Study are as below:

Socio- Economic Profile of Respondents

- Socio economic profile of the respondents revealed that 42.2% of the interviewed respondents were females and 57.8% were males.
- About 42.2% of the covered respondents were in the age group of 35-49yrs. The mean age of the respondents was 39yrs.
- About 29.7 percent of the respondents had no formal schooling (illirate), just 7 percent were graduates
- As expected in these states, majority (89%) were Hindus. About 41.1 percent of the respondents belonged to OBC category. Just 12.5% were in the General Category.
- Majority of the respondents were involved in Agriculture (Cultivators), 30.8 percent.
- On an average each household in all the 5 states comprised of more than 04 members.
- In each household at least 1-2 members were earning (92.4 percent).
- The average monthly income of the respondents was around Rs.6303.23/-, varied from State to State like in Uttar Pradesh it was highest (Rs. 9645/-) and in Andhra Pradesh it was lowest. (Rs.4675.93/-).
- Average expenditure on Water was around Rs.227.31/- per month.

Housing Condition of General Population

- About 21.3 percent of the respondents were staying in Kuchcha houses, while 45.6% and 33.1% were staying in Pucca and Semi –Pucca Houses.
- About 76 percent of the houses had 1-2 rooms. About 53.6% had separate room for Kitchen in their house.
- **Regarding the sanitation facilities,** only 6.8 percent of Households have a ventilated improved pit latrine, 19 percent have a pit toilet with slab, and Majority of the households (57.4%) had no toilet facility at home, Open defecation.
- Nearly 97 percent were the owner of their house while just 3 percent were on rent. Total Electrification in all the states seems to achieve 73.4 percent.

Common Diseases prevalent in the Society:

- Prevailing diseases in the area as per the respondents were- Diarrhea (56.3%), Vomitting (29.7%), Malaria (30.4%) and Typhoid (20.2%).
- About 60.1% quoted unclean water as the major cause for Diarrhea.
- Almost all the respondents were aware about Hygiene practices and were even practicing the same.

Source of Drinking Water and its Accessibility:

- About 36.1 percent of the respondents have access to improved source of drinking water, public tap/stand pipe. About 22.8 percent of them have access to tube well/bore well for drinking, and the same percent get water from hand pump.
- For about 65% of the households the distance of water source from household was less than 1 km, mainly women were the ones who fetched the water from outside (75.7%).
- For 35.9%, the time taken to collect the water from the nearest source was less than 5 minutes while 33.7% quoted 5-15 minutes spend at the water source.

Condition of Existing Water Supply

- For about 67.1% of the households, water supplied at their home is yellow in color and has sour taste.
- About 44.5% felt that after drinking the water supplied at home they fell ill.

Existing practices for purifying the Drinking Water:

- About 93.9 percent believed to clean the unsafe water before drinking.
- About 73% quoted Boiling as one of the method to clean the unclean water. About 19.8% said to use purifier for cleaning; about 15.2% had the knowledge of adding bleaching powder to the unclean water.
- The main source of information regarding water purifier was Interpersonal Communication (35%), Health workers (23.3%), Television (11.7%), and Radio (8%).

Practice for Safe Drinking Water

- About 59.3 percent of the respondents treated the water before drinking.
- Maximum (30.8%) quoted that they cover the water with lid, about 19.9% were boiling the water for the whole family and 35.3% were straining through cloth.
- About 67.9% of the respondents were purifying the water for more than 5yrs.
- Maximum respondents (73.1%) were aware about different methods of water filtration in Uttar Pradesh. Least (31.5%) were aware about it in Andhra Pradesh.
- Economically better off households had more knowledge about methods of water purification as compared to poorer households.
- About 51 percent of the respondents preferred low cost filtration. About 17.5% were drinking water bottles and 12.2% believed that there was no need for water filtration.

Willingness to pay for Water Filtration Product:

- About 49.8 percent of the respondents wanted to pay for filtered water on daily basis. About 46.7% wanted one time investment for the purifier.
- Maximum (32.8%) of the respondents want to pay Upto Rs.500/- for the filter product. Just 4.5% were willing to pay more than Rs.5000/-
- About 59% of the respondents earning more than Rs.5000/- per month were willing to pay for the water purifier. Among them all were fine for paying above Rs.5000/- for the purifier while none of the respondents earning less than Rs5000/- was interested to buy filtration product more than 5000/-. It clearly depicts that economically better off households can afford more as compared to poorer households.
- About 64.8% of the respondents were ready to give **maintenance cost of filtration** (One Time Investment). State wise variations were observed, like In Tamil Nadu, 100% of the respondents were willing to pay the maintenance cost while in Andhra Pradesh just 26.7% were willing to pay.
- Most of the respondents (about 64.5%) were willing to **pay multiple installments** for buying the purification product while just 15.2% were interested in giving **one time installment.**
- About 58.9 percent had preference for loan/ installment to buy the water purifier.
- About 45% of the respondents earning more than Rs.5000/- were willing to pay entire amount in comparison to respondents earning less than Rs.3000/-, (17 percent). It clearly depicts that economically better off households can afford more as compared to poorer households.

