Study on utilization of improved water sources and level of iron contamination in different sources, Sheohar (Bihar)

Submitted to
Water for People

Submitted By:
TRIOs Development Support (P) Ltd,
New Delhi

July 2017

Acknowledgement

To begin with, I would like to express my gratitude to Water for People and One Drop particularly Mr. Nick Burn (Chief of Strategy and Scale, WFP), Ms. Meena Narula (Country Director -India WFP) and Ms. Lauren Alcorn (Director- Asia and Africa, One Drop) for providing us opportunity to conduct the Water Quality study in Bihar. I would like to mention our special thanks to WFP and One Drop team for their continued support and inputs throughout the implementation of the study. My sincere thanks to Ms Pritha Bhattacharya (Program Associate) for coordination with TRIOs team during the assignment. A special mention goes for the National and Bihar State Project Teams of WFP, lead and partner NGOs who extended support during the field work.

The water quality study would not have been possible without avid participation and information sharing by the community members, government officials and other key stakeholders. I would like to adequately thank all the participants for their contributions, time and continued engagement during the study. Let me reiterate our commitment to privacy of these individuals and information shared, so that it does not impact their lives in any manner.

This study was very useful in understanding the water quality situation in the district Sheohar and in identifying the parameters that require regular monitoring. Water quality was assessed by conducting chemical tests covering selected parameters and bacteriological tests at different points of community water supply systems and the finding of the study has given good insight on the water quality related issues in the district, which may be useful for strategic directions.

This study has given immense opportunity for institutional learning to TRIOs. I am proud and highly value the contributions made by TRIOs core team including Mr. Rajan Mahajan, Mr. Satyendra Keshari, Dr Keerti, Mr. Suresh Kumar and back stopping support team Ms Hetal Ravalji, Ms Bhavna Nahata and Ms Aniva Mahapatra for their technical support for data analyses and report. I am sure that the report would help in guiding the way forward of the project.

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Abbreviations & Acronyms

APHA	American Public Health Association
APL	Above Poverty Line
AWCs	Anagnwadi Centre
BDO	Block Development Officer
BIS	Bureau of Indian Standards
BPL	Below Poverty Line
CGWB	Central Ground Water Board
DALY	Disability-Adjusted Life Year
FGD	Focused Group Discussion
GDP	Gross Domestic Product
GoI	Government of India
GPs	Gram Panchayat
HHs	Household Survey
ICDS	Integrated Child Development Scheme
IEC	Information, Education and Communication
IDIs	In- Depth Interviews
IPC	Infection Prevention and Control
KAP	Knowledge Attitude and Practise
LPCD	Liters per Capita per Day
MDG	Millennium Development Goals
MPN	Most Probable Number
NABL	National Accreditation Board for Testing and Calibration Laboratories
NGO	Non-Governmental Organization
NSSO	National Sample Survey Office
O&M	Operation and Maintenance
OBC	Other Backward Class
OD	Open Defecation
ODF	Open Defecation Free
ORS	Oral Rehydration Solutions
PHED	Public Health Engineering Department
PRI	Panchayati Raj Institution
PSU	Primary Sampling Unit
PWD	Public Work Department
SBM	Swachh Bharat Mission
SC	Scheduled Caste
SDG	Sustainable Development Goal
SLI	Standard of Living Index
ST	Scheduled Tribe
VHSNC	Village Health Sanitation and Nutrition Committee
VHSC	Village Health and Sanitation Committee
TSC	Total Sanitation Campaign
WASH	Water, Sanitation and Hygiene
WATSAN	Water and Sanitation
WFP	Water For People
WHO	World Health Organization

Executive Summary

Background and Rationale of the Study

In 2010, the UN General Assembly and the Human Rights Council made the breakthrough decision to explicitly recognize the human right to water and sanitation. The SDG goal six states that "by 2030, ensure availability and sustainable management of water and sanitation for all', extending the original MDG 7 targets to cover all freshwater issues from the perspective of economic, social and environmental sustainability, in a holistic manner. India is one of the world's fastest growing economies and home to 17% of the world's population. However, it has the most number of rural people living without access to clean water – 63.4 million – 'Wild Water', Water Aid's State of the World's Water 2017 report reveals.

In the context of Bihar, as per the report published by NSSO 69th round, in rural Bihar 924 per 1000 households have 'improved source' and 976 per 1000 households having 'sufficient' drinking water during 2012, which was far better as compared to all India (855)[1]. This clearly spells out sufficiency of improved and sufficient drinking water in rural Bihar. However, due to frequent breakdown of old assets, lack of repairs and maintenance, and irregular power supply prevents the sustainability of various technologies in rural Bihar for the provision of safe drinking water (State draft water policy of Bihar). In the context of district Sheohar, although the district has abundance of both surface and groundwater resources, erratic rainfall, siltation, water logging and riverbank erosion are among the issues that affect water quality and availability.

Water For People and One Drop initiated Project Sheohar in 2014, an initiative aimed at driving lasting solutions to widespread problem of access to water and sanitation across the Sheohar district. The main project objective was to improve the living conditions of people in Sheohar by providing a sustainable access to safe drinking water to all, increasing access to sanitation to 60% of the population and developing livelihood models that could replicated for the benefits of 2% of the population by 2018. The water related component of Project Sheohar is being implemented in 13 Gram Panchayats in the district. The focus of WFP work has been to develop at least one deep safe drinking water source per hamlet/ habitation of 250 people so as to ensure that the distance from all households to a safe source is less than 500 meters. WFP is also working to reduce open defecation through awareness activities at school and community level, formation of women Joint Liability Groups (JLGs), credit provisions and linkages, establishment of Points of Purchase (PoPs) of toilet construction materials and strengthening agriculture based livelihoods.

In the aforementioned backdrop, the present study was undertaken to understand the utilization of improved water sources in Sheohar district and level of iron, arsenic, fluoride and zinc, E Coli and MPN contamination in different water sources through ground water testing. Both quantitative and qualitative data was collected under the study to understand knowledge, attitude and practice of communities in relation to drinking water, sanitation and hygiene.

Methodology

The multistage cluster sampling was used to select the PSUs and target groups as well as water points for the study. For water testing purpose, total 675 water points were selected from all five blocks of Sheohar district, which included 135 water samples from each block.

[1] http://mospi.nic.in/mospi_new/upload/kye_indi_of_water_Sanitation69rou_24dec13.pdf

Water points included India Mark-II &III as government sources, private hand pumps such as Singoor and Tara hand pumps and third type of water points set up in the project area of each gram panchayat by Water for People (WFP). Priority was given to the water points installed by WFP followed by government and thirdly to private hand pumps. *Of the total water points covered (675) the sample constituted of 56.9% government water points, 32.6% private and 10.5% WFP water points. The sampled hand pumps selected for water testing were from depths within 100ft, 100-200ft and more than 200ft.*

Water samples for water testing component were collected, preserved, coded and transported by well qualified and trained field personnel. The analysis for chemical contamination was conducted at the NABL accredited water testing lab at Patna, whereas biological contamination was analyzed using portable kits and lab test validations. Sampling, preservation, storage, transportation of water sample was undertaken as per the American Public Health Association (APHA) standard methods and handed over to the lab for proper analysis. Prior to analysis, the laboratory was checked to ensure NABL certification, required Equipment, AR grade chemical reagents and presence of skilled staff, such as, chemists and microbiologists. All the safety measures were available in the lab to manage any unwanted hazard or contamination incidence either chemically or microbiologically. Water collection was done using suitable marked containers with suitable preservatives with fully equipped PPE on site at water points and then preserved. Unique ID was given for each sample collected. Separate sample bottles were used for microbiological analysis and stored in an ice box having capacity of 100 samples to check MPN contamination. Chemical parameters such as Arsenic, Fluoride, Zinc and Iron were tested using SDDC (silver diethyldithiocarbamate method), SPDNS, Zincon and Phenanthroline methods respectively with the help of UV spectrophotometers by preparing fresh standard curve with suitable concentration of chemicals and blanks. Preparation of chemicals and standard curve were finalized in the lab under the supervision of core team of TRIOs.

The samples were tested for Arsenic, Fluoride, Iron and Zinc as chemical parameters and MPN (Most Probable Number) and E. Coli as microbiological parameters from all five blocks of Sheohar district.

The geo-coordinates for water points were also recorded for each sampled water point. Besides the contamination, risk assessment was also carried for each sampled water point by field team, using standard observation checklist as per 'Uniform Drinking Water Quality Monitoring Protocol 2013, GOI'. For KAP survey, sample of total 1585 HHs were selected across 5 blocks of district. The KAP study was done in same PSUs where water testing was performed.

The sample was distributed among following categories of respondents:

Respondents	Proportion of Target Groups to total population Sheohar district [2]	(Weightage) % of Respondents Per Village	Sample of Target Groups Per Village	Total Sample (45 Villages)
Adult Male (19-54 years)	0.91	0.42	15	675
Adult Female (19-49 years)	0.77	0.35	12	540
Adolescent Boys (10-19)	0.28	0.13	5	225
Adolescent Girls (10-19)	0.21	0.1	3	135
	2.17		**35**	**1,575**

[2]Census 2011

The required number of field surveys and water testing personnel were trained and deployed. The data for KAP study was conducted using Computer Aided Personal Interview (CAPI) technique. The quantitative data was reviewed and uploaded on cloud server directly from the file using online data transfer protocols.

Data collection was carried out in the month of January 2017. Core team of TRIOs collected qualitative data through 6 FGDs each with target group of adult male, adult female, adolescent boys and girls. Consultation and In Depth Interview (IDIs) were conducted with district and block level Government officials, PRI members, School Teachers and staff of implementing NGOs partners.

Scope/Limitation/ Constraints of the Study

- Keeping in view the study objective and design, it provides the status of water quality and KAP of community on WASH for district Sheohar as a whole. The comparisons for indicators for intervention and non-intervention areas of Project Sheohar may not be much significant under the study.
- The study only gives the present status of water quality and KAP indicator for community on WASH thus serves as baseline status which will provide basis for planning the future strategies and activities in the district.
- The water testing study was carried out in winter season. The bacterial contamination level may change /increase in the summers.
- The water testing was not carried out in institutional water points such as schools, health centers etc.

Study Findings

Water Quality Testing (Chemical and Biological):

The chemical parameters i.e. Arsenic, Fluoride, Iron and Zinc and Bacteriological parameters are MPN and E. Coli were tested in water sample collected from selected water points under the study. The results of the tests are as follows:

Although Iron contamination does not have any direct short term impacts on health, in the long term it causes gastroenteritis and unpleasant taste to drink. It also discolors any item it comes in contact with causing stains. Of all the water points, 67% were found to have iron level above permissible limit. All the GPs of all the five blocks showed iron contamination more than 0.3mg/l. Iron contamination above permissible range was observed in 268 government water points, 156 private hand pumps and 34 water points set up by WFP.

Arsenic contamination causes arsenicosis, a kind of skin lesions. The presence of arsenic in drinking water calls for regular monitoring as it is imperative to prevent arsenic contamination and consequent health hazards. 99% of samples were tested under permissible limit for arsenic However in Piprahi and Purnahiya blocks the arsenic level was found above permissible limits in 5 GPs viz., Belawa, ParsauniBaij, Kuama, Adouri and Basant Jagjiwan (ranging 0.059mg/l to maximum 0.35 mg/l).

Water samples were also tested for fluoride content which was found to be within the permissible limit of 1-1.5mg/l as per BIS standards. More than 99% of the treated water points were safe for fluoride level, except for a few pockets (only 5 out of 675 sampled and tested water points had presence of fluoride above permissible limit) of Jehangirpur GP of Dumri Katsari block and Belahiya GP of Purnahiya block. Based upon the study findings, continuous monitoring of fluoride is suggested to check any rise above permissible levels.

It is a matter of concern that all the water sources (near about 80%) in GPs across all five blocks indicated fluoride contamination below the 1ppm concentration which may cause dental carries in children.

In terms of Zinc almost all the water points of all GPs of all five blocks were under permissible limit. About 23% water points had Zinc concentration less than 5mg/l; whereas, the 77% water points having 5-15 mg/l. Presence of Zinc was reported in some of the samples, which is a matter of concern. This requires continuous monitoring of the drinking water. Implication of zinc on human health is still being researched but excess of zinc may cause enzyme copulation in the human body.

On bacteriological parameters based on the Multiple Fermentation Tube method, MPN was detected in all samples as per BIS standards. E. Coli was also found to be present in more than 2% of water samples from 8 GPs out of the selected 15 GPs. About 98% samples were safe from fecal matter contamination in drinking water. However it may be noted that bacteriological contamination may vary with change in climate. It is more likely to increase in summers and decrease in winter depending on the other factors such as sanitation status of the water source.

As per the Uniform Drinking Water Quality Monitoring Protocol, sanitary inspections should be carried out for all new sources of water before they are used for drinking water and on a regular basis. For the purpose of sanitary risk assessment of water points covered under the study, a standard sanitary inspection form was used by the study team. The questions were structured as 'yes' or 'no'. Yes answers scored one point and each no answer scored zero.

The overall sanitation risk score showed 65.3% of water points in the High Risk category while 7.9% in the Very High Risk category. The overall sanitation risk assessment was carried out on 10 parameters as per the format and guidelines prescribed by Government of India under the 'Uniform Drinking Water Quality Monitoring Protocol'.

The information was collected through onsite observation and group interaction with community living around the water point. The source wise contamination risk score results showed 9.1% of government water points at a Very High Risk score while, only 1.4% of WFP water points were at Very High Risk. Similarly about 74% of the government water points were at high risk compared to 66.8% of private and 12.7% of WFP water points.

KAP Survey

Socio- Demographic Characteristics:

Owing to migration in search of work to other states such as Punjab, Haryana, Delhi and Maharashtra, it was observed that the percentage of females in the age group of 35-49 years was higher than the males present in the village at the time of the survey. About 38% of the working population was under the age bracket of 20-49 years.

The sex ratio in Sheohar (898) was lower than the state average (916) but matched the Census 2011 figure (893)[3]. The population (7 years and above) covered under the survey included 63.9% literate. More females in the age group of 15-19 years had completed their secondary level education as compared to their male counterparts. The percentage of pre-school going children (3-6 years) was quite better at 63% in comparison to the state average of 51.1%, that was reported in the "Rapid Survey on Children 2013-14", by the Ministry of Women and Child Development.

[3] Source: Census 2011

In Sheohar, society is patriarchal with almost nine out of ten households reporting a male as the head of household. The median age of the head of the household was found to be 40 years, about 45% of the heads reported to be in the poorest category of the standard of living index, indicating precarious living conditions for the households.

The total sample constituted of 55.6% males and 44.4% females. About 48% of the respondents were homemakers, 29.3% were involved in agriculture or non-farm based activity. Majority of the adult respondents were Hindus and almost a quarter of the adolescent respondents were from the Scheduled Caste and 52.2% from the OBC category. 64.5% adolescents had completed/pursued their secondary education across the district which was more than double of adults who had completed their secondary education (27.7%).

Water Access and Supply:

Hand pumps were the source of drinking water for almost 92% of households across the blocks. These were used across house types, education, religion, caste and living standard index. Tube well/bore well were present only in three households which belonged to HH falling in the wealthiest category of the SLI index. In about three-fourth of the households, the location of water source was within their own dwelling across the blocks, with Tariyani block having the highest percentage and Purnahiya block the least. Only 17% of the households accessed water from some plot or yard other than their own. More pucca and semi-pucca houses had water source in own dwelling compared to kaccha houses. It is interesting to note that around 71% households living below the poverty line had water source within their own dwelling.

One fourth of the total respondents fetched water from hand pump having less than 100ft depth, among them 85.5 % had water source within their own dwelling. The depth of the hand pump was greater than 100ft in case the head of household had higher education (60.6%) and for households falling in wealthiest standard of living index bracket (54.9%). In HH where water was fetched from outside, the primary responsibility of fetching water lied with women in 81% of the households surveyed across the blocks. The average distance for fetching drinking water was less than 200mtrs for 83% of the households across the blocks. Majority of HHs made three to six trips per day to fetch water per day. At least one in four households made at least two trips to get sufficient drinking water in a day. Average time taken to fetch drinking water was half an hour for around 45% households.

About 93-99% (95.8% across blocks) of households in the different blocks reported that the available quantity of water was satisfactory. Households water tariff only for hand pumps (4.9%) and public taps/standpipes (5.3%). Purnahiya block had the highest number/ percentage of households paying water tariff and Sheohar had the least number of households (2.9%) paying water tariff.

Other than drinking, water was also used for cooking, cleaning and washing purposes by households. Hand pumps were again the primary source for all the aforementioned activities. Fetching water for other purposes was also a woman's job ranging between 75-87% households across the blocks, compared to 11-20% of adult men reported across the five blocks. The distance of external source was less than 200 meters for 82-100%.

In terms of issues faced in availing drinking water, conflicts at water source; community or common water resources was reported as places of conflict, for ex, public tap and standpipes were reported by 45.7% of households where they faced violence while fetching water. In case of hand pumps only 18.3% of households reported conflicts. Illiterate respondents (23%) faced more violence in comparison to their educated counterparts.

In fact, the percentage of households reporting conflict gradually decreased with increase in education of head of household as well as standard of living index. The wealthiest reported at least (11.2%) and poorest (27.3%) violence during fetching water.

Among other issues, shortage of drinking was reported in the months of May, June (73.8%) and July. More than three-fourths of the households reported that they had not experienced any kind of breakdown in water supply. However breakdown of water supply was a major problem in Dumri Katsari and Purnahiya blocks where it was reported to occur 6-10 times in last 12 months preceding the survey. Drying up of water sources in summer was the main reason for breakdown of water points as reported by two-thirds of the households. Water scarcity can impact on availability and consumption of safe drinking water, inadequate sanitation and poor hygiene. All these can lead to health complications in summers such as diarrheal induced cholera, typhoid fever, etc.

The other reason cited was time taken for repair of water point by about one fourth of the respondents. Repairs usually took 1-7 days, with at least half of the respondents mentioning repair within 1-2 days. The situation was critical in Dumri Katsari where 31% reported repairs in 2-7 days. However, Sheohar block was highly critical as 12% of households reported more than seven days for repair of their water source. In case of interrupted water supply three-fourths of the households relied on neighbors across the five blocks.

Water was stored in metallic vessels by 65% households and in plastic bottles by 17%, households. Overall, 10.5% households reported they drank directly from the source. Almost 83.2% of households reported cleaning of the storage containers either every day or prior to fetching water, while, 4.7% of households reported they never cleaned the storage containers. Water storage containers were covered by one in every two households. Two-third respondents from Purnahiya block did not cover the water container; although, the water was placed at an elevated height by 33% households. Water was stored at ground level by two-thirds of the respondents in the five blocks. Water hygiene was not followed by 77% of households across the five blocks, as they dipped their hands in the drinking water while taking out using mug or glass.

Observations in 89.3% of the households revealed that at least 48.5% of households used a clean cup or ladle to take out water from the container, which was kept away from the floor and children's reach. In 44.5% and 54.5% of households the water container was covered with lid and the container looked clean respectively.

It was found through observation that, on the contrary to reported 55%, in only 44.5% households the drinking water storage container was covered. Similarly, 27.2% households reported storing of drinking water vessel at elevated place whereas 24.5% found to be actually practicing the same.

Perception of Respondents on Drinking Water Quality:

Overall, 76% of respondents were satisfied with drinking water quality. When asked to rate the quality of drinking water on 3 point scale, 71% of respondents said the water quality was good and 22% households said the quality was average. Further, households were asked to score the water based on its clarity, colour, smell, taste, healthiness, etc. 78.4% of households said the quality of water was good in terms of clarity, 68% of households said the colour and same percentage of HH said smell was good. The overall quality of water based on taste (71.1%), healthiness (69.3%), stability of service (72.4%), convenience (72.1%) was reported to be good.

Average frequency of hand washing was reported 4-6 times in a day across respondent categories that cuts through education, religion, caste and wealth index. Education status did not influence hand washing as almost equal number of respondents who were illiterates (52.3%) and those who had higher education (50%) washed their hands 4-6 times in a day. About 26% of respondents washed their hands 7-10 in a day across different backgrounds.

A good practice was reported with about 94% of respondents saying they washed hands before eating, 85% of respondents reported washed hands after defecation or using the toilet. Nearly half of the population washed their hands before preparing a meal. 18.7% & 17.1% of respondents washed their hands after touching an animal and after cleaning child feces respectively.

Overall, about 72% of respondents washed their hands with soap and water, while only 8.8% used only water for washing hands. About `4% of respondents washed their hands with mud/dust and water and a small percentage of 5% respondents used ash and water to clean their hands. Practice of hand washing with soap and water improved with improvement in education level. While 63.4% illiterate respondents reported hand washing with soap and water, around 88% respondents with higher level of education reported this practice. Hand washing practice improved with improved standard of living. While 85% respondents who were in wealthiest category reported hand washing with soap and water, only 63% poorest practiced it.

Reasons for not using soap for washing hands were unavailability of soap/cleaning agent (80.3% overall), or they did not like (10.4% overall), while about 8% did not know of any reasons for not doing so. Overall, one in two respondents felt that hand washing with soap and water stopped germs from spreading; whereas, around 30% thought it prevented sickness. However, majority (68.6%) felt that it just kept the hands clean.

During observations of hand washing areas, it was noted that water was available in 93.1% of households and a cleaning agent (soap bar or liquid, powder) was available in 65% of the households observed. The situation was critical in Sheohar block as only in 56% of households a cleaning agent was available at/ near hand washing area at the time of the survey. Overall, only 16.2% respondents were aware about any water borne diseases. The level of awareness among respondents was least (8%) in Piprahi block and highest (21%) in Dumri Katsari block. Among the respondents who were aware about water borne diseases around 71% respondents were aware about diarrhea, around 36% about Jaundice, 5% about dysentery, 11% about cholera, around 29% about fluorosis and around 35% about typhoid.

Awareness among adult women (12%) about waterborne diseases was very low such as Cholera (9.2%) and dysentery (12.3%). This was quite critical to note as women were majorly involved in fetching, storage and handling of drinking water.

Awareness about water borne diseases increased with an increase in standard of living index, i.e., 21.3% wealthiest and 12% poorest were aware. Similarly, awareness also improved from SC (10%), ST (15%), OBC (13%) to general category (33%).

About 28.8% of households reported a member suffering from water borne disease in last one year. Of these, about 80% members were suffering from Diarrhea, followed by Typhoid (28.7%), Jaundice (21.2%).In Sheohar block the percentage of affected with diarrhea was quite high at 91.1%. The incidence of diarrhea among children (0-5 years) in last two weeks was reported 9.5% of HHs.

Awareness about water quality testing being conducted by government/community body was reported by about 20% of households. Of these 52.4% of respondents said the quality test result was not shared. About 35% knew the result of water quality which was safe for drinking, 9% were aware from the result of water quality testing that the water was unsafe for drinking while nearly 2% knew from the results that the water was unsafe for all purposes.

Interestingly, overall 85% households were not aware about the program and schemes on drinking water. Further, only around 16% adult males and 13% adult females were aware about programs or schemes on drinking water. Among those who were aware of any drinking water/ program, about 34.3% households were aware about Everyone Forever program, 12% about Swachh Bharat Mission (SBM) and only 2% were aware about Seven Resolves program. Overall, one in two respondents reported that program/scheme was beneficial for them. When asked about the benefits of the scheme or program of the government or non-government bodies, around 63% respondents said that the households were able to use improved water source and the water used was free from contamination in all seasons.

Majority of households (91%) did not treat their drinking water. Only 4% of the households boiled their water, 3% used other methods (alum, bleach, strain through a cloth and water filter). Households with higher education (15.2%) undertook water treatment before drinking. This was in variance to 75-87% of respondents saying treatment of water is necessary for good health.

Community awareness (defined as knowledge of the respondents about the particular activity) about BCC activities was low as overall, 22% respondents were aware about any BCC including social art activity related to water quality and water treatment organized in their area. The respondent group wise analysis shows that higher percentage of adolescents (boys 33.8%, girls 31.7%) was aware about these activities as compared to adults (21.9% male, 14.8 female). Further, out of those who were aware about BCC activities 22.3% said to be aware of MDS/drama, 16.2% about street plays and 4.5% were aware about screening of short films (the social are activities conducted by WFP). Only 5% respondents were aware about house to house counseling. Awareness about any activity was higher in case of intervention villages (27.3%) in comparison to non-intervention (18.1%) villages.

In overall study area, out of those respondents who were aware of the BCC activities;18.6% stated that they participated in any BCC/social art activity related to water quality and treatment. Participation was higher among adult female (22%) as compared to the other categories of respondents i. e. adolescent girls (18%), adult male (18.1%), adolescent boys (15.8%).

Participation rate was particularly high in Purnahiya block where 33.3% respondents reported to have participated in BCC including social art activities related to water quality and treatment. When the respondents were asked to rate the BCC including social art activities, 42.4% respondents felt the activities very good, 54.4% felt good, 1.7% and 1.4% respondents felt that activities were just average and poor respectively.

The questions on water and sanitation facility at school were asked to school going adolescents during KAP survey. On an average 77% of adolescent boys and girls reported presence of a water point for drinking water in their school. 61% boys and 63% girls reported water points were functional in the school. Most schools had single water point for drinking water as reported by 36% boys & 42% girls. Water quality as per taste (87% boys & 90% girls) was reported to be good. However, 32% boys & 18% girls reported presence of bad smell in the water from the school water source.

Only 16% boys and 17% girls reported presence of school sanitation committee. Particularly, in Tariyani and Sheohar blocks around 25% boys and girls reported presence of school sanitation committee in school.

Sanitation:

Percentage of households with toilet facilities shows correlation with education level of HH head across the blocks. Presence of toilets improved with the house type, caste and APL/BPL status. Number of households having toilet facility at home was less than half (37.4%, 592 HHs) of the total sampled households. Of these majority of the households (83%) had improved sanitation facilities of three types i.e. presence of flush to sewer/septic tank/pit, pit toilet and twin pit or composite toilet. Among those HHs where toilet facility was not available, poverty was reported as the main reason for not constructing toilet by 94% of respondents.

Reasons given for constructing toilets at home included safety of women (77.8%) followed by financial support in the form of government incentive received for construction of toilets (21%) and for use by visitors at HH(16.4%). Out of those households where toilet facility was available the overall toilet usage by all family members was 94.4%, which was above 90% usage in all the blocks with Sheohar block leading at 97.1%. When asked about reasons for not using toilets (in 33 HHs) respondents across categories (adults & adolescents) have said they 'like to defecate in the open' (45.5%), followed by non-functional toilets mostly due to O&M issues (42.4%).

Causal Relationship among Key Indicators

The data reveals that only 9% of total households were treating drinking water which includes boiling of water, straining through cloth etc. among. While looking at the causal relation between economic status of HH based on the type of card available; it was found that out of total HH in APL category, about 13% were treating drinking water at home; whereas in BPL household it was only 6.6%. A significant association was found between household which used treated drinking water and Poverty of Household. $[\chi^2 = 18.8, \mathrm{P} = 0.000 < 0.05]$.

The data analysis indicated that the education level of the household head was directly correlated with availability of toilet facility at HH. The percent of HH with toilet facility was less where the head of household was illiterate (25.7% toilet facility) and it further increased with the increase of the education level of household head (72.7% toilet facility in case of higher education). It was found that the education has significantly associated with the household having toilet facility. $[\chi^2 = 130.46, \mathrm{P} = 0.00 < 0.05]$.

About 37.4 % of total households had toilet facility among surveyed households. 46 % of households having APL cards had toilets at their homes; whereas, 35.2 % of households had no cards but had toilet facility in their home. Only about 35% of BPL HH and 34 % of Antodaya HHs had toilet facility at home.

While checking the association between household having toilet and economic status of household, it shows a strong significant relationship. $[\chi^2 = 14.7, \mathrm{P} = 0.002 < 0.05]$.

Out of the total 1585 households covered under the survey incidence of diarrhea among children age 0-5 years, was reported among 5.6% of households. The incidence of diarrhea was 6.4% in households where main source of drinking water was hand pump with more than 100 feet depth. The incidence increased to 6.5 % among households having main source of water (hand pump with less than 100 feet depth).It was also observed by checking the association between depth of hand pump with incidence of diarrhea which shows a strong significant relationship. $[\chi^2 = 105.1, \mathrm{P} = 0.000 < 0.05]$.

Among APL card holders 94.6% of households use hand pump as main source of drinking water. The percentage of households using hand pumps as main source decreases from BPL (91%) to Antodaya (87.8%) and 92.9% of no card holders use hand pumps as main source. A significant association has been found between card type and main source of drinking water [$\chi^2 = 25.907, \mathrm{P} = 0.01 < 0.05$].

Of the total households 41.1% of households facing shortage of also encountered violence while fetching water. A significant association has been was observed between shortage of water and violence faced by households [$\chi^2 = 121.32, \mathrm{P} = 0.000 < 0.05$].

Conclusion

The central role of access to water and sanitation for sustainable development is now even more confirmed with the formal adoption of the 17 Sustainable Development Goals (SDGs) in September 2015 by the United Nations (UN) General Assembly. Among these, Goal 6 is to ensure availability and sustainable management of water and sanitation for all by 2030. This presents a great challenge for India, because according to WHO/UNICEF (2014), India was in the group of only 45 countries where sanitation coverage was less than 50% and home to largest population lacking sanitation.

As per NFHS 4 (2015-16), 89.3 per cent rural households had access to improved drinking water sources. According to Ministry of Drinking Water and Sanitation there are total 63968 habitations in India which suffers from water contamination issues.

Thus, over the last decade, water and sanitation coverage has captured increasing policy attention and is now exemplified in the national initiatives like Swachh Bharat Mission, National Water Quality Sub Mission and Strategic Plan for Ensuring Drinking Water Security in Rural India 2022. These missions provide strategy and milestone to achieve the national goals in water and sanitation components.

In order to realise the objectives of the study, as mentioned earlier in the summary, on water quality front out of total 675 water points tested under the study, the level of Arsenic and Fluoride was found with in permissible limits in more than 99% water points. With regard to Zinc, all 100% water points were under the permissible limit. Iron contents were found above permissible limits in 68 % sources across all the GPs which surely cause of concern. E. Coli was present in 2% of samples while absent in 98% sources. MPN count was tested in 10% of the total sampled water points. MPN was detected at all the 67 sampled water point tested for this. This indicated the bacterial contamination of water.

As per sanitary survey risk analysis, 8% water points were found under Very High Risk Category (VHR), 65% water points under the High Risk Category (HR), 12% under Mild Risk Category (MR) and 15% Low Risk Category (LR). It is worth noting that majority of government water points and least of WFP water points were figuring in very high or high risk category.

Since the water testing and sanitary risk assessment was carried out in winter season, therefore, the chances of increased bacteriological contamination may be ruled out in summers especially considering that 73% of water points were falling under either very high or high risk categories.

Further, the KAP study findings revealed that by and large on water access and availability aspects, overall 82.9% HHs (where water sources were out of premises), fetched drinking water from a source less than 200 meters and on an average 95.8% of households covered under the study were satisfied with water availability.

However the qualitative assessment gives a better insight to above data and shows that, in priority intervention GPs covered under the program; the water point, installed or restored by WFP remained the most preferred source for fetching drinking water for HHs. However, when it came to water tariff, a miniscule of households were paying any kind of water tariff or user charge. The mechanism of user committee for maintaining the water point was existing where WFP installed the water infrastructure with varied level of capacities and functionality, but else- where community structure or mechanisms formed by government such as VHSC/ VHSNCs/VWSC were not much functional. Water borne diseases were reported during the study but awareness was limited to diarrhoea and dysentery among community. Other water borne diseases such as jaundice, cholera and typhoid were largely unknown. Incidence of diarrhoea was reported across all blocks with highest in Sheohar block (11.9%), indicating both lack of awareness and unhygienic water handling and treatment practices.

Status of sanitation and hygiene in Sheohar is defined by economy and intent. Most of the households reported lack of money as the major impediment towards constructing toilets. People mentioned convenience of open defecation but also spoke about various challenges faced by them during open defecation, all in the same breath. Even when households had the ability to construct toilets they lacked intent to construct. This is evident from the findings as about half the household having APL status did not have toilets.

The study findings indicate that behaviour change communication activities have not been able to penetrate much. However more respondents were aware of any WASH related BCC activity including social art activities conducted in their area in intervention GPs as compared to non-intervention GPs.

Low coverage and participation rates indicate that much needs to be done on the front of BCC activities. Although innovative ideas such as Multi-Disciplinary Shows indicate that Water for People is not only thinking but also investing on creative and innovative behaviour change communication activities but presently the impact of all these has been very limited at both school and community level. There is a need for sustained targeted interventions as well as integrated behaviour change communication to ensure people have the knowledge and awareness to change their attitude and eventually, their practices.

Further statistical analysis of the data revealed that there is significant association between treatment of drinking water and economic status of household. There was a higher possibility of undertaking treatment of water in those households which were economically well-off. Data analysis indicated that education level of the head of the household was directly correlated with availability of toilet facility at HH level.

Availability of IHHL has a significant association with household economic status. Analysis shows that depth of the hand pump has a strong significant association with incidence of diarrhea. Further, there is a significant association between shortage of water at household level and violence faced by household while fetching water.

The findings of the study lead us to conclude that in district Sheohar there is a high dependency on hand pumps for drinking water and other purposes. While people are aware about the aspects of safe drinking water such as depth of the hand pump and drinkability of water, there is a need for increased awareness on issues related to water handling and water treatment.

Incidences of water borne diseases indicate that people lack awareness on prevention of water borne diseases. While the focus of the study was mainly water quality, findings on sanitation related indicators indicate that there is still significant requirement for IHHL in the District. From the point of view of project, challenges related to WASH also present opportunities for the project to think innovatively to ensure better project implementation in terms of reach and quality.

Recommendations

Based on data analysis, field observations, and interactions with partners, staff, community and key stakeholders the key recommendations area presented below. The recommendations have been grouped in to three categories i.e. suggestions related to program planning and implementation, recommendations at the level of WFP India Core Team and emerging opportunities.

Program Planning and Implementation Level:

a. Water Access, Availability O&M, Management

- The existing water points installed by Water for People have wider acceptance among community as reflected through FGDs with community and IDIs with stakeholders, however the contamination risk was found high or very high at some of the water points. WFP team can plan for technological interventions to bring down the contamination risk at these water points.
- It is suggested that besides expansion in newer areas, WFP team can continue working for strengthening of existing community mechanisms such as "User Committees". WFP can also explore possibilities of its linkages with existing forums constituted by government such as VHSC/ VHSNC, Ward Level Committees for water and sanitation schemes etc. This would be helpful in mainstreaming of community structure created under the project and sustainability. However while exploring linkages with VHSC/ VHSNCs it would be important that such forums should be functional and active. In case of non-functionality additional efforts would be required at the level of WFP for this. The orientation of VHSC/ VHSNC members would be useful in taking forward this process.
- The user committee member should be thoroughly oriented periodically and provided handholding support on following aspects

    - Their roles and responsibility Do's and don'ts for keeping the water point safe.
    - Recharging related aspects .
    - Last water testing date and results should be kept in the records as well as displayed.
- The WATSAN committees in schools should be strengthened by periodic orientations and regular monitoring by Water for People and community involvement.
- As per the findings of the study, the role of government health service providers seems miniscule in relation to water borne diseases. As per IPHS guidelines, responsibilities of ANMs also include increasing awareness about public health issues in the community including water borne diseases. WFP and partners should involve government health and ICDS functionaries in their work to ensure they provide health counseling to families including component on water borne diseases.
  Additionally, WFP and Partners should train the health and ICDS frontline workers on counseling on water borne diseases and safe water practices.
- Since women are predominantly involved in fetching and handling water. Intensive awareness programmes (IPC/ small group meetings) for women would be useful for ensuring safe water practices, hygiene and sanitation.

- Out of those HH having O&M issue related to water point, about 50% households reported repairs within 1-2 days and about 9% in about 7 days. WFP can plan to provide training for O&M to more local youths so that they may serve as Jal-Bandhus where ever required in project area.

b. <u>Water Quality Aspects:</u>

Major issue in water quality is related to iron contamination and MPN contamination. Arsenic contamination was observed on both banks of the river Baghmati which is tributary of river Ganga. Followings are recommendations:

- One of the major recommendations given by community was that government should increase the depth of existing hand pumps WFP team may advocate with government for the same
- **The sanitation risk assessment of community water points to be conducted twice a year as also recommended by GoI guidelines**
- WFP may further plan to get the water sample tested for water points showing presence of arsenic or fluoride for planning any further intervention.
- All the water points having water contamination beyond permissible limit should be marked and a display board stating that “Water not Safe for Drinking” fixed at it.
- Arsenic removal devices can be set up at source points to treat the drinking water based on absorption, coagulation cum sedimentation techniques.
- **Iron Removal Arrangement** must be adhered at all water points having iron contamination level more than permissible limit. This would follow aeration, sedimentation-cum-filtration techniques.
- **Recharging and water harvesting interventions can also be promoted. These may be taken up on pilot basis in some area with assessment and documentation of results of pilots to explore its further scale up.**
- Installation of water treatment / purifying plants in selected community water points with high contamination levels of Fe or F or As in ground water is a necessity. Water ATMs or other technological innovations suggested by Government of India may be piloted at few selected locations. The rapid feasibility studies prior to piloting such innovations would be useful. The innovative technologies on water quality, accredited by Government of India may be adopted where ever applicable to address the water quality issues in the project area. The compendium for the same is available on link *http://mdws.gov.in/sites/default/files/Compendium_of_Innovative_Technologies.pdf*
- Active **IEC/BCC materials** in consultation with WASH experts can be distributed to generate awareness on preventive measures that can be taken up by the community in case of arsenic contamination. IEC/BCC materials could include **Supplementary Diet Charts** to avoid/curtail Arsenic or Fluoride contamination. Supplementary diet chart could include use of sulphur and anti-oxidants containing food items such as, garlic, ginger, pumpkin, papaya, mango, etc. for daily consumption
- In addition, IEC activities and live demonstrations could be carried out in the community explaining hazards of chemical and bacteriological contaminants, water treatment processes such as, boiling of drinking water and use of chlorine tablets such as Aqua tablet, Panibandhu and water handling and storage practices, etc.
- **Disinfection** should be carried out at all water points to minimize bacterial as well as oral fecal transmitted diseases or **automatic disinfection dispenser** can be attached with water points to get access to safe water. Chlorine dispensers can also be used attached to the water points. At HH level most simplified way could be use of Chlorine tablets or liquid. The community should also be provided orientation on the usage of these measures.
- **Sanitary Risk Management** approaches (hardware structures) must be adopted to ensure construction of sanitary seal, foundation block, BOE and Soak pit at all water points to check and avoid bacterial or fecal matter contamination in drinking water.

- **Software component of Risk Management** would involve generating awareness in the community about keeping water points neat, clean and dry in order to eliminate all the sources of pollution around the water points.
- **Iron and Manganese** are known as twin parameters of drinking water so testing of manganese should be added with iron under the study of drinking water whenever any testing is carried out.
- Sheohar being an agriculture belt, fertilizers are commonly used. Testing of nitrate should also be incorporated to identify any nitrate contamination in studies in future.

c. <u>BCC Strategy and Social Arts:</u>

Water for People should develop a strong BCC strategy with operational plan and M&E Framework for roll out of strategy focusing on safe practices related to water quality aspects, sanitation and hygiene covering community as well as stakeholders. Based on the finding some of the key points to be considered while planning strategy and activities include following:

- Water quality aspects and its impact on the health in short and long term
- Water conservation and recharging aspects
- Water quality maintenance at HH levels and community sources
- Using chorine for water cleaning
- Importance of water point up keep and reduction in sanitation risks
- Safe handling of water from source to the household level
- Discouraging use of plastic bottles for drinking water storage, keeping in view the environment conservation
- The awareness level on water schemes/ program was very low and needs to be addressed among all the target groups i.e. adults as well as adolescents
- Hand washing with soap should be more focused on the poorer community as well as in schools
- Sheohar and Tariyani bocks to be focused more in terms of involving people in the BCC activities as their involvement was found very low in present study

d. <u>Sanitation</u>

- The participatory approaches like CLTS should be used in some selected areas to make them ODF. The sites to be selected in consultation with the government and WFP can collaborate with government to complement and supplement their effort for achieving ODF. This would also showcase the impact of the project
- The strategy should focus on specific need of blocks and GPs e.g. the percentage of households having toilets at home but not using it was highest in Dumri Katsari block. Thus more focused effort would be required to address the issue on non-usage of toilets in this block as compared to others.
- Majority of non-user of toilets stated that “they liked defecting in open”. This aspect is to be taken in to consideration while developing BCC plan. The community can be made aware of the ill effect of open defection on health, nutrition (including stunting and wasting of children), drinking water quality and other safety and social aspects etc.
- Poverty was cited as key reason for non-construction of toilets particularly in Dumri Katsari and Piprahi blocks. The project team can plan to further expand interventions like sanitation loans in the in these area to provide support to the needy population.
- Nigrani Committee could be formed to monitor and motivate those who are defecating in the open to change their practices. This has happened in their nearby Panchayat as reflected by community.

Water for People Level:

- Some participants during the FGDs suggested that the community water point by WFP should be installed in government/ Panchayat land instead of private land. They shared that in some cases where it's been installed in private land the private land owner tried to restrict/ bar other people to use it and started considering it as their own property. Some participants also had confusion on why the financial contribution is taken from them while constructing the water point. They did not have clarity on community contribution component on installation of water point by WFP.
- **Thus the project team should clearly orient the community on the amount charged/ contribution taken from community and the overall intent behind it.**
- The project implementation team can be provided trainings in areas like Planning, Implementation, Monitoring and Evaluation (PIME) of Community Based Projects
- The MIS and documentation was found to be comparatively weaker areas especially at the field level. It is recommended that the existing MIS systems/ formats to be reviewed, simplified and project staff to be thoroughly oriented on that.
- The exposure visits of implanting staff to other success interventions in the state or outside the state would be useful in enriching their understanding and capacities in areas of water, sanitation, and hygiene.

Emerging Opportunities:

Water for people may explore possibilities to align their further project with the existing government schemes and program on water and sanitation front. On one hand this would be helpful in bridging the implementation gaps in existing government program and on the other hand would be cost effective proposition for water for people to show case the impact of their intervention/ program. Some of the suggestive areas as under

- Government is focusing on the provision of piped water scheme to every households as per its program and policy. However the scheme would be implemented in phases. Thus WFP can map the areas/ locations which are likely to be covered in the last phase of the existing piped water scheme and focus on providing technical support on sustainability of existing sources on pilot basis or may also install new water points (if required).
- Possibilities to be explored to further train the Jal Bandhus for O&M related works under piped water scheme as well
- Extend support to government in community mobilization and IEC component of the scheme
- PRI members are the key functionaries to plan and execute the piped water scheme. Given their low capacities on this subject, WFP can plan a capacity building program for PRIs on orienting them on the provisions of scheme and on how to plan implement and monitor the scheme. Or else WFP may advocate with government to initiate a capacity building program for PRIs.

Considering the focus of government on ward level planning and implementation of water and sanitation programs in Bihar; WFP team can also work out the strategy to support government in priority Panchayat wards identified by them for implementing the water and sanitation activities. *Considering the focus of government on ward level planning and implementation of water and sanitation programs in Bihar; WFP team can also work out the strategy to support government in priority Panchayat wards identified by them for implementing the water and sanitation activities.*

Section 1: Introduction

1.1. Background

In 2010, the UN General Assembly and the Human Rights Council made the breakthrough decision to explicitly recognize the human right to water and sanitation. The SDG goal six states that "by 2030, ensure availability and sustainable management of water and sanitation for all', extending the original MDG 7 targets to cover all freshwater issues from the perspective of economic, social and environmental sustainability, in a holistic manner.

Clean Water and sanitation: Why it matters ?

- Around 1.8 billion people globally use a source of drinking water that has faecally contaminated.
- Some 2.4 billion people lack access to basic sanitation services, such as toilets or latrines.
- Water scarcity affects more than 40 per cent of the global population and is projected to rise.
- Water and sanitation related diseases remain among the major causes of death in children under five; more than 800 children die every day from diarrheal diseases linked to poor hygiene.
- More than 80 per cent of wastewater resulting from human activities is discharged into rivers or sea without any treatment, leading to pollution.
- The economic impact of not investing in water and sanitation costs 4.3 per cent of sub-Saharan African GDP.
- The World Bank estimates that 6.4 per cent of India's GDP is lost due to adverse economic impacts and costs of inadequate sanitation.

(Source: Clean Water and Sanitation: Why it matters, Sustainable Development Goals, UNDP)

India, one of the world's fastest growing economies and home to 17% of the world's population, has the most number of rural people living without access to clean water – 63.4 million – 'Wild Water', Water Aid's State of the World's Water 2017 report reveals. Globally in 2015, 91% of people had access to water suitable for drinking. 4.2 billion had access to tap water while 2.4 billion had access to wells or public tap. 1.8 billion people still use an unsafe drinking water which can be result in infectious disease[4].

Access to safe drinking-water is essential to health, a basic human right and a component of effective policy for health protection. As defined by WHO in the, "Guidelines for Drinking-water Quality –2017" Safe drinking-water does not represent any significant risk to health over a lifetime of consumption, including different sensitivities that may occur between life stages. Those at greatest risk of waterborne disease are infants and young children, people who are debilitated and the elderly, especially when living under unsanitary conditions.[5]

The Ministry of Drinking Water & Sanitation, Government of India, has prepared a Strategic Plan for the rural drinking water sector for the period 2011 to 2022. The Goal of the Strategic Plan is:[6]

[4]WHO Drinking-Water Fact sheet N°391, June 2015.
[5] http://www.who.int/water_sanitation_health/publications/drinking-water-quality-guidelines-4-including-1st-addendum/en/
[6] Strategic Plan 2011-22, Ensuring Drinking Water Security in Rural India, Department of Drinking Water and Sanitation, Ministry of Rural Development, GoI.

To ensure that every rural person has enough safe water for drinking, cooking and other domestic needs as well as livestock throughout the year including during natural disasters. By 2022, every rural person in the country will have access to 70 lpcd within their household premises or at a horizontal or vertical distance of not more than 50 meters from their household without barriers of social or financial discrimination. Individual States can adopt higher quantity norms, such as 100 lpcd.

It is recognized that States will adopt their own strategies and phased timeframes to achieve this goal. Three standards of service can be identified depending on what communities want:

- Basic piped water supply with a mix of household connections, public taps and hand pumps (designed for 55 lpcd) -with appropriate costing as decided by States taking affordability and social equity into consideration
- Piped water supply with all metered, household connections (designed for 70 lpcd or more) - with appropriate cost ceilings as decided by States taking affordability and social equity into consideration.
- In extreme cases, hand pumps (designed for 40 lpcd), protected open wells, protected ponds, etc., supplemented by other local sources – preferably free of cost.

Optimum use of rainwater should be an integrated element in all the three cases.

Paradigm Shift:

In the Eleventh Five year Plan (2007-12) the basis of coverage under the rural water supply programme telescoped from habitations to households i.e. ensuring drinking water supply to all households in the community. Hitherto rural water supply was predominantly provided through hand pumps. In the Twelfth Five Year Plan (2013-17), there will be a major shift of emphasis towards piped water supply with the goal of providing at least 50% of the rural population with at least 55 lpcd within the household premises or at a horizontal or vertical distance of not more than 100 meters from their household without barriers of social or financial discrimination.

Timelines[4]

✓ By 2017,

- Ensure that at least 55% of rural households are provided with piped water supply; at least 35% of rural households have piped water supply with a household connection; less than 20% use public taps and less than 45% use hand pumps or other safe and adequate private water sources. All services meet set standards in terms of quality and number of hours of supply every day.
- Ensure that all households, schools and anganwadis in rural India have access to and use adequate quantity of safe drinking water.
- Provide enabling support and environment for Panchayat Raj Institutions and local communities to manage at least 60% of rural drinking water sources and systems.

✓ By 2022,

- Ensure that at least 90% of rural households are provided with piped water supply; at least 80% of rural households have piped water supply with a household connection; less than 10% use public taps and less than 10% use hand pumps or other safe and adequate private water sources.
- Provide enabling support and environment for all Panchayat Raj Institutions and local communities to manage 100% of rural drinking water sources and systems.

Bihar – State Overview: Bihar is the third largest state by population of Republic India having population over 103 million. 89% of its population resides in rural area. The state is well known for its abundant natural resources, perennial rivers, fertile lands and a long glorious history. In spite of abundant natural resources the state remained one of the poorest in the country since independence. The condition further deteriorated after the state's division and separation of Jharkhand as Bihar retained almost 75 percent of the population but was left with 54 percent of the land bereft of almost all mineral resources, thus inducing a lot of strain on the available resources.[7]

The drinking water supply in the state is primarily dependent upon the ground water. Hand pumps remain the major source of drinking water in rural areas supplying water to 91.4% households (Census 2011). As per census data only 1.4% of the households used to get tap water in 2001 in rural areas which increased to 2.5% in 2011.

As per the report published by NSSO 69th round, in rural Bihar 924 per 1000 households have 'improved source' and 976 per 1000 households having 'sufficient' drinking water during 2012, which was far better as compared to all India (855)[8]. This clearly spells out sufficiency of improved and sufficient drinking water in rural Bihar. However, due to frequent breakdown of old assets, lack of repairs and maintenance, and irregular power supply prevents the sustainability of various technologies in rural Bihar for the provision of safe drinking water (State draft water policy of Bihar). The arsenic and fluoride contamination of ground water also poses a serious water quality problem (Srikanth).

As per research studies, the gross per capita water availability in Bihar will decline from about 1950 m^3/year in 2001 to as low as about 1170 m^3/year in 2050. Further, Bihar will reach a state of water stress before 2020 when the availability of clean water falls below 1000 m^3 per capita.

Water Quality Status in India and Bihar: Ground water resources are dynamic in nature and are affected by different factors such as irrigation activities, industrialization and urbanization. The process is slow but its effects are dreadful. The drinking water contamination status in India is increasing in terms of Fluoride, Arsenic, Iron, Nitrates, Salinity and other heavy metals.

The presence of fluoride in ground water has been reported. The incidence of fluoride, above permissible levels of 1.5ppm occurs in 150 districts in 17 states in the country with Odisha and Rajasthan being the most severely affected. The presence of iron contamination was reported from 16 states of India. The iron content above permissible level of 0.3 mg/l was found in 23 districts from 4 states, namely, **Bihar,** Rajasthan, Tripura and West Bengal and coastal Odisha and parts of Agartala valley in Tripura. The arsenic affected states in India are 13 in which high levels of arsenic above the permissible levels of 0.05ppm parts per million (ppm) was found in the alluvial plains of the Ganges covering six districts of West Bengal. Arsenic contamination in ground water has been reported in Gangetic alluvial plain as well as in Brahmaputra alluvial plain and few other districts also other than Gangetic and Brahmaputra alluvial plain. The presence of heavy metals in groundwater was found in 40 districts from 13 states, viz., Andhra Pradesh, Assam, Bihar, Haryana, Himachal Pradesh, Karnataka, Madhya Pradesh, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal, and five blocks of Delhi.

[7] http://phed.bih.nic.in/Docs/Mott-Final-Report.pdf
[8] http://mospi.nic.in/mospi_new/upload/kye_indi_of_water_Sanitation69rou_24dec13.pdf

Table 1.1: Water quality status in India

(Source: CGWB, 2012 and PHED Bihar, 2009)

Arsenic
Uttar Pradesh, Bihar, Jharkhand, WB, Chhattisgarh, Assam, Manipur, Karnataka, Andhra Pradesh, Punjab, Haryana, Himachal Pradesh ***Total 13 States are affected.***
Fluoride
Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, J&K, Jharkhand, Karnataka, Kerala, Maharashtra, Madhya Pradesh, Odisha, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, West Bengal. ***Total-19 States are affected.***
Iron
Assam, West Bengal, Odisha, Chhattisgarh, Karnataka, Bihar, UP, Rajasthan, Maharashtra, Madhya Pradesh, Jharkhand, Tamil Nadu, Kerala, and North Eastern States. **Total 16 states are affected.**

In Bihar, a study conducted by Ghosh et al. (2008) more than 30 thousand hand pumps were tested out of which 32% of tested sources had arsenic contamination of more than 10 ppb. A total of 16 districts in Bihar (57 blocks) is affected by high level of arsenic in the groundwater. Trivalent arsenic is 87% in groundwater of Bihar. According to this study, *Sheohar is one of the districts affected by high level of arsenic contamination*.

The state government's recent findings of the water quality mapping of the whole state (2,26,145 samples were tested during November 2007 – February 2008 covering all the 38 districts) indicates that the drinking water sources in rural areas are not safe in most of the area and the health of the rural population is at risk. Out of the 38 districts, water sources of 1750 habitations of 80 blocks in 13 districts situated along the river Ganges are partially affected by arsenic contamination (As>50 ppb) whereas the drinking water sources of 6373 habitations of 22 districts are affected by excess Fluoride (>1.5 ppm) and presence of excess iron in ground water is in majority of the districts. Apart from chemical impurities,fecal contamination of water is prevalent in many water sources (Envirotech Report 2008).

Major contamination of Ground Water in Bihar:

- **Fluoride:** In vast tracts of Bihar, the prevalence of physical deformity is a chilling evidence of excessive fluoride. Although there is a lack of any structured study, dental fluorosis is widely prevalent in 18 districts affected with fluoride.
- **Arsenic:** Arsenic is a much more serious problem and is often termed as a disaster in waiting in case of Bihar. A survey of 15000 samples from Bihar (Since 2000) has found arsenic concentration above 0.05ppm in 12 districts, 32 Blocks and 201 villages. The survey also confirmed the presence of arsenical skin lesions, consistent peripheral motor and sensory neuropathy as well as other neurological abnormalities in arsenicosis patients of Bihar.
- **Iron contamination:** Although Iron is not toxic but it creates unpalatable taste to drinking water, creates enormous laundry problems due to discoloration. There are reported cases of indigestion and gastro-intestinal cases among population consuming iron-laden waters. At least 9 districts of Bihar have severe Iron problems.

Table 1.2: Water quality affected districts in Bihar
(Source-PHED, Bihar 2009)

Water Quality Affected Districts		
13 Arsenic Prevalence Districts	11 Fluoride Prevalence Districts	9 Iron Prevalence Districts
1. Saran 2. Vaishali 3. Samastipur 4. Darbhanga 5. Buxar 6. Bhojpur 7. Patna 8. Begusarai 9. Khagaria 10. Lakhisarai 11. Munger 12. Bhagalpur 13. Katihar	1. Kaimur 2. Rohtas 3. Aurangabad 4. Gaya 5. Nalanda 6. Shiekhpura 7. Jamui 8. Banka 9. Munger 10. Bhagalpur 11. Nawada	1. Supaul 2. Araria 3. Kishanganj 4. Saharsa 5. Purnea 6. Katihar 7. Madhepura 8. Begusarai 9. Khagaria

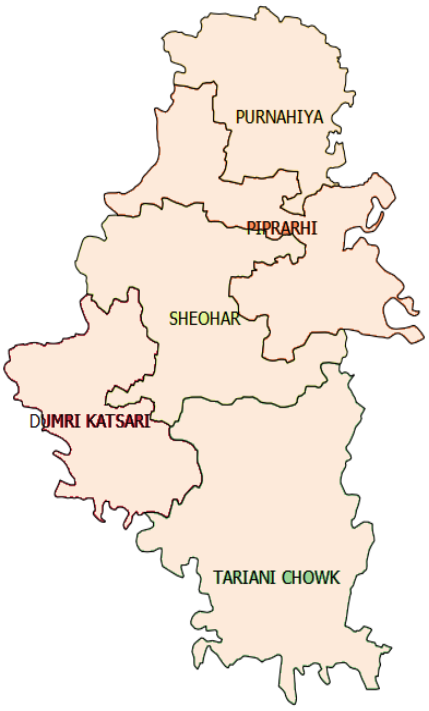
Besides, Bihar has the lowest Human Development Index (0.367)[9]and nominal GDP per capita of all Indian states and Union territories. The situation is especially more grim in Sheohar, where 55.3%[10] population lives below the poverty line with literacy rate of barely 53.8% and 81.7%[11] of population depends on agriculture for their livelihoods. As per, Ministry of Drinking Water and Sanitation, only 44.06% of habitations are covered under National Rural Drinking Water Programme while household toilet coverage reaches 48.78% [12], forcing the vast majority of the population to practice open defecation, contributing to the degradation of water resources

According to WHO, about 80% of all diseases in human beings are caused by water. Lack of water, sanitation and hygiene results in the loss of 0.4 million lives annually in India (WHO, 2007). The socio-economic costs of water pollution are extremely high: 1.5 million children under 5 years die each year due to water-related diseases, 200 million person-days of work are lost each year, and the country loses about Rs. 366 billion each year due to water-related diseases[13]. McKenzie and Ray[12] also observed similar effects of water pollution; however, the magnitude of the effect was modest. The study shows that India loses 90 million days a year due to water borne diseases with production loses and treatment costs worth Rs. 6 billion. Poor water quality, sanitation and hygiene result in the loss of 30.5 million disabilities adjusted life years (DALY) in India

Thus, whatever is the nature of physical pollution, be it chemical or bacteriological, aquifers get affected. Rapid urbanization, especially in developing countries like India, has affected the availability and quality of groundwater due to its over-exploitation and improper waste disposal methods, especially in urban areas.

[9] http://www.in.undp.org/content/dam/india/docs/bihar_factsheet.pdf
[10] District Level SWASTH Survey (DLSS) 2015-16
[11] Census 2011
[12] http://sbm.gov.in/sbmdashboard/DistrictRanking.aspx
[13] http://www.academia.edu/9361658/AN_EMPIRICAL_STUDY_ABOUT_WATER_POLLUTION_IN_INDIA

Sheohar at Glance: Sheohar is an administrative district in the state of Bihar situated around 150 km in the north and east from Patna the capital of Bihar. The district is divided into five blocks with its headquarters in Sheohar. The population density of the district is highest among all other districts of Bihar. The district is a part of Tirhut division where the 2nd majority of Bihar Muslim population exists. Sheohar was carved out from Sitamarhi district in October 1994 and occupies an area of 443 Sq.km and has a population of 656,916 (Census 2011). Agriculture is the main stay of the people.



The district is located in the north-western part of North Bihar plains, with highly fertile land and abundant groundwater repositories. The district of Sheohar has both surface and groundwater resources are relatively abundant. However, erratic rainfall, siltation, water logging and riverbank erosion are among the issues that affect water quality and availability. The economy of the district is mainly agricultural in nature. It is one of the most flood affected districts of Bihar**.**

Water Quality in Sheohar: The district of Sheohar has abundance of both surface and groundwater resources. However, erratic rainfall, siltation, water logging and riverbank erosion are among the issues that affect water quality and availability – especially for agricultural practices. Quality of ground water in nature depends on the geological formations holding it i.e. Aquifers. All ground water contains salts in solution that are derived from the paths, and rocks through which it moves. In addition, ground water contamination is caused by discharge containing pollutants, which get mixed with them. Quality of ground water is described with reference to the needs i.e., drinking, industrial and irrigation to assess the quality of ground water for different purposes. The physical and chemical constituents are determined and are compared with the standard ones, recommended each for the drinking, industrial and irrigations requirements.

Chemical quality- Ground water quality in the district in general is found to be potable and found as per specification of Bureau of Indian standards. General range of chemical parameters of Sheohar district: [14]

- Electrical conductivity: of ground water of parts of the district is found to be 526 micro siemens /cm. at 25OC.
- pH: Ground water of the parts of the Sheohar district is slightly alkaline in nature where pH varies to 8.18.
- Carbonate: Carbonate is found to be nil in the district.
- Bicarbonate: concentration of bicarbonate is 308 mg/l.
- Chloride: concentration of chloride is found to be 7 mg/l.
- Calcium: Calcium is found to be 22 mg/l in the area.
- Magnesium: in Sheohar concentration of Magnesium has been found to be 43 mg/l.
- Thorium: Thorium concentration is found to be around 230 mg/l.
- Sodium and Potassium: concentration of sodium is up to 20 mg/l while potassium occurs up to 5 mg/l.

[14] Ground Water Information Booklet Sheohar District, Bihar State, by Central Ground water Board Ministry of Water Resources (Govt. of India) Mid-Eastern Region Patna, September 2013

1.2. Brief of Project Sheohar - Everyone Forever

Water For People and One Drop initiated Project Sheohar in 2014, an initiative aimed at driving lasting solutions to widespread problem of access to water and sanitation across the Sheohar district. The main project objective is to improve the living conditions of people in Sheohar by providing a sustainable access to safe drinking water to all, increasing access to sanitation to 60% of the population and developing livelihood models that could replicated for the benefits of 2% of the population by 2018.

This partnership of WFP and One Drop shares the recognition that sustainability and economic empowerment are the foundations of development and that, local institutions and partners are critical to the success of program implementation. One Drop has developed an innovative, systemic approach aimed at generating lasting change and improving living conditions through better access to water and sanitation. Called 'ABC for Sustainability', this approach is based on three complementary components: A for access to safe drinking water and sanitation, B for behavioral change using Social Art about water and sanitation and C for capital in form of microloans to support local production and improve the economic well-being of communities. Thus, the project is implemented through One Drop's 'ABC for Sustainability' approach, which enriches and accelerates the Everyone Forever ('EF') Water For People's approach. WFP and One Drop are also partnering with Government Partners, social art partners, civil society partners, and private sector partners to reach their targeted objective.

1.3. Rationale of the Study

Owning to the critical condition of quality of ground water, status of sanitation and hygiene, Water for People has been investing in improved water sources in Bihar for over last two years in 13 Gram Panchayats covering a population of 154448 (Census 2011). The focus has been to develop at least one deep safe drinking water source per hamlet/ habitation of 250 people, to ensure that the distance from all households to a safe source is less than 500 meters. Further, WFP is also working to reduce open defecation through awareness activities at school and community level, formation of women Joint Liability Groups (JLGs), credit provisions and linkages, establishment of Points of Purchase (PoPs) for toilet construction materials and strengthening agriculture based livelihoods.

Now the present study has been undertaken with a two fold objectives i.e.

a. To understand the level of chemical (iron, arsenic, fluoride and zinc) and biological (E Coli and MPN) contamination in the water points
b. To assess the Knowledge, Attitude and Practice (KAP) of the communities and their preferences in relation to water, sanitation and hygiene in district Sheohar.

Through this study, WFP aimed to develop a program that allows for everyone to access water from a safe source (both bacteriologically and chemically). How that is accomplished in a context with seemingly low demand for safe water was deemed as a challenge and thus, more insights into actual water use and demand for safe water was required. The methodology for present study has been designed in a way so as to estimate the key project indicators in district Sheohar as a whole and to provide insights to develop a comprehensive program towards safe drinking water.

1.4. Study Framework and Methodology

In order to realize the objectives the study, the two fold framework and methodology was developed i.e.

a) Assessment of chemical and biological contamination in water sources through onsite and lab based water testing and contamination risk observation of water points

b) Understand the KAP of community on access to safe drinking water and sanitation through HH survey of target groups of women, men and adolescents and IDIs and FGDs with key stakeholders.

The multistage cluster sampling was used to select the PSUs and target groups as well as water points. In each block 3 GPs (1intervention and 2 non-intervention) were selected. Thus total 15 GPs were selected in all and in each GP 3 villages/ PSUs were selected using random sampling. In each PSU total 35 household were selected for KAP study and 15 water points were selected for water testing.

*T*otal 675 water points were covered under the study from all five blocks of Sheohar district, which included 135 water samples from each block. Water points included India Mark-II &III as government sources, private hand pumps such as Singoor and Tara hand pumps and third one were water points set up in the project area of each Gram Panchayat by Water for People (WFP). Priority was given to the WFP water points followed by government and thirdly, last priority was given to private hand pumps. Water samples for water testing component were collected, preserved, coded and transported by well qualified and trained field personnel. The analysis for chemical contamination was conducted at the NABL accredited water testing lab at Patna, whereas biological contamination analyzed using portable kits and lab test validations. The Geo-coordinates were also recorded for each sampled water point. Besides the contamination risk assessment was also carried for each sampled water point, by field team, using standard observation checklist, attached as *Annexure 2*.

The mix of quantitative, qualitative, and observational methods was used for data collection. Total 1585 HHs were covered under the KAP Survey. *(The detailed methodology, sampling plan including number and types of target group stakeholders covered under the study is given in Annexure-1).* Based on the finalized methodology and sampling plan, the necessary quantitative, qualitative, water testing related tools was developed and finalized after translation and pretesting. The required number of field surveys and water testing personnel were trained and deployed. The data for KAP study was conducted using Computer Aided Personal Interview (CAPI) technique. The quantitative data was reviewed and uploaded on cloud server directly from the file using online data transfer protocols. The data collection process was rigorously supervised by the field supervisors, coordinators, and core team of TRIOs for assuring quality. Core team of TRIOs collected qualitative data through 6 FGDs each with target group of adult male, female, adolescents boys and girls. Consultation and In Depth Interview (IDIs) were conducted with district and block level Government officials, PRI members and staff of implementing NGOs partners. The data was further processed and analyzed using SPSS and draft report was prepared by the core team.

1.5. Scope of Study/Limitation/ Constraints

- Keeping in view the study objective and design, it provides the status of water quality and KAP of community on WASH for district Sheohar as a whole. The comparisons for indicators for intervention and non-intervention areas of Project Sheohar may not be much significant under the study.
- The study only gives the present status of water quality and KAP indicator for community on WASH thus serves as baseline status which will provide basis for planning the future strategies and activities in the district.
- The water testing study was carried out in winter season. The bacterial contamination level may change /increase in the summers.
- The water testing was not carried out in institutional water points such as schools, health centers etc.

Section 2: Assessment of Water Quality

Bihar has 38 districts, 532 blocks, 8741 GPs, 38175 villages and 1,07,640 habitations in which 8.4% SC (9039), ST 1.64% (1766) and 89.96% others(96,835). Number of water quality affected habitations are 6599, out of which 893 are fluoride affected, 357 arsenic affected, 5348 iron affected. The total water coverage of water quality affected habitations are 3025 in which 381 are fluoride affected, 262 arsenic affected and 2561 are iron affected. The number of habitations covered with piped water supply schemes in Bihar verses Sheohar districts are as follows in table given below:

Table 2.1: Drinking water schemes in Bihar & Sheohar
(Source: Format-B7, MoDWS, GOI, as on 07.04.2017)

State/ district	With ongoing schemes	Completed schemes	New Schemes	Total
Bihar	1,939	4,921	16	6,579
Sheohar	30	27	0	57

Coverage: The total number of water points covered under the study was 675 from all five blocks of Sheohar district, which included 15 water points in each PSU and 135 water points from each block. Water points included India Mark-II &III as government sources, private hand pumps such as Singoor and Tara hand pumps and third one were water points set up in the project area of each G*ram Panchayat* by Water for People (WFP). Priority was given to the WFP water points followed by government and thirdly, last priority was given to private hand pumps. Detailed sampling is attached as *Annexure 1.*

Type of water Source	No. of water points
Government	384
Private	220
Water For People	71
Total	**675**

Methods and quality assurance measures: Testing of all parameters was carried out using analytical methods as per ISO: 10500, 2012 in NABL accredited laboratory, under the supervision of water quality expert team. Sampling, preservation, storage, transportation of water sample was undertaken as per the American Public Health Association (APHA) standard methods and handed over to the lab for proper analysis. Prior to analysis, the laboratory was checked to ensure NABL certification, required Equipment, AR grade chemical reagents and presence of skilled staff, such as, chemists and microbiologists. All the safety measures were available in the lab to manage any unwanted hazard or contamination incidence either chemically or microbiologically.

Water collection was done using suitable marked containers with suitable preservatives with fully equipped PPE on site at water points and then preserved. Unique ID was given for each sample collected. Separate sample bottles were used for microbiological analysis and stored in an ice box having capacity of 100 samples to check MPN contamination. Chemical parameters such as Arsenic, Fluoride, Zinc and Iron were tested using SDDC (silver diethyldithiocarbamate method), SPDNS, Zincon and Phenanthroline methods respectively with the help of UV spectrophotometers by preparing fresh standard curve with suitable concentration of chemicals and blanks. Preparation of chemicals and standard curve were finalized in the lab under the supervision of core team of TRIOs. Testing of some samples was also carried out on trial basis, with all prepared chemicals and standard curve to ensure the quality of testing. All data quality control measures were followed through at every step right from sampling to testing of samples. The samples were tested for Arsenic, Fluoride, Iron and Zinc as chemical parameters and MPN (Most Probable Number) and E.Coli as microbiological parameters from all five blocks of Sheohar district. The samples were collected from water points that were already in use by the community.

Key challenges during fieldwork and mitigation strategies: Key challenges during the field work were proper sampling, storage, transportation and handing over of all the samples to the lab. The challenges faced in the aforementioned were mitigated very practically with the help of local people/community and expert team of lab in the field. Especially for Bacteriological samples, freezing and transportation of samples every day to the lab was very tough work.

2.1. Chemical Parameter and Results

The chemical parameters under the study are Arsenic, Fluoride, Iron and Zinc and Bacteriological parameters are MPN and E. Coli. These parameters are discussed in detail in the following pages.

2.1.1. Arsenic:

Arsenic is called as a geo-genic contaminant in ground water. Arsenic is found in different forms in ores in the earth crusts and mixes with ground water through the mobility of chemicals and causing arsenic contamination. As per Bureau of Indian Standards (BIS) standards the permissible limit of arsenic in drinking water is 0.05mg/l.

Sources of exposure: Arsenic is a natural component of the earth's crust and is widely distributed throughout the environment in the air, water and land. It is highly toxic in its inorganic form. People are exposed to elevated levels of inorganic arsenic through drinking contaminated water, using contaminated water in food preparation and irrigation of food crops, industrial processes, eating contaminated food and smoking tobacco. Long-term exposure to inorganic arsenic, mainly through drinking of contaminated water, eating of food prepared with this water and eating food irrigated with arsenic-rich water, can lead to chronic arsenic poisoning. Skin lesions and skin cancer are the most characteristic effects.

Health effects[15]**:** Arsenic occurs in inorganic and organic forms. Inorganic arsenic compounds (such as those found in water) are highly toxic while organic arsenic compounds (such as those found in seafood) are less harmful to health. Above the permissible limit, it has adverse effects on human being as arsenicosis, a kind of skin lesions. The arsenicosis begins with skin pigmentosa (Breakdown of Melanin pigment in skin of palm, sole, chest and back), dermatitis (Decaying of dermal layer of skin) and ultimately causes gangrene (Decaying of flesh and attained wound with push), which is the last stage of skin cancer. Other than skin, Arsenic also affects the liver (Hepatomegaly), Spleen (Splenomegaly) and cardiovascular system.

Acute effects: The immediate symptoms of acute arsenic poisoning include vomiting, abdominal pain and diarrhea. These are followed by numbness and tingling of the extremities, muscle cramping and death, in extreme cases.

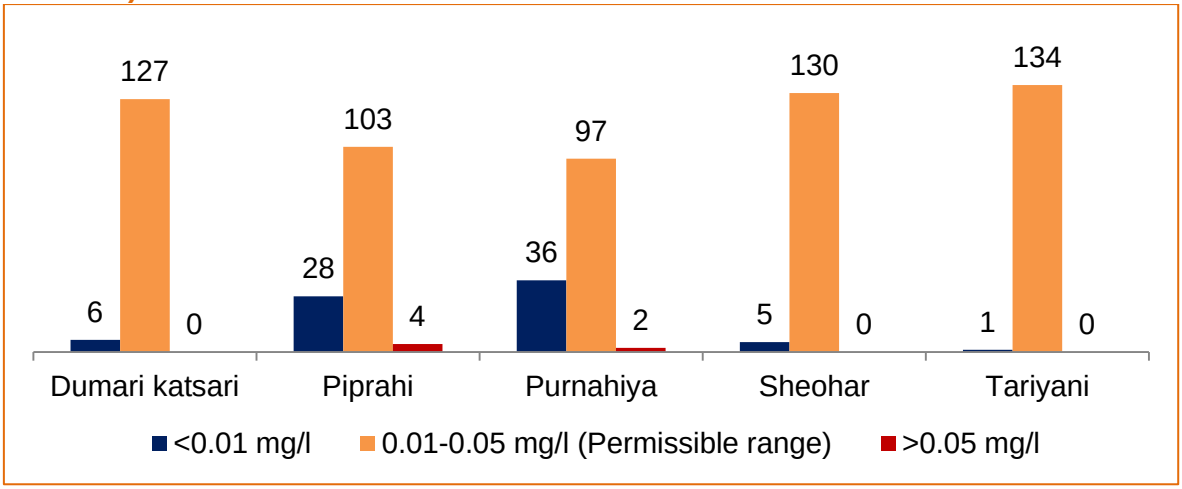
Long-term effects: The first symptoms of long-term exposure to high levels of inorganic arsenic (e.g. through drinking-water and food) are usually observed in the skin, and include pigmentation changes, skin lesions and hard patches on the palms and soles of the feet (hyperkeratosis). These occur after a minimum exposure of approximately five years and may be a precursor to skin cancer.

The International Agency for Research on Cancer (IARC) has classified arsenic and arsenic compounds as carcinogenic to humans, and has also stated that arsenic in drinking-water is carcinogenic to humans.

[15] Guidelines for Drinking-water Quality-WHO-2017

Result of analysis: Result of arsenic test has been analysed as block wise and GP wise. Total 675 water samples were tested for the arsenic from all five blocks of Sheohar district. More than 99% samples were found under the permissible limit and less than 1% were above the permissible limit which can be easily understand with followings graphs as Block wise and GP wise.(N=675*)*

Figure 2.1: Block wise analysis of water points for arsenic contamination (in numbers)



In Dumari Katsari, Sheohar and Tariyani blocks for all the sampled water points the level of arsenic was found either with in or below permissible limit in water testing results. However in Piprahi and Purnahiya blocks the arsenic level was found above permissible limits in 5 GPs viz., *Belawa, Parsauni Baij, Kuama, Adouri and Basant Jagjiwan (ranging 0.059 mg/l to maximum 0.35mg/l) as depicted in the table below;*

Table 2.2: GP wise analysis of water points for arsenic contamination (in number)

GP Name	Arsenic		
	<0.01 mg/l (below permissible range)	0.01-0.05 mg/l (permissible range)	>0.05 mg/l (above permissible range)
Jahangirpur	1	43	0
Mahamadpur Katsari	5	55	0
Rohua	0	29	0
Belawa	18	41	1
Kuama	4	25	1
Parsauni Baij	6	37	2
Adouri	20	24	1
Basant Jagjiwan	7	37	1
Basantpatti	9	36	0
Harnahi	0	45	0
Kushhar	0	15	0
Sarsaula Khurd	5	70	0
Chhatauni	0	60	0
Narwara	0	15	0
Belahiya	1	59	0
Total	**76**	**591**	**6**

The presence of arsenic in ground water itself calls for continuous monitoring of water quality in the affected geographical locations in the project area. Therefore, attention to water quality monitoring is imperative to trace arsenic contamination if any.

Prevention and control: The most important action in affected communities is the prevention of further exposure to arsenic by the provision of a safe water supply for drinking, food preparation and irrigation of food crops. There are a number of options to reduce levels of arsenic in drinking-water.

- ✓ Discriminate between high-arsenic and low-arsenic sources. For example, paint hand pumps with different colors. This can be an effective and low-cost means to rapidly reduce exposure to arsenic when accompanied by effective education.
- ✓ Substitute high-arsenic sources, such as groundwater, with low-arsenic, microbiologically safe sources such as rain water and treated surface water. Low-arsenic water can be used for drinking, cooking and irrigation purposes, whereas high-arsenic water can be used for other purposes such as bathing and washing clothes.
- ✓ Install arsenic removal systems – either centralized or domestic – and ensure the appropriate disposal of the removed arsenic. Technologies for arsenic removal include oxidation, coagulation–precipitation, absorption, ion exchange and membrane techniques. There is an increasing number of effective and low-cost options for removing arsenic from small or household supplies, though there is still limited evidence about the extent to which such systems are used effectively over sustained periods of time.
- ✓ High-risk populations should also be monitored for early signs of arsenic poisoning – usually skin problems.

2.1.2. Fluoride:

Fluoride is also another geo-genic contaminant found in ground water as salts of calcium and sodium. The permissible limit for fluoride is 1-1.5 ppm in drinking water as per BIS standards. Fluoride is a vital element for the growth of teeth in children, water having less fluoride can cause dental carries in children, whereas, in adults the fluoride above permissible limit accumulates in the bones and teeth and ultimately leads to dental and skeletal fluorosis.

Sources of exposure: Fluorine is a common element that is widely distributed in Earth's crust and exists in the form of fluorides in a number of minerals, such as fluorspar, cryolite and Fluor apatite. Traces of fluorides are present in many waters, with higher concentrations often associated with groundwater. In groundwater, concentrations of Fluoride vary with the type of rock through which the water flows but do not usually exceed 10 mg/l; highest natural level reported is 2800 mg/l.

Health effects[16]**:** After oral uptake, water-soluble fluorides are rapidly and almost completely absorbed from the gastrointestinal tract, although this may be reduced by complex formation with aluminum, phosphorus, magnesium or calcium. Absorbed fluoride is rapidly distributed throughout the body, where it is incorporated into teeth and bones, with virtually no storage in soft tissues.

Acute effects: To produce signs of acute fluoride intoxication, minimum oral doses of about 1 mg of fluoride per kilogram of body weight were required. Acute high-level exposure to fluoride causes immediate effects of abdominal pain, excessive saliva, nausea and vomiting. Seizures and muscle spasms may also occur.

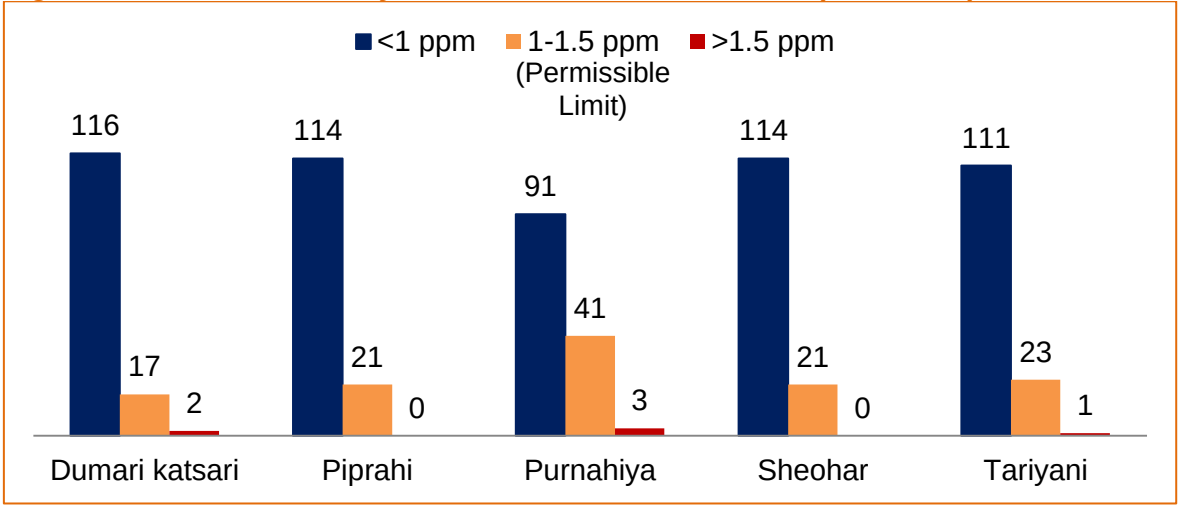
[16] Guidelines for Drinking-water Quality-WHO-2017

Long-term effects: Ingestion of excess fluoride, most commonly in drinking-water, can cause fluorosis which affects the teeth and bones. Moderate amounts lead to dental effects, but long-term ingestion of large amounts can lead to potentially severe skeletal problems. Paradoxically, low levels of fluoride intake help to prevent dental caries.