LINKS BETWEEN DEMAND AND SUPPLY: STAKEHOLDERS PERCEPTION

Both qualitative and quantitative data show that despite of increased understanding about need for safe drinking water among consumers, the adoptability and practice remained low in most study areas. The main reasons being the understanding about the concept of safe water, adoption of conventional method of filtration, inaccessibility of different purification products and affordability of the products.

Quantitative analysis revealed that about 37.6% of the households believed that quality of water and the source of drinking water are clean and thus safe. 'Tastes good' is also considered as an attribute of safe water. But, very often water considered as clean is not safe, it contains more harmful things than they possibly perceive.

When asked about the methods adopted by people to treat water it was found that 93.6 percent of the respondents were adopting local methods of filtration like straining through cloth, boiling, use of alum, bleaching powder, covering by lid etc. Very few were opting for water purifiers, RO / Water bottles.

From the in-depth interviews with the stakeholders, it was found that lack of awareness and affordability were the major reasons for peoples' reluctance, especially in rural areas, for buying a water purification product. In rural areas, more people would opt for a daily basis supply by buying 5-10 liters of safe water costing at about Rs.2-5. As mentioned by Head of Ambuja Cement in Andhra Pradesh "people in rural areas cannot afford to pay for modern filtration product, thus they adopt local methods like Boiling, Bleaching, use of alum, cloth filtration etc."

Even though both distributors and manufacturers are trying hard to reach their products through advertisements, demonstrations and community approach, only limited proportion of consumers are coming forward, more among those belong to higher economic stratum. The main reasons again are non-affordability, besides low awareness. The loan options at present are either nonexistent or are very few, who are not very keen to provide loans of very low amount.

Despite of availability of large number of water purifiers in the market, and many options available, still in rural areas people are not using water purifiers, mainly because of non affordability and lack of information, both about contaminated water as well as the need of purifying the drinking water. Quantitative analysis revealed that 60.3% of the respondents earning more than Rs.5000/- a month, and just 9.3 % earning less than Rs. 3000/-, had knowledge of need for water purification. It clearly depicts that economically better off households had knowledge about methods of water purification as compared to poorer households. And, thus were also interested to opt for a purifier at a cost which is affordable.

Even if loans are offered, the priority of consumers, feel majority of stakeholders as well as consumers, are different for taking loans, then for water purification products, as loan repayment might become difficult for them, especially in rural areas who do not have regular incomes, mostly being farm based workers.

As quoted by Head of Micro Financing Institute in Andhra Pradesh "the loans given are generally up to Rs.30000/-. Small loans are not entertained and even people in rural areas don't have enough resource to pay back the loaned amount"

Quantitative analysis exposed that 46.3% of the respondents earning more than Rs.5000/- were interested in taking loan as they had pay back capacity, However, respondents earning less than Rs.5000/- per month were reluctant to take loan and pay back the amount even in small and multiple installments.

A sizeable consumers, despite of their economic background, however felt the need for safe drinking water and are ready to buy if available at accessible place and cheaper on daily basis- say Rs. 2-3 per bucket of 10-15 liters. The local purification plants, where ever giving such options are well received and successful.

A Distributor from Tamil Nadu stated, “People in our area are still incapable to buy & meet the expense of Water purifier”. Similar opinion was of Distributor from Rajasthan who mentioned that “people buy purifier/ RO only when they can afford to bear the initial and maintenance cost, and such people are very few, so mostly people adopt local purification methods which are free of cost”.

Distributor in Andhra Pradesh who was also running a local purification plant stated “People of about 8-10 villages are directly benefitted by purified drinking water supplied by our water plant at Rs.2-3/- per bucket of 10 liters. Even we are being approached by some of the neighbouring small towns for supply of drinking water from our plant. ”

APPROACHES ADOPTED BY STAKEHOLDERS & CONSUMERS TO PROMOTE SAFE DRINKING WATER

All the stakeholders feel great need for generating awareness and knowledge among community on safe drinking water, problems arising due to unsafe drinking water, introducing viable purification products as per the affordability status of community and introducing affordable loans at minimum interest rates and EMI.