Chronic high-level exposure to fluoride can lead to skeletal fluorosis. In skeletal fluorosis, fluoride accumulates in the bone progressively over many years. The early symptoms of skeletal fluorosis include stiffness and pain in the joints. In severe cases, the bone structure may change and ligaments may calcify, with resulting impairment of muscles and pain.

Result of analysis: Result of fluoride contamination was analysed as block wise and GP wise as below. (N=675)

Figure 2.2: Block wise analysis for fluoride contamination (in number)



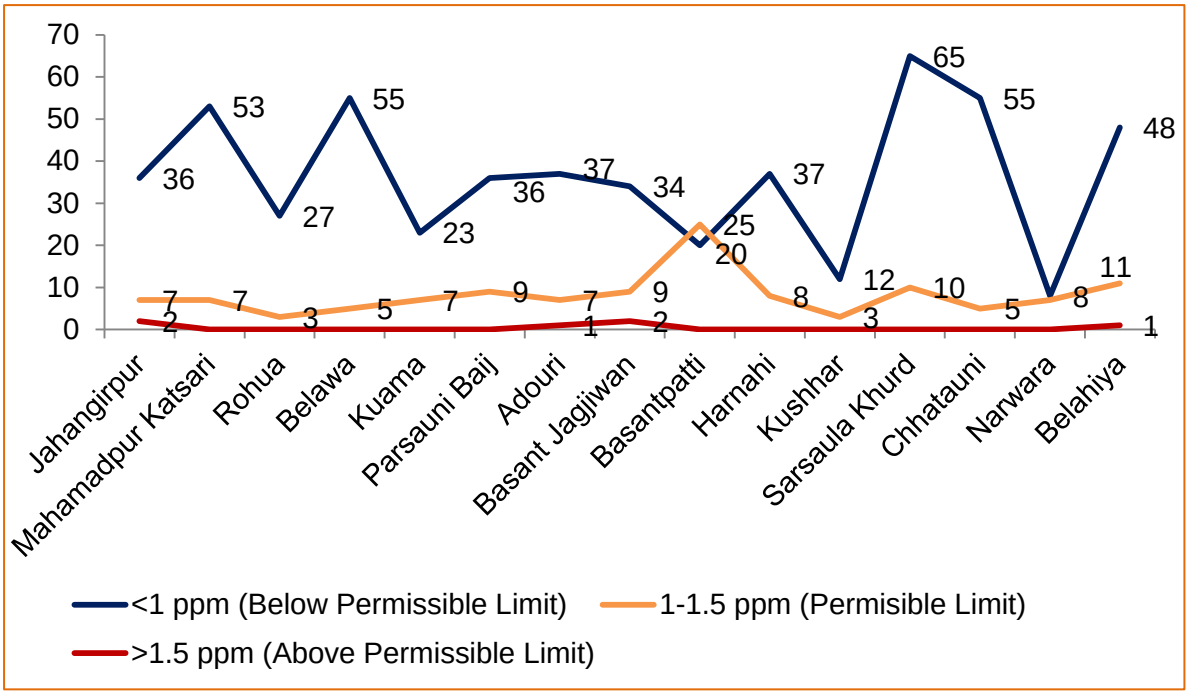
By and large majority (99%) of water points were tested safe in terms of fluoride contamination. Only few pockets of Jahangirpur GP of Dumari Katsari and Belahiya GP of Purnahiya block showed traces of fluoride contamination. More than 99% water points tested safe.

It is a matter of concern that all the water sources (near about 80%) in GPs across all five blocks indicated fluoride contamination below the 1ppm concentration which may cause dental carries in children.

Prevention and control: Removal of excessive fluoride from drinking-water is difficult and expensive.

- ✓ The preferred option is to find a supply of safe drinking-water with safe fluoride levels. Where access to safe water is already limited, de-fluoridation may be the only solution
- ✓ The continuous monitoring of fluoride is important in all the water points where even it is showing below permissible level at this stage. This is because in long run this may also rise up above permissible level. Appropriate ground water recharge strategies may address this risk.
- ✓ It is suggested to generate awareness among community on necessary prevention and precaution methods.

Figure 2.3: GP wise analysis of water points for fluoride contamination (in number)

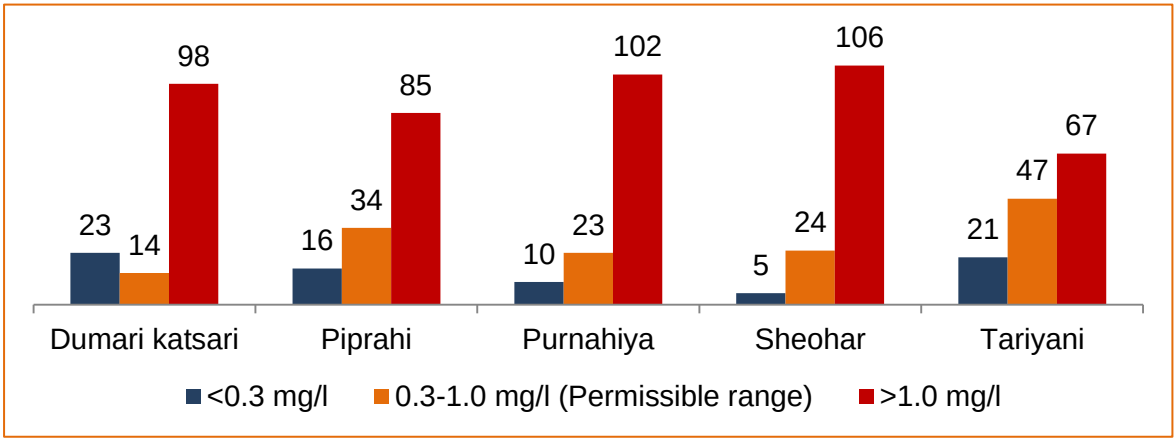


2.1.3. Iron:

Iron is also known as a geo-genic contaminant in drinking water because it comes in water from the soil laden with iron. Iron is found in water in two forms, ferrous and another one is ferric forms. Ferrous form oxidizes when it comes in contact with air and changes into ferric forms. Iron contamination gives a yellow or brown appearance in water few minutes after fetching water from the water points. Iron contamination more than permissible limit (more than 1.0 mg/l) may cause gastroenteritis and unpleasant taste to drink. Iron doesn't have any visible impacts on human health but may cause discoloration in pots and clothes causing stains which are not removed easily.

Result of analysis: Result has been was analyzed block wise and GP wise which is as below: (N=675)

Figure 2.4: Block wise analysis of water points for iron contamination (in number)



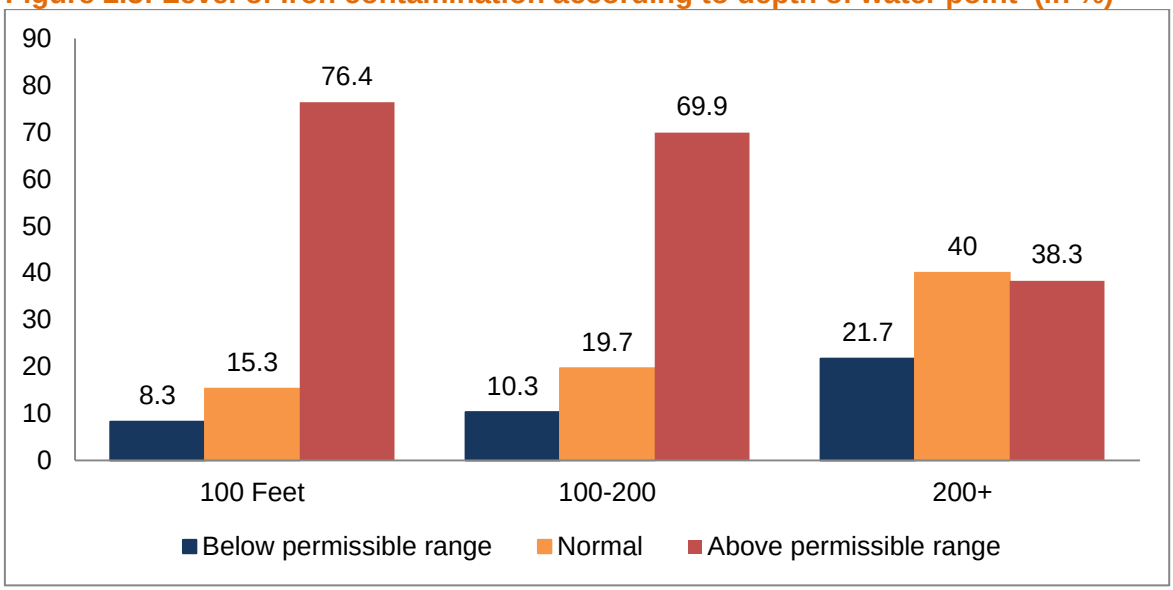
Of all the tested water points 67% water points were found to have iron concentration more than permissible limit and 33% were under the permissible limit as per BIS standards.

Table 2.3: GP wise analysis water points for iron contamination (in number)

Gram Panchayat	Iron			No. of Water Points
	<0.3 mg/l	0.3-1.0 mg/l (Permissible range)	>1.0 mg/l	
Jahangirpur	2	4	39	45
Mahamadpur Katsari	20	8	32	60
Rohua	1	2	27	30
Belawa	8	12	40	60
Kuama	3	13	14	30
Parsauni Baij	5	9	31	45
Adouri	2	9	34	45
Basant Jagjiwan	5	5	35	45
Basantpatti	3	9	33	45
Harnahi	0	4	41	45
Kushhar	0	6	9	15
Sarsaula Khurd	5	14	56	75
Chhatauni	7	22	31	60
Narwara	4	4	7	15
Belahiya	10	21	29	60
Total	**75**	**142**	**458**	**675**

All GPs of all five blocks are showing the iron concentration more than 0.3mg/l. ranging in 47% to 90 % of water points tested under the study. In Rohua and Harnai GPs more than 90% of water point tested, had the iron content higher than the permissible limits, where as in Narwara and Kuama GPs about 47% of water point tested has iron contents higher than the permissible limits.

Figure 2.5: Level of Iron contamination according to depth of water point (in %)



It is evident from the figure 2.5 above that iron above permissible limit was there in water points dug at the depth of 100 feet, 200 feet and 300 feet. However is also evident from

the data that the proportion of water points having iron concentration above permissible limits were more in water points falling in in 100 feet depth category as compared to those falling in 200 feet depth category. It further decreased in case of water points falling in above 200 feet depth category. ***This is to be noted that information on depth of water points was obtained from the community living around the water points. Thus was based on their perception and understanding and not on any scientific measurement of the depth of water points***

Table 2.4 provides the level of iron concentration in 71 WFP water points covered under the study sample, in accordance with the depth of the water points. The aspect was controllable through in-depth technological (hydro-geological) assessment of place where water points were constructed/installed.

Table 2.4: Depth of WFP Water Point with level of Iron Concentration

Depth of WFP Water Points (In feet)	Iron Level		
	<0.3 mg/l (Below permissible range)	0.3-1.0 mg/l (Permissible range)	>1.0 mg/l (Above permissible range)
130	1	0	0
150	0	0	1
160	0	0	1
165	0	0	1
180	1	0	4
190	0	0	1
200	3	6	13
210	0	1	2
220	2	4	4
230	1	1	0
240	3	3	4
250	3	7	3
300	0	1	0
Total No. of WFP hand pump	**14**	**23**	**34**

Table 2.5 presents the block, GP and village wise list of WFP water points covered under the sample in the study according to level of iron concentration. It is to be noted that in some of the villages viz. Jhitkahi and Purnahiya Chandandih all the sample water points established by WFP are showing iron concentration above permissible limits. The above table can be used by WFP team for planning further interventions in various villages to address the water quality issues due to high concentration of iron using hardware technologies and software activities.

Table 2.5: Village-wise list of WFP water points according to the level of iron concentration

Block	GP	Village	Iron level		
			<0.3 mg/l	0.3-1.0 mg/l (Permissible range)	>1.0 mg/l
Dumri Katsari	Mohamadpur Katsari	Dumri	1	2	2
	Mohamadpur Katsari	Gazipur Jaisingh pur	3	1	1
	Mohamadpur	Jhitkahi	0	0	5

Block	GP	Village	Iron level <0.3 mg/l	0.3-1.0 mg/l (Permissible range)	>1.0 mg/l
	Katsari				
	Rohua	Masha	0	0	1
Piprahi	Belwa	Belwa Narkatiya Nizamat	0	0	1
	Parsauni Baij	Dharampur Dekuli	2	1	2
	Parsauni Baij	Parsauni	2	1	2
Purnahiya	Basant Patti	Basant Patti	1	1	4
	Basant Patti	Bedaul Adam	0	0	2
	Basant Patti	Purnahiya Chandandih	0	0	5
Sheoher	*Harnahi*	Harnahi	0	1	0
	Siharsaula Khurd	Bhagwanpur Bheli	0	2	0
	Siharsaula Khurd	Bishunpur Kishundeo	2	2	1
	Siharsaula Khurd	Dharampur Rajwan Mal	0	3	2
	Siharsaula Khurd	Parsauni Taiyab	0	1	0
	Siharsaula Khurd	Sisaula	0	2	3
Tariyani	Belahiya	BaijnathPur	0	2	1
	Belahiya	Belahi balha baljnathpur	1	3	1
	Belahiya	Fatehpur Ghaus	1	1	1
	Chhatauni	Chhatauni	1	0	0
Total Number of WFP Water Point			**14**	**23**	**34**

2.1.4. Zinc:

Zinc is a pipe material based contamination in drinking water caused through GI pipes which are used in the boring to tap ground water. In the GI pipes Zinc is plated over the cast iron. Zinc is water soluble. In India, Centre for Science and Environment has taken Zinc in its water contamination studies, however, in Bihar, this is the first time that Zinc contamination has been taken up in this study for drinking water. Permissible limit of Zinc is 5-15 mg/l in drinking water as per BIS standards. The adverse effects of Zinc are enzymatic dysfunctions in human body, since it acts as a coenzyme in human physiology. Zinc is also known to strengthen diaphragm of human abdomen and the cortex of hair. Health implications of Zinc are still being researched by scientists. But excess of Zinc ultimately may cause the enzyme copulation in human physiology.

Result of analysis: All the sample was analysed as block wise and GP wise which is as below. (N=675).

Figure 2.6: Block wise analysis of water points for Zinc contamination (in number)

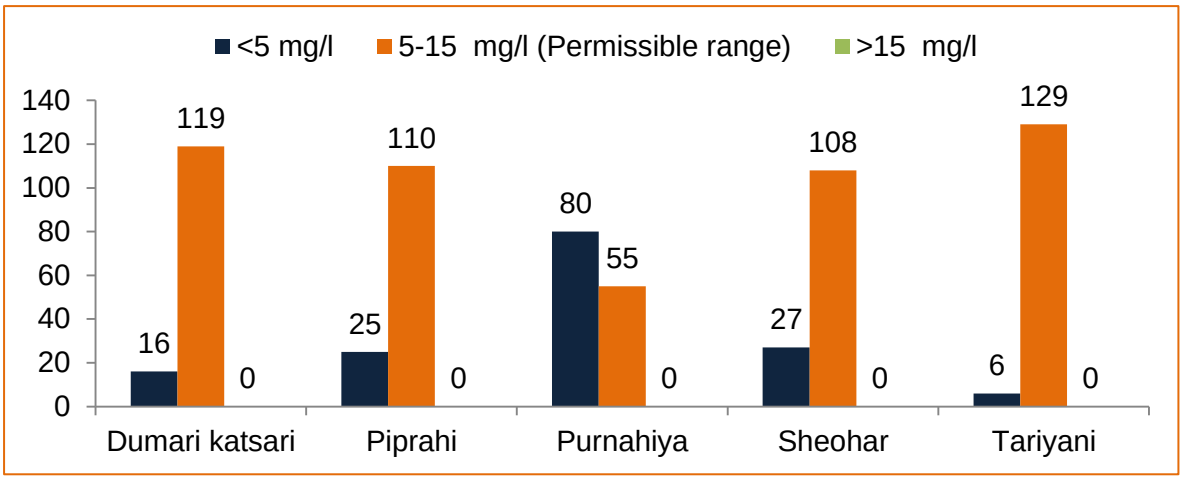
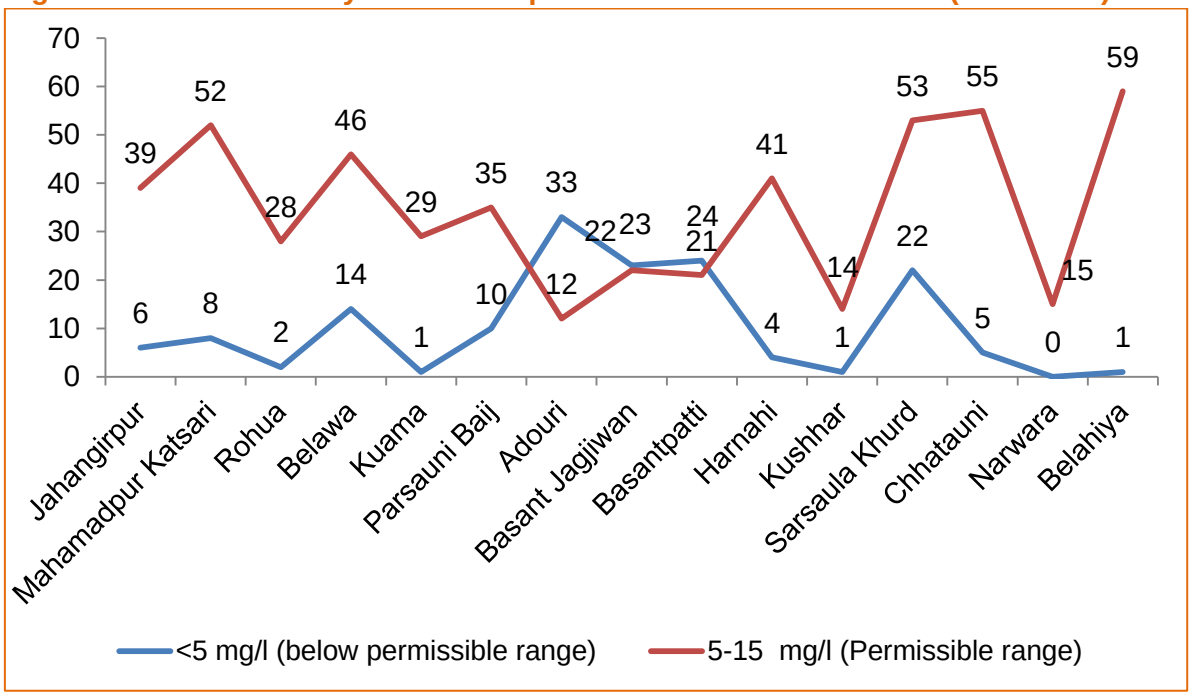


Figure 2.7: GP wise analysis of water points for Zinc contamination (in number)



In terms of Zinc all the water points of all GPs of all five blocks are under permissible limit. About 23% water points had Zinc concentration less than 5 mg/l, whereas, the 77% water points having 5-15 mg/l. Presence of Zinc was reported in some samples is a matter of concern. This requires regular monitoring of drinking water from all the points.

Zinc contamination could be attributed to the GI pipe which is used for sourcing ground water and supply. GI pipes are made by electroplating Zinc over cast iron pipes. Zinc is water soluble which may cause water contamination. Therefore, Zinc has been taken up in the study as part of the drinking water quality parameters.

2.2. Bacteriological Parameter and Results

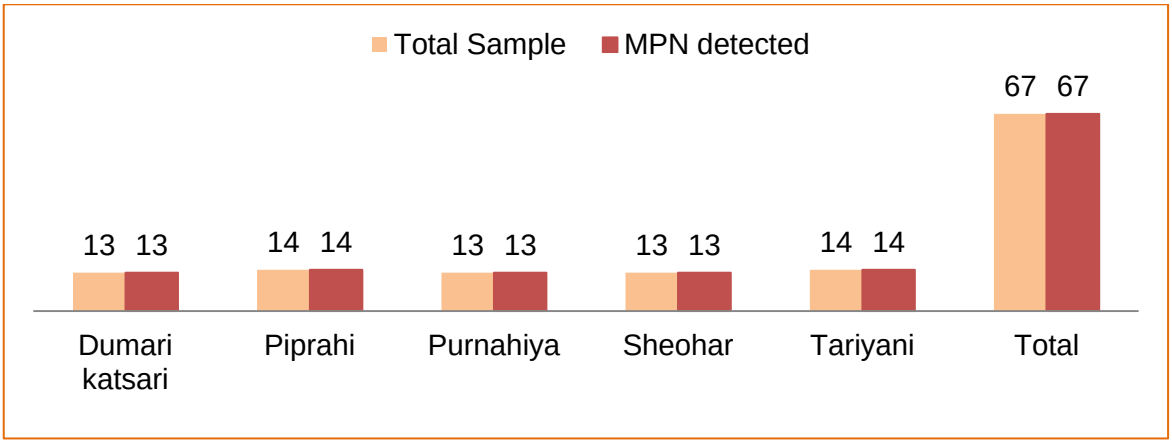
The bacteriological parameters under the study are MPN (Most Probable Number) and E. Coli. The E. Coli testing of all 100% samples (N=675) was conducted and only 10% (N=67) of total sample was tested for MPN.

2.2.1. MPN (Most Probable Number):

It is the bacterial count in drinking water in terms of most probable number based on '*Multiple Fermentation Tube*' method. The total count of all types' possible coliform bacteria in 100ml of water is due to the presence of both fecal and non-fecal matter contamination. Permissible limit of MPN as per BIS standards is "not detectable" in 100ml of water.

Result of Analysis: Total 67 samples were taken for the study of MPN count and analyzed as block wise (N=67) which as below:

Figure 2.8: Block wise analysis for MPN count (in number)



Above graphs show that MPN is detected in all samples (100%) in all GPs in all the five blocks. Bacteriological contamination in drinking water was found in all 100% samples which may cause the bacterial diseases some of them are explained in section 2.2.2 below;

2.2.2. E. Coli (Escherichia Coli):

For microbial water quality, verification is likely to be based on the analysis of faecal indicator microorganisms, particularly Escherichia Coli as its presence is the indication of fecal matter contamination in drinking water. The permissible limit is absence of E. Coli in 100ml of water as per BIS standards. The presence of fecal matter in drinking water may cause the fecal borne diseases such as, diarrhea, dysentery, etc.

Source and occurrence:[17] Enteropathogenic E. coli are enteric organisms, and humans are the major reservoir. Routes of exposure Infection is associated with person-to-person transmission, contact with animals, food and consumption of contaminated water. Person-to-person transmissions are particularly prevalent in communities where there is close contact between individuals, such as nursing homes and day-care centres.

[17] Guidelines for Drinking-water Quality-WHO-2017

Health implications:[18] Fecal contamination of water causes different types of short term or acute effects which is fatal for children as well as adults both causing diarrhea, dysentery, typhoid, jaundice, etc. The long term effects of fecal matter contamination are such as Poliomyelitis (POLIO), Acute Encephalitis Syndrome (AES) and other neurological disorders. Poliomyelitis and AES are viral diseases transmitted through fecal matter. Fecal matter is transmitted to humans through the oral fecal transmission route (Five F carriers such as Feces, Fluid, Field, Finger, Flies. This is a cause of concern as they can lead to not only bacterial and viral diseases but also parasitic health implications such as ascariasis and worm infestations.

Result of analysis: The data is analysed as block wise and GP wise (N=675) which is as below:

Figure 2.9: Block wise analysis for E. Coli (in number)

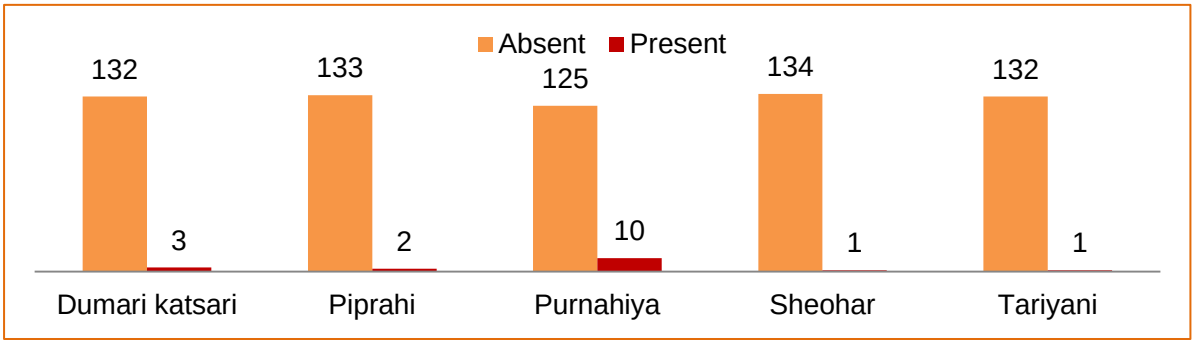
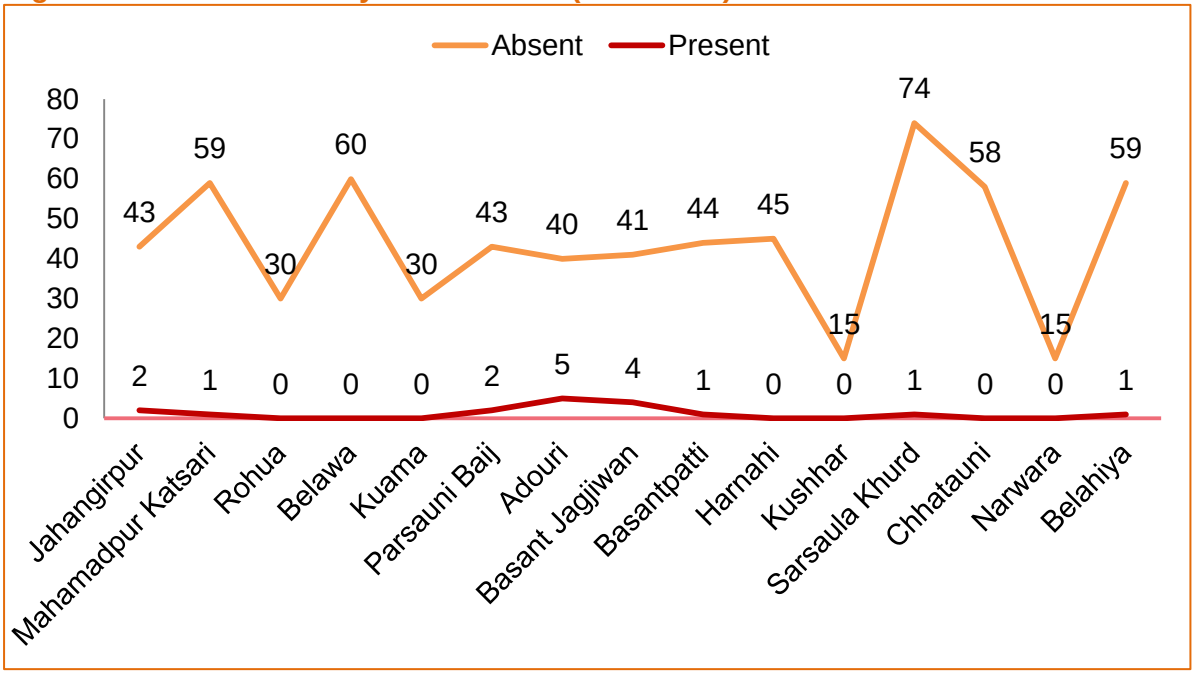


Figure 2.10: GP wise analysis for E. Coli (in number)



E. Coli was present only in more than 2% of water samples collected and tested in 8 GPs across all the five blocks under the study. About 98% samples were safe from fecal matter contamination in drinking water. *However it may be noted that bacteriological contamination may vary with change in climate. It is more likely to increase in summers and decrease in winter depending on the other factors such as sanitation status of the water source*

[18] Guidelines for Drinking-water Quality-WHO-2017

Co-relation between groundwater quality and the depth of hand pump: As shown in table below, it is evident that Arsenic, Fluoride and Iron concentration above permissible limit decrease as depth of hand pump increase.

Table 2.6: Co-relation between groundwater quality and the depth of hand pump

Heavy metals in water	Range	Depth of Source			Chi-square	P-value
		within 100 ft	100-200 ft.	More than 200		
Arsenic	Below Permissible Range	18.1	10.4	11.7	4.55	0.34
	Normal	80.6	88.7	88.3		
	Above the Permissible range	1.4	.9	0.0		
Fluoride	Below Permissible Range	77.8	81.2	83.3	1.25	0.87
	Normal	20.8	17.9	16.7		
	Above the Permissible range	1.4	.9	0.0		
Iron	Below permissible range	8.3	10.3	21.7	27.44	0.00
	Normal	15.3	19.7	40.0		
	Above permissible range	76.4	69.9	38.3		
Zinc	Below permissible range	40.3	20.5	21.7	14.24	0.001
	Normal	59.7	79.5	78.3		
	Above permissible range	0.0	0.0	0.0		

2.3. Source Wise Analysis

Chemical and bacteriological contamination vis-a-vis type of water source: Table below shows that all the water points of WFP were safe in terms of Arsenic, Fluoride and Zinc contamination only in 47% of WFP water points were indicating iron contamination more than permissible limit. As indicated in table 2.7, only 1 WFP water point has shown the presence of E. Coli out of 71 WFP water point covered under the sample for water testing.

Table 2.7: Fluoride and iron level in water by type of source

Type of Water Source	Fluoride		Iron		No. of Water Points
	Below Permissible Range	Above the Permissible Range	Below Permissible Range	Above Permissible Range	
Government	379	5	116	268	384
Private	219	1	64	156	220
Water For People	71	0	37	34	71
Total	**669**	**6**	**217**	**458**	**675**

Table 2.8: Arsenic and Zinc level in water by type of source

Type of Water Source	Arsenic		Zinc		No. of Water Points
	Below Permissible Range	Above the Permissible Range	Below Permissible Range	Above Permissible Range	
Government	380	3	384	0	384
Private	216	3	220	0	220
Water For People	71	0	71	0	71
Total	**667**	**6**	**675**	**0**	**675**

Table 2.9: Presence of E Coli in water by type of water source

Type of Water Source	E. Coli		No. of Water Points
	Absent	Present	
Government	375	9	384
Private	213	7	220
Water For People	70	1	71
Total	**658**	**17**	**675**

Source of water *vis a vis* depth of source: It is evident form the table below that the depth of 80% of water sources was between 100-200ft as reported by the respondents.

Table 2.10: Percentage distribution of water points by type of source and depth of water point

Type of source	Depth of source		
	Below 100 ft.	100-200 ft.	More than 200 ft.
Government	3.1	93.7	3.1
Private	27.3	68.6	4.1
Water for People	.0	45.1	54.9
Total	**10.7**	**80.4**	**8.9**

Satisfaction level of respondent on water quality and level of Iron content in water: Block and GP wise causal relation between satisfaction levels of respondents related to water quality and permissible and below permissible level of iron contents in water was analyzed, as presented in Table 2.11 and 2.12.

Table 2.11: Block wise distribution of respondents who were satisfied with water quality vis a vis water points with iron level normal and below permissible limit

Block Name	Respondents satisfied with water quality (KAP findings)	Water points with iron level at normal and below permissible limit (Water testing findings)
Dumari katsari	67.9	27.4
Piprahi	81.3	37.0
Purnahiya	79.6	24.4
Sheohar	71.4	21.5
Tariyani	79.8	50.4
Total	**76.0**	**32.1**

Table 2.12: GP wise distribution of respondents who were satisfied with water quality vis a vis water points with iron level normal and below permissible limit

GP Name	Respondents satisfied with water quality (KAP findings)	Water points with iron level at normal and below permissible limit (Water testing findings)
Jahangirpur	65.7	13.3
Mahamadpur Katsari	74.3	46.7
Rohua	58.6	10.0
Belawa	74.3	33.3
Kuama	80.0	53.3
Parsauni Baij	91.5	31.1
Adouri	81.9	24.4
Basant Jagjiwan	74.8	22.2

GP Name	Respondents satisfied with water quality (KAP findings)	Water points with iron level at normal and below permissible limit (Water testing findings)
Basantpatti	82.1	26.7
Harnahi	77.1	8.9
Kushhar	48.6	40.0
Sarsaula Khurd	72.6	25.3
Chhatauni	74.8	48.3
Narwara	71.4	53.3
Belahiya	86.7	51.7
Total	**76.0**	**32.1**

It is to be noted that the information on satisfaction level on water quality was obtained by respondents during KAP. This was based on the perception of the respondent, whereas level of iron was determined through chemical testing of water from sampled water points.

While checking the correlation between satisfaction level vis a vis permissible iron level at GP level, the value (r) comes out be very less i.e. 0.19, which shows weak relationship between these variables.

Iron concentration in water in WFP intervention and non-intervention areas and water quality perceived by community

WAF intervention and non-intervention village wise analysis of water points covered under the study indicated that in WFP intervention villages, total 63.5% water points were showing iron concentration above permissible level as compared to the 72% water points in non-intervention villages. Looking at the satisfaction level 80.4% respondents expressed satisfaction with water quality in WFP intervention villages whereas 72.8% were satisfied with the water quality in non-intervention villages.

Further on being asked to rate the water quality on basis of physical parameters such as water clarity, color, smell and taste, more respondents in WAF intervention area considered it good as compared to respondents of WFP non-intervention area as also depicted below. (*Details given in Table **2.3A.1** . in Annexure*)

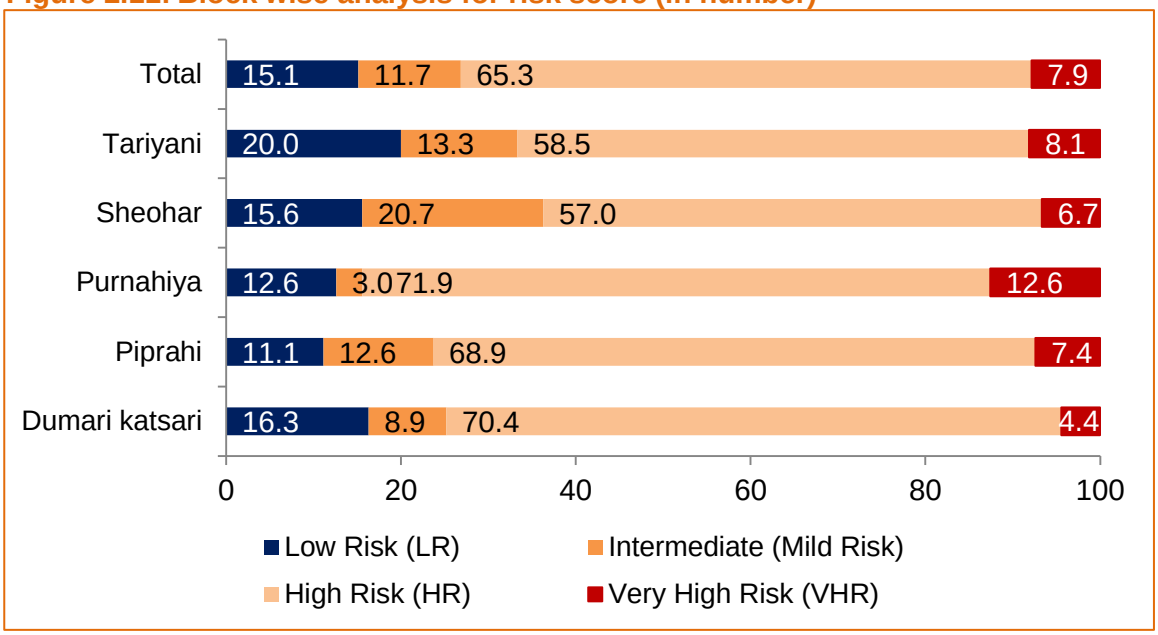
Table 2.13: Iron concentration in intervention in non-intervention areas and water quality perceived by respondents

Parameter	Rated "Good" in WFP intervention area	Rated "Good" in non-intervention area
Clarity	81%	76.5%
Colour	70.4%	66.3%
Smell	71.5%	65.6%
Taste	72.2%	70.3%

2.4. Sanitary Survey and Risk Assessment

Provision of safe drinking water *vis-à-vis* health protection has more relevance in rural India from view point of chemical and microbial risk. To ensure provision of safe drinking water to the consumers, it is important to monitoring drinking water quality of water sources. BIS has specified drinking water quality standards in India and 'Uniform Drinking Water Quality Monitoring Protocol 2013' provides guidelines and standards for water quality monitoring of various water sources including hand pumps.

Figure 2.11: Block wise analysis for risk score (in number)



For water quality monitoring water testing and sanitary survey or sanitary inspection is important. A sanitary inspection is an on-site inspection of a water supply facility to identify actual and potential source of contamination. The physical structure and operation of the system and external environmental factors (such as toilet location) are evaluated.

As per the Uniform Drinking Water Quality Monitoring Protocol, sanitary inspections should be carried out for all new sources of water before they are used for drinking water and on a regular basis. The guidelines also prescribed on-site survey forms. *(Form/ Checklist is attached as Annexure 2*).

These forms consist of a set of questions which have “yes” or “no” answers. The questions are structured so that the “yes” answers indicate that there is risk of contamination and “no” answers indicate that the particular risk is absent. Each “yes” answer scores one point and each “no” answer scores zero point. At the end of the inspection the points are added up, and the higher the total of identified risks, the greater the risk of contamination.

The protocol also recommend that a minimum of two annual inspections along with microbial water quality monitoring to be undertaken to check the reliability of the information. For the purpose of sanitary risk assessment of water points covered under the study, the above mentioned standard sanitary inspection form was used by the study team. The data collection teams were trained by the water quality expert to carry out the survey at all the sampled water point sites.

The information for sanitary survey form was collected by onsite inspection of sampled water points and group discussion with community member having households near the water point. The data was processed and analyzed to arrive at the key findings presented in this study.

Result of analysis/Risk score: The contamination risk assessment was carried out at the all 675 water points from where the water testing samples were collected. The analysis of the risk score reveals that 7.9 % of the water points were falling in very high risk category.

Table 2.14:Sanitary risk of water point in WFP intervention of non-intervention GPs and satisfaction level with water quality reported by respondents

GP Name	Contamination Risk Score (%)				Satisfied with water quality
	Low Risk (LR)	Mild Risk (MR)	High Risk (HR)	Very High Risk (VHR)	
WFP intervention GPs	**22.5**	**13.7**	**56.5**	**7.4**	**80.4**
Mahamadpur Katsari	25.0	13.3	53.3	8.3	74.3
Parsauni Baij	21.7	15.2	58.7	4.3	91.5
Basantpatti	24.4	2.2	62.2	11.1	82.1
Sarsaula Khurd	20.0	21.7	50.0	8.3	72.6
Belahiya	21.7	13.3	60.0	5.0	86.7
WFP non-intervention GPs	**10.1**	**10.4**	**71.3**	**8.2**	**72.8**
Jahangirpur	6.7	2.2	91.1	0.0	65.7
Rohua	13.3	10.0	73.3	3.3	58.6
Belawa	3.4	15.3	69.5	11.9	74.3
Kuama	10.0	3.3	83.3	3.3	80.0
Adouri	4.4	6.7	80.0	8.9	81.9
Basant Jagjiwan	8.9	0.0	73.3	17.8	74.8
Harnahi	15.0	18.3	60.0	6.7	77.1
Kushhar	0.0	26.7	73.3	0.0	48.6
Chhatauni	20.0	15.0	51.7	13.3	74.8
Narwara	13.3	6.7	80.0	0.0	71.4
Total	**15.1**	**11.7**	**65.3**	**7.9**	**76.0**

The data presented in table 2.10a indicates that in WFP intervention GPs 63.9 % water points were falling in either high or very high risk category (56.5% high risk and 7.4% very high risk) as compared to 79.5% water points in WFP non-intervention GPs (71.3% in high risk and 8.2% very high risk). Further analysis of sanitation risk with satisfaction with water quality shows that more respondents (82.4%) in WFP intervention GPs were satisfied with the water quality compared to 72.8% respondents in non-intervention GPs.

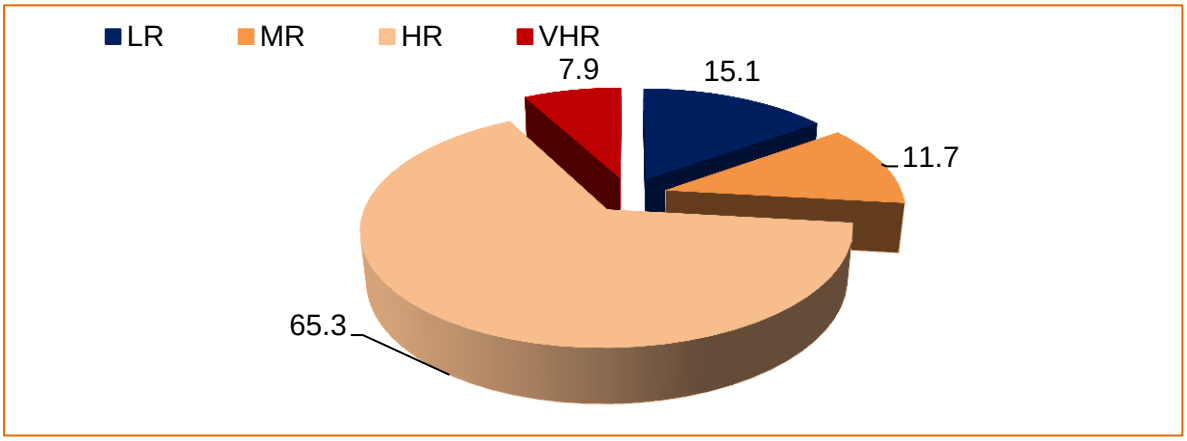
Table 2.15: Source wise sanitation risk score

Type of Source	Contamination Risk Score (No.)				Contamination Risk Score (%)				No. of Water Points
	LR	MR	HR	VHR	LR	MR	HR	VHR	
Government	29	35	285	35	7.6	9.1	74.2	9.1	384
Private	25	31	147	17	11.4	14.1	66.8	7.7	220
Water for People	48	13	9	1	67.6	18.3	12.7	1.4	71
Total	**102**	**79**	**441**	**53**	**15.1**	**11.7**	**65.3**	**7.9**	**675**

Looking at the type of source, out of total government water points tested, majority have been found in very high risk (9.1 %) and high risk category (74.2%). This was followed by the private water points type where 7.7 water points were in very high risk and 66.8% in high risk category out of total private water point tested under the study.

The hand pumps established by WFP were comparatively better off in this regard, as out of total WFP water points covered under the testing only 1.7% have been found in very high risk and 12.7 in high risk category.

Figure 2.12: Overall sanitation risk score (N=675)



*LR- Low Risk; MR-Mild Risk; HR- High Risk; VHR- Very High Risk

About 25% of the sources tested were found to have MPN above the permissible limit while rest 75% were under the permissible limit. E.Coli were present in 2% of samples while absent in 98% sources. As per sanitary survey and risk analysis, 65% water points were under the High Risk Category (HR), 8% were falling under Very High Risk Category (VHR), 12% under Mild Risk Category (MR) and 15% Low Risk Category (LR).

Although, majority of the water points tested in all five blocks in Sheohar district were safe in terms of Arsenic, Fluoride and Zinc contamination but the presence of these metals in samples of water is a point for concern in the future. The project can develop comprehensive communication strategy to generate awareness for preventive measure at both household and community level. The diet chart promoting supplementary food can be useful in case of preventing ill effects of Arsenic and Fluoride. Since, majority of water points were showing iron concentration above permissible limit, thus Iron Removal Plant (IRP) is also recommended for all water points having contamination above permissible limit. The strategies for ground water recharging may also help in containing the further rise in chemical contaminants like iron. Community can be trained to treat the iron contaminated water at household level. (The recommendations are also covered in last section in detail).

2.5. Correlation Among Different Parameters or Multiple Contaminations

The followings are the correlation among the different parameters:

- **Arsenic and Iron**: The arsenic contamination along with iron is strongly correlated i.e. the water samples having the arsenic contamination also have the iron contamination**.**
- **Arsenic and Zinc:** All water samples having arsenic presence also have the Zinc presence. Zinc is the reducing agents for the arsenic in drinking water.
- **Iron and E Coli: The causal relation between Iron level above permissible limit and presence of E Coli was drawn which was not found significant (p =0.06)**
  Iron and MPN: All the water samples having the iron contamination also have the MPN count as detectable.

The table 2.16 shows that out of water points tested in WFP non- intervention GPs, more water points (79.5%) were found in either high or very high sanitary risk category as compared to 63.9% water points in WFP intervention area. Similarly more water points indicated iron concentration above permissible limit in WFP non-intervention areas (71%) as compared to WFP intervention area (63.5%). However it was not found statistically significant.

Table 2.16: Contamination risk and iron contamination in intervention and non-intervention areas

GP Name	Contamination Risk Score				Iron Concentration		
	Low Risk (LR)	Mild Risk (MR)	High Risk (HR)	Very High Risk (VHR)	<0.3 mg/l	0.3-1.0 mg/l (Permissible range)	>1.0 mg/l
WFP-GPs	**22.5**	**13.7**	**56.5**	**7.4**	**15.1**	**21.4**	**63.5**
Mahamadpur Katsari	25.0	13.3	53.3	8.3	33.3	13.3	53.3
Parsauni Baij	21.7	15.2	58.7	4.3	11.1	20.0	68.9
Basantpatti	24.4	2.2	62.2	11.1	6.7	20.0	73.3
Sarsaula Khurd	20.0	21.7	50.0	8.3	6.7	18.7	74.7
Belahiya	21.7	13.3	60.0	5.0	16.7	35.0	48.3
Non-WFP GPs	**10.1**	**10.4**	**71.3**	**8.2**	**8.2**	**20.8**	**71.0**
Jahangirpur	6.7	2.2	91.1	0.0	4.4	8.9	86.7
Rohua	13.3	10.0	73.3	3.3	3.3	6.7	90.0
Belawa	3.4	15.3	69.5	11.9	13.3	20.0	66.7
Kuama	10.0	3.3	83.3	3.3	10.0	43.3	46.7
Adouri	4.4	6.7	80.0	8.9	4.4	20.0	75.6
Basant Jagjiwan	8.9	0.0	73.3	17.8	11.1	11.1	77.8
Harnahi	15.0	18.3	60.0	6.7	0.0	8.9	91.1
Kushhar	0.0	26.7	73.3	0.0	0.0	40.0	60.0
Chhatauni	20.0	15.0	51.7	13.3	11.7	36.7	51.7
Narwara	13.3	6.7	80.0	0.0	26.7	26.7	46.7
Total	**15.1**	**11.7**	**65.3**	**7.9**	**11.1**	**21.0**	**67.9**

On analysis of the bacteriological contamination in water points and incidence of diarrhea in children (age 0-5) in 2 weeks of survey was also conducted, however any significant correlation was not found. This may be due to the fact that survey reflected the status and findings on these aspects for winter season. The status may differ in summer season when both bacteriological contamination as well as incidence of diarrhea increases as also evidenced by various research studies. (Details given in Table 2.6A.1…. in Annexure)

2.6. Conclusion from Water Quality Testing

Total 675 water points were taken under the study from all five districts of Sheohar. In terms of Fluoride and Arsenic contamination, almost 99% water points were under permissible limit and less than 1% was contaminated. With regard to Zinc, all 100% water points were under the permissible limit. However, Iron contamination was reported as high as in 68 % sources were contaminated with iron more than permissible limit. A major concern to be noted was iron contamination in water points in all five blocks of Sheohar district.

Section 3: Findings of KAP Indicators

3.1. Demographic Profile and Households Characteristics

The data for all the members of households was collected using household roaster. The key findings of data related to population (members of household) are presented below:

3.1.1. Age Distribution:

It has been observed in the study roughly, one in four individuals from households covered under the survey was young in the age bracket of 10-19 years. Further, 20% individuals from the surveyed households belonged to the 20-34 years age group. Therefore, one in two individuals from respondent households belonged to 10-34 years of age. In almost all the blocks, individuals in the age of 5-9 years contributed 15-17% of the population but in Purnahiya the percentage of population in this age group was 12-14%. A certain peculiarity was observed in the age group 35-49 years, wherein, more females than males have been reported in the study area.

During FGDs it surfaced that male members of the families migrate to states such as Punjab, Tamil Nadu and Maharashtra in search of work. This could also be one of the factors for lower proportion of male.

The 60+ population formed a meager 3.7% of the total population with almost equal distribution of males (4%) and females (3.3%). The total working population of about 38% falls under the working age category between 20-49 years.

3.1.2. Sex Ratio:

As per census 2011, the sex ratio of Sheohar district was 893 which is lower than the state level average of 916. As per the study findings, the overall sex ratio was 898 which was close to the 2011 census figures. In Sheohar, significant percent of individuals, among the surveyed households (15.7%), were female in the age group of 0-6 years which was higher than male individuals in the same age group.

Table 3.1: Sex ratio distribution

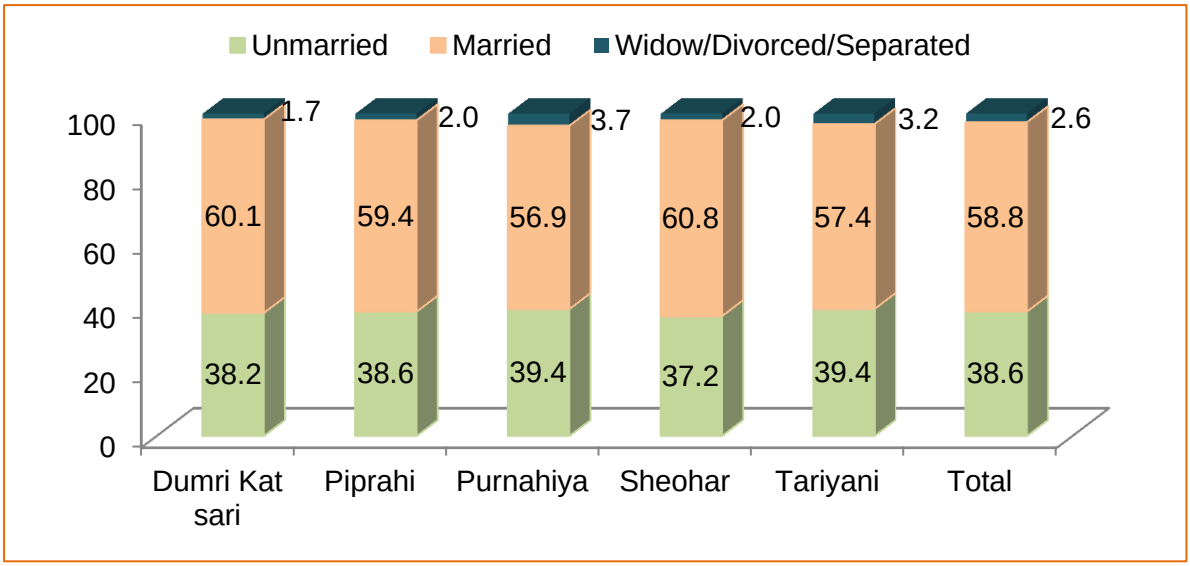
Blocks	Sex Ratio	Census 2011
Dumri Katsari	872	889
Piprahi	897	912
Purnahiya	892	891
Sheohar	903	891
Tariyani	924	886
Overall for District	**898**	**893**

3.1.3. Marital Status Age and Sex of Population:

As per the study findings, around 59% of the surveyed population was found to be married, 39% were never married or single and around 3% were widow/widower or separated. One out of four persons in the age group 60 years or more was either widow/widower or separated. However, this percentage was higher (38.3%) among females than in males (18.4%).

Further, more females in the age group 15-19 years were married than males (1.7%) in the same age group, which indicated girls were being married off at a younger age as compared to boys. The difference in percentage of married male and female population in the 20-24 years age group was significantly high. 91.6% females in this age group were married against 53.7% males. A possible explanation of this difference could be that youth in this age group generally migrate outside for work and marriage takes place much later for them.

Figure 3.1: Percentage distribution of household population (above 10 years) by marital status, age and sex



3.1.4. Educational Status:

The literacy rate in the district of Sheohar, as per Census 2011 was 66 percent. In the surveyed population a little more than one-third (36.1%) were found to be illiterate. One in four persons had completed primary level of education and 32.1% had completed secondary level of education.

Only 3.4% of the surveyed population had completed more than secondary level of education. However, the golden lining was that more young people were found to have completed secondary level education. Gender-wise, female illiteracy was higher than male illiteracy, wherein, 44% females were found to be illiterate as against 28% males. However, more females (75%) in the age group (15 -19 years) reported to have completed their secondary level of education than their male counterparts (72%).

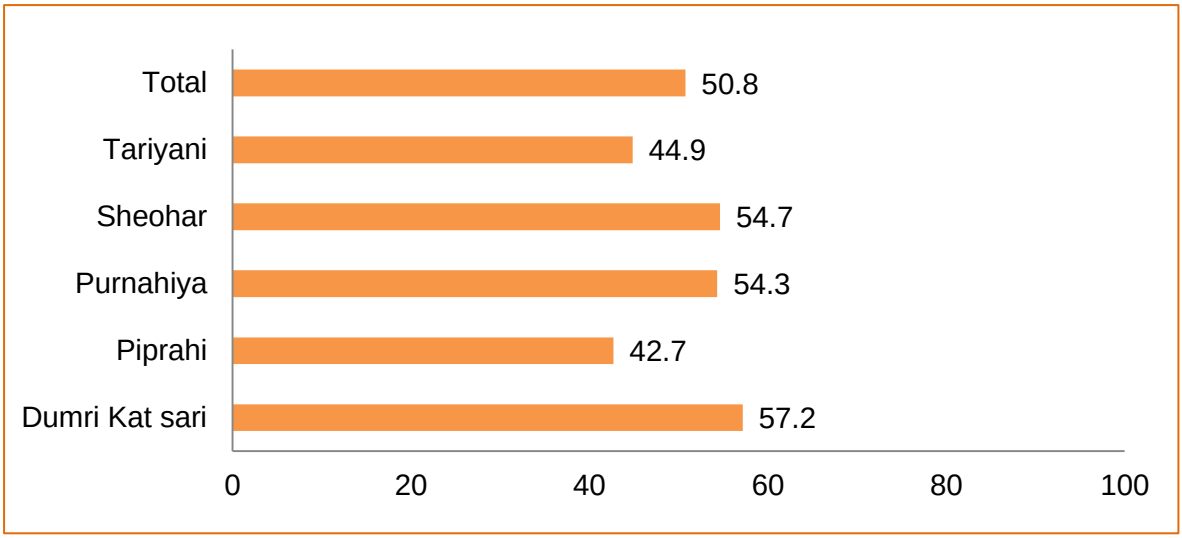
3.1.5. Status of Children (0 - 6 Years of Age):

During the study the surveyed households provided data for 1,578 children below the age of 6 years. About one-third of the children (34.2%) fall in the 5-6 years age group followed by 29.4% in between 3-4 years and a quarter in between 1-2 years. About 63% of children were in the age group of 3-6 years which is the ideal time for children to attend pre-school education.

However, as per the findings of the study, only half of the eligible children in this age group were attending pre-school education at the time of the survey. Attendance of children in pre-schools was particularly low in Piprahi and Tariyani blocks. Dumri Katsari had the highest percentage of 3-6 years aged children attending pre-school.

As per the "*Rapid Survey on Children 2013-2014",* conducted by the Ministry of Women and Child Development, Government of India (GoI), 51.1% of children in age group of 3-6 years in rural areas were attending pre-schooling at AWCs in Bihar. Pre-school education as reported in the present study is matching with the state level findings of the Rapid Survey. The block wise finding children attending pre-school education is presented in Fig 3.2.

Figure 3.2: Percentage of children (3-6 years) attending pre-school education



3.1.6. Profile of Head of Household:

Over all in 9 out of 10 surveyed households, males were reported as the head of the household in the district. Women as head of the household constituted around 8% households. In Dumri Katsari block around 10% households were headed by women followed by Sheohar (8%), Tariyani (7.8%) and Piprahi (7.6%) while Purnahiya had the lowest (5.3%) percentage of households with a female as head.

About one-third of the household heads, covered under the survey, fell in the age group of 35-44 years taking decisions in the family. Further, around one in every four households had a household head in the age group of 45-59 years. However, in Sheohar and Tariyani blocks, in one out of four households the head belongs to 25-34 years. On an average in about 10.3% households, the household head was 60 years or more of age, the highest numbers being in Purnahiya (15.7%) and Tariyani (11.8%). This indicates that in these two blocks majority of decisions were taken by older people. The median age of the head of the household was found to be 40 years which varied in Piprahi (39 years) and in Purnahiya where it was 42 years.

About 42.5% households in total, ranging between 40-44% in the five blocks had 5-6 family members. In Dumri Katsari 9% households had very small families with 1-2 members; whereas, in Purnahiya it was observed that 23% of households had very big families with more than 7 members in the family. As per the findings of this study, on an average, one in two household were illiterate. Piprahi (60%) had the highest percentage of illiterate head of household; on the other hand, Tariyani block had the highest percentage of literate heads of household. (*Details in Table 3.A.1 in Annexure*)

As per the district profile of Sheohar, the primary occupation of the people of this district is agriculture where all types of crops are produced. Varieties of rice, wheat, and a number of rabbi crops are produced. Study findings show that, agriculture/non-agriculture based labour was the primary occupation of 45.1% head of households. In Piprahi this figure was close to 47%. In Sheohar, roughly one out of two head of households reported to be involved in agriculture or non-agriculture labour for livelihood. Only 20% head of the household reported to be cultivators (having their own land), wherein, Dumri Katsari had the highest 25.1% household heads working as cultivators. Government or private service had the third highest category of occupation with overall 15.6% of head of households involved. However, in Tariyani block (20.2%) one out of five head of the households reported to be in government or private service.

3.1.7. Respondent's Profile:

The sample was divided into two categories, i.e., adult (males and females) and adolescent (boys and girls). The sample constituted of 55.6% males and 44.4% females from a total of 1221 adult respondents. Of the total respondents, in the five blocks, one in every two were illiterate (52.8%), while, about 27.7% respondents had completed secondary education. Nearly two-thirds of the respondents were illiterate in Piprahi (64.3%) on the higher side and Purnahiya (43.7%) had the least illiterates. About one-third of respondents in Purnahiya and 21% in Tariyani, both on the higher side had completed secondary and primary education respectively. About 41% of the respondents were homemakers, followed by 29.3% working as laborers in agriculture or non-farm based activities. The respondents were mainly Hindus (92.4%). Amongst the adult respondents more than half (52.2%) belonged to the Other Backward Class (OBC) in the caste hierarchy followed by 25.8% of respondents from the Scheduled Caste. (*Details in Table 3.A.2 in Annexure*)

In the case of the second category of respondents (total 363), i.e., adolescents (10-19 years), the highest percentage of respondents (37.5%) were in the 14-16 years, followed by 10-13 years adolescents (34.7%) and last in 17-19 year's category. Adolescent boys were more in numbers (62.3%) than adolescent girls. Almost 80% of the respondents were currently attending school at the time of the interview. Of the total respondents about 64.5% had completed their secondary education while 5.2% were illiterates. Only three percent of respondents had completed higher secondary education. (*Details in Table 3.A.3 in Annexure*)

3.1.8. Household/Housing Characteristics:

Only 17% households had all weather or '*pucca*' houses. More than half of the households (52.8%) were residing in '*kuccha'* houses. However, nearly three-quarters (72%) of the houses were electrified and rest one in four households (26.9) used kerosene as source of light. Solar panels were being used by a miniscule 0.6% of households as main source of light. A significantly high percentage nearly three quarter of (73.3%) households used firewood (57.9%) or leaves/straw as fuel for cooking. Only 13.2% household's used liquefied petroleum gas (LPG) or natural gas. About 12% households also used dung cakes as cooking fuel. The Standard of Living Index (SLI) indicates that 45.2% of households were in the poorest category and about one-third (32.6%) in wealthiest category. The reference for Standard of Living Index calculation has been taken from the NFHS-2 and the weightage for indicators has been calculated following similar parameters.

Standard of living Index:

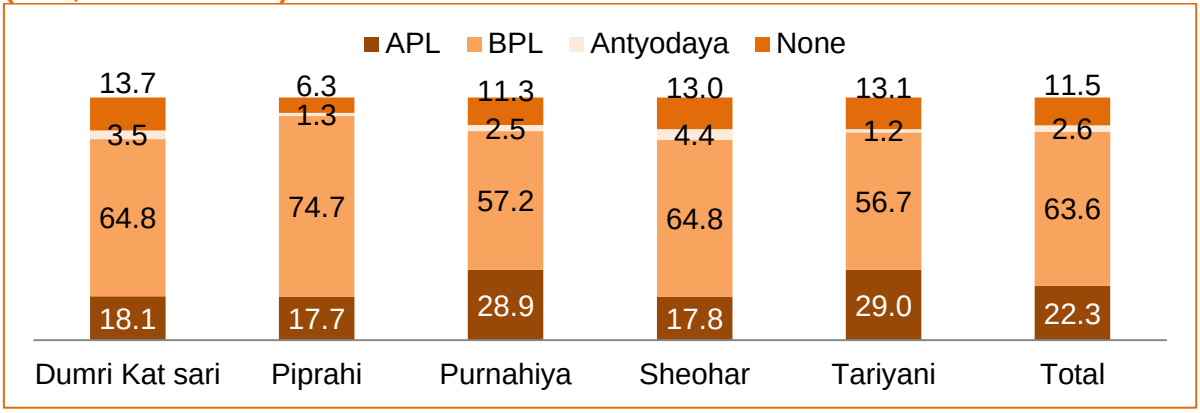
The Standard of Living Index (SLI) is a scoring system where the house and facilities associated with the house are given scores. These scores are then summed and the result measured against a static set of SLI cut-offs. Households with a score 0 -3 are classified as having a 'Low' SLI, a score of 4-6 is a 'Medium' SLI, and scores 7 and above are a 'High' SLI. **Variables used for the calculation:**

- *House type:* 4 for puccca, 2 for semi-pucca,0 for kaccha
- *Toilet facility/Sharing Pattern*: 4 for own flush toilet and using all members, 2 for own flush toilet or non-improved toilet and shared and using all members, 1 for having non-improved toilet and not using by all member of the household, 0 for no facility.
- *Main source of lighting:* 2 for electricity, 0 for other source of lighting.
- *Main fuel for cooking:* 2 for LPG/natural gas, Electricity or bio-gas, 1 for coal/lignite or Kerosene and 0 for other fuels.
- *Source of drinking water:* 2 for piped into dwelling/yard/plot, 1 for public tap, hand pump, tube well, 0 for others.

Over all 63.9% households reported to have BPL cards at the time of survey. Piprahi reported the highest percentage of BPL card holders, where, three out of four households had BPL card. Antyodaya card given to the poorest of the poor households was reported in 2.6 % households as given in Fig 3.3. In addition, 87% households reported to have Aadhaar card, which is important to facilitate/avail various government schemes and services.

During observation of cards it was found that 39.5% households possessed pink ration card; whereas, 36% households possessed white ration card. Further, around 16% households possessed green colour card and around 6% households possessed yellow card. Around 2.4% households did not show their card.

Figure 3.3: Percentage distribution of households by government ration cards (APL, BPL & Others)



3.2. Water

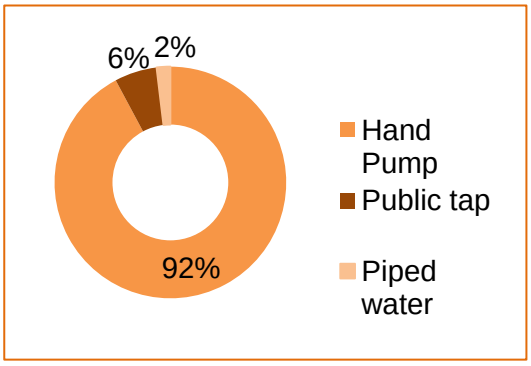
In the following section the report elaborates the findings on water usage, consumption and practices. This section has been explained in two parts;

- Drinking water – which details out the source, access, consumption pattern, volume consumed purpose of use, etc.
- Water for other purposes – also details out the sources, usage pattern, and volume consumed, etc.

3.2.1. Drinking Water:

a. Source, Access & Utilization: Hand pump was the **MAIN SOURCE** of drinking water for majority of households (91.9%) ranging between 85-95% households across the five blocks as given in Fig 3.4. Hand pumps are used across house types, ration card types, education, religion, caste and living standard index. Sheohar block has the highest dependency on hand pumps, while, Purnahiya block has the least, where, 10% of households depend on public taps or stand pipes. A very small percentage (6%) of households draws water from public tap or standpipes across the blocks.

Figure 3.4: Percentage distribution of households according to main source of water



Piped water into dwelling/yard/plot is available for only 2% households. Usage of public tap or standpipes as main source of drinking water was very less in all the blocks except in Purnahiya and Dumri Katsari. In Purnahiya and Tariyani 4-5% households have access to piped water.

Further, if we look at the distribution of water source as per type of house we observe that more than 90% households across all house types are accessing water from hand pumps. However, piped water is available in around 3% *semi-pucca* households and around 6% *kucha* and *semi-pucca* households access water from public tap or stand pipe. Interestingly, 12% households having Antyodaya card reported to access water from public tap or stand pipe, whereas, 7% households with BPL card access water from public tap or stand pipe. Not much difference in pattern of access of water across levels of literacy and SLI was observed. However, more Hindu households (6%) are accessing water from public tap or stand point than Muslim households (3.1%). Further, more percentage (9.4%) of households from the Schedule Caste category of the society were accessing water from public tap compared to other social categories. Invariably, the least important source of drinking water in the district of Sheohar remains tube well or bore well with just 0.2% households fetching water from them. (*Detailed Table 3.A.4 in Annexure*)

Overall 62.7% of households cited water source is within my dwelling/my own property, as the primary reason for getting water from the main source. Other reasons cited were water is good in taste and is safe and healthy (33.3%), water source is near to house (21.4%), water is available throughout the year (8.1%). (*Details in Table 3.A.5 in Annexure*).

Installation of hand pumps

It was revealed during focus group discussion with community that at many households they had installed hand pumps at their household of their own or with support provided by Panchayat Presidents, local MLA or Local M.P. However they were not very sure whether this support was provided by elected representation under some scheme or through their own funds. In majority cases the hand pumps installed were shallow. In case some deep well source available near household they preferred bringing water from that source for drinking purposes and used the water of their own hand pumps for other purposes.

b. Location of Main Water Source for Drinking Purpose: Accessibility of water source was identified as in own dwelling, in any other own yard or plot and elsewhere given in Table 3.2. Overall, 74.6% households reported location of water source in their own dwelling in the district. In Tariyani block, highest percentage (83.5%) of households reported water source in own dwelling; whereas, in Purnahiya, only 69.5% households, which was the lowest among the four blocks reported water source in own dwelling. Overall in Sheohar district, in 17.1% household's water source was located in any other yard or plot. Percentage of such households was high in Purnahiya (22%), Piprahi (19%) and Dumri Katsari (19.6%). Only 8.3% households accessed water elsewhere, of which 90.6% households accessed within their hamlet in the village (probably <than 500mtrs from home).

In Sheohar block, 13% households reported to access water from elsewhere, which was mainly from a source within the hamlet. More *pucca* and *semi-pucca* houses had water source in own dwelling compared to *kucha* houses. It is interesting to note that around 71% households living below the poverty line have water source within their own dwelling. Education definitely influenced access of water as higher literacy of household heads led them to have water points within own dwelling as in the case of about 91% households.

In addition, higher percentage of households belonging to general category of the population had water source in own dwelling compared to households belonging to other social categories.

Of the total population surveyed, according to the caste hierarchy only 63.4% of ST households from ST category, while, 86.3% of households from general category had a water source in their own dwelling. Also one in every four ST household had to fetch water from outside their hamlet. As per the findings from this study, the access of water within dwelling is observed to increase with increasing SLI. While 87.2% households in the wealthiest category and only 64% households in the poorest category of standard of living index had water source within dwelling.

Table 3.2: Location of main source for drinking water by background characteristic

Background Characteristics	Location of main water Source for drinking purpose			Total No. of HH	If main water source for drinking purpose is not within premises, then location of water source			No. of HH where main water source for drinking purpose was not within premises
	In own dwelling	In any other own yard/ plot	Elsewhere		Within hamlet	Outside hamlet but within village	Outside village	
Block								
Dumri Katsari	74.0	19.0	7.0	315	89.0	11.0	0.0	82
Piprahi	71.5	19.6	8.9	316	92.2	5.6	2.2	90
Purnahiya	69.5	22.0	8.5	318	87.6	12.4	0.0	97
Sheohar	74.3	12.7	13.0	315	95.1	4.9	0.0	81
Tariyani	83.5	12.1	4.4	321	88.7	11.3	0.0	53
Type of house								
Kaccha	68.5	23.3	8.2	837	89.0	10.2	.8	264
Pucca	86.0	6.3	7.7	271	97.4	2.6	0.0	38
Semi-Pucca	78.8	12.4	8.8	477	92.1	7.9	0.0	101
Type of card								
APL	83.9	11.3	4.8	354	89.5	8.8	1.8	57
BPL	71.2	18.9	9.8	1008	91.7	7.9	.3	290
Antyodya Card	63.4	26.8	9.8	41	93.3	6.7	0.0	15
None	77.5	15.9	6.6	182	82.9	17.1	0.0	41
Education level of HH Head								
Illiterate	68.3	21.9	9.8	836	89.4	9.8	.8	265
Primary	77.5	13.0	9.5	231	94.2	5.8	0.0	52
Secondary	82.3	12.2	5.5	452	91.3	8.8	0.0	80
Higher	90.9	4.5	4.5	66	100.0	0.0	0.0	6
Religion								
Hindu	74.2	17.2	8.6	1457	90.4	9.0	.5	376
Muslim	78.9	15.6	5.5	128	92.6	7.4	0.0	27
Caste								
SC	66.7	25.2	8.2	417	89.9	10.1	0.0	139
ST	63.4	31.7	4.9	41	73.3	26.7	0.0	15
OBC	74.8	15.0	10.2	821	92.8	6.8	.5	207
General	86.3	9.8	3.9	306	88.1	9.5	2.4	42
Standard of Living Index								
Poorest	64.3	26.8	8.9	717	88.7	10.5	.8	256

Background Characteristics	Location of main water Source for drinking purpose			Total No. of HH	If main water source for drinking purpose is not within premises, then location of water source			No. of HH where main water source for drinking purpose was not within premises
	In own dwelling	In any other own yard/ plot	Elsewhere		Within hamlet	Outside hamlet but within village	Outside village	
Medium	76.9	12.3	10.8	351	91.4	8.6	0.0	81
Wealthiest	87.2	7.0	5.8	517	97.0	3.0	0.0	66
Total	**74.6**	**17.1**	**8.3**	**1585**	**90.6**	**8.9**	**.5**	**403**

Interaction with Government Officials on Safe Drinking Water Access and Quality in Sheohar

The highlights of interactions (IDIs) with district nodal officials from the PHED and Block Development Officials are as below;

- **Water Access and Quality:** For providing safe drinking water and addressing issues of water quality the district administration is in process of planning and roll out of *"Har Ghar Nal Ka Jal",* scheme launched by Government of Bihar under *"7 Nishchye initiative*" in September 2016. Under this, all the households are proposed to be covered under the piped water supply scheme in five years in a phased manner. For monitoring the water quality iron, arsenic and fluoride affected habitations and hamlets the community based monitoring system would be developed. Under the scheme the ward or ward cluster wise proposal will be prepared by Sub- Panchayat Committees. The committee will prepare the need based plan in consultation with community, specifying requirement infrastructure requirement and budget etc. The committee would be provided technical support by JEs/ Engineers of PHED for infrastructure related layout and budget. Committee would also be entrusted with responsibility of managing O&M of the schemes for five years. The planning process is about to complete as the mapping and listing of wards to be taken up in phased manner is almost complete in Sheohar district.

- **Challenges:** Some of the key challenges as foreseen by some of the officials include, evolving consensus in community where one scheme is to be planned and installed for serving more than one ward; Issues in land acquisition for laying pipelines and constructing water tanks; newer areas for PRI members and their capacity building O&M may also pose problem in some of the areas etc. Besides some officials also felt that it may take time for changing behaviour and practices of community for switching from hand pumps to piped water supply (in some cases).

- **Where WFP may support:** They recognised the effort of Water for People in providing water points in selected areas in the district and suggested that the piped water scheme would be taken up in a phased manner. Therefore WFP may plan addressing the water issues in areas which are likely to be covered at a later stage. It may also extend support in community mobilization aspects related to the scheme including safe water practices at household level and explore possibility in supporting in O&M aspects, etc.

c. Depth of hand pumps: Around one in every two households reported that the depth of hand pump from which they draw water was more than 100 feet as detailed in *Table 3.3* In Piprahi and Tariyani more than 50% households and in the remaining three blocks more than 40% households reported drawing water from hand pumps which were dug more than 100 feet deep. About 21.3% of illiterates were unaware of the depth of hand pumps from which they fetched their drinking water whereas it was only 10.6% for head of households with higher education. Overall around one in every four households on an average reported that the hand pump from which they fetched water was less than 100 feet deep. Further, around 55% households in the wealthiest category of standard of living index had knowledge that the hand pump from which they were fetching water was more than 100 feet; whereas, around 43% poorest households had the knowledge that the hand pump from which they were drawing water was more than 100 feet in depth.

Table 3.3: Percentage distribution of HH according to depth of hand pump in their HH

Characteristics	Depth of the hand pump			Total HH - Main source of drinking water - hand pump
	Yes, it is more than 100ft	Yes, it is less than 100ft	Don't know	
Blocks				
Dumri Katsari	42.9	31.7	18.1	315
Piprahi	57.3	19.9	17.7	316
Purnahiya	44.0	23.3	18.6	318
Sheohar	47.3	30.8	16.5	315
Tariyani	50.8	20.9	19.9	321
Education Level of Household Head				
Illiterate	45.3	25.6	21.3	836
Primary	50.6	30.7	13.9	231
Secondary	51.3	22.6	15.7	452
Higher	60.6	21.2	10.6	66
Standard of Living Index				
Poorest	43.4	29.6	18.8	717
Medium	49.3	23.1	16.2	351
Wealthiest	54.9	20.9	18.6	517
Total	**48.5**	**25.3**	**18.2**	**1,585**

d. Fetching Drinking Water – Distance, No. of Trips: Women played a major role in domestic water management in areas where safe water was not available in the house as presented in *Table 3.4*. In these settings, women were mainly responsible for collecting, storing, and using water. In 81.4% household's adult women were mainly involved in fetching drinking water from outside source. The trend was similar across blocks except in Purnahiya where 19.6% adult men fetched water. Overall only 3% adolescent girls reported fetching water from outside, while only 1.2% adolescent boys were involved in fetching water.

Table 3.4: Percentage distribution of HH where drinking water source is outside the house according to the main person responsible for fetching drinking water

Main Person responsible for Fetching water	Dumri Kat sari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Adult Female	81.7	80.0	75.3	84.0	90.6	81.4
Adult Male	9.8	13.3	19.6	13.6	1.9	12.7
Adolescent Girl	2.4	3.3	3.1	2.5	3.8	3.0

Main Person responsible for Fetching water	Dumri Kat sari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Adolescent Boy	2.4	2.2	0.0	0.0	1.9	1.2
Do not fetch water to home for this purpose	0.0	0.0	1.0	0.0	0.0	.2
Any Other(Any one)	3.7	1.1	1.0	0.0	1.9	1.5
Total HH where drinking water source not within premises	**82**	**90**	**97**	**81**	**53**	**403**

The average distance covered to fetch drinking water was less than 200 meters for 83% households across the districts. Tariyani (90.6%) had the highest and Piprahi (72.2%) lowest percentage of households fetching water from distances less than 200. In Piprahi about 10% households fetched water from 200-500 meters and equal percentage of HH from more than one kilometer.

One in every two households where drinking water source was not within premises, made 3-6 trips, to bring enough drinking water in the household. Further, one in every four households made at least two trips per day to bring sufficient water for drinking. In Purnahiya block, around 11% households had to make more than ten trips to fetch water from a source located outside their home. In Piprahi almost two-thirds (62.2%) of households made 3-6 trips to get drinking water.

Of the total intervention villages covered under the study villages 92.2% of households sourced the drinking water from hand pumps. In non-intervention villages similar to intervention villages 91.7% of households sourced water from hand pumps.

Table 3.5: Source of water in intervention and non-intervention villages

Main source of drinking water	Type of village	
	Intervention Village	Non-Intervention Village
Piped into dwelling	1.6	1.5
Piped to yard/plot	.4	.3
Public tap/standpipe	5.4	6.3
Hand pump	92.2	91.7
Tube well/bore well	.3	.1
Total no. of HH	**670**	**915**

The average time taken to fetch water was more than half an hour for around 45% households across the blocks; while a quarter (one in four) of the respondent's households spent 11-20 mins to fetch drinking water. In Purnahiya around 64% households spent more than thirty minutes every day to fetch water.

e. Water Availability: Satisfaction with respect to water availability was high in the range of 93-99% (95.8% across blocks) of reported households as given in *Table 3.6*. Piprahi (99.1%) had the highest satisfaction levels while Purnahiya lowest (93.1%). In Dumri Katsari and Sehohar around 3% households reported insufficiency of water at sometimes. Only 3% households availing water from hand pump reported that they sometimes faced insufficiency of water. As per the standard of living index wealthiest households (97.7%) were highly satisfied while the poorest (94.4%) were least satisfied.