Ambuja Cement, an NGO in Andhra Pradesh mentioned "NGOs like us can facilitate in giving information and knowledge about ill effects of contaminated water and thus need of the hour is to work collectively towards this concern. Local initiatives and community participation to improve drinking water condition can certainly help."

Another NGO, CERDS in Andhra Pradesh stated "The consumer has to have the needed information about water quality and other aspects of drinking water to make a correct decision on which water to drink. Our NGO, CERDS is playing an important role in improving the public access to proper information about the local problems, including drinking water quality and the water related risks for the human health. We organize the seminars, workshops and debates on water problems for the communities and try to give technical solutions for improvement of the situation at local level. We also disseminate information materials on water and health problems to people in the community."

On providing loans the representative of one of the Micro Financing Institute in Tamil Nadu felt, "We are not giving loans for water purifiers in particular, but have no objection if anybody buys it under 'household belongings' loan or if large number of people show their interest in such loan, then we can certainly introduce small loans like this at minimum interest rates"

As is clear from the analysis and also discussions with other stake holders that economically better of consumers are prepared to opt for relatively costly filtration products and also prepared to take loans and repay the EMI, introduction of different type of products could be considered. These could be affordable modern products and also the safe drinking water supply on daily basis from local plants on cheaper rates. In fact, in urban areas this mix has been successful with ROs and other such products are preferred at household level and bulk water bottles (relatively cheaper) at office/community level.

Quantitative data revealed that 53.8 percent of the respondents earning more than Rs.5000/- preferred one time investment for buying a water purifier while just 6.6% earning less than Rs.3000/- were willing to pay for the purifier. It clearly depicts that economically better off households were willing to pay one time investment as compared to poorer households

Some of the micro financing institutions are prepared to give loans if co-operative societies are formed and loan repayments are ensured through them (May collect on daily basis and repayment could be on monthly basis for all those become member of that Society). Once the product is purchased, the maintenance would not pose many problems due to low maintenance cost, habitual to safe water drinking and keep their one time investment intact.

As quoted by one of NGO Head, from West Bengal "*first of all*, provision of safe drinking water is the responsibility of the government. Safe water is the right of every citizen; it should be free of cost. *Secondly* government should arrange for loans to buy small products like water purifiers and also should provide subsidy to buy such products. Same opinion was held by D. Ebinasar, Head of Growing Opportunity Private Ltd, Micro Financing Institute, Tamil Nadu who further added ""no financing institution will mind giving the loan for water purifier as long as it's repaid on time""

The most viable product however remains the local supply of safe water through local purification plants.

Like in Andhra Pradesh, A distributor was also running a local established water purification plant in his community. The Plant was established in a cluster of 8-10 villages and purified drinking water was being supplied at the cost which was quite low; 2-3 rupees per bucket of 10 liters.

MAJOR OBSTACLES FACED IN INCREASING DEMAND FOR SAFE WATER

- Low awareness and knowledge of safe drinking water need, and health hazards due to intake of contaminated water.
- Low awareness and knowledge of various methods/ ways to purify and its accessibility.
- Low affordability
- Low priority over other essentials
- Need to introduce cheaper and affordable options
- Not many micro financing institutes would come forward for low cost product, unless a community bulk buy and assurance for loan recovery through some mechanism.

OBSERVATIONS AND RECOMMENDATIONS

The analysis drawn from the observations made by interviewing the beneficiaries and different stakeholders clearly brings out that the majority of the population; especially in rural areas are not accessible to safe drinking water. The major factors, as discussed above have been low awareness of need for safe water, inaccessibility of safe drinking water and also lack of affordability to get safe water. Therefore, the efforts need to address both awareness and knowledge generation as well as to reach safe drinking water at affordable cost.

In rural areas looking into the other priorities of the people as against the safe drinking water, it would be difficult to convince the poor people especially in the bottom quintile groups to buy water purifier either by investing or even by providing them loans. Two pronged strategies could be adopted for upper and lower strata of the beneficiaries- providing cheap loans at very low EMI and providing safe water on daily basis at a minimal cost respectively. For serving majority of the rural population with safe water supply, local water purification plants could be established which provide safe drinking water on daily basis at minimal cost to the door steps.

<u>Success story of Mr. V Nagi Reddy</u>, Water purifier distributor and also running a community water plant in Andhra Pradesh could be taken as an ideal example.