Table 3.6: Percentage distribution of HH according to availability of sufficient drinking water

	Available water is sufficient for household			Total number of HH
	Yes	Sometimes not sufficient	No	
Block				
Dumri Katsari	96.8	3.2	0.0	**315**
Piprahi	99.1	.9	0.0	**316**
Purnahiya	93.1	6.9	0.0	**318**
Sheohar	96.8	3.2	0.0	**315**
Tariyani	93.5	5.0	1.6	**321**
Main Source of drinking water				
Piped into dwelling	100.0	0.0	0.0	**25**
Piped to yard/plot	100.0	0.0	0.0	**6**
Public tap/ standpipe	88.3	11.7	0.0	**94**
Hand pump	96.2	3.4	.3	**1,457**
Tube well/bore well	100.0	0.0	0.0	**3**
Standard of Living Index				
Poorest	94.4	5.0	.6	717
Medium	96.0	3.7	.3	351
Wealthiest	97.7	2.3	0.0	517
Total	**95.8**	**3.8**	**.3**	**1,585**

f. Expenditure on Water Tariff/ user charges, repair and maintenance : As given in *Table 3.7*. Only 4-5% households had to spend on water tariff/user charges repair and maintenance. Purnahiya (6.9%) and Piprahi (6.0%) had the highest number of households incurring any expenditure on tariff/user charges and repair and maintenance, while Sheohar block (2.9%) had the least number of HH spending on it. The average amount of tariff paid ranges from Rs. 10/- to Rs. 50/-. Further, the average amount spent on user charges or repair maintenance of water point etc. in each block was Rs. 50/- except Purnahiya block, where the average expenditure was Rs. 30/- per month. Expenditure increased with increase in standard of living. However, during FGD with the community it was found that wherever WFP water points have been installed, a water user committee was formed. These committee usually levy charges for using water from the source. The amount collected is usually spent on O&M of the water point. This information was shared by the members of the User Committee who were part of the FGDs conducted with community.

While around 3.3% of the poorest, 5.4% of medium and 6.8% in the wealthiest category made any expenditure on water tariff/ user charge or repair and maintenance.

Table 3.7: Percentage distribution of HH by the amount paid for water tariff/user charges and repair and maintenance

	Whether HH incurred expenditure on water tariff/ user-charges or repair & maintenance		Total number of household	Average amount spent	No. of HH incurred expenditure on water point (user charge O&M)
	Yes	No			
Main Source of Drinking Water					
Piped into dwelling	4.0	96.0	**25**	20.0	**1**
Piped to yard/plot	0.0	100.0	**6**	-	**0**

	Whether HH incurred expenditure on water tariff/ user-charges or repair & maintenance		Total number of household	Average amount spent	No. of HH incurred expenditure on water point (user charge O&M)
	Yes	No			
Public tap/ standpipe	5.3	94.7	**94**	10.0	**5**
Hand pump	4.9	95.1	**1,457**	50.0	**72**
Tube well/bore well	0.0	100.0	**3**	-	**0**
Block					
DumriKatsari	4.8	95.2	**315**	50.0	**15**
Piprahi	6.0	94.0	**316**	50.0	**19**
Purnahiya	6.9	93.1	**318**	30.0	**22**
Sheohar	2.9	97.1	**315**	50.0	**9**
Tariyani	4.0	96.0	**321**	50.0	**13**
Standard of Living Index					
Poorest	3.3	96.7	**717**	25.0	**24**
Medium	5.4	94.6	**351**	30.0	**19**
Wealthiest	6.8	93.2	**517**	50.0	**35**
Total	**4.9**	**95.1**	**1,585**	**50.0**	**78**

3.2.2. Water Use for Other Purposes:

The sub section 3.2.2 (a to g) specifically provides information on the sources and water usage for other purposes than drinking, such as cleaning, bathing, etc.

a. Source, Access & Utilization: On an average, around 88% households reported use of water from hand pumps for cooking, cleaning utensils, washing clothes, house cleaning, bathing, flushing toilets and washing or cleaning of animals. Only around 6% households (each) reported to use water from public tap or stand pipe for all the aforementioned purposes.

b. Location of water used for other purposes: Households where water source was within their own dwelling used it for cooking (75.4%), cleaning utensil (78.8%), washing clothes (79.3%), house cleaning (79.4%) , bathing (79.4%), etc. However, more than 80% households reported use of water from this source in their own dwelling for flushing toilets (87%) and cleaning & washing animals. In case the water source was in any other own yard or plot then this percentage decreased considerably to 10-16% possibly due to reduction in ease of accessing water source, while it dropped to less than 10% for flushing toilets or cleaning animals drops as given in *Table 3.8*.

This indicates that ease of access to water source decides priority of use of water. This is also evident from data on households fetching water from a source which is not within premises of the household. In case the source is within hamlet 85–100% households reported using water for other purposes whereas when the water source was outside hamlet less than 13% households reported using water for other purposes. This percentage fell to as low as 2% when water had to be fetched from outside the village.

Table 3.8: Location of water source used for other purpose

Purpose	Location of water source			Total No. of HHs	If water source is not within premises, then location of water source			No. of HH where water source was not within premises
	In own dwelling	In any other own yard/ plot	Elsewhere		Within hamlet	Outside hamlet but within village	Outside village	
Cooking	75.4	16.6	8.1	1,510	91.4	8.1	.5	372
Cleaning Utensils	78.8	14.1	7.1	1,505	90.0	8.8	1.3	319
Washing Clothes	79.3	13.7	7.1	1,501	89.7	9.0	1.3	311
House Cleaning	79.4	13.6	6.9	1,498	89.3	9.7	1.0	308
Bathing	79.4	13.7	6.9	1,503	88.1	11.0	1.0	310
Flushing toilets/ cleaning	87.0	8.4	4.6	832	84.3	13.9	1.9	108
Animal washing/ drinking	83.8	9.7	6.6	808	86.3	12.2	1.5	131
Other Use	88.2	5.9	5.9	17	100.0	0.0	0.0	2

c. Fetching water from outside source: Fetching water was mainly a woman's job whether it was adult women or adolescent girls as reported by respondents. In more than two-thirds of households, ranging between 75-87% adult women fetch water from an outside source for various uses purposes other than drinking. Only in around 11-20% households, adult men fetch water which was used for other purposes. In around 2-6% households a female child fetches water compared to about 1-3% households male child fetches water for other purposes. Fetching water was mainly a woman's job whether it was adult women or adolescent girls as reported by respondents as given in Table 3.9. In more than two-thirds of households, ranging between 75-87% adult women fetched water from an outside source for various uses other than drinking. Only in around 11-20% households, adult men fetched water which was used for other purposes. In around 2-6% households a female child fetched water compared to about 1-3% households male child fetched water for other purposes.

Table 3.9: Percentage distribution of households for fetching water from outside source used for other purposes according to person responsible

Purpose	Main person responsible for fetching water						Total number of HH where water source was not within premises
	Adult woman	Adult man	Female child	Male child	Do not fetch water to home for this purpose	Any Other (Specify)	
Cooking	79.3	14.8	3.8	1.3	0.0	.8	372
Cleaning Utensils	79.3	14.1	4.4	.9	.9	.3	319
Washing Clothes	77.5	12.5	4.8	2.3	2.3	.6	311
House Cleaning	79.5	11.7	5.8	1.9	0.0	1.0	308
Bathing	77.4	13.2	2.6	2.9	2.9	1.0	310
Flushing toilets/ cleaning	87.0	10.2	2.8	0.0	0.0	0.0	108
Animal washing/ drinking	75.6	20.6	3.1	.8	0.0	0.0	131
Any other	0.0	100.0	0.0	0.0	0.0	0.0	2

d. Distance travelled to fetch water for other purposes: The distance of external source of water was less than 200mtrs for around 82-100% household's to fetch water for other purposes as given in *Table 3.10* Water used for flushing of toilets had the highest percentage of households at 95.4%. Consumption/Utilization of water for other purposes decreased with increasing distance of fetching water. This was also evident from previous tables where prioritization of water use was affected by location of source of water. In case of more than 500mtrs distance, about 2-7% households fetched water from an external source, in which case, house cleaning was the primary activity for use. For households travelling more than one kilometer to fetch water animal washing/drinking (8.4%) was the primary activity for which water was fetched.

Table 3.10: Percent distribution of household who fetched water from outside the dwelling for other purpose according to distance traveled

Purpose	Distance travel to fetch water				Total number of HH where water source was not within premises
	0-200 Meters	201-500 Meters	501-1000 Meters	More than 1 KM	
Cooking	83.9	4.6	5.9	5.6	372
Cleaning Utensils	82.4	5.3	6.3	6.0	319
Washing Clothes	82.3	5.8	6.4	5.5	311
House Cleaning	82.5	4.9	6.8	5.8	308
Bathing	83.2	4.5	6.5	5.8	310
Flushing toilets/ cleaning	95.4	0.0	1.9	2.8	108
Animal washing/ drinking	84.0	3.8	3.8	8.4	131
Any Other	100.0	0.0	0.0	0.0	2

e. Trips to fetch water: On an average, nearly half of the surveyed households made 0-6 trips to collect water for other purposes. When water was primarily used for cooking and cleaning utensils, one in two households (more than 59%) made 3-6 trips. Subsequently decreased in order of priority, wherein, washing clothes was done by 48.9% in 3-6 trips, bathing in about two trips by 41.3% households, while, animal washing was carried out in 0-2 trips by 40.5% households. Among other activities such as, flushing/cleaning toilets was the least on the priority list when the number of trips to fetch water increased from 3-6 to 7-10 trips.

Around 41% households each reported spending more than 30 minutes in fetching water used for cooking, washing utensils and washing clothes. Around 43% households reported fetching water from outside source for cleaning utensil, while other activities were house cleaning (31.5%), bathing (37.1%), flushing toilets (32.4%) and washing animals (39.7%) which also took more than 30 mins in a day. One in four households reported spending 11-20 minutes fetching water for use in house cleaning and flushing toilets.

f. Utilization by volume: Around two-thirds of the household, ranging between 31-42% households, fetched more than 60ltrs of water to be used for other purposes. In this the highest percentage of households fetched water for animal washing/drinking while least number of households fetched water for flushing of toilets as given in *Table 3.11*.

Volume of water utilization varied between least 89 liters for flushing toilets to 131 liters for animal washing/drinking. Cooking and other cleaning activities such as, cleaning utensils, washing clothes, house cleaning and bathing took 106, 112,118, 105 and 120 liters of water respectively.

Table 3.11: Percentage distribution of household who fetched water from outside the house for other purpose according to volume of water used

Purpose	Volume of water for other purposes fetched from outside the house				Average quantity of water fetched for other purposes by HH (in liters)	Total number of HH where water source was not within premises
	0--20 Liters	21-40 Liters	41--60 Liters	More than 60 Liters		
Cooking	25.5	26.6	14.0	33.9	106	372
Cleaning Utensils	18.2	29.5	18.5	33.9	112	319
Washing Clothes	17.7	25.7	19.0	37.6	118	311
House Cleaning	36.7	19.2	11.0	33.1	105	308
Bathing	28.7	17.1	19.0	35.2	120	310
Flushing toilets/ cleaning	41.7	12.0	14.8	31.5	89	108
Animal washing/ drinking	32.8	14.5	10.7	42.0	131	131
Any Other	100.0	0.0	0.0	0.0	14	2

One in two households (52.1%) reported that around 40 liters of water was fetched from outside source was used up for cooking whereas, around 34% households reported that they utilized more than 60 liters of water for cooking purposes as given in *Table 3.11*. Further, 34% households reported using more than 60 liters of water for cleaning utensils whereas, 112 liters of water on an average was used for this activity.

Around 38% households used more than 60 liters of water for washing clothes. An average 118 liters of water was spent on washing clothes. Around 33% households reported using more than 60 liters of water for cleaning house whereas on an average 105 liters of water is spent on this activity. Around 35% households reported utilizing more than 60 liters of water on bathing, whereas, on an average 120 liters of water brought from an outside source was used for bathing. Around 42% households use around 20 liters of water to flush toilets whereas around 31% households reported use of more than 60 liters of water for this purpose. This was an important finding as on an average least amount of water (89 ltrs) was used for cleaning toilets.

g. Satisfaction with water availability for other purposes: More than 90% respondents were satisfied with the amount of water available and water source for various other purposes other than drinking as given in *Table 3.12*. Respondents were highly satisfied for cooking and other cleaning purposes such as, cleaning utensil, washing clothes, house cleaning, bathing, flushing toilets, washing animals and other purposes. Only 17.6% households reported that the available water was sometimes insufficient for afore mentioned purposes.

Table 3.12: Percentage distribution of household according to the level of sufficiency of water availability for other purpose and water source

Purpose	Type of water source					Available water is sufficient			Total HH
	Piped into dwelling	Piped to yard/plot	Public tap/ standpipe	Hand pump	Tube well/ bore well	Yes	Sometimes not sufficient	No	
Cooking	1.5	0.4	5.7	92.2	0.3	94	5.8	0.3	1,510
Cleaning Utensils	1.3	0.3	4.3	93.8	0.3	94.6	5.1	0.3	1,505

Purpose	Type of water source					Available water is sufficient			Total HH
	Piped into dwelling	Piped to yard/plot	Public tap/ standpipe	Hand pump	Tube well/ bore well	Yes	Sometimes not sufficient	No	
Washing Clothes	1.3	0.3	4.3	93.6	0.3	93.7	6	0.3	1,501
House Cleaning	1.3	0.2	4.1	94	0.3	93.7	6.1	0.3	1,498
Bathing	1.3	0.2	4.2	93.9	0.4	92.7	6.9	0.3	1,503
Flushing toilets/ cleaning	0.2	0.5	1.9	96.9	0.5	90.3	9.5	0.2	832
Animal washing/ drinking	0.4	0	2.7	96.3	0.1	90.8	8.8	0.4	808
Any Other	0	5.9	5.9	88.2	0	82.4	17.6	0	17

3.2.3. Issues in Availing Drinking Water:

a. Water and violence: There is a long history of conflicts over water resources, extending back thousands of years into myths, legends, and ancient history. But even now, in the modern world, disputes over access to water, the use of water as a weapon, and the targeting of water systems during conflicts remain all too common. Indeed, our work suggests that the risks of water-related violence and conflict is growing, not diminishing, as population, resources, and economic and environmental pressures on scarce water resources increase. Many of these risks are materializing at the sub-national level rather than only as disputes among nations.

Community or common water resources have been reported as places of conflict, for ex, public tap and standpipes were reported by 45.7% of households where they faced violence while fetching water. Although piped connection in dwelling or yard (16.1%) and hand pumps (18.3%) were also reported as places where households faced violence it was comparatively less than public tap/stand pipes. Interestingly, tube well or bore well were not reported as places of violence by households. Percentage households reporting violence was particularly high in Purnahiya block in which 22% households reported to have faced violence. In Sheohar and Piprahi more than 20.3% & 21.5% of households reported facing violence while fetching water.

Further, 23.1% illiterate households reported facing violence while fetching water from water source. Percentage of households reporting violence while fetching water decreased with increasing education level. Similar pattern was observed in categories under standard of living index. While around one in every four poorest households reported to have faced violence while fetching water only 11% wealthiest households reported to have faced violence while fetching water from a water source.

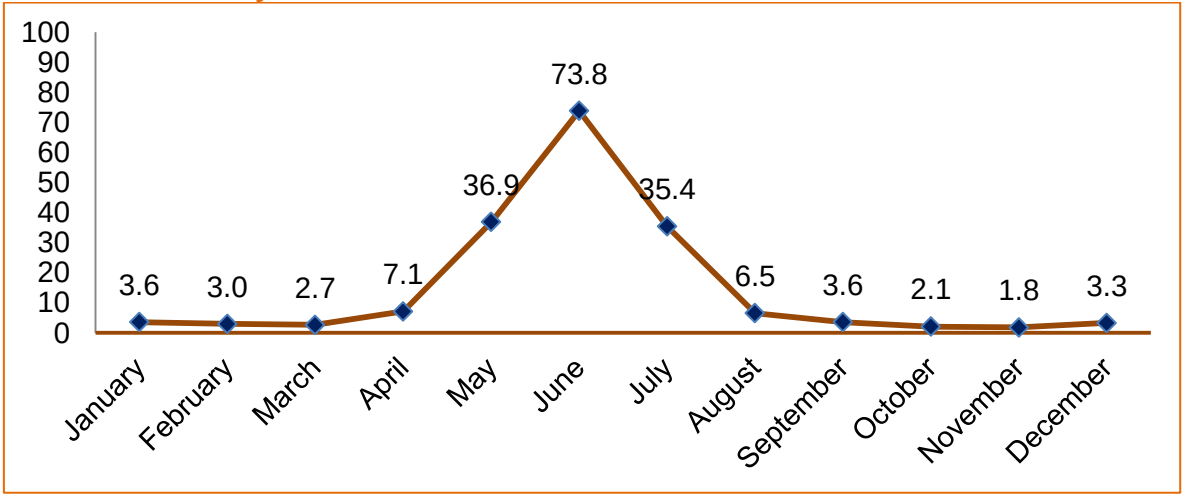
Table 3.13: Percentage distribution of HH ever faced any violence while fetching water

	Ever faced any kind of violence while fetching water		Total No. of household
	Yes	No	
Main Source of Drinking Water			
Piped into dwelling/ yard/ plot	16.1	83.9	31
Public tap/Stand pipe	45.7	54.3	94
Hand pump	18.3	81.7	1,457
Tube well/bore well	0.0	100.0	3

	Ever faced any kind of violence while fetching water		Total No. of household
	Yes	No	
Block			
DumriKatsari	19.0	81.0	315
Piprahi	21.5	78.5	316
Purnahiya	22.0	78.0	318
Sheohar	20.3	79.7	315
Tariyani	16.2	83.8	321
Education Level of Household Head			
Illiterate	23.1	76.9	836
Primary	18.6	81.4	231
Secondary	15.0	85.0	452
Higher	15.2	84.8	66
Standard of Living Index			
Poorest	27.3	72.7	717
Medium	17.1	82.9	351
Wealthiest	11.2	88.8	517
Total	**19.8**	**80.2**	**1,585**

b. Water shortage: On an average, 21% households reported facing water shortage i.e. inadequate availability of water, in any month in the last one year. In all the four blocks except Sheohar more than 20% households reported shortage. Shortage was mainly reported in the months of May, June and July. Almost two-third of households reported shortage in June. Sheohar (83.6%) and Dumri Katsari (81.9%) blocks had the highest number of households reporting shortage in June. Shortage was reported in 7% households in the months of April and August.

Figure 3.5: Percentage distribution of HHs who reported shortage of water in any month in last one year



c. Breakdown of water sources: On an average, 78.5% households reported that they had never experienced a break down in water supply in last one year. However, around 17% households reported break down of water supply for five times or less. Break down of water supply was a major problem in Dumri Katsari and Purnahiya block as around 3.5% households reported break down for 6-10 times in last 12 months. In Sheohar, 19% households reported break down for five times or less in the last 12 months. The percentage of complaints was more for less than five times when a water source had broken down.

Table 3.14: Percentage distribution of HH where regular water supply had broken down and usual time taken for repairs/ restoration of supply

Regular water supply	Block					
	Dumri Kat sari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Usual time taken for repair						
24 hours	15.4	19.4	26.3	22.4	26.2	22.1
1--2 days	44.6	52.2	47.4	43.3	49.2	47.4
2--7 days	30.8	17.9	19.7	22.4	18.5	21.8
more than 7 days	9.2	10.4	6.6	11.9	6.2	8.8
Reason for the breakdown of supply						
Water sources dried up in summers	78.5	74.6	65.8	55.2	61.5	67.1
O& M issue in water supply	21.5	22.4	17.1	41.8	18.5	24.1
Water not available at panchayat tanks etc.	0.0	0.0	1.3	0.0	3.1	.9
Water supply is hampered because of complaints against water quality	0.0	0.0	2.6	0.0	6.2	1.8
Others	9.2	13.4	15.8	16.4	15.4	14.1
No. of HH where regular water supply had broken down in last 12 months	**65**	**67**	**76**	**67**	**65**	**340**

In case of break down the usual time taken for repair was 1-7 days as reported by two-thirds of the respondents. At least half (47.8%) of households reported repairs within 1-2 days. Around 9% households reported more than seven days for repair. The condition seems critical in Dumri Katsari where around 31% households reported that 2-7 days' time taken to repair a water source in case of break-down. The situation of Sheohar was highly critical as around 12% households reported waiting for more than 7 days for repair of their water source.

Among those households who reported breakdown of water supply, the primary reason for break-down was reported as drying up of water source. In addition, one in every four households reported operation and maintenance issue in water supply as the main reason for break down. Around 1.8% households reported that water supply was hampered because of complaints against water quality.

The issue of drying up of water source seems really critical in Dumri Katsari and Piprahi as three-fourth of households in each of these blocks reported this reason for disrupted water supply. Operation and maintenance issues seem to be plaguing Sheohar block as around 41.8% households reported this as the main reason in disruption of regular water supply.

Source wise breakdown data shows that about 69.6% of households reported their hand pump dried due to drying up of water source in summer while 36.2% of households reported O&M issues. In case of piped water in dwelling or to yard/plot, 100% of households reported drying up of source in summers. In case of public tap/land pipe half of households (for each reason) reported drying and O&M issues of water source as given in *Table 3.15* below.

Table 3.15: Percentage distribution of households according to reasons for breakdown of supply from hand pumps

Reason for breakdown	Hand Pump
Water sources dried up in summers	69.6
Operation and maintenance issue in water supply	36.2
Water not available at Panchayat tanks etc.	0.7
Water Supply is hampered because of complaints against water quality	1.7
Total no. of HHs	**293**

In case of breakdown of regular water supply three-fourth of households reported to rely on neighboring household for fulfilling water needs as given in *Table 3.16*. Such a situation seems common in Piprahi and Purnahiya as more than 80% households reported taking help from neighbors in case of breakdown of their water source.

Public stand posts came to rescue of around 31.8% households. Public stand posts really seemed to be the lifeline for households in Tariyani block as around 38% households reported to have used the same when their regular water supply broke down.

Table 3.16: Percentage distribution of HH using various alternative drinking water source in case of breakdown of main supply from main source

Alternate Arrangement	Block					
	Dumri Katsari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Neighbour's household tap connection	73.8	80.6	81.6	74.6	69.2	76.2
Another public stand post	32.3	32.8	22.4	34.3	38.5	31.8
Own hand pump	7.7	6.0	3.9	3.0	4.6	5.0
Own or others open well	1.5	0.0	0.0	3.0	0.0	0.9
Buying of water	0.0	0.0	0.0	0.0	1.5	0.3
Any others	0.0	1.5	1.3	3.0	0.0	1.2
No. of HH where regular water supply had broken down in last 12 months	**65**	**67**	**76**	**67**	**65**	**340**

d. Challenges faced related to drinking water: *Table 3.17* shows distribution of adult and adolescent respondents by type of challenges faced related to drinking water. As per the findings of the study, around 6% respondents reported non-availability of water as the main challenge related to drinking water. Around 10% respondents reported distance of water point as the main challenge. In fact around 12% adult women reported this as main challenge.

Further, around 4% respondents reported waiting time at water point as the main challenge. Around 6.5% adolescent girls reported this as their main challenge. Around 3.5% respondents reported availability of less quantity of water as the main challenge. Around 7.4% respondents reported contamination of drinking water by dirt as the main challenge.

Around 2.3% households reported contamination by chemicals as the main challenge. Around 13% households overall reported quality of water in terms of smell and colour as the main challenge. However, most respondents (64.3%) did not face any challenge related to drinking water.

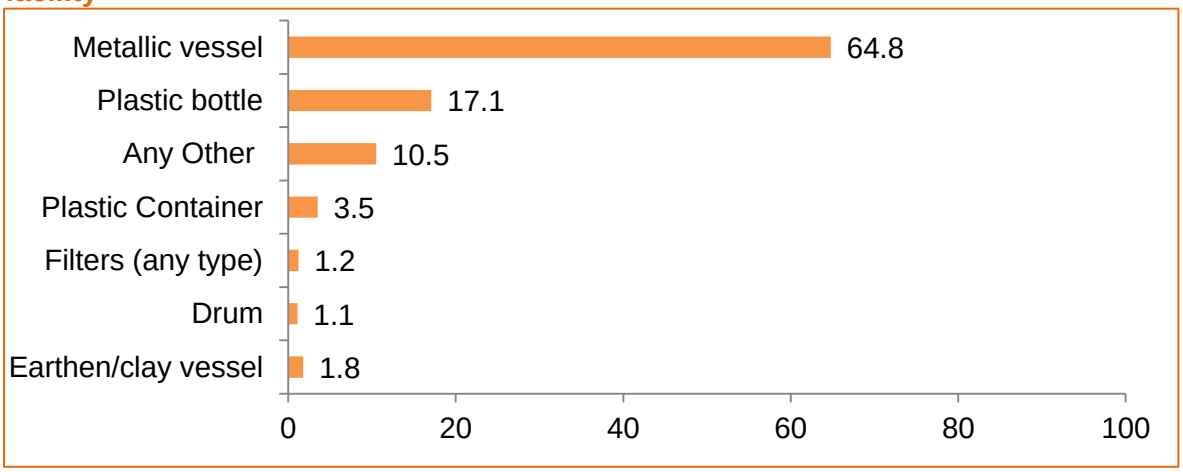
Table 3.17: Percentage distribution of adult and adolescent respondents by type of challenges faced related to drinking water

Challenges faced related to drinking water	Adult Male (20-54 years)	Adult Female (20-49 years)	Adolescent Boys (10-19)	Adolescent Girls (10-19)	Total
Water is not available	5.9	6.5	4.9	5.8	5.9
Water points are very far	8.4	11.8	8.9	10.1	9.8
Waiting time at water point/source	4.0	4.4	4.0	6.5	4.4
Less Quantity available	3.5	3.0	2.7	7.2	3.5
Contaminated with dirt	6.5	9.4	4.0	10.1	7.4
Contaminated with insects, larvae	0.0	.4	0.0	0.0	.1
Contaminated with chemicals	2.5	2.4	2.2	.7	2.3
Quality of water in terms of smell, colour is not good	13.7	13.7	8.9	12.9	12.9
Unsafe for drinking	2.5	2.2	2.2	2.9	2.4
High Cost	.1	0.0	.9	0.0	.2
Functionality of supply point	.1	.2	0.0	1.4	.3
No Problem	65.5	60.5	72.0	60.4	64.3
Any Other	0.0	0.0	.4	0.0	.1
Total No. of Respondents	**679**	**542**	**225**	**139**	**1,585**

3.2.4. Community Knowledge, Attitude and Practices about Drinking Water Storage and handling:

a. Drinking water storage: Metallic vessel was the most commonly used container for storing water by almost two-thirds of the (65%) households, followed by plastic bottles (17% households) being the next preferred containers as presented in *Fig 3.6.* Earthen or clay vessel (1.8%) drums & filters (1.1% each) and plastic containers (3.5%) were also used by households. In Piprahi around 70% households reported metallic vessels for storage; whereas, 23.5% households in Dumri Katsari reported storing water in plastic bottles. However, overall 10.5% households reported that they drank directly from the drinking water source using utensils such as a *lota.* Sheohar block (16%) and Dumri Katsari block (9.8%) reported drinking water directly from the water source.

Figure 3.6: Percentage distribution of HH according to drinking water storage facility



Further, 45.4% households reported that they cleaned their utensils every day, 37.8% households reported to be cleaning their water storage utensil before fetching water across the district as shown in *Table 3.18* below. Further, around 6.5% households reported cleaning the utensils only when they were dirty.

It is alarming to note that about 4.7% households that they never cleaned the water storage utensils across the district. Sheohar (7%) and Dumri Katsari (6%) blocks had the highest number of households who never cleaned the storage containers.

In more than 45% households in Dumri Katsari, Piprahi, Sheohar and Tariyani reported cleaning the water storage utensils every day; whereas, more than 35% households reported cleaning the utensils before fetching water in Dumri Katsari, Piprahi and Tariyani blocks.

Table 3.18: Percentage distribution of HH according to frequency of cleaning water storage

Frequency of cleaning storage vessel/ containers	Dumri Kat sari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Before fetching water	35.2	38.6	49.1	28.6	37.4	37.8
When it is dirty	7.3	6.6	6.6	7.6	4.4	6.5
Everyday	47.0	47.2	35.5	48.3	49.2	45.4
Once in 2-3 days	3.2	4.4	2.5	5.1	3.7	3.8
Every week	0.6	0.3	1.3	1.3	0.0	0.7
Never	6.0	2.8	3.5	7.0	4.4	4.7
Don't know	0.6	0.0	1.6	2.2	0.9	1.1
Total No. of HH	**315**	**316**	**318**	**315**	**321**	**1,585**

b. Water handling: As per the findings of the study, around 55% households reported that they covered the utensils in which water was stored. This practice was critical in Purnahiya block as more than two-third (68.6%) of the households reported not covering the utensils in which water was stored.

Water was stored at ground level (overall 65% households), with highest percentage reported from Dumri Katsari (70% households). One in four households from across the five blocks reported storage of water at elevated level. This practice was majorly reported from Purnahiya (33% households).

Majority (77%) of households reported taking out water from water storage utensil by dipping hand using mug or glass in the water. This practice was particularly critical in Dumri Katsari block where 85% households reported that they dipped hand to take out water from water storage utensil. Only 13% households reported to take out water through a handle glass or ladle.

This practice was mostly followed in Purnahiya block as around 33% households reported to use handle glass or ladle to take out water from water storage utensil. Only around 4% households had a system of tap attached to vessel to draw out drinking water. In Purnahiya around 5% households reported use of this system.

Table 3.19: Percentage distribution of HH covered on water handling practices

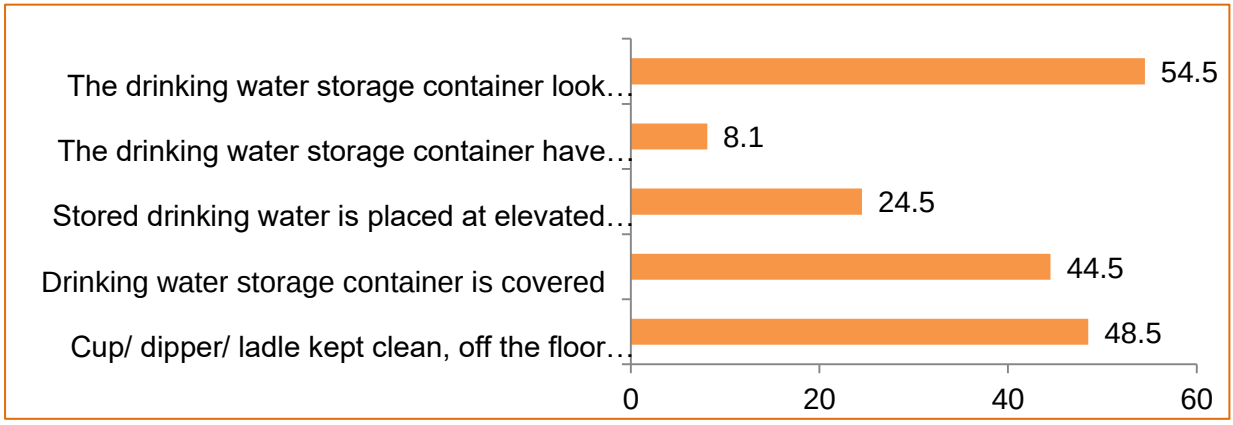
	Dumri Katsari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Whether covered or not						
Yes	54.9	49.1	68.6	45.1	55.1	54.6
No	40.3	46.2	28.3	48.6	40.8	40.8
Sometimes	4.8	4.7	3.1	6.3	4.0	4.6
Place to keep the stored drinking water						
At ground level	70.8	67.7	61.6	63.2	62.0	65.0
At elevated level	22.2	26.6	32.7	23.8	30.5	27.2
At underground level	.6	.6	.9	.6	2.5	1.1
Any other (specify)	6.3	5.1	4.7	12.4	5.0	6.7
Method of withdrawing water from water sources						
Tap attached to the vessel	1.6	4.4	5.7	4.8	4.4	4.2
Handle glass/ladle	8.6	14.6	19.8	8.3	16.2	13.5
By dipping hand (through mug, glass etc.)	85.1	76.9	72.0	76.2	76.9	77.4
Any other (specify)	4.8	4.1	2.5	10.8	2.5	4.9
Total number of household	**315**	**316**	**318**	**315**	**321**	**1,585**

c. Observation of drinking water storage & handling: In around 89.3% households the enumerators were allowed to observe the water storage area. Observations revealed at least one in two household's (48.5%) used a clean cup or ladle kept off the floor and out of reach of children across the blocks. It was found through observation that, on the contrary to reported 55%, in only 44.5% households the drinking water storage container was covered. Similarly, 27.2% households reported storing of drinking water vessel at elevated place whereas 24.5% found to be actually practicing the same. Further, in 54.5% of household's drinking water storage container looked clean.

Table 3.20: Percent distribution of HH by status of drinking water storage area across the block

Observation Status of storage area	Dumri Katsari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Observed	91.4	89.9	90.6	87.9	86.9	89.3
No permission to see	4.8	8.2	8.2	6.0	8.7	7.2
Not observed, other reason	3.8	1.9	1.3	6.0	4.4	3.5
Total number of HH	**315**	**316**	**318**	**315**	**321**	**1,585**

Figure 3.7: Percentage distribution of HH according to the observation of drinking water storage facility



FGD Findings - Awareness on Drinking Water Quality & Practices

- On being asked, whether they knew about the chemical or bacteriological contamination, majority participants stated that they were not much aware about it and how to detect that
- Majority said that the awareness activities on water sanitation takes place in their area through street theatre, print media etc. however the aspect related to chemical or bacteriological contamination, and how community should address that are not covered. They said that it would be a welcome step if government or some other agency organizes such activities. They also suggested that one of the activity could be that some technical resource persons visit their village and hold a community meeting to answer their queries on the subject.
- In some of the villages where FGD conducted, participants shared that the water testing was conducted by government in their village but results were not shared with them.
- The participants said that they have no other option but to drink water from the source which they deem fit, however this put them at risk also.
- In some of the villages participants told that iron contamination was higher as their cloths get stained and colour of water is also brownish. They were also interested to know if some community based treatment plan/ system may be established in their village to purify water from iron contamination. They also expressed their willingness to contribute some amount if any organization or individual take such initiative in their village.
- Apart from diarrhea majority were not much aware of other water borne diseases, its reasons, implications etc.
- In general participants cited that gastric, joint pains and cancer is prevalent in the community and their perception is that these are due to water related issues.

3.2.5. Treatment of Drinking Water and Water Quality:

Water quality refers to the basic and physical characteristics of water that determine its suitability for life or for human uses. It is perfectly clear that water quality has tremendous effects on human health both in the short term and in the long term. Short-term impacts of water quality refer to the sudden or in-day consequences of drinking and consuming water.

Contaminated and un-boiled water containing a number of viruses and harmful germs can be detrimental to human health. Drinking contaminated water, in medical term, may cause water-related diseases including diarrhea, bacterial dysentery, cholera, typhoid and many other contagious illnesses. For instance, diarrhea brings about the loss of both water which leads to dehydration and, in some cases, of live.

► Treatment of drinking water:

Majority (90%) of households did not treat water to make it safe. Overall, in only 4% of households boiled the water. Compared to other blocks, Purnahiya reported highest (6.3%) percentage of households who boiled water before drinking. In Piprahi, hardly 2% households reported to boil water. Overall, only 2% households reported to strain water through cloth. In Purnahiya, around 3% households reported to strain water through cloth.

Further, overall 76% households drawing water from piped source in dwelling reported that they do not treat drinking water. Around 67% households fetching water from piped source in yard or plot do not treat water. Around 93% households drawing water from public tap/stand pipe do not treat water before drinking. Overall, 91% households drawing water from hand pump do not treat water. Only 4% households reported to boil water before drinking.

Mostly (5%) households in *semi-pucca* houses compared to other *kucha* and *pucca* houses reported to boil water before drinking. 2.1% such households also reported use of cloth to strain water. However, 90% or more households across house type did not treat water before drinking.

Households with higher level of literacy undertook treatment of water more than other households. While 15.2% households with higher education reported boiling drinking water, only 2% illiterate households, 3% households with primary education and 6% households with secondary education reported to boil water before drinking. Further, while 12% households from general category of population reported to boil water before drinking, 2% households in SC, 5% households in ST and only 2% households in OBC category reported to boil water before drinking.

Practice of treatment of water improved with improving standard of living. While 5.2% wealthiest households reported boiling of water to treat it, 4.6% medium and 2.5% poorest households reported boiling of water to treat it. (*Details in Annexure Table 3.A.7*)

► Reasons for treating drinking water:

As per the findings of the study, 75-87% respondents across respondent groups reported that treatment of water is necessary as treated water is good for health as given in *Table 3.21.* While more than 70% adult male, female and adolescent girl respondents reported that the treated water is good for health, around 87% adolescent boys reported that treatment of water was good for health. Further, around 38% adolescent boy respondents felt that treatment of water is required as it makes water free from germs, bacteria and contamination from viruses whereas same percentage of girls felt that treatment of water resulted in making water free from dirt and contamination. Further, 25 – 42% respondents across various respondent groups felt that treatment of water can prevent sickness.

Overall, 79% respondents reported that treatment of water was good for health. More than 80% respondents in Purnahiya, Sheohar and Tariyani block reported that treatment of water was good for health. Around 17% respondents reported that treatment of water made water free from germs, bacteria and contamination from viruses. One in four respondents felt that water can be made free from germs through treatment in Sheohar block.

Table 3.21: Percentage distribution of HH who treat drinking water according to reason for treating drinking water

	Good for health	makes water free from germs	makes water free from dirt	Prevent sickness	No. of HH who treat drinking water
Type of respondents					
Adult Male (20-54 years)	77.8	16.7	13.9	41.7	36
Adult Female (20-49 years)	79.3	6.9	10.3	24.1	29
Adolescent Boys (10-19)	76.9	38.5	15.4	30.8	13
Adolescent Girls (10-19)	87.5	25.0	37.5	37.5	8
Block					
Dumri Kat sari	56.3	12.5	18.8	37.5	16
Piprahi	71.4	14.3	28.6	28.6	7
Purnahiya	82.8	20.7	17.2	31.0	29
Sheohar	86.7	26.7	6.7	73.3	15
Tariyani	89.5	10.5	10.5	5.3	19
Total	**79.1**	**17.4**	**15.1**	**33.7**	**86**

Further, around 15% respondents reported that treatment of water frees it from dirt and other contamination whereas around 34% respondents felt that treatment of water could prevent sickness. This information is further collaborated by the findings of FGDs as mentioned below;

"We do not know scientifically whether the water have higher level of iron contents. This is the reason known from time of our fore fathers. People also believe that the deeper the water source, more safe it is." Respondent during FGD

FGD Findings – Knowledge on treatment, storage and handling of Drinking Water

- Though majority respondent believed that boiling of water makes it safer for drinking purposes however, they shared that in practice it becomes cumbersome. Some of the respondents said that they usually boil water before drinking.
- On probing about the safe handling of water, majority said, "We know that using ladled utensil/ mud keep water safe" however in practice they do not follow that perhaps because it is not deemed as a priority.
- A large number of the respondents stored drinking water in the aluminum container and kept it on the floor; covered with cloth or some lid.
- Some boiled it if any doubt about the contamination, some used thin cloth as sieve for filtering

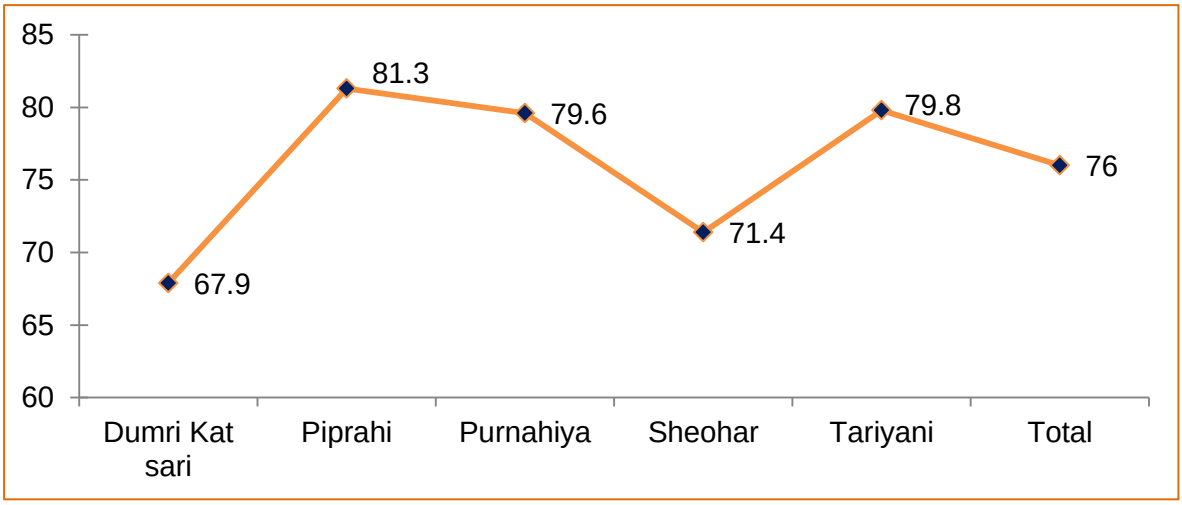
a. Satisfaction with drinking water quality and services: The households were asked to rate the quality of water based on the physical parameters (clarity, colour, smell, taste etc.) at a scale of good, average and poor. As per the findings of the study, overall 78.4% households reported drinking water quality as good and 18% households reported it as average in terms of clarity of water. The different aspects of water quality and services such as color (68.1%), Smell (68.1%), taste (71.1%), Healthiness (69.3%), stability of service (72.4%), convenience (72.1%) were reported good. In Dumri Katsari about 5% households reported that the quality of drinking water as per clarity of water was poor. In Dumri Katsari block reportedly has the highest percentage of households that said water quality was poor based on color (18%), and all the other parameters such as smell (10%), healthiness (15%), and stability of service (8.3%), while based on convenience Piprahi (9.2%) had the highest percentage of households where they said water quality was poor. (*Details in Table 3.A.8 in Annexure*)

Table 3.22: Percentage distribution of respondents according to quality of drinking water by water source

	Satisfied with the quality of drinking water			No. of Household
	Yes	No	Don't know	
Type of respondents				
Adult Male (20-54 years)	76.4	23.4	0.1	679
Adult Female (20-49 years)	74.2	25.6	0.2	542
Adolescent Boys (10-19)	81.3	18.2	0.4	225
Adolescent Girls (10-19)	72.7	27.3	0.0	139
Main source of drinking water				
Piped into dwelling	84.0	16.0	0.0	25
Piped to yard/plot	83.3	16.7	0.0	6
Public tap/standpipe	71.3	28.7	0.0	94
Hand pump	76.1	23.7	0.2	1457
Tube well/bore well	100.0	0.0	0.0	3
Total	**76.0**	**23.8**	**0.2**	**1,585**

Households in Dumri Katsari were least satisfied with the quality of drinking water in comparison to other blocks as can be seen in the light of the finding from *Fig 3.8* below. Overall three-fourths of respondents were satisfied with the quality of drinking water in the district. Further, higher percentage of households in Dumri Katsari stated that smell (14.3%) and colour (18.1%) of water is of poor quality as compared to other blocks (as given in *Table 3.A.8 in Annexure*) Piprahi Purnahiya and Tariyani reported the highest satisfaction levels with the quality of drinking water. Further, three-fourths of respondents drawing drinking water from hand pumps were satisfied with quality of drinking water while cent percent households were satisfied with tube wells. More than 80% respondents which had piped water in dwelling or plot reported that they were satisfied with quality of drinking water. However, only 71% respondents fetching drinking water from public tap or stand pipe were satisfied with quality of drinking water.

Figure 3.8: Percentage distribution of respondents who were satisfied with the quality of drinking water



As per the findings of the study, most (71%) respondents across all respondent categories reported that the quality of drinking water service was good. Further, overall, around 22% respondents rated the quality of water service as average. However, around 7% respondents rated the quality of drinking water as poor. The level of dissatisfaction was highest among adult male respondents as around 7.1% adult male respondents rated quality of water service as poor. Around 12% respondents availing piped water into dwelling rated quality of water service as poor. Around 10% respondents fetching water from public tap or stand pipe rated water service quality as poor; whereas, around 7% hand pump users rated quality of water service as poor. Further, while 10.5% respondents in Dumri Katsari rated quality of water service as poor around 5% respondents in other blocks rated the quality of water service as poor. (*Details in Table 3.A.9 in Annexure*)

Level of satisfaction regarding water quality improved with improvement in type of housing. While around 9% respondents living in *kucha* houses reported that the quality of water service was poor, around 5% households in *pucca* houses and 4% households in *semi-pucca* houses reported quality of water as poor. Further, while dissatisfaction regarding quality of water service was lower in respondents with higher education it was highest amongst respondents who were illiterate and had primary level of education. While around 7% respondents illiterate or with primary level of education reported that the quality of water services was poor only 3.5% respondents with higher level of education reported that quality of water service was poor. Further, while 7% respondents from Hindu community reported that the quality of water service was poor only 5% respondents from Muslim community reported quality of water service was poor.

Satisfaction regarding quality of water service was highest among respondents from ST and lowest among respondents of general category of population. While 83% respondents from ST reported that quality of water service was good only 63% respondent from general category ranked quality of water services as good. The poorest respondents as per standard of living index had highest dissatisfaction regarding quality of water services. While 8.4% poorest respondents found the quality of water services poor, only 4.3% wealthiest respondents reported quality of water services as poor. (*Details in Table 3.A.9 in Annexure*)

3.3. Hand Washing Practices

The average frequency of hand washing was 4-6 time in a day across respondent categories and cuts through education, religion, caste and wealth index. It was reported, that for each category of respondents, i.e., one in every two adult male (51.5%), adolescent boys (50.2%) and girls (57%) washed their hands 4 to 6 times per day. Also, around one in every four adult male (35.9%) respondents reported to wash their hands for 7-10 times. The same followed for adult female (28.4%), adolescent boys (23.6%) and girl (27.3%) respondents.

As per the block-wise distribution of respondents, around 58% respondents in Piprahi and Sheohar reported to be washing their hands 4 to 6 times in a day. Around 48-49% households in Purnahiya and Tariyani reported washing their hands for 4 to 6 times in a day. Nearly a third of the respondents in Dumri Katsari (35.2%) and Tariyani (33%) reported washing their hands 7-10 times in a day. One in four respondents in Purnahiya and around 22% households in Sheohar reported to be washing their hands for 7 to 10 times in a day. Further, around 7% households in Purnahiya block reported to be washing their hands for 11 to 15 times daily. (*Details in Table 3.A.10 in Annexure*)

More than half of respondents living in *semi-pucca* (54.1%) and *pucca* (50.9%) houses reported to be washing their hands for 4-6 times in a day. Around one-third of the respondents living in *pucca* houses reported washing their hands 7- 10 times a day.

Education and religion did not influence hand washing as almost equal number of respondents who were illiterates (52.3%) and those who had higher education (50.%) washed their hands 4-6 times in a day. Similarly there was not much difference in pattern of hand washing between Hindu and Muslim respondents. However, more (6%) respondents from general category of the society reported to be washing their hands 11 to 15 times a day.

Frequency of hand washing increased with improvement in standard of living wherein it was reported 30% respondents in the wealthiest category reported to be washing their hands for 7-10 times a day, 27.4% respondents in medium category and 24% respondents in poorest category of standard of living reported to washing hands 7-10 times a day. However, 6% respondents in medium category of standard of living index reported to wash their hands 11-15 times in a day which was higher than percentage of respondents in poorest and wealthiest category of standard of living index. (*Details in Table 3A.10 in Annexure*)

► Percentage distribution as per when to wash hands

Table 3.23 shows, the percentage distribution of respondents according to the critical times when they wash their hands. Most (94.1%) respondents reported that they washed their hands before eating. Around 48.5% respondents reported washing hands before preparing meals. Around 56% respondents in Tariyani and one in two respondents in Sheohar block reported to wash their hands before preparing meals.

Around 40% respondents in other blocks reported to wash their hands before meals. Further, around 85% respondents reported that they washed their hands after defecation or using toilet. More than 85% respondents in Sheohar, Piprahi and Tariyani blocks reported to wash their hands after defecation or using toilet. More than 80% respondents in Dumri Katsari and Purnahiya blocks reported to wash their hands after defecation and using toilets. Around 19% respondents reported to wash their hands after touching animals. More than 20% respondents in Tariyani and Purnahiya blocks reported washing their hands after touching animals. Around 17% respondents reported to wash their hands after touching child faeces across the five blocks.

More than 20% respondents in Tariyani and Purnahiya reported to undertake this practice. Further, around 12% respondents reported to wash their hands after cleaning animal faeces. In Purnahiya 16% respondents reported to undertake this practice. Further, around 13% respondents reported to wash their hands before feeding anyone. Around 8.3% respondents reported to wash their hands after taking care of sick persons.

Based on the findings, it could be inferred that out of 5 critical times of hand washing, households to some extent were following right hand washing practices before eating (94.1%) and after defecation/using toilet (84.9%) however only 48.5%, 17.1% and 8.3% of the households were following right hand washing practices before preparing meal, after cleaning child faeces and after taking care of sick person respectively. Therefore, these areas need to be emphasized during the BCC activities of the project to attain complete change in hand washing practices of the households.

Table 3.23: Percentage distribution of respondents according to the need of hand washing

When wash their hands	Dumri Katsari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Before eating	94.0	94.6	94.7	95.2	92.2	94.1
Before preparing meal	46.0	43.7	46.5	50.2	55.8	48.5
After defecation/using toilet	81.3	86.4	80.5	89.5	86.6	84.9
After touching animal	12.1	17.1	21.4	19.4	23.7	18.7
After cleaning child faeces	18.7	11.1	20.1	14.3	21.2	17.1
After cleaning animals faeces	9.2	10.8	16.0	8.9	15.0	12.0
Before feeding other	13.0	9.8	14.8	10.2	16.2	12.8
After taking care of sick person	11.1	8.5	8.8	7.0	6.2	8.3
Any other (Any time when require)	1.3	2.2	2.8	6.7	2.5	3.1
No. of Respondents	**315**	**316**	**318**	**315**	**321**	**1,585**

► Material used for hand washing according to background characteristics

Majority (72.2%) of respondents reported to usually wash their hands with soap and water. About 8.8% respondents reported washing their hands only with water, 5% respondents washing their hands with ash & water and 14% respondents reported washing their hands with mud/dust and water. Around 86% adolescent girls reported that they washed their hands with soap and water. Further, around 80% respondents living in *pucca* houses reported washing their hands with soap and water whereas only 67% respondents living in *kucha* houses did so. Ironically, while 80% respondents having antyoaya card, washed their hands with soap and water, only 69% respondents who are BPL did so.

Practice of hand washing with soap increases with increase in education of respondent as presented in Annexure *Table 3.A.11*. In case of illiterate respondents, 63.4% respondents reported practicing hand washing with soap and water whereas around 88% respondents with higher level of education reported this practice. Hand washing was less practiced by respondents from OBC. While only 68% from OBC did so more than 70% respondents from SC and ST category of population practiced hand washing with soap and water. On the other hand, 85% respondents from general category washed their hands with soap and water. Hand washing practice improved with improved standard of living. While 85% respondents who were wealthiest reported practiced hand washing with soap and water only 63% poorest practiced it.

As shown in *Table 3.24*, higher percentage of respondents had washing hand with soap and water in WFP intervention area as compared to respondents in non-intervention area except at moments i.e. before eating (only marginal) and after taking care of sick person.

It is interesting to note that in both the areas (intervention and non-intervention) higher percentage of respondents reported washing hand with soap and water before feeding others as compared to moments like after defecating or before eating. This may be due to the believes existing in community and further probing on these aspects by project implementation teams can be useful to improve practices on this front in future.

Table 3.24: Percentage distribution of respondents in WFP intervention and non-intervention area according to hand washing with soap and water at critical times

Critical time of Hand Washing	Respondents Washing Hands with Soap and Water		
	WFP intervention GPs	Non-intervention GPs	Total
Before eating	72.0	72.3	**72.2**
Before preparing meal	75.2	74.9	**75.0**
After defecation/using toilet	75.2	73.1	**74.0**
After touching animal	71.4	69.8	**70.4**
After cleaning child faeces	80.0	72.8	**76.0**
After cleaning animals faeces	67.1	65.0	**65.8**
Before feeding other	85.6	83.0	**84.2**
After taking care of sick person	73.5	81.3	**77.3**
Any other	61.5	43.5	**53.1**

► Reasons for not washing hands with soap and water

Around 85% adult male and 74% of female respondents that reported not using soap reported that soap was not available for washing hands as given in *Table 3.25 below.* Around 8% of male and 13% of the female respondents admitted that they did not like to wash their hands. Around three in four adolescent boys reported that since soap was not available they did not wash their hands with soap whereas around 14% adolescent boys reported that they did not like to wash their hands with soap. Around 85% adolescent girls reported that soap was not available to wash hands whereas around 10% did not like to wash their hands with soap.

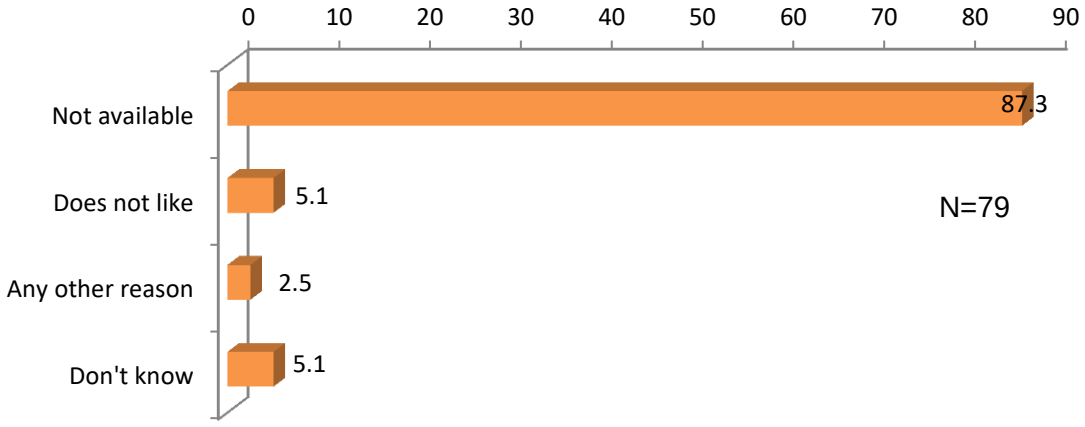
Further, in Dumri Katsari and Sheohar 85% respondents reported unavailability of soap as a reason for not washing their hands with soap. In Piprahi and Tariyani around 80% respondents reported unavailability of soap as the reason for not washing their hands with soap. In Purnahiya, 67% respondents reported non availability of soap as a reason for not washing their hands with soap.

Table 3.25: Percentage distribution of respondents according to reason for not washing hands with soap and water

	Reasons for not washing hands with soap				Number of Respondents
	Not available	Does not like	Any other (specify)	Don't know	
Type of Respondents					
Adult Male (20-54 years)	85.3	7.8	2.3	4.6	217
Adult Female (20-49 years)	74.0	13.0	.7	12.3	146
Adolescent Boys (10-19)	75.9	13.8	0.0	10.3	58
Adolescent Girls (10-19)	85.0	10.0	0.0	5.0	20
Block					
Dumri Kat sari	85.3	11.8	0.0	2.9	102
Piprahi	80.4	7.8	1.0	10.8	102
Purnahiya	67.1	21.5	2.5	8.9	79
Sheohar	85.9	5.9	2.4	5.9	85
Tariyani	80.8	5.5	1.4	12.3	73
Total	**80.3**	**10.4**	**1.4**	**7.9**	**441**

Among the wealthiest households where respondents did not use water and soap for washing hands (N=79) the primary reason was non availability.

Figure 3.9: Percentage of respondents among wealthiest household according to reason for not washing hands with soap



► Reasons for using soap and water for washing hands

Overall, one in two respondents felt that hand washing with soap and water stopped germs from spreading whereas around 30% thought it prevented sickness as given in *Annexure Table 3.A.12.* However, majority (68.6%) felt that it just kept the hands clean. While 62% adolescent boys felt that hand washing with soap and water prevented germs from spreading around 72% adult female reported that it kept the hands clean. In Purnahiya and Tariyani more than 50% respondents felt that hand washing with soap and water prevented germs from spreading whereas in Tariyani three –fourth of respondents felt it kept hands clean. More than 30% respondents in Piprahi, Sheohar and Tariyani felt that hand washing with water and soap prevented sickness.

More than half of the respondents living in *pucca* and *semi-pucca* houses felt that hand washing with soap and water could prevent spread of germs whereas more than 30% respondents living in *semi-pucca* houses reported hand washing with soap and water prevented sickness.66% respondents with higher level of education felt that hand washing with soap and water prevented germs from spreading whereas 30% such respondents felt that it could prevent sickness. Awareness regarding relation of hand washing and prevention of spread of germs and sickness was particularly low among respondents from ST. Only 3% ST respondents reported that hand washing could prevent sickness. *(Details in Annexure Table 3.A.12)*

Observations of hand washing area

Overall, in around 91% households enumerators were allowed to observe washing area. More than 90% households allowed observation of washing area barring Piprahi, where 86.4% households allowed the enumerators to observe washing area. During observation it was noted that water was available in 93.1% households. In more than 90% households across blocks water was observed to be available.

Soap bar or liquid soap or powder as cleaning agent was observed in around 65% households. However, 72.2% respondents reported that they usually wash their hands with soap. Situation was critical in Sheohar as only in 56% households soap/bar/liquid soap/powder was observed to be present during the time of survey. However, 73% of the household had reported that they usually use soap for washing hands.

3.4. Water Borne diseases

Water-borne diseases are infectious diseases spread primarily through contaminated water. Though these diseases are spread either directly or through flies or filth, water is the chief medium for spread of these diseases and hence they are termed as water-borne diseases. Most intestinal (enteric) diseases are infectious and are transmitted through faecal waste. Pathogens – which include virus, bacteria, protozoa, and parasitic worms – are disease-producing agents found in the feces of infected persons. These diseases are more prevalent in areas with poor sanitary conditions. These pathogens travel through water sources and interfuses directly through persons handling food and water. Since these diseases are highly infectious, extreme care and hygiene should be maintained by people looking after an infected patient. Hepatitis, cholera, dysentery, and typhoid are the more common water-borne diseases that affect large populations in the tropical regions.

It is estimated that around 1000 children under five die every day-from diarrheal diseases, one of the leading causes of child mortality and only one of the illnesses caused by poor water quality. There are still more than two billion people in the world who lack adequate sanitation, and over one billion lack access to safe drinking water. WHO says that overall, 842,000 deaths from diarrheal diseases each year could be prevented by improved water, sanitation and hygiene. From the data it was observed that the number of household members suffering from water borne diseases in WFP intervention villages was marginally less than non-intervention villages as shown in *Table 3.26 below.*

Table 3.26: Percent distribution of household according to incidence and type of water borne disease according by blocks, Sheohar

Member suffering from water borne disease	Intervention Village	Non-Intervention Village	Total
Yes	28.1	29.4	28.8
No	71.9	70.6	71.2
Total number of household	**670**	**915**	**1,585**

Knowledge about water borne diseases

Overall, only 16.2% respondents were aware about any water borne diseases. The level of awareness among respondents was least (8%) in Piprahi block and highest (21%) in Dumri Katsari block. Among the respondents who were aware about water borne diseases around 71% respondents were aware about diarrhea, around 36% respondents were aware about Jaundice, 5% respondents were aware about dysentery, 11% respondents about cholera, around 29% about fluorosis and around 35% about typhoid. In Tariyani around 80% respondents reported to be aware about diarrhea whereas in Purnahiya around 41% respondents were aware about jaundice, 20% respondents in Dumri Katsari were aware about dysentery, 14% respondents, highest among all blocks, were aware about cholera, 32% respondents in Dumri Katsari were aware about fluorosis whereas 44% respondents were aware about typhoid in Piprahi. (*Details in Annexure Table 3.A.13*)

Further, very low percentage (12%) adult women were aware about water borne diseases. This finding is important as adult women play critical role in water fetching and handling. Awareness of adult women respondents was particularly low about diseases such as cholera (9.2%) and dysentery (12.3%). Respondents who used piped water in dwelling and piped water to yard or plot or used hand pump had greater awareness about water borne diseases then those using public tap or stand pipe while around 16% respondents using piped water or hand pump were aware about water borne diseases. Awareness about cholera was significantly low among public tap or stand pipe users whereas awareness about dysentery and cholera was significantly low among hand pump users.

Respondents living in *kucha* houses had lower awareness level about water borne diseases than respondents living in *pucca* and *semi-pucca* houses. While 14% respondents living in *kucha* houses were aware about water borne diseases around 19% respondents in *pucca* and *semi-pucca* houses reported to be aware about water borne diseases.

Awareness regarding dysentery was particularly low about dysentery among respondents living in *kucha* houses whereas in *pucca* and *semi-pucca* houses the respondents knew little about dysentery and cholera. Families with APL status had more awareness about water borne diseases than those having BPL or Antyodaya cards. While 22% respondents above poverty line had awareness about water borne diseases only 14% BPL and Antyodata respondents reported being aware about water borne diseases. Increase in awareness level about water borne diseases increased with education level of respondents. While 8.6% respondents who were illiterate were aware about water borne diseases 54.4% respondents with higher education were aware about water borne diseases. More (16.5%) respondents from Hindu community were aware about water borne diseases compared to respondents from Muslim community (13.3%). Further, respondents from general category who were aware about water borne diseases was higher (33%) compared to respondents from ST (15%), SC (10%) and OBC (13%) categories. Further, the respondents who were wealthiest as per standard of living index had higher awareness regarding water borne diseases than the medium and poorest respondents. While 21.3% wealthiest respondents reported to be aware about water borne diseases around 18% medium and 12% poorest respondents reported to be aware about water borne diseases. *(Details in Annexure Table 3.A.13)*

► Incidence and type of water borne disease

At the time when the study was conducted, around one in four households reported that some family member in the household was suffering from water borne disease as shown in *Table 3.26*.

The condition was particularly critical in Sheohar block where 33.3% households reported that a family member was suffering from water borne disease. In more than one of four households a member of the household was reported to be suffering from water borne disease.

Table 3.27: Percentage distribution of HH according to incidence and type of water borne disease

Blocks	Dumri Katsari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Member suffering from water borne diseases						
Yes	26.7	28.5	27.4	33.3	28.3	28.8
No	73.3	71.5	72.6	66.7	71.7	71.2
Total number of HH	**315**	**316**	**318**	**315**	**321**	**1,585**
Type of water borne disease						
Diarrhoea	84.5	86.7	55.2	91.4	80.2	80.1
Jaundice	20.2	22.2	23.0	21.0	19.8	21.2
Dysentery	15.5	17.8	12.6	12.4	16.5	14.9
Cholera	7.1	6.7	8.0	4.8	11.0	7.4
Fluorosis	9.5	10.0	16.1	4.8	7.7	9.4
Typhoid	19.0	28.9	46.0	14.3	37.4	28.7
Any Other	1.2	1.1	1.1	1.9	2.2	1.5
No. of HH - member suffered WBD	**84**	**90**	**87**	**105**	**91**	**457**

► Children affected with diarrhea and seeking treatment

Around 80% households reported that family members were suffering or had suffered previously from diarrhea. The condition was particularly critical in Sheohar block as around 91% households reported to have faced incidence of diarrhea in their family. Further, around 21% households reported incidence of jaundice in their family at some point of time in the past or in present. The incidences of jaundice were critical in Purnahiya block. Around 15% households reported incidence of Dysentery in the past and this condition was critical in around 18% households in Piprahi. Further, around 7.4% households reported incidence of Cholera in their family. Around 9.4% households reported fluorosis. Fluorosis incidences were found to be particularly high in Purnahiya block as around 16% households reported incidence of fluorosis. Further, around 29% households reported incidence of typhoid. The condition was critical in 46% households in Purnahiya which is also among the highest. In Tariyani around 37% households reported incidences of Typhoid whereas around 30% households in Piprahi reported incidences of typhoid. *(Details in Annexure Table 3.A.14)*

As per the findings of the study, around 9.5% children (0-5 years) across the blocks suffered from diarrhea in the last one year. The percentage of households with cases of children with diarrhea was highest (12%) in Sheohar block.

Further, in Purnahiya and Tariyani block around 10% households reported incidence of diarrhea in children. Overall, around 93% households out of households, which reported incidence of diarrhea, 93% households reported receiving treatment. However, in Purnahiya block only 88% households reported receiving treatment. The preferred source of treatment for most (77.4%) households was private health facility. In Dumri Katsari 94.4% households reported to visit private health facility for treatment. Further, 9.5% households fetching water form a public tap or hand pump reported incidence of diarrhea among children.

Around 11.3% households living in *kucha* houses reported incidences of diarrhea among children. Only 2.4% household living in pucca houses reported incidences of diarrhea among children. There is an interesting finding regarding distribution of households as per economic status and incidences of diarrhea among children. While there was no significant difference in percentage of households reporting incidences of childhood diarrhea across card type or economic status, it was observed that all (100%) households who were poorest of poor or Antyodaya, approached private health facility for treatment. This was limited to around 79% in case of other households.

Percentage of households reporting incidences of diarrhea reduced from households belonging to ST to households from general category of population. While around 18% households from ST category reported incidences of diarrhea among children, it was only 4% in case of households from general category. Further, households from ST category access government health care more than households from any other castes.

Further, more percentage (12%) poorest households reported incidences of diarrhea compared to the wealthiest households which was almost half of the poorest households. Ironically, poorest households were accessing private health facility more than medium and wealthiest category of people. *(Details in Annexure Table 3.A.14)*

► Awareness about diarrhea

Overall, only 33.3% respondents were aware about diarrhea. Awareness was particularly low among adult female. Roughly, one in four adult women was aware about diarrhea. Across blocks, awareness about diarrhea was particularly low in Sheohar where only 30.8% respondents reported to be aware about diarrhea. Respondents living in *kucha* houses were less aware about diarrhea. While only 27% respondents living in *kucha* houses were aware about diarrhea 39-41% respondents in *pucca* and *semi-pucca* houses were aware about it. *(Details in Annexure Table 3.A.15)*

More BPL families were unaware about diarrhea compared to APL and Antyodaya families. While 29% respondents from BPL households were aware about diarrhea more than 40% APL and Antyodaya respondents knew about it. Awareness regarding diarrhea improved with education level. While 24% illiterate respondents knew about diarrhea, 70% respondents with higher level of education were aware about it. Respondents from ST category of population had little awareness about diarrhea. While only 15% respondents from ST category were aware about diarrhea, 49% respondents from general category were aware about it. Awareness regarding diarrhea improved with improved standard of living. While 24.5% poorest respondents were aware about diarrhea, around 43% wealthiest respondents were aware about it. *(Details in Annexure Table 3.A.15)*

Those who were aware about diarrhea among them, 30% respondents were aware that frequent bowel movement was symptom of diarrhea, whereas majority (89%) respondents were aware that watery stool was symptom of diarrhea. Around 36% respondents reported abdominal pain as a possible symptom for diarrhea. Around 4% respondents were unaware about the symptoms of diarrhea.

► Awareness about symptoms of diarrhea

Roughly, one in four respondents reported untreated water as cause of diarrhea. Percentage of such respondents was highest in Purnahiya where 53% respondents reported untreated water as the cause of diarrhea. Further, around 40% respondents reported not washing hand before eating as main cause of diarrhea. Overall, 17% respondents reported improper cooking of food as main cause for diarrhea whereas 8% respondents reported not washing vegetables or fruits before cooking as cause for it.

Only 4% respondents reported not washing of hands after defecation as the main source of diarrhea. However, 36% respondents reported lack of sanitation as main cause of diarrhea. *(Details in Annexure Table 3.A.16)*

Overall, 24% respondents felt that access to safe drinking water was important to prevent diarrhea whereas 46% respondents felt hand washing with soap was essential to prevent diarrhea. Almost one in two adult women and adolescent girls and little more than half adolescent boys felt that hand washing was critical to prevent diarrhea. Around 8% respondents felt that good personal hygiene was important whereas 32% respondents felt improved sanitation was an important way to prevent diarrhea. Only 3% respondents felt rotavirus vaccination was important to prevent diarrhea.

Around 47% respondents felt that ORS can treat diarrhea. 57% adolescent boys reported ORS as treatment for diarrhea. Around 31% respondents felt homemade fluid (sugar and salt fluid) could treat diarrhea. Around 43% adult female respondents felt that medicine from health center could cure diarrhea. Around one in two adult male and female respondents reported medicine from heath center as treatment for diarrhea. *(Details in Annexure Table 3.A.16)*

3.5. Community Awareness about Water Related Schemes and Water Testing

3.5.1. Water Quality Testing:

During the time of the study, around 20% households reported that they were aware that water quality testing was conducted by government or community body as given in *Table 3.28*. In Tariyani around 23% households reported that they were aware about water quality testing conducted by government or community body. The awareness level of households about water quality testing was least in block Sheohar as only 16% households reported that they were aware about water quality testing conducted by government or community body.

Table 3.28: Percentage distribution of HHs according to status of water quality testing by government / community body

	Dumri Katsari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Water Quality testing conducted by govt./comm body						
Yes	22.2	19.9	17.6	16.2	23.4	19.9
No	67.0	74.1	77.4	76.2	70.4	73.0
Don't know	10.8	6.0	5.0	7.6	6.2	7.1
Total number of HH	**315**	**316**	**318**	**315**	**321**	**1,585**
Water test result						
Water is safe for drinking	27.1	31.7	26.8	39.2	49.3	35.2
Water is unsafe for drinking, but safe for other HH purposes	10.0	11.1	14.3	9.8	4.0	9.5
Water is unsafe for all the purposes	1.4	1.6	1.8	2.0	2.7	1.9
Did not share the results	61.4	54.0	53.6	49.0	44.0	52.4
Any other (specify)	0.0	1.6	3.6	0.0	0.0	1.0
No of Household where water quality test	**70**	**63**	**56**	**51**	**75**	**315**

► **Status of water quality testing**

Further, around 35% households overall were aware about the result of the water quality testing as water was safe for drinking. This awareness was highest in Tariyani block where 49% households knew the result of water testing as water was safe for drinking whereas, lowest awareness about water test result was among households of Purnhiya and Dumri Katsari block as 27% households in both these blocks reported that they knew that the result of water quality test was that the water was safe for drinking. Further, only 9% households knew that the result of water quality testing of their water source was that the water was unsafe for drinking but safe for other purposes. This awareness was lowest in Tariyani block as only 4% households knew that the water from the water source was unsafe for drinking but safe for other purposes. Overall, 2% households knew that the result of water quality testing was that the water was unsafe for all purposes. One in two households reported that the result of water quality testing was not shared with them. More than 60% households in Dumri Katsari reported that results of water quality testing by government or community body was not shared with them.

Further, around 35% households overall were aware about the result of the water quality testing as water was safe for drinking. This awareness was highest in Tariyani block where 49% households knew the result of water testing as water was safe for drinking whereas lowest awareness about water test result was among households of Purnahiya and Dumri Katsari block as 27% households in both these blocks reported that they knew that the result of water quality test was that the water was safe for drinking. Further, only 9% households knew that the result of water quality testing of their water source was that the water was unsafe for drinking.

This awareness was lowest in Tariyani block as only 4% households knew that the water from the water source was unsafe for all purposes. Overall, 2% households knew that the result of water quality testing was that the water was unsafe for all purposes. One in two households reported that the results of water quality testing were not shared with them. More than 60% households in Dumri Katsari reported that results of water quality testing by government or community body was not shared with them.

As reflected in *Table 3.29*, out of respondents surveyed in WFP intervention area 24% said that any government or community body conducted water quality test in their area, whereas comparatively lesser percentage of respondents (16.8%) out of total surveyed in WFP non-intervention areas said so.

Table 3.29: Percent distribution of respondents in WFP intervention and non-intervention areas who reported that water quality testing was conducted by government or community body in their area

Name of GP	Any government or community body conduct a water quality testing		
	Yes	No	Don't know
WFP intervention GPs	**24.0**	**69.6**	**6.4**
Mahamadpur Katsari	19.3	67.1	13.6
Parsauni Baij	29.2	68.9	1.9
Basantpatti	18.9	79.2	1.9
Sarsaula Khurd	20.0	73.1	6.9
Belahiya	33.6	60.8	5.6
WFP non-intervention GPs	**16.8**	**75.5**	**7.7**
Jahangirpur	22.9	66.7	10.5
Rohua	27.1	67.1	5.7
Belawa	21.4	67.9	10.7
Kuama	2.9	94.3	2.9
Adouri	16.2	77.1	6.7

Name of GP	Any government or community body conduct a water quality testing		
	Yes	No	Don't know
Basant Jagjiwan	17.8	75.7	6.5
Harnahi	14.3	74.3	11.4
Kushhar	2.9	97.1	0.0
Chhatauni	15.4	78.3	6.3
Narwara	14.3	77.1	8.6
Total	**19.9**	**73.0**	**7.1**

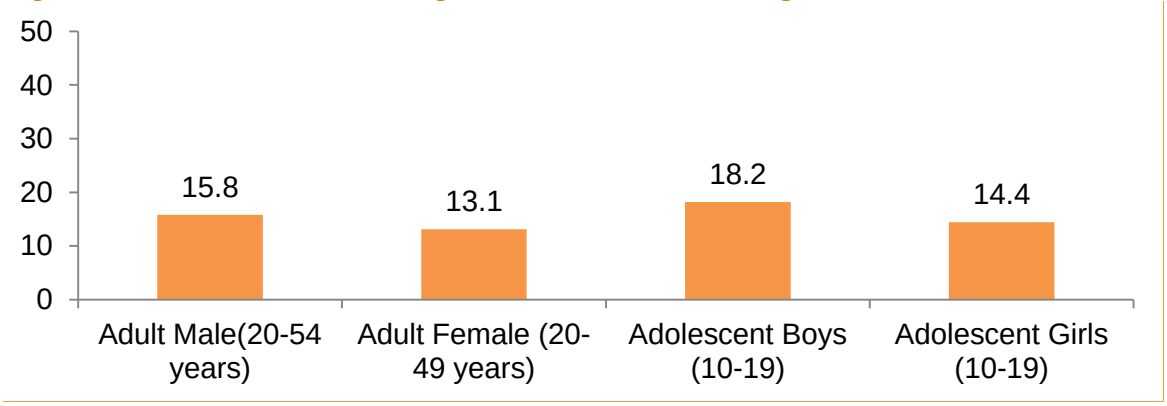
Box: FGD and Observational Findings: Community Based Mechanisms

- Some participants said that no user fee was levied but this was possibly because some villages in which FGDs took place were non-intervention villages of WFP. In WFP project intervention village's user fee was levied on those who used WFP hand pumps.
- In some villages participants were aware of the VHSNC/VHSC or any committee related to water or sanitation aspects
- In some villages participants were not aware about community based water scheme except government hand pumps (which do not have any maintenance mechanism)
- In those villages were WATSAN committee formed by WFP partners existed -
- Water points constructed in past 2 years by WFP were in better condition. On observation they were found clean and maintained.
- Some participants said that WATSAN committee charged 100 rupees per HH per month for usage. On an average 25 HH were covered by each WFP water point. There is one WATSAN committee for each WFP water point
- A member if the WATSAN Committee on maintenance and repairing of water points said, "Every HH is supposed to contribute Rs 5 per month but it is not paid by all or on time, thus they are short of funds. They have got the technical repairs done for the hand pumps by calling the Jal Bandhu Shukhati Ram. He charges Rs 300 per visit. The roof of the water point was Kachha roof thus normally gets depreciated in 6 months' time especially during rains. They last got it repaired 3 months back now it is swept away by heavy windfall in recent past."

3.5.2. Water Related Schemes:

Interestingly, overall 85% households were not aware about the programs/schemes on drinking water. Further, only around 16% adult males and 13% adult females were aware about any programs or schemes on drinking water.

Figure 3.10: Awareness of Program/Scheme on Drinking Water



The awareness level of adolescent boys was more than other respondents groups as around 18% adolescent boys reported that they were aware about the schemes and programs on drinking water. Further, around 14% households were aware about the schemes and programs on drinking water. The level of awareness about programs and schemes on drinking water was particularly low among adult male respondents in Dumri Katsari and Purnahiya, among adult female in Purnahiya, among adolescent boys in Sheohar and adolescent girls in Tariyani.

► Aware of type of program/scheme on drinking water

Overall 34.3% households were aware about Everyone Forever program, 12% were aware about Swachh Bharat Abhiyaan and only 2% were aware about Seven Resolves program. One in two households reported that they did not remember the name of the program or scheme. More than 45% households in Dumri Katsari and Purnahiya reported of being aware about the Everyone Forever program. Around 35% households in Tariyani reported remembering this program, whereas, one in four households in Piprahi remembered this program. When the households were asked if they knew about the agency which was implementing these programs, most (64%) households reported that these programs were being implemented by government while only 13% households reported that these programs were being implemented by non-government organizations. Around 21% households reported that they were not aware about the implementing agencies of these programs. The respondents were not aware about the name of the program, however, they were aware about the implementing agency probably through the outreach activities taking place in the villages.

Table 3.30: Percentage distribution of respondents aware about type of program/scheme

Block	Dumri Katsari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Name of Program/Scheme						
Everyone Forever	48.9	25.5	48.8	19.2	34.8	34.3
Seven Resolves	0.0	5.5	2.4	0.0	0.0	1.7
Swacch Bharat Abhiyaan	2.2	5.5	4.9	19.2	26.1	11.7
Don't Know the Name	48.9	63.6	43.9	59.6	37.0	51.5
Other (PWD, NGO etc.)	0.0	0.0	0.0	1.9	2.2	.8
Who is implementing this program						
Government	73.3	76.4	75.6	34.6	63.0	64.0
NGO	2.2	5.5	4.9	30.8	21.7	13.4
PRI	2.2	0.0	2.4	0.0	2.2	1.3
Don't Know	22.2	18.2	17.1	34.6	13.0	21.3
No. of Respondents aware about the govt. program/scheme	**45**	**55**	**41**	**52**	**46**	**239**

► Awareness about benefit of the drinking water scheme/program

Overall, one in two respondents reported that the respective program mentioned in *Table 3.31* was beneficial for them. One in two male and adolescent girl respondents reported that the program was beneficial for them whereas 66% adolescent boys and around 44% adult women reported that the program or scheme was beneficial for them.

When asked about the benefits of the scheme or program of the government or non-government bodies, around 63% respondents said that the households were able to use improved water source and the water used was free from contamination in all seasons, around 38% respondents said that the main benefit was reduction in distance of source from households, around 15% respondents reported that there was reduction in time for fetching water, around 10% respondents reported increase in water use per capita, around 9% respondents reported reduction in health expenses and around 11% respondents reported reduction in incidences of water borne diseases.