Mr. Reddy, a **Distributor of Chaitanya Rupa Enterprises** was also running a local established water purification plant. The Plant was established in a cluster of 8-10 villages and **purified drinking water was being supplied at the cost which was quite low; 2-3 rupees per bucket of 10 liters.**

The **marketing strategies adopted by Mr. Reddy** for popularizing **Aqua Kare products** as well as the community water plant included advertisements in *Yellow Pages, distribution of brochures at local level and in local newspapers*. When he started his business in this sector he spent almost Rs. 10 lakhs on publicity of the products and now every month he spends about Rs.2000/- for the publicity of Aqua Kare. Now as his water plant has already become popular and he is also getting demand from neighborhood areas, he does not need any further publicity for his community plant. The community plant has been quite successful and also is running in profits.

Chart 1: Local Community Based Water Plant in Andhra Pradesh:

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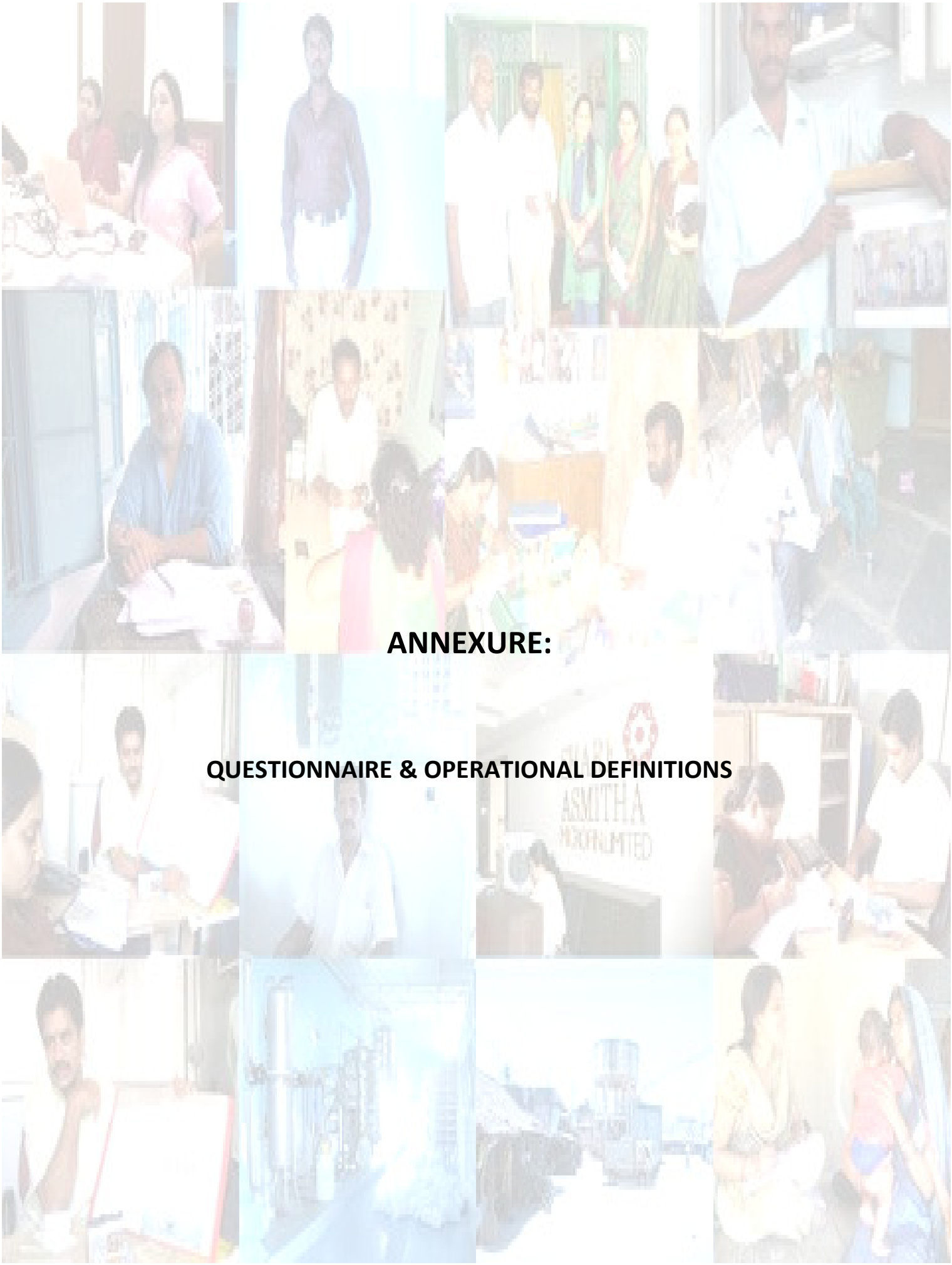

ANNEXURE:

QUESTIONNAIRE & OPERATIONAL DEFINITIONS