Table 3.31: Percentage distribution of respondents according to the nature of benefit received by government program/ scheme on drinking water

	Type of Respondents				
	Adult Male (20-54 years)	Adult Female (20-49 years)	Adolescent Boys (10-19)	Adolescent Girls (10-19)	Total
Program is beneficial for HH					
Yes	51.4	43.7	65.9	50.0	51.5
No	48.6	56.3	34.1	50.0	48.5
Total number of respondents aware about drinking water program/schemes	**107**	**71**	**41**	**20**	**239**
Benefit					
HH using improved water source and free of any contamination in all seasons	60.0	67.7	51.9	90.0	62.6
Reduction in distance of source from HH (m)	40.0	35.5	44.4	20.0	38.2
Reduction in time taken to fetch water (min)	18.2	9.7	18.5	0.0	14.6
Increase in water use per capita (lpcd)	10.9	6.5	14.8	0.0	9.8
Reduction in health related expenses	5.5	12.9	14.8	0.0	8.9
Reduction in incidences of water borne diseases	14.5	6.5	11.1	0.0	10.6
No. of respondents beneficial with the program/Scheme	**55**	**31**	**27**	**10**	**123**

3.6. Community's Awareness about and Participation in any Behavior Change Communication including Social Art Activities in their area

The respondents were asked whether they were aware of any BCC activity on water quality and treatment taken place in their area. Those who were aware were further asked about their participation in various activities, rating of activities, benefit, messages given in the activities and suggestions. This is to be noted that besides other BCC activities, the social art activities organized by WFP i.e. Street Plays, MDS/Drama, and Short Films were specifically covered under this sub section.

► Awareness about BCC including Social Art Activities

Overall, 22% respondents were aware about any social art activity related to water quality and treatment taken place in their area. The respondent group wise analysis shows that higher percentage of adolescents (boys 33.8%, girls 31.7%) were aware about these activities as compared to adults (21.9% male, 14.8% female).

Further, out of those who were aware about BCC activities 20.8% said to be aware of MDS/drama, 16.2% about street plays, and 4.5% were aware about screening of short films (Social Art activities conducted by WFP). 5% respondents were aware about house to house counseling.

(*Details in Annexure Table 3.A.17*)

Further, higher proportion of respondents were aware about BCC activities on water quality and treatment taken place in their area in Sheohar (32.7%) and Piprahi (30.1%) blocks, compared to Dumri Katsari (17.8%), Purnahiya (15.1) and the least in Tariyani (14.6%). Around 28.5% respondents in Piprahi and 31.7% respondents in Sheohar reported being aware of MDS/drama whereas 20.6% and 26% respondents in Piprahi and Sheohar reported being aware of street plays respectively.

Proportion of respondents aware about the BCC including social art activities increased with increase in the education levels. While 15.2% illiterate respondents were aware about social art activities, 33.3% respondents with higher education were aware about the same. Further, respondents with higher level of education seemed to have a liking for short films more than respondents with lower level of education. 12.3% respondents with higher education reported to be aware about screening of short films. They also were more aware about MDS/drama (31.6%) and street plays (26.3%).

23% respondents from Hindu community were aware about social art activities whereas only 11.7% of Muslim community knew about it. Further, awareness about social art activities was almost same among respondents from general category (24.5%), SC (23%), OBC (21.1%) and lowest among schedule tribes.

This indicates that all the social groups were equally covered under the social art activities except schedule tribes. This is to be noted that the ST were 2.6% of total sample of respondents covered under the study. There was no significant difference in awareness of respondents across categories under standard of living index. *(Details in Annexure Table 3.A.17)*

► Awareness about activities in WFP intervention & non-intervention villages

In intervention villages total of 27.3% and in non-intervention villages 18.1% of respondents were aware about any BCC including social art activity organized in in the study area. Majority of respondents were aware about drama/MDS as presented in *Table 3.32.*

Table 3.32: Percentage distribution of respondents who were aware about any BCC including social art activities in intervention and non-intervention villages

Type of village	Aware about any social art activities	No. of HH	Social art activities					No. of HH aware about any activities
			MDS/Drama	Street plays	Screening of short films	House to house counseling	Any other	
Intervention Village	27.3	670	96.2	79.2	21.3	19.1	0.0	183
Non-Intervention Village	18.1	915	91.0	67.5	19.9	25.9	.6	166
Total	**22.0**	**1585**	**93.7**	**73.6**	**20.6**	**22.3**	**.3**	**349**

► Participation in BCC including social art activities on water quality and treatment

Out of those respondents who were aware of the BCC activities;18.6% stated that they participated in any BCC/social art activity related to water quality and treatment. Participation was higher among adult female (22%) as compared to the other categories of respondents i. e. adolescent girls (18%), adult male (18.1%), adolescent boys (15.8%).

Participation rate was particularly high in Purnahiya block where 33.3% respondents reported to have participated in BCC including social art activities related to water quality and treatment. About one in every four respondents in Tariyani (25.5%) and Piprahi (22%) block reported to have participated in social art activities related to quality of water. Whereas least participation was in Sheohar (8.7%) and Dumri Katsari (12.5%) blocks.

Further the analysis of level of participation of respondents in social art activities (on water quality and treatment) organized by WFP indicates that the highest participation was in MDS/drama (22.3%) followed by street play (16.2%) and short films (4.5%).

More respondents (around 19%) from the Hindu community reported to have participated in social art activities on water quality and treatment as compared to 13.3% from Muslim community.

The poorest as per the standard of living index had the highest participation. While 21% respondents from the poorest category participated in social art activities, the participation was 19% among respondents falling in wealthiest category of status of living index. (*Details in Annexure Table 3.A.18*)

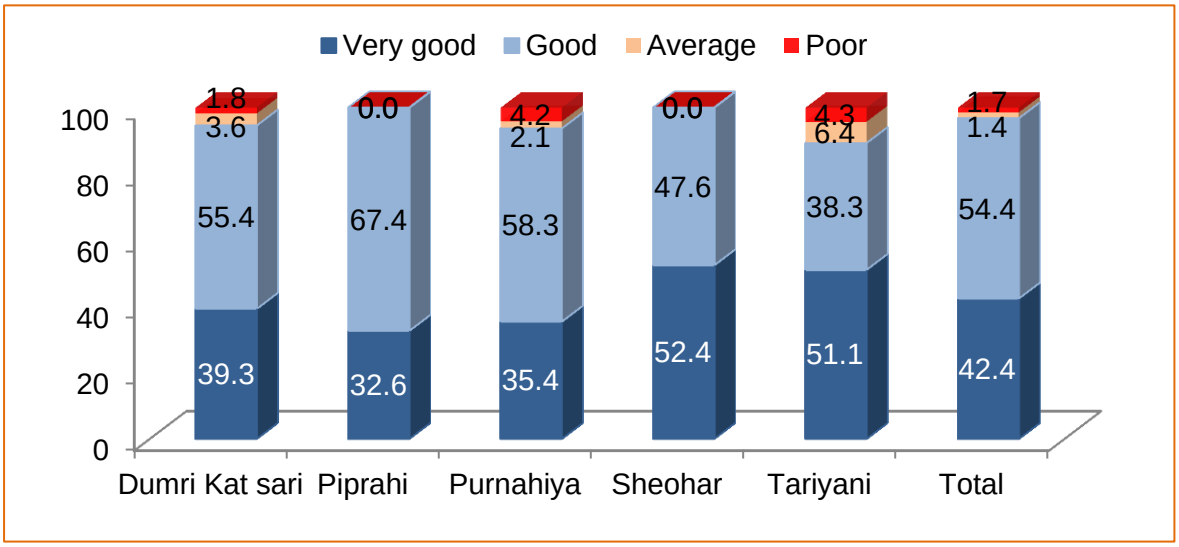
► Rating of Activities

When the respondents were asked to rate the activities, 42.4% respondents felt the activities very good, 54.4% felt good, 1.7% and 1.4% respondents felt that activities were just average and poor respectively. Further 80.8% respondents felt that the social art activities were beneficial for the community. (*Details in Annexure Table 3.A.18*)

More respondents (32%) from the general category had participated in the social art activities compared to other social groups. In fact 20% respondents who participated in the social art activities belonged to schedule tribe.

However, 46% participants from other backward caste felt very good after participating in the social art activities whereas in case of other social groups the percentage of respondents ranged from 35-40%. The block wise rating for BCC activities including social art is given in figure below.

Figure 3.11: Block wise rating of BCC activities (% of respondents)



Respondents from other backward caste also found the social art activities more beneficial compared to respondents from other social categories. Ironically, the poorest respondents did not find it as beneficial as the wealthiest respondents. While 82% respondents reported the social art activities to be beneficial, 76% poorest respondents reported the social art activities as beneficial for the community. (Details in *Annexure Table 3.A.18*).

3.7. Water Facilities at School

As per the study, percentage distribution of adolescent boys and girls according to drinking water facility and its status at their schools, on an average, around 77% boys and girls reported that their school had water point or facility. More than 80% boys and girls in blocks Tariyani and Sheohar reported presence of drinking water points or facilities in school. However, only 70% boys and girls in block Dumri Katsari reported presence of drinking water point or facility in school. In Piprahi block while around 81% girls reported presence of drinking water point in school 71% boys reported its presence. Interestingly, in Purnahiya block only 59% girls reported presence of drinking water point or source as presented in *Table 3.33.*

Findings of FGD with School Children:

The school children in focus group discussion shared that they were not sure and aware that whether the water quality test was conducted at the water point in their school or not. Even if it had been conducted ever, they were not informed about it or about the results of tests by the school authorities.

In some of the FGDs school children shared that quality of drinking water was not up to the mark in their school. They perceived so as they could sense it through bad taste or smell in the water. In such cases the children consumed water from only that hand pump in school where taste and smell was normal or good else carried water from their home. However water quality issues were not reported by any of the children going to schools where WFP has installed water points.

On being asked on usage of water point in school; 73% boys and 70% girls responded in affirmative. If we observe block-wise response, 86.7 & boys and 75% of girls in Sheohar block reported using drinking water points and facilities whereas 80% boys and 71% girls in Tariyani reported using drinking water points.

Use of water points in schools was found to be dismal in Purnahiya block as only 55% girls and 64% boys reported using drinking water points. In Dumri Katsari and Piprahi around 68% boys and 75% girls reported to use drinking water points or facilities in school.

Around 61% boys and 63% girls reported that drinking water facility in their school was functional. On the contrary, around 12% boys and 10% girls reported that few drinking water points in school were functional.

Additionally, around 4% boys and girls reported that none of the water point in their school was functional. This problem seems critical in Sheohar block where 9% boys and 7% girls reported that the drinking water point was functional.

Further, as per the findings of the study, most of the schools had single tap for drinking water as 36% boys and 42% girls reported presence of only one tap for drinking water in their school. One in two girls in Tariyani and Dumri Katsari, Piprahi, Purnahiya, Sheohar and Tariyani reported presence of single tap for drinking water. However, one in two boys and 43% girls reported presence of multiple taps at same level for drinking water as presented in *Table 3.32.*

Around 40% boys and 37% girls reported water logging near water station or point. This problem of water logging was critical in Purnahiya block as around 65% boys and girls reported water logging near drinking water facility. One in two girls in Tariyani reported water logging near water point. Further, around 42% boys in Sheohar reported water logging near water point.

When the respondents were asked about distance of toilet from drinking water station an important and interesting finding came to light. While 64% boys reported that the toilet was less than 50 meters from drinking water station, only 47% girls reported distance of toilet as less than 50 meters from drinking water facility. This issue seems particularly critical in Sheohar where 42% girls reported that the toilet was more than 500 meters away from the drinking water facility as presented in *Table 3.32.*

On an average, 87% boys and around 90% girls found the water good in taste whereas around 7% boys and 6% girls found the taste of water as sour. Around 4-5% students reported that carry their own drinking water from home hence, they have never tasted the water in school. Further, one in four boys and around 18% girls in Purnahiya found the taste of water as sour which is quite critical as in other blocks percentage of boys and girls who found the taste of water was in single digit.

Table 3.33: Percent distribution of adolescent boys and girls according to drinking water points/facilities, their usage and functionality in their schools

Adolescent	Dumri Katsari		Piprahi		Purnahiya		Sheohar		Tariyani		Total	
	B	G	B	G	B	G	B	G	B	G	B	G
School have drinking water point/ facility												
Yes	69.6	74.1	71.1	81.5	72.7	58.6	88.9	85.7	82.2	85.7	76.9	77.0
No	30.4	25.9	28.9	18.5	27.3	41.4	11.1	14.3	17.8	14.3	23.1	23.0
No. of Respondents	**46**	**27**	**45**	**27**	**44**	**29**	**45**	**28**	**45**	**28**	**225**	**139**
Use the water point at school												
Yes	67.4	74.1	68.9	77.8	63.6	55.2	86.7	75.0	80.0	71.4	73.3	70.5
No	2.2	0.0	2.2	3.7	9.1	3.4	2.2	10.7	2.2	14.3	3.6	6.5
Functional status of water point												
Yes, all are functional	56.5	55.6	60.0	70.4	54.5	51.7	68.9	60.7	66.7	75.0	61.3	62.6
Yes Few are functional	10.9	18.5	11.1	7.4	11.4	3.4	11.1	17.9	13.3	3.6	11.6	10.1
None are functional	2.2	0.0	0.0	3.7	6.8	3.4	8.9	7.1	2.2	7.1	4.0	4.3
Level of Water Station												
Yes, Multiple taps at same level	21.7	11.1	26.7	18.5	20.5	24.1	51.1	42.9	31.1	21.4	30.2	23.7
Yes, multiple taps at different levels	10.9	11.1	8.9	22.2	13.6	6.9	11.1	7.1	11.1	7.1	11.1	10.8
Single tap	37.0	51.9	35.6	40.7	38.6	27.6	26.7	35.7	40.0	57.1	35.6	42.4
Water logging near water station/point												
Yes	34.4	30.0	34.4	18.2	65.6	64.7	42.5	29.2	27.0	50.0	40.5	37.4
No	65.6	70.0	65.6	81.8	34.4	35.3	57.5	70.8	73.0	50.0	59.5	62.6
Distance of toilet from drinking water station facility/ point												
Less than 50 Meter	65.6	45.0	59.4	45.5	62.5	58.8	65.0	37.5	64.9	50.0	63.6	46.7
50-100 Meters	12.5	25.0	9.4	18.2	21.9	11.8	10.0	20.8	13.5	25.0	13.3	20.6
101-500 Meters	0.0	0.0	0.0	0.0	0.0	5.9	0.0	0.0	0.0	0.0	0.0	.9
500 + Meters	21.9	30.0	31.3	36.4	15.6	23.5	25.0	41.7	21.6	25.0	23.1	31.8
No. of Adolescent Respondents reported to have drinking water station facility/ point at school	**32**	**20**	**32**	**22**	**32**	**17**	**40**	**24**	**37**	**24**	**173**	**107**

B- Boys; G- Girls

► Perception of adolescents on water taste & quality

Further, when asked about presence of bad smell in drinking water from source in school, around 32% boys and 18% girls reported they have always experienced bad smell in the water from drinking water source in school. The condition is particularly serious in schools in Dumri Katsari, Sheohar and Tariyani where more than 25% girls and boys reported experiencing bad smell in drinking water from source in school as presented in *Table 3.33.*

Hand washing facility or place was available in most of the schools as 66% boys and 53% girls reported presence of the same in their schools. However, only 37% girls in Tariyani and 56% girls in Sheohar reported presence of water point for hand washing. Further, separate hand washing point for girls and boys was reported by 14% boys and 16% girls. One in four girls reported separate hand washing point for girls and boys in Sheohar block.

Around 59% boys and 74% girls reported presence of water point in school toilet. While 90% girls in Dumri Katsari reported water facility in toilet in school only 47% boys reported presence of water facility in toilet. In general, more boys reported lack of water facility in toilet compared to girls. In only Tariyani block equal percentage of boys and girls reported presence of water facility in school toilet as presented in *Table 3.34.*

Table 3.34: Percent distribution of adolescent boys and girls according to the taste and quality of water at school

Adolescent	Dumri Katsari		Piprahi		Purnahiya		Sheohar		Tariyani		Total	
	B	G	B	G	B	G	B	G	B	G	B	G
Taste of water at school												
Good	90.6	95.0	90.6	100.0	71.9	82.4	95.0	83.3	86.5	87.5	87.3	89.7
Sour	3.1	5.0	3.1	0.0	25.0	17.6	2.5	8.3	5.4	4.2	7.5	6.5
Never tasted	6.3	0.0	6.3	0.0	3.1	0.0	2.5	8.3	8.1	8.3	5.2	3.7
Ever Experienced bad smell in school drinking water												
Yes, always	25.0	25.0	31.3	9.1	21.9	5.9	30.0	25.0	48.6	20.8	31.8	17.8
Yes, sometimes	15.6	20.0	15.6	13.6	40.6	29.4	10.0	16.7	13.5	20.8	18.5	19.6
Never	59.4	55.0	53.1	77.3	37.5	64.7	60.0	58.3	37.8	58.3	49.7	62.6
School have water point station facility/point for hand washing												
Yes, common	56.3	55.0	68.8	63.6	68.8	70.6	77.5	45.8	56.8	37.5	65.9	53.3
Yes, separate	18.8	10.0	9.4	9.1	21.9	23.5	7.5	25.0	13.5	12.5	13.9	15.9
No	25.0	35.0	21.9	27.3	9.4	5.9	15.0	29.2	29.7	50.0	20.2	30.8
School toilet have water facility												
Yes	46.9	90.0	50.0	72.7	65.6	70.6	62.5	66.7	70.3	70.8	59.5	73.8
No	53.1	10.0	50.0	27.3	34.4	29.4	37.5	33.3	29.7	29.2	40.5	26.2
No. of Adolescent Respondents	**32**	**20**	**32**	**22**	**32**	**17**	**40**	**24**	**37**	**24**	**173**	**107**

► School Sanitation Committees and its Functions

As per the findings of the study, the percentage of schools with school sanitation committee was very low. Only 16% boys and 17% girls reported presence of school sanitation committee. Presence of school sanitation committee is noteworthy in Tariyani and Sheohar blocks as 25% or more boys and girls reported presence of school sanitation committee in school as shown in *Table 3.35*.

Table 3.35: Percentage distribution of adolescent boys and girls according to having School Sanitation Committee and function of SSC

Adolescent	Dumri Katsari		Piprahi		Purnahiya		Sheohar		Tariyani		Total	
	B	G	B	G	B	G	B	G	B	G	B	G
School have sanitation Committee/student brigade/school sanitation club												
Yes	8.7	11.1	13.3	7.4	4.5	13.8	24.4	25.0	26.7	28.6	15.6	17.3
No	91.3	88.9	86.7	92.6	95.5	86.2	75.6	75.0	73.3	71.4	84.4	82.7
No. of Respondents	**46**	**27**	**45**	**27**	**44**	**29**	**45**	**28**	**45**	**28**	**225**	**139**
Function of SSC												
Keep School Environment Clean	25.0	0.0	16.7	0.0	100.0	25.0	18.2	0.0	50.0	12.5	34.3	8.3
About Safe water use	0.0	33.3	16.7	0.0	0.0	25.0	9.1	0.0	41.7	0.0	20.0	8.3
Keep school and yourself clean	25.0	33.3	50.0	100.0	0.0	0.0	45.5	57.1	0.0	37.5	25.7	41.7
Provide hygiene food to the students on time	0.0	0.0	0.0	0.0	0.0	25.0	0.0	14.3	0.0	0.0	0.0	8.3
Don't Know any Thing	50.0	33.3	16.7	0.0	0.0	25.0	27.3	28.6	8.3	50.0	20.0	33.3
No. of Adolescent reported to have Sanitation Committee in School	**4**	**3**	**6**	**2**	**2**	**4**	**11**	**7**	**12**	**8**	**35**	**24**

► Training or orientation on safe drinking water

Overall, around 18% boys and 11% girls reported to have received any training or orientation on water. While in Tariyani block 31% boys reported to have received training or orientation only 2.3% boys in Purnahiya reported to have received any training or orientation. In case of girls, 14.3% girls in Sheohar reported to have received training or orientation whereas only 7.4% girls in Piprahi reported to have received training or orientation on water (Details in Annexure Table 3.A.19)

The frequency of organized training was weekly or monthly as overall 80% girls and 50% boys have reported. In Purnahiya 100% boys said that the training or orientation was organized weekly whereas, only 33% girls reported the same. Similarity of responses from boys and girls was observed in Tariyani and Sheohar regarding weekly organization of training or orientation. Interestingly, while half of the boys reported that training and orientation programs were not frequently organized only 20% girls supported this response.

Around half of both boys and girls reported that the training programs were conducted by government organizations while 15% boys and 20% girls responded that the training or orientation programs were conducted by private organizations. Around 17% boys and 27% girls responded that the programs were conducted by NGOs.

Overall, 52.5% boys and 60% girls reported that the main topic covered during the training program was regarding water treatment whereas 37.5% boys and 20% girls reported prevention from water borne diseases as the main topic covered during the training. Only 2.5% boys and 20% girls reported household remedies for water borne diseases as main topic covered during training program. Overall, 92.5% boys and 87% girls reported that they felt that the trainings were beneficial for them. *(Details in Annexure Table 3.A.19)*

FGDs with adolescents

- Some children said that at home some of them use boiled water but at school direct water from hand pump is consumed
- Hand washing with soap was not always practiced by children as soap was rarely available at school. Long queue time at school at water pump also deterred them going for hand washing at critical times
- At private schools some of the children used treated water but at home direct water from hand pump was consumed. Hand washing with soap was not always practiced by them at home
- The children felt that a lot of time was wasted in long queue for hand washing and problems increased during summer. Further, the children were not aware about the mechanism of repair of the water point at school broke down
- In some villages children said that WATSAN committee was present in the school (especially where WFP has installed WATSAN infrastructure in the schools). Each child had to pay per month for the usage of services in school. However, there were different versions on amount paid. Some of them even said they had not paid anything.
- Personal hygiene was taught in school but some children followed it some not as nobody asked them for this. Only some time parents/ teachers pointed out.
- Money for dress is spent on other aspects therefore, children wear dirty and uniforms are not available in sufficient numbers
- Majority knew that the open defecation may lead to diseases but how and what type of diseases and its consequences not clear to them
- Majority were aware that cleanliness, hand washing personal hygiene is important but it did not fall in priority.
- None of them was aware of SBM. When asked about SBM or Mahatma Gandhi's spectacle as symbol some of them instantly answered "It's new 2000 rupee note"

3.8. Sanitation Practices

The overall presence of toilets was reported among 37.2% households (less than half of total households) across various socio-economic markers during the study. The findings point out to the fact that education and wealth have greater influence on sanitation practices than religion, and caste upon the study population. Some of the interesting findings are given in *detail in Table 3.A.20 in the Annexure*. Majority (56%) of the households with *pucca* houses reported to have toilet facility. It was the *kucha* (72%) and *semi-pucca* (57%) houses which majorly lacked toilet facility.

However, it would be important to note that among kaccha and semi-pucca houses, 28% and 43% houses had toilet facility respectively. Further 54% of APL families did not have toilets in their homes. As per the findings of this study, economic status had an influence on having toilet facility at home as almost two-third of the respondents in the wealthiest Standard of Living Index had toilets at home. Around total 65% households in BPL and Antyodaya category did not have toilet facility. The sex of the head of the household also did not matter in having toilets in homes, as almost 62% household (each) heads from both the sexes did not have toilets.

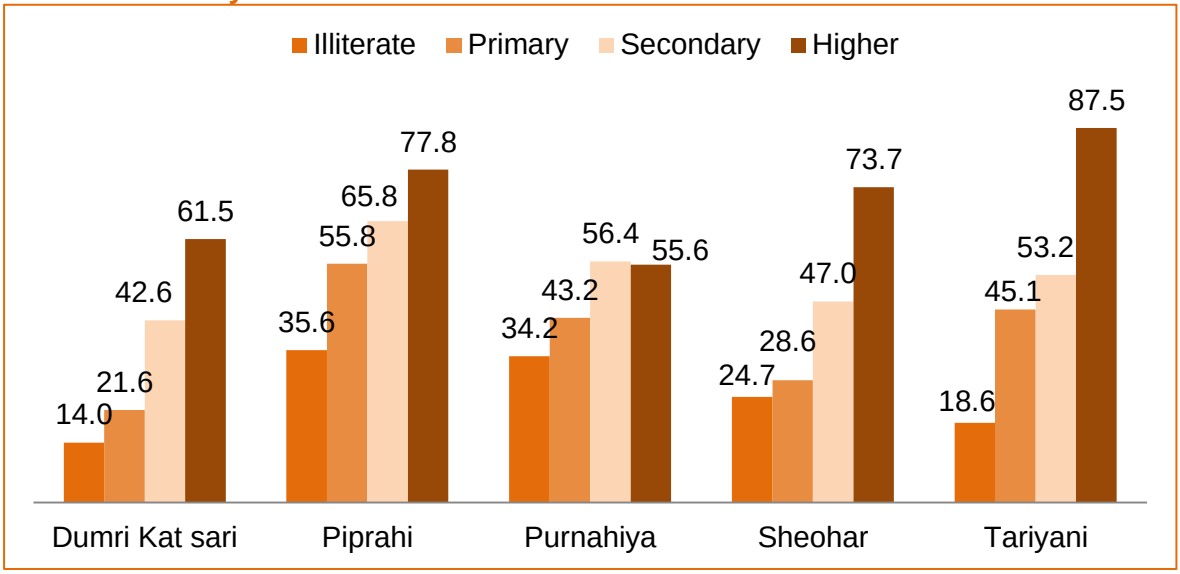
Sanitation – Interaction with Government Functionaries

During IDIs with the District and Block Level Nodal persons of Government they stated that only 3 Panchayats are declared ODF in the district till now, but as per the FY 2016-17 target Sheohar districts is planned to be made first ODF district in the state. Official stated that they are working at full swing towards this and mapped and listed the Panchayat wards to be made ODF at priority. They appreciated the contribution of WFP project in taking forward the IEC activities towards achieving ODF target. As per their suggestions WFP team may provide the human resources who could be trained and deployed by districts and blocks in triggering process as resource persons and should provide more IEC related support in the priority wards identified by government for achieving ODF status.

A significant relation between literacy and presence of toilet facility is observed from the findings of this study. The *percentage of households with toilet facility increases with increase in literacy level and this applies invariably to all the blocks*. In case of head of households having completed secondary education, overall 72.7% households had toilet in their homes across the five blocks. On the other hand, in case of illiterates 74.3% households did not have toilets across the five blocks, with Dumri Katsari standing out at 86% households not having toilets as presented in *Fig 3.12*.

About 38.2% of Hindus and 28% of Muslim respondents of the total interviewed had toilets in their homes. However, in the social hierarchy 58.2% of general caste population had toilets; whereas, three-fourths of SCs (75.5%), two-thirds of STs (63.4%) and OBCs (63.8) did not have toilets in their homes. As per the findings of the study, there is higher probability to find toilet facility in households with smaller family size. The probability of finding toilet facility also increases with improved standard of living index. As per the findings of the study, 76% households with toilet facility were wealthiest, while only 13% poorest households had toilet facility.

Figure 3.12: Percentage distribution of respondents across educational level having sanitation facility



Further, as per the findings of the study, out of the surveyed households with toilet facility, most (83%) households had improved sanitation and remaining 17% had not-improved sanitation facility. Improved sanitation was defined with the presence of three kinds of systems i.e., flush to sewer/septic tank/pit, secondly biogas or pit toilet and thirdly twin pit or composite toilet. Non-improved sanitation was defined with the presence of flush/pour flush to elsewhere, secondly open pit and thirdly dry toilet. Out of the those households with improved sanitation facility, 67% has flush to sewer/septic tank/pit system, 14% had twin pit or compost toilet system and only 2% had biogas or pit toilet. On the other hand, out of the households with non-improved toilet facility, most (7.4%) households were using dry toilet and around 4% were using open pit. Only 2.5% were using flush/pour flush to elsewhere.

Further, if we look at block-wise distribution of toilet facility Purnahiya (21.6%), Dumri Katsari (18.8%) and Piprahi (18.4%) had almost one in every five households using non-improved type of toilet. Percentage of households with dry toilet was particularly high (14.3%) in Piprahi and Dumri Katsari (13.3%). In addition, out of all the *kuccha* households with toilet facility, around 14% were using dry pit toilet. Percentage of non-improved toilets increased with increasing poverty and so did the use of dry and pit toilets. Further, one in every four Scheduled Caste household was using non-improved sanitation facility. Around 35.6% of poorest households on the SLI were using non-improved sanitation facility. *(Details in Table 3.A.21 in Annexure)*

FGD findings on Sanitation & Hygiene

- At the time of FGD rapid toilet construction work was in progress in some of the village visited for collection of information especially in Taryani block
- Majority of HHs were going for open defecation
- There was no panchayat or community mechanism for waste collection and disposal found in any of the villages visited for FGDs. It was done by households in their own private area. Common places were uncovered
- The garbage at HH level was collected and dumped in nearby field. People did not care about any garbage outside the boundary of their household
- For bathing purposes some households used cloth as temporary sheds
- In some schools toilets were present but they were locked hence they were not used. In such cases boys used to go out in forest/field which used to take 8-10 minutes of their academic time per day

3.5.3. Reasons for constructing toilet facility for those having toilet at home:

Of the total 37.4% households having toilet facility various reasons were cited for construction of toilets at home. The most important reason for construction of toilets was safety of women, as stated by 77.8% of respondents across all age groups interviewed. This was followed by reasons such as, government incentive (21%) and for visitors (16.4%). Thus, safety of women, financial support and social position within family and community were considered among most important aspects for constructing and using toilets. These aspects could be used by policy makers and implementation agencies to drive people towards promoting use of toilets.

Table 3.36: Percentage distribution of adult and adolescent respondents according to reason for constructing toilet facility at HH

Reason for construction of toilet at house	Adult Male	Adult Female	Adolescent Boys	Adolescent Girls	Total
For visitors	18.6	14.7	17.1	11.1	16.4
Government Program offered incentive	22.3	18.8	21.1	22.2	21.0
NGO or Other Program offered subsidy	4.9	5.6	2.6	1.9	4.6
For sick and old people	5.7	5.1	7.9	7.4	5.9
Someone encouraged me	4.5	3.0	2.6	5.6	3.9
Children forced me to construct	9.5	13.2	10.5	9.3	10.8
It's important to have toilet for safety of women in family	78.8	78.7	73.7	75.9	77.8
Any other	0.0	.5	1.3	0.0	.3
Total no. of Household	**264**	**197**	**76**	**54**	**591**

3.5.4. Toilet Usage:

During the study it was found that 38.7% households shared toilet/toilet facility with other households as given in *Table 3.37.* In Piprahi and Sheohar more than 40% households were sharing toilet facility. Interestingly, most of the households (36.7%) that shared toilet facility had small family size. In case of families with 7-9 members, 29.3% of households shared toilet facilities.

Table 3.37: Percentage distribution of household having toilet facility, shared with other households and their sharing pattern

	Dumri Katsari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Toilet facility shared with other HH						
Yes	38.8	42.2	38.8	40.4	32.8	38.7
No	61.3	57.8	61.2	59.6	67.2	61.3
No. of HH having toilets	**80**	**147**	**139**	**104**	**122**	**592**
No. of HH shared toilet facility						
1-3	35.5	40.3	31.5	38.1	37.5	36.7
4-6	16.1	19.4	20.4	11.9	22.5	18.3
7-9	22.6	30.6	37.0	26.2	25.0	29.3
10+	25.8	9.7	9.3	23.8	15.0	15.3
Don't Know	0.0	0.0	1.9	0.0	0.0	.4
No. of HH shared toilet facility	**31**	**62**	**54**	**42**	**40**	**229**

Toilet usage by all family members in the household (94.4%) was almost similar across the blocks, with Sheohar block (97.1%) leading among other blocks. Dumri Katsari (8.8%) had the highest percentage of non-users within a family across age and sex. Percentage of children and women to men, preferring not to use the toilets was particularly high in this block. It is interesting to note that out of the household where all the family members were not using the toilet facility, 45.5% (15 HHs) reported that they "like to defecate in the open" as reasons for not using toilets. This was followed by non-functional toilets (42.4%) which made it inherent for them to defecate in the open.

In Dumri Katsari block, 57% (3 HH) respondents reported that they 'liked to defecate in the open' as the main reason for not using toilet; whereas, lack of water facility was the second most important reason. Non-functionality of toilets was a major reason in Sheohar and Tariyani blocks as one in two respondents cited this as a reason for defecating in the open. Further, convenience and aptitude towards open defecation was cited as major reason in Piprahi and Purnahiya blocks followed by non-functionality of toilets.

"We have saved money for constructing the toilet at our HH. But due to sudden medical problem had to undergo operation and the money got spent on that? Kindly, suggest if there is some solution to this" a woman respondent during FGDs.

3.5.5. Reasons for not having toilet facility:

Poverty was the main reason reported by 94% of respondents for not constructing toilet at home as given in *Table 3.38.* In Dumri Katsari and Piprahi blocks, 96.6% & 97% respondents reported poverty as the main reason for not constructing toilets respectively. In Sheohar block, 34.6% respondents reported that they were waiting for government incentive. Interestingly, 3.5% adolescent girls felt that toilet construction at home was not necessary. At the same time, 34.1% adolescent girls also said their families were waiting for government incentive to construct toilet at home.

Table 3.38: Percentage distribution of adult and adolescent respondents by reason for not having toilet facility in house

	Poverty	Do not feel it is necessary	Waiting for the govt. Subsidy	Was there earlier but break down due to poor construction	Have other priority works	Feel uncomfortable and suffocated in closed toilets	Any other (specify)	Total No. of HH
Blocks								
Dumri Kat sari	96.6	1.3	23.0	.4	.9	.4	0.0	235
Piprahi	97.0	1.2	30.8	.6	0.0	0.0	.6	169
Purnahiya	89.9	2.8	26.8	2.2	1.1	.6	1.7	179
Sheohar	94.3	1.4	34.6	.9	.5	0.0	1.9	211
Tariyani	91.5	1.0	31.2	2.0	0.0	.5	1.0	199
Type of respondents								
Adult Male (20-54 years)	92.0	1.7	28.7	1.0	.2	.5	.5	415
Adult Female (20-49 years)	96.8	.9	29.3	1.7	0.0	.3	.9	345
Adolescent Boys (10-19)	95.3	1.4	27.0	1.4	.7	0.0	2.7	148

	Poverty	Do not feel it is necessary	Waiting for the govt. Subsidy	Was there earlier but break down due to poor construction	Have other priority works	Feel uncomfortable and suffocated in closed toilets	Any other (specify)	Total No. of HH
Adolescent Girls (10-19)	89.4	3.5	34.1	0.0	3.5	0.0	1.2	85
Total	**94.0**	**1.5**	**29.1**	**1.2**	**.5**	**.3**	**1.0**	**993**

3.5.6. Place of defecation in absence of toilet facility at home:

Among those households (62.7%) not using toilets, and categories ranging between 89-98% of respondents (avg. 96.3%), across age groups and categories in the different blocks reported they defecated in agricultural field/farm. Only a small percentage of respondents (2.7%) reported using public toilets and around 17% reported defecating on the side of the road or railway track, whereas, 10.8% reported defecation near garbage space. Among adolescents not using toilets, OD in agriculture field/farm was reported by all 100% adolescent girls, while, 100% of adolescent boys reported defecating in agricultural field/farm in Dumri Katsari and Piprahi. Around 12% adolescent girls reported to be defecating near road side or railway track as compared to 23.6% adolescent boys. The OD pattern reported by adult males and females was not so different.

One in two respondents reported problem during rainy season (overall 48.4%) followed by difficulty during day time (39.5%) as the major problems while defecating in the open. However, in Purnahiya around 40% adult male respondents reported difficulty to defecate in open during night. Further, 43% in Tariyani and 39% adult male respondents in Sheohar felt loss of dignity in defecating in the open. For adult women there was not much difference in the responses. They also felt loss of dignity in defecating in open like males. In Purnahiya and Tariyani also 40% or more adult women felt loss of dignity in defecating in the open.

Reasons for not using toilets:

- The male folks having toilets at HH and not using it told that those who usually stay in temporary huts made near the agriculture field prefer defecating in open as that is more convenient/ time saving for them instead of going to their HH for using constructed toilets. They also mostly wash hands with mud/ ash after defecation due to easy availability of the same.
- Male avoid using it as they think that by using the toilet, tank/ pit will fill up quickly and then toilet will not be usable for women and children
- Male especially elderly were also reluctant to use toilets at their home as they do not find it comfortable and had been practicing open defecation from years.
- Those who do not have toilets constructed at home cited economic insufficiency as a reason for not constructing toilet.
- Some of those were not very sure whether they would get complete/ or part of promised incentive from government or not

Challenges related to open defecation

- Most of the participants said that they faced problem due to rains. Women said that they felt ashamed to go out when there was light. During pregnancy and when they were ill they faced serious problems in open defecation.
- In some villages children narrated incidents of how some elderly were attacked by wild animals including dogs. In one village children narrated an incident in which a wild boar attacked and killed an elderly person who had gone for defecation

Around 43% adult female in Piprahi and Sheohar felt difficulties during night. Further, 40% or more adolescent girl respondents felt ashamed to defecate in the open in blocks Purnahiya and Sheohar. However, their major problems were defecating outside during rainy season and during day time. Interestingly, more than 45% adolescent girls in Sheohar reported difficulty in open defecation during night time.

It is to be noted that overall about 47.3% adolescent boys felt ashamed or loss of dignity to defecate in the open while the percentages for the same was lower than 40% for adult males, females and adolescent girls.

Section 4: Causal Relation among Key Indicator

In order to understand the causal relationship between socio -economic and health aspect with water and sanitation related practices, the data has been analysed using cross tabulation and required statistical tests. Some of indicators showing statistically significant causal relationship have been presented in this section. This cross tab analysis can be used for planning future strategies under the program.

4.1. Causal relation between economic (APL/BPL) status of HH and water treating practices

The data reveals that only 9% of total households were treating drinking water which includes boiling of water, straining through loth etc. among. While looking at the causal relation between economic status of HH based on the type of card available; it was found that out of total HH in APL category, about 13% were treating drinking water at home; whereas in BPL household it was only 6.6%. It was also found statistically significant as described in the table below;

Table 4.1: Percentage of APL and BPL household practicing treatment of drinking water

	% Household treating drinking water		Total
	Yes	No	
APL	13.0	87.0	354
BPL	6.6	93.4	1008
Antodaya	9.8	90.2	41
None	13.7	86.3	182
Total	**9.0**	**91.0**	**1,585**

A significant association has been found between household used treated drinking water and Poverty of Household; it shows a strong significant relationship. $[\chi^2 = 18.8, P = 0.000 < 0.05]$.

4.2. Causal relation between availability of toilet facility at HH vis-a-vis education level of HH head

The data analysis indicated that the education level of the household head was directly correlated with availability of toilet facility at HH. As reflected in table below, the percent of HH with toilet facility was less where the head of household was illiterate and it further increased with the increase of the education level of household head.

Table 4.2: Association between education status and household having toilet facility

HH having toilet facility	Education Level of Household Head				Total
	Illiterate	Primary	Secondary	Higher	
Yes	25.7	39.0	52.9	72.7	37.4
No	74.3	61.0	47.1	27.3	62.6
Total	**836**	**231**	**452**	**66**	**1,585**

It was found that the education has significantly associated with the household having toilet facility. $[\chi^2 = 130.46, P = 0.00 < 0.05]$.

4.3. Causal relation between economic (APL/BPL) status of HH and availability of toilet facility at HH

About 37.4 % of total households had toilet facility among surveyed households. 46 % of households having APL cards had toilets at their homes; whereas, 35.2 % of households had no cards but had toilet facility in their home. Only about 35% of BPL HH and 34 % of Antodaya HHs had toilet facility at home.

While checking the association between household having toilet and economic status of household, it shows a strong significant relationship. [$\chi^2 = 14.7, P = 0.002 < 0.05$].

Table 4.3: Association between education status and household having toilet facility

	Having toilet facility		Total
	Yes	No	
APL	46.0	54.0	354
BPL	34.8	65.2	1008
Antodaya	34.1	65.9	41
None	35.2	64.8	182
Total	**37.4**	**62.6**	**1,585**

4.4. Causal relation between depth of hand pump vis-a-vis with incidence of diarrhea among children age 0-5 years

Out of the total 1,585 households covered under the survey incidence of diarrhea among children age 0-5 years, was reported among 5.6% of households. The incidence of diarrhea was 6.4% in households where main source of drinking water was hand pump with more than 100 feet depth. The incidence increased to 6.5 % among households having main source of water (hand pump with less than 100 feet depth).

It was also observed by checking the association between depth of hand pump with incidence of diarrhea it shows a strong significant relationship. [$\chi^2 = 105.1, P = 0.000 < 0.05$].

Table 4.4: Association between education status and household having toilet facility

Depth of hand pump	Incidence of diarrhea				Number of Household
	Yes	No	No infant or children at home	Don't know	
Yes, it is more than 100ft	6.4	82.2	7.0	4.4	768
Yes, it is less than 100ft	6.5	77.1	7.2	9.2	401
Don't know	1.7	72.2	25.0	1.0	288
Total	**5.6**	**78.8**	**10.9**	**4.7**	**1,585**

4.5. Causal Relation between availability of safe drinking water with type of card holders

Among APL card holders 94.6% of households have their main source of water from hand pumps. The percentage of households using hand pumps as main source decreases from BPL (91%) to Antodaya (87.8%) and 92.9% of no card holders use hand pumps as main source. A significant association has been found between card type and main source of drinking water [$\chi^2 = 25.907, P = 0.01 < 0.05$].

Table 4.5: Causal relation between type of card holder and main source of drinking water

Main source of drinking water	Type of Card			
	APL	BPL	Antyodya Card	None
Improved water source	100	100	100	100
Piped water into dwelling/ /plot	1.7	2.0	.0	2.7
Public tap/Standpipe	2.8	7.0	12.2	4.4
Hand Pump	94.6	91.0	87.8	92.9
Tube well/bore well	.8	.0	.0	.0

4.6. Causal relation between shortage of drinking water and households having faced any violence

Of the total households 41.1% of households facing shortage of also encountered violence while fetching water. A significant association has been was observed between shortage of water and violence faced by households [$\chi^2 = 121.32, P = 0.000 < 0.05$].

Table 4.6: Causal relation between shortage of drinking water and violence faced by households

Shortage of water	Faced any violence		
	Yes	No	Total
Yes	41.1	58.9	100
No	14.1	85.9	100
Total	**19.8**	**80.2**	**100**

Section 5: Conclusion and Recommendations

5.1. Conclusion

The central role of access to water and sanitation for sustainable development is now even more confirmed with the formal adoption of the 17 Sustainable Development Goals (SDGs) in September 2015 by the United Nations (UN) General Assembly. Among these, Goal 6 is to ensure availability and sustainable management of water and sanitation for all by 2030. This presents a great challenge for India, because according to WHO/UNICEF (2014), India was in the group of only 45 countries where sanitation coverage was less than 50% and home to largest population lacking sanitation.

As per NFHS 4 (2015-16), 89.3 per cent rural households had access to improved drinking water sources. According to Ministry of Drinking Water and Sanitation there are total 63968 habitations in India which suffers from water contamination issues.

Thus, over the last decade, water and sanitation coverage has captured increasing policy attention and is now exemplified in the national initiatives like Swachh Bharat Mission, National Water Quality Sub Mission and Strategic Plan for Ensuring Drinking Water Security in Rural India 2022. These missions provide strategy and milestone to achieve the national goals in water and sanitation components.

The study had two fold objectives i.e.

a. To understand the level of chemical and biological contamination in the water points
b. To assess the Knowledge, Attitude and Practice (KAP) of the communities and their preferences in relation to water, sanitation and hygiene in district Sheohar.

In order to meet the above objectives the study covered both intervention GPs where WFP implemented project as well as non-intervention GPs , so that assessment may provide the status for entire district. The findings of the study are not only expected to help in improving and refining the existing interventions, but also in providing base for planning the future strategies.

On water quality front out of total 675 water points tested under the study, the level of Arsenic and Fluoride was found with in permissible limits in more than 99% water points. Arsenic was found above permissible limits at 6 water points (3 governments, 3 private) and Fluoride at 6 points (5 governments and 1 private). With regard to Zinc, all 100% water points were under the permissible limit. Iron contents were found above permissible limits in 68 % sources across all the GPs which surely cause of concern. E. Coli was present in 2% of samples while absent in 98% sources. MPN count was tested in 10% of the total sampled water points. MPN was detected at all the 67 sampled water point tested for this. This indicated the bacterial contamination of water.

As per sanitary survey risk analysis, 8% water points were found under Very High Risk Category (VHR), 65% water points under the High Risk Category (HR), 12% under Mild Risk Category (MR) and 15% Low Risk Category (LR).

It is worth noting that majority of government water points and least of WFP water points were figuring in very high or high risk category. Since the water testing and sanitary risk assessment was carried out in winter season, therefore, the chances of increased bacteriological contamination may not be ruled out in summers especially considering that 73% of water points were falling under either very high or high risk categories.

The KAP study findings revealed that by and large on water access and availability overall 3/4th respondents fetched drinking water from a source less than 200 meters and on an average 95.8% of households covered under the study were satisfied with water availability. However the qualitative assessment gives a better insight to above data and shows that, in priority intervention GPs covered under the program; the water point, installed or restored by WFP remained the most preferred source for fetching drinking water for HHs. However, when it came to water tariff, a miniscule of households were paying any kind of water tariff or user charge. The mechanism of user committee for maintaining the water point was existing where WFP installed the water infrastructure with varied level of capacities and functionality, but else- where community structure or mechanisms such as VHSC / VHSNCs were not functional. Water borne diseases were reported during the study but awareness was limited to diarrhoea and dysentery. Other water borne diseases such as jaundice, cholera and typhoid were largely unknown. Incidence of diarrhoea was reported across all blocks with highest in Sheohar block, indicating both lack of awareness and unhygienic water handling and treatment practices.

Status of sanitation and hygiene in Sheohar is defined by economy and intent. Most of the households reported lack of money as the major impediment towards constructing toilets. People mentioned convenience of open defecation but also spoke about various challenges faced by them during open defecation, all in the same breath. Even when households had the ability to construct toilets they lacked intent to construct. This is evident from the findings as about half the household having APL status did not have toilets.

The study findings indicate that behaviour change communication activities have not been able to penetrate much. However more respondents were aware of any WASH related BCC activities conducted in their area in intervention GPs covered under water component as compared to non-intervention GPs.

Low coverage and participation rates indicate that much needs to be done on the front of BCC. Although innovative ideas such as Multi-Disciplinary Shows indicate that Water for People is not only thinking but also investing on creative and innovative behaviour change communication activities but presently the impact of all these has been very limited at both school and community level. There is a need for sustained targeted interventions as well as integrated behaviour change communication to ensure people have the knowledge and awareness to change their attitude and eventually, their practices.

5.2. Recommendations

Based on data analysis, field observations, and interactions with partners, staff, community and key stakeholders the key recommendations area presented below. The recommendations have been grouped in to three categories i.e. suggestions related to program planning and implementation, recommendations at the level of WFP India Core Team and emerging opportunities.

1) Program Planning and Implementation Level:

a. Water Access, Availability O&M, Management

- The existing water points installed by Water for People have wider acceptance among community as reflected through FGDs with community and IDIs with stakeholders, however the contamination risk was found high or very high at some of the water points. WFP team can plan for technological interventions to bring down the contamination risk at these water points.

- It is suggested that besides expansion in newer areas, WFP team can continue working for strengthening of existing community mechanisms such as “User Committees”. WFP can also explore possibilities of its linkages with existing forums constituted by government such as VHSC/ VHSNC, Ward Level Committees for water and sanitation schemes etc. This would be helpful in mainstreaming of community structure created under the project and sustainability. However while exploring linkages with VHSC/ VHSNCs it would be important that such forums should be functional and active. In case of non-functionality additional efforts would be required at the level of WFP for this. The orientation of VHSC/ VHSNC members would be useful in taking forward this process.
- The user committee member should be thoroughly oriented periodically and provided handholding support on following aspects
    - Their roles and responsibility Do’s and don’ts for keeping the water point safe.
    - Recharging related aspects .
    - Last water testing date and results should be kept in the records as well as displayed.
- The WATSAN committees in schools should be strengthened by periodic orientations and regular monitoring by Water for People and community involvement.
- As per the findings of the study, the role of government health service providers seems miniscule in relation to water borne diseases. As per IPHS guidelines, responsibilities of ANMs also include increasing awareness about public health issues in the community including water borne diseases. WFP and partners should involve government health and ICDS functionaries in their work to ensure they provide health counseling to families including component on water borne diseases.
  Additionally, WFP and Partners should train the health and ICDS frontline workers on counseling on water borne diseases and safe water practices.
- Since women are predominantly involved in fetching and handling water. Intensive awareness programmes (IPC/ Small Group Meetings) for women would be useful for ensuring safe water practices, hygiene and sanitation.
- Out of those HH having O&M issue related to water point, about 50% households reported repairs within 1-2 days and about 9% in about 7 days. WFP can plan to provide training for O&M to more local youths so that they may serve as Jal-Bandhus where ever required in project area.

b. <u>Water Quality Aspects</u>

Major issue in water quality is related to iron contamination and MPN contamination. Arsenic contamination was observed on both banks of the river Baghmati which is tributary of river Ganga. Followings are recommendations:

- One of the major recommendations given by community was that government should increase the depth of existing hand pumps WFP team may advocate with government for the same
- The sanitation risk assessment of community water points to be conducted twice a year as also recommended by GoI guidelines
- WFP may further plan to get the water sample tested for water points showing presence of arsenic or fluoride for planning any further intervention.
- All the water points having water contamination beyond permissible limit should be marked and a display board stating that “Water not Safe for Drinking” fixed at it.
- Arsenic removal devices can be set up at source points to treat the drinking water based on absorption, coagulation cum sedimentation techniques.
- **Iron Removal Arrangement** must be adhered at all water points having iron contamination level more than permissible limit. This would follow aeration, sedimentation-cum-filtration techniques.
- Recharging and water harvesting interventions can also be promoted. These may be taken up on pilot basis in some area with assessment and documentation of results of pilots to explore its further scale up.

- Installation of water treatment / purifying plants in selected community water points with high contamination levels of Fe or F or As in ground water is a necessity. Water ATMs or other technological innovations suggested by Government of India may be piloted at few selected locations. The rapid feasibility studies prior to piloting such innovations would be useful. The innovative technologies on water quality, accredited by Government of India may be adopted where ever applicable to address the water quality issues in the project area. The compendium for the same is available on link *http://mdws.gov.in/sites/default/files/Compendium_of_Innovative_Technologies.pdf*
- Active **IEC/BCC materials** in consultation with WASH experts can be distributed to generate awareness on preventive measures that can be taken up by the community in case of arsenic contamination. IEC/BCC materials could include **Supplementary Diet Charts** to avoid/curtail Arsenic or Fluoride contamination. Supplementary diet chart could include use of sulphur and anti-oxidants containing food items such as, garlic, ginger, pumpkin, papaya, mango, etc. for daily consumption
- In addition, IEC activities and live demonstrations could be carried out in the community explaining hazards of chemical and bacteriological contaminants, water treatment processes such as, boiling of drinking water and use of chlorine tablets such as Aqua tablet, Panibandhu and water handling and storage practices, etc.
- **Disinfection** should be carried out at all water points to minimize bacterial as well as oral fecal transmitted diseases or **automatic disinfection dispenser** can be attached with water points to get access to safe water. Chlorine dispensers can also be used attached to the water points. At HH level most simplified way could be use of Chlorine tablets or liquid. The community should also be provided orientation on the usage of these measures.
- **Sanitary Risk Management** approaches (hardware structures) must be adopted to ensure construction of sanitary seal, foundation block, BOE and Soak pit at all water points to check and avoid bacterial or fecal matter contamination in drinking water.
- **Software component of Risk Management** would involve generating awareness in the community about keeping water points neat, clean and dry in order to eliminate all the sources of pollution around the water points.
- **Iron and Manganese** are known as twin parameters of drinking water so testing of manganese should be added with iron under the study of drinking water whenever any testing is carried out.
- Sheohar being an agriculture belt, fertilizers are commonly used. Testing of nitrate should also be incorporated to identify any nitrate contamination in studies in future.

c. BCC Strategy and Social Arts

Water for People should develop a strong BCC strategy with operational plan and M&E Framework for roll out of strategy focusing on safe practices related to water quality aspects, sanitation and hygiene covering community as well as stakeholders. Based on the finding some of the key points to be considered while planning strategy and activities include following:

- Water quality aspects and its impact on the health in short and long term
- Water conservation and recharging aspects
- Water quality maintenance at HH levels and community sources
- Using chorine for water cleaning
- Importance of water point up keep and reduction in sanitation risks
- Safe handling of water from source to the household level
- Discouraging use of plastic bottles for drinking water storage, keeping in view the environment conservation
- The awareness level on water schemes/ program was very low and needs to be addressed among all the target groups i.e. adults as well as adolescents

- Hand washing with soap should be more focused on the poorer community as well as in schools
- Sheohar and Tariyani bocks to be focused more in terms of involving people in the BCC activities as their involvement was found very low in present study

d. Sanitation

- The participatory approaches like CLTS should be used in some selected areas to make them ODF. The sites to be selected in consultation with the government and WFP can collaborate with government to complement and supplement their effort for achieving ODF. This would also showcase the impact of the project
- The strategy should focus on specific need of blocks and GPs e.g. the percentage of households having toilets at home but not using it was highest in Dumri Katsari block. Thus more focused effort would be required to address the issue on non-usage of toilets in this block as compared to others.
- Majority of non-user of toilets stated that "they liked defecting in open". This aspect is to be taken in to consideration while developing BCC plan. The community can be made aware of the ill effect of open defection on health, nutrition (including stunting and wasting of children), drinking water quality and other safety and social aspects etc.
- Poverty was cited as key reason for non-construction of toilets particularly in Dumri Katsari and Piprahi blocks. The project team can plan to further expand interventions like sanitation loans in the in these area to provide support to the needy population.
- Nigrani Committee could be formed to monitor and motivate those who are defecating in the open to change their practices. This has happened in their nearby Panchayat as reflected by community.

2) Water for People Level:

- Some participants during the FGDs suggested that the community water point by WFP should be installed in government/ Panchayat land instead of private land. They shared that in some cases where it's been installed in private land the private land owner tried to restrict/ bar other people to use it and started considering it as their own property. Some participants also had confusion on why the financial contribution is taken from them while constructing the water point. They did not have clarity on community contribution component on installation of water point by WFP.
- Thus the project team should clearly orient the community on the amount charged/ contribution taken from community and the overall intent behind it.
- The project implementation team can be provided trainings in areas like Planning, Implementation, Monitoring and Evaluation (PIME) of Community Based Projects
- The MIS and documentation was found to be comparatively weaker areas especially at the field level. It is recommended that the existing MIS systems/ formats to be reviewed, simplified and project staff to be thoroughly oriented on that.
- The exposure visits of implanting staff to other success interventions in the state or outside the state would be useful in enriching their understanding and capacities in areas of water, sanitation, and hygiene.

3) Emerging Opportunities:

Water for people may explore possibilities to align their further project with the existing government schemes and program on water and sanitation front. On one hand this would be helpful in bridging the implementation gaps in existing government program and on the other hand would be cost effective proposition for water for people to show case the impact of their intervention/ program.

Some of the suggestive areas as under

- Government is focusing on the provision of piped water scheme to every households as per its program and policy. However the scheme would be implemented in phases. Thus WFP can map the areas/ locations which are likely to be covered in the last phase of the existing piped water scheme and focus on providing technical support on sustainability of existing sources on pilot basis or may also install new water points (if required).
- Possibilities to be explored to further train the Jal Bandhus for O&M related work under piped water scheme as well
- Extend support to government in community mobilization and IEC component of the scheme
- PRI members are the key functionaries to plan and execute the piped water scheme. Given their low capacities on this subject, WFP can plan a capacity building program for PRIs on orienting them on the provisions of scheme and on how to plan implement and monitor the scheme. Or else WFP may advocate with government to initiate a capacity building program for PRIs.
- Considering the focus of government on ward level planning and implementation of water and sanitation programs in Bihar; WFP team can also work out the strategy to support government in priority Panchayat wards identified by them for implementing the water and sanitation activities. Considering the focus of government on ward level planning and implementation of water and sanitation programs in Bihar; WFP team can also work out the strategy to support government in priority Panchayat wards identified by them for implementing the water and sanitation activities.

Annexure 1: Detailed Methodology

► Sampling Plan

For the selection of water points and KAP respondents, multistage random sampling was done.

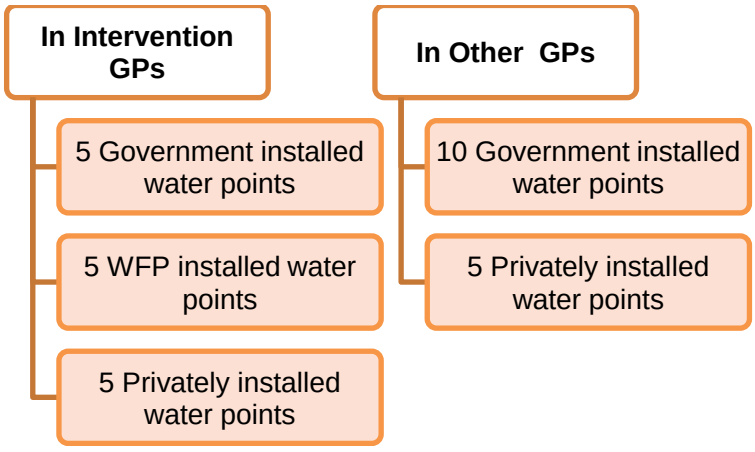
At First Stage:
In each block one intervention GP (where WFP is having their interventions) and 2 other non-interventional GP (where WFP is not having their interventions) were selected randomly.

At Second Stage:
From each selected GP three PSUs (village) were selected using random sampling methodology.

At Third Stage:
For selection of water points: After identification of PSU (village), water points (hand pumps) for sample were selected purposively considering the adequate geographical and population coverage.

In Intervention GPs
- 5 Government installed water points
- 5 WFP installed water points
- 5 Privately installed water points

In Non- Intervention GPs
- 10 Government installed water points
- 5 Privately installed water points



Selection of respondents for KAP Survey
- First the Notional map of village along with all its hamlets was developed so that all communities get equal chances of getting selected
- Survey team then met the PRI member and get the HH list (if available) else confirm approximate number of HH in the village and divided this number with total 35 HH to be selected in the village to arrive at interval
- First HH was selected using on the random number between 1 and interval
- The second and onward HH was selected after adding the interval to previous selected HH number
- Required number of respondents was then interviewed -one from each selected HH

► Sample Size and Distribution

The respondent category wise sample distribution for HH KAP survey was as follows**:**

Respondents	Proportion of Target Groups to total population Sheohar district [19]	(Weightage) % of Respondents Per Village	Sample of Target Groups Per Village	Total Sample (45 Villages)
Adult Male (19-54 years)	0.91	0.42	15	675
Adult Female (19-49 years)	0.77	0.35	12	540
Adolescent Boys (10-19)	0.28	0.13	5	225
Adolescent Girls (10-19)	0.21	0.1	3	135
	2.17		**35**	**1,575**

The qualitative data was collected through Focus Group Discussions FGDs and IDIs with community and key stakeholders respectively. The respondent wise sample size and distribution for qualitative component is given below;

Sample Size for Qualitative Study

Respondents	Tool	Sample Distribution	Total
Focus Group Discussions			
Female	Checklist/ FGD prompts	3 from intervention GPs and 3 from other GPs	6
Male		3 from intervention GPs and 3 from other GPs	6
Adolescent Boys		3 from intervention GPs and 3 from other GPs	6
Adolescent Girls		3 from intervention GPs and 3 from other GPs	6
		Total FGDs	**24**
Key Informants Interviews			
District Official	Semi-structured Questionnaire	District Nodal Officer –PDED, District Official-Rural Department/ SBM	2
Block Official		2 in each block (Block Nodal Officer-PHED and BDOs)	10
School Principal		2 from intervention GPs and 2 from other GPs	4
PRI Member		2 from intervention GPs and 2 from other GPs	4
		Total IDIs	**20**

[19] as per census 2011

Annexure 2: Checklist for Sanitary Risk Assessment

SN	Indicator of assessment	Response (Encircle the appropriate response)	
		Yes	No
1.	Is there a toilet within 10m of the hand-pump?	1	2
2.	Is the nearest toilet on higher ground than the hand-pump?	1	2
3.	Is there any other source of pollution (e.g. animal excreta, rubbish, and surface water) within 10m of the hand-pump?	1	2
4.	Is the drainage poor, causing stagnant water within 2m of the hand-pump?	1	2
5.	Is the hand-pump drainage channel faulty? Is it broken, permitting ponding?	1	2
6.	Is the fencing around the hand-pump inadequate, allowing animals in?	1	2
7.	Is the concrete floor less than 1m wide all around the hand-pump?	1	2
8.	Is there any ponding on the concrete floor around the hand-pump?	1	2
9.	Are there any cracks in the concrete floor around the hand-pump which Y/N could permit water to enter the well?	1	2
10.	Is the hand-pump loose at the point of attachment to the base so that water could enter the casing?	1	2

Total score of risks..... /10
Contamination risk score: *9–10 very high Risk (VHR)*
6–8 high Risk (HR)
3–5 Intermediate (Mild Risk)
0–2 Low risk (LR)

Annexure 3 - Table

Table 2.3A.1: GP-wise level of iron concentration in sampled water points and satisfaction level and rating on water quality reported by respondents

GP Name	Level of Iron			Household satisfied with water quality	Household rating on water quality											
					Clarity			Color			Smell			Taste		
	<0.3 mg/l	0.3-1.0 mg/l (Permissible range)	>1.0 mg/l		G	A	P	G	A	P	G	A	P	G	A	P
WFP Village	15.1	21.4	63.5	80.4	81.0	16.1	2.8	70.4	17.0	12.5	71.5	18.8	9.7	72.2	17.2	10.6
Mahamadpur Katsari	33.3	13.3	53.3	74.3	79.3	18.6	2.1	65.7	15.0	19.3	68.6	16.4	15.0	74.3	15.0	10.7
Parsauni Baij	11.1	20.0	68.9	91.5	89.6	7.5	2.8	74.5	7.5	17.9	79.2	7.5	13.2	76.4	4.7	18.9
Basantpatti	6.7	20.0	73.3	82.1	82.1	15.1	2.8	77.4	14.2	8.5	73.6	17.0	9.4	77.4	15.1	7.5
Sarsaula Khurd	6.7	18.7	74.7	72.6	74.3	21.1	4.6	61.7	26.9	11.4	62.3	30.3	7.4	60.0	28.6	11.4
Belahiya	16.7	35.0	48.3	86.7	83.9	14.7	1.4	77.6	16.1	6.3	78.3	16.8	4.9	78.3	16.1	5.6
Non-WFP Village	8.2	20.8	71.0	72.8	76.5	19.5	4.0	66.3	24.0	9.6	65.6	24.8	9.6	70.3	22.8	6.9
Jahangirpur	4.4	8.9	86.7	65.7	77.1	21.9	1.0	55.2	34.3	10.5	48.6	40.0	11.4	60.0	36.2	3.8
Rohua	3.3	6.7	90.0	58.6	65.7	18.6	15.7	54.3	18.6	27.1	61.4	21.4	17.1	61.4	18.6	20.0
Belawa	13.3	20.0	66.7	74.3	82.9	16.4	.7	74.3	22.1	3.6	69.3	22.1	8.6	82.1	17.1	.7
Kuama	10.0	43.3	46.7	80.0	87.1	12.9	0.0	80.0	15.7	4.3	67.1	20.0	12.9	84.3	15.7	0.0
Adouri	4.4	20.0	75.6	81.9	87.6	11.4	1.0	81.9	12.4	5.7	83.8	13.3	2.9	82.9	12.4	4.8
Basant Jagjiwan	11.1	11.1	77.8	74.8	73.8	17.8	8.4	66.4	23.4	10.3	70.1	21.5	8.4	66.4	25.2	8.4
Harnahi	0.0	8.9	91.1	77.1	74.3	23.8	1.9	61.9	30.5	7.6	66.7	28.6	4.8	65.7	28.6	5.7
Kushhar	0.0	40.0	60.0	48.6	54.3	37.1	8.6	42.9	42.9	14.3	28.6	42.9	28.6	45.7	37.1	17.1
Chhatauni	11.7	36.7	51.7	74.8	71.3	22.4	6.3	65.0	23.8	11.2	67.1	23.8	9.1	66.4	23.8	9.8
Narwara	26.7	26.7	46.7	71.4	74.3	25.7	0.0	60.0	28.6	11.4	65.7	25.7	8.6	71.4	17.1	11.4
Total	**11.1**	**21.0**	**67.9**	**76.0**	**78.4**	**18.0**	**3.5**	**68.1**	**21.1**	**10.9**	**68.1**	**22.3**	**9.7**	**71.1**	**20.4**	**8.5**
G- Good; A- Average; P- Poor																

Table 2.6A.1: Bacteriological contamination at water point in WFP intervention and non-intervention GPs and incidence of diarrhea among children (0-5 years) in last 2 weeks

Name of GP	MPN detected (No. of water point)	Presence of E. Coli (No. of water point)	Children suffered from Diarrhea in last two weeks (%)	Satisfied with water quality (Yes %)
WFP intervention GPs	**28**	**6**	**10.7**	**80.4**
Mahamadpur Katsari	6	1	9.6	74.3
Parsauni Baij	5	2	5.3	91.5
Basantpatti	4	1	17.9	82.1
Sarsaula Khurd	7	1	12.8	72.6
Belahiya	6	1	7.0	86.7
Non-intervention GPs	**39**	**11**	**9.1**	**72.8**
Jahangirpur	4	2	5.2	65.7
Rohua	3	0	7.0	58.6
Belawa	6	0	8.5	74.3
Kuama	3	0	6.3	80.0
Adouri	4	5	3.9	81.9
Basant Jagjiwan	5	4	9.6	74.8
Harnahi	4	0	7.7	77.1
Kushhar	2	0	17.2	48.6
Chhatauni	6	0	14.7	74.8
Narwara	2	0	4.3	71.4
Total	**67**	**17**	**9.5**	**76.0**

Table 3.A.1: Profile of Head of Household: Percentage distribution of head of HH by sex, age, education, occupations, religion, caste, no. of usual family members

Block	Dumri Katsari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Gender						
Male	89.8	92.4	94.7	91.7	92.2	92.2
Female	10.2	7.6	5.3	8.3	7.8	7.8
Age Group						
<25 Years	4.4	5.4	3.8	5.7	2.8	4.4
25-34 Years	23.5	25.3	17.0	27.6	26.5	24.0
35-44 Years	35.6	37.7	33.3	29.2	29.9	33.1
45-59 Years	27.0	26.9	30.2	27.6	29.0	28.1
60+ Years	9.5	4.7	15.7	9.8	11.8	10.3
Median age of the Head of the Household	40.0	39.0	42.0	40.0	40.0	40.0
No. of usual member in the house						
1-2	9.2	6.3	5.3	6.7	4.0	6.3
3-4	27.6	29.1	27.4	34.0	36.4	30.9
5-6	43.5	43.7	44.3	40.6	40.2	42.5
7 +	19.7	20.9	23.0	18.7	19.3	20.3
Education Status						
Illiterate	54.3	60.4	48.7	55.2	45.2	52.7
Primary	11.7	13.6	13.8	17.8	15.9	14.6

Block	Dumri Katsari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Secondary	29.8	23.1	34.6	21.0	34.0	28.5
Higher	4.1	2.8	2.8	6.0	5.0	4.2
Occupation						
Cultivator	25.1	21.2	23.6	11.7	18.7	20.1
Agriculture/Non-agriculture labour	40.6	47.2	45.0	53.3	39.6	45.1
Business/Self Professional	9.2	7.9	8.5	6.7	10.6	8.6
Govt./Pvt. Service	12.4	16.1	14.5	14.9	20.2	15.6
Homemaker	8.9	5.7	4.1	6.0	6.5	6.2
Still Studying	.6	.3	.3	.3	0.0	.3
Not working	3.2	1.6	4.1	6.7	4.4	4.0
Other (Pensioner)	0.0	0.0	0.0	.3	0.0	.1
Religion						
Hindu	95.9	91.5	90.3	89.2	92.8	91.9
Muslim	4.1	8.5	9.7	10.8	7.2	8.1
Caste						
Schedule Caste	34.0	14.6	27.4	31.1	24.6	26.3
Schedule Tribe	3.2	.6	4.4	1.6	3.1	2.6
Other Backward Class	37.1	73.4	45.9	54.0	48.6	51.8
General	25.7	11.4	22.3	13.3	23.7	19.3
Standard of Living Index						
Poorest	54.0	48.1	41.8	37.8	44.5	45.2
Medium	19.0	18.0	26.7	27.6	19.3	22.1
Wealthiest	27.0	33.9	31.4	34.6	36.1	32.6
Total No. of HH	**315**	**316**	**318**	**315**	**321**	**1,585**

Table 3.A.2: Percent distribution of adult (20-54 Years) respondents according to background characteristics and block

	Dumri Kat sari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Gender						
Adult Male	55.4	56.1	56.3	55.0	55.2	55.6
Adult Female	44.6	43.9	43.7	45.0	44.8	44.4
Age group						
15-24 Years	16.1	13.5	11.4	18.2	11.3	14.1
24-34 Years	32.2	34.0	36.7	40.1	38.7	36.4
35-44 Years	35.5	36.5	33.1	26.9	34.3	33.3
45-54 Years	16.1	16.0	18.8	14.9	15.7	16.3
Education Level						
Illiterate	52.9	64.3	43.7	57.0	46.4	52.8
Primary	12.0	14.3	18.4	12.8	21.0	15.7
Secondary	31.4	19.7	33.5	24.0	29.8	27.7
Higher	3.7	1.6	4.5	6.2	2.8	3.8
Occupation Level						
Cultivator	12.8	10.7	12.2	8.3	11.3	11.1
Agriculture/non-	27.7	31.6	27.8	31.4	28.2	29.3

	Dumri Kat sari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
agriculture labour						
Business/Self professional	7.4	5.7	6.5	5.4	5.6	6.1
Govt./Pvt. Service	8.7	9.4	12.2	11.6	12.9	11.0
Homemaker	41.7	41.0	39.2	42.1	39.9	40.8
Still Studying	.8	0.0	.8	.4	1.2	.7
Not working	.8	1.6	1.2	.8	.8	1.1
Religion						
Hindu	96.3	91.4	91.0	90.9	92.3	92.4
Muslim	3.7	8.6	9.0	9.1	7.7	7.6
Caste						
Schedule caste	33.9	14.3	26.5	30.6	23.8	25.8
Schedule tribe	2.9	.4	5.7	1.7	2.8	2.7
Other Backward Class	37.6	73.4	45.3	54.5	50.0	52.2
General	25.6	11.9	22.4	13.2	23.4	19.3
Total no. of respondents	**242**	**244**	**245**	**242**	**248**	**1,221**

Table 3.A.3: Percent distribution of adolescent (10-19 Years) respondents according to background characteristics and block

	Dumri Kat sari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Age Group						
10-13 Years	34.7	40.3	28.8	34.2	35.6	34.7
14-16 Years	37.5	34.7	38.4	39.7	37.0	37.5
17-19 Years	27.8	25.0	32.9	26.0	27.4	27.8
Gender						
Adolescent Boys	63.9	62.5	60.3	63.0	61.6	62.3
Adolescent Girls	36.1	37.5	39.7	37.0	38.4	37.7
Currently Attending School						
Yes	80.6	70.8	76.7	82.2	89.0	79.9
No	19.4	29.2	23.3	17.8	11.0	20.1
Education Level						
Illiterate	4.2	9.7	5.5	4.1	2.7	5.2
Primary	31.9	27.8	28.8	23.3	24.7	27.3
Secondary	63.9	59.7	61.6	69.9	67.1	64.5
Higher	0.0	2.8	4.1	2.7	5.5	3.0
Total number of respondents	**72**	**72**	**73**	**73**	**73**	**363**

Table 3.A.4: Main source of drinking water used at house by background characteristics of the house

	Piped water into dwelling/ yard/plot	Public tap/Standpipe	Hand Pump	Tube well/ bore well	Total No. of household
Block					
Dumri Kat sari	.3	6.7	92.7	.3	315
Piprahi	.3	4.7	94.9	0.0	316
Purnahiya	4.1	10.1	85.8	0.0	318
Sheohar	.3	4.4	94.6	.6	315
Tariyani	4.7	3.7	91.6	0.0	321
Type of House					
Kaccha	1.4	6.7	91.9	0.0	837
Pucca	1.5	3.0	94.5	1.1	271
Semi-Pucca	3.1	6.3	90.6	0.0	477
Type of card					
APL	1.7	2.8	94.6	.8	354
BPL	2.0	7.0	91.0	0.0	1008
Antyodya Card	0.0	12.2	87.8	0.0	41
None	2.7	4.4	92.9	0.0	182
Education Level of Household Head					
Illiterate	1.2	6.6	92.2	0.0	836
Primary	.9	3.9	95.2	0.0	231
Secondary	3.5	6.4	89.6	.4	452
Higher	4.5	1.5	92.4	1.5	66
Religion					
Hindu	2.1	6.2	91.6	.2	1457
Muslim	.8	3.1	96.1	0.0	128
Caste					
Schedule caste	4.3	9.4	86.3	0.0	417
Schedule tribe	0.0	7.3	92.7	0.0	41
Other Backward Class	.4	4.3	95.2	.1	821
General	3.3	5.6	90.5	.7	306
Standard of living Index					
Poorest	.8	7.4	91.8	0.0	717
Medium	4.8	6.6	88.6	0.0	351
Wealthiest	1.5	3.5	94.4	.6	517
Total	**2.0**	**5.9**	**91.9**	**.2**	**1585**

Table 3.A.5: Percent distribution of household by reason for collecting drinking water from main source according to background characteristics

Background Characteristics		Reason for collecting water from main source						Total No. of HHs
		Water is good in taste, and is safe & healthy	Water source is within my dwelling/ my own property	Water source is near to my house	Water is available throughout the year	Water is tested regularly	Any other	
Block	Dumri Kat sari	27.9	67.3	21.3	6.7	0.0	0.0	315
	Piprahi	30.1	63.6	25.0	7.3	0.0	.6	316
	Purnahiya	47.5	50.3	18.2	9.1	.3	.3	318
	Sheohar	22.2	68.6	27.9	10.5	1.6	1.0	315
	Tariyani	38.6	63.9	14.6	7.2	0.0	.9	321
Type of House	Kaccha	29.6	56.9	24.6	6.9	.2	.4	837
	Semi-pucca	35.1	72.7	15.9	8.9	.4	1.5	271
	Pucca	38.8	67.3	18.9	9.9	.6	.4	477
Type of Card	APL	37.3	63.8	13.8	8.8	0.0	.6	354
	BPL	33.0	62.0	23.6	8.8	.6	.6	1,008
	Antyodya Card	22.0	56.1	31.7	4.9	0.0	0.0	41
	None	29.7	65.9	21.4	3.8	0.0	.5	182
Education Level of Household Head	Illiterate	34.2	57.2	25.0	8.1	.5	.6	836
	Primary	29.9	66.2	20.3	10.0	0.0	.4	231
	Secondary	31.9	69.5	17.9	7.3	.4	.4	452
	Higher	43.9	74.2	3.0	7.6	0.0	1.5	66
Sex of Household Head	Male	33.3	63.2	20.4	8.2	.3	.5	1,461
	Female	33.1	57.3	33.1	7.3	.8	1.6	124
Religion	Hindu	34.0	62.3	21.3	8.1	.3	.5	1,457
	Muslim	25.8	68.0	21.9	8.6	.8	.8	128
Caste	SC	28.1	60.9	25.4	8.4	.5	0.0	417
	ST	51.2	43.9	19.5	4.9	0.0	0.0	41
	OBC	33.1	62.1	22.5	8.4	.5	.9	821
	General	38.6	69.3	13.1	7.5	0.0	.7	306
No. of Member	1--2	32.0	60.0	26.0	8.0	0.0	2.0	100
	3--4	32.9	66.7	17.8	8.2	0.0	.6	490
	5--6	34.0	59.7	23.2	10.1	.7	.3	673
	7+	32.9	63.7	21.7	4.0	.3	.6	322
Standard of Living Index	Poorest	28.7	53.7	27.5	4.9	.1	.1	717
	Medium	38.2	64.7	19.9	12.0	.9	1.4	351
	Wealthiest	36.4	73.9	13.9	10.1	.4	.6	517
	Total	**33.3**	**62.7**	**21.4**	**8.1**	**.4**	**.6**	**1,585**

Table 3.A.6: Percentage distribution of household who treat drinking water to make it safe for drinking by block and background characteristics

Background Characteristics	Boil	Use Alum/ Add bleach/ Chlorine Tablets	Strain through a cloth	Use Water Filter	Let it stand and settle	Don't Know	Do nothing	Total No. of HH
Block								
Dumri Kat sari	4.1	0.0	1.6	.6	0.0	1.6	93.3	315
Piprahi	1.6	0.0	.6	.3	0.0	1.6	96.2	316
Purnahiya	6.3	2.8	3.5	.3	.3	9.7	81.1	318
Sheohar	2.9	0.0	1.0	.6	1.6	.6	94.6	315
Tariyani	4.4	0.0	1.2	0.0	.3	4.0	90.0	321
Main Source of Drinking water								
Piped into dwelling	12.0	0.0	12.0	0.0	0.0	0.0	76.0	25
Piped to yard/plot	16.7	0.0	16.7	0.0	0.0	0.0	66.7	6
Public tap/standpipe	4.3	2.1	2.1	0.0	0.0	2.1	92.6	94
Hand pump	3.6	0.5	1.3	.4	.5	3.7	91.3	1,457
Tube well/bore well	0.0	0.0	0.0	0.0	0.0	0.0	100.0	3
Type of House								
Kaccha	3.7	0.7	1.6	.1	.1	3.7	91.3	837
Pucca	2.6	0.0	.7	1.5	1.1	2.6	92.6	271
Semi-Pucca	4.8	0.6	2.1	.2	.6	3.8	89.7	477
Education Level of HH Head								
Illiterate	2.0	0.6	1.3	0.0	.5	3.2	93.7	836
Primary	3.0	0.4	.4	0.0	.9	3.0	93.1	231
Secondary	6.0	0.7	2.7	.9	0.0	4.6	86.9	452
Higher	15.2	0.0	1.5	3.0	1.5	1.5	78.8	66
Sex of household HH								
Male	3.8	0.6	1.5	.4	.4	3.5	91.2	1,461
Female	4.0	0.0	2.4	0.0	.8	4.0	89.5	124
Religion								

Background Characteristics	Boil	Use Alum/ Add bleach/ Chlorine Tablets	Strain through a cloth	Use Water Filter	Let it stand and settle	Don't Know	Do nothing	Total No. of HH
Hindu	3.8	0.6	1.6	.4	.4	3.5	91.1	1,457
Muslim	4.7	0.0	.8	0.0	.8	3.9	90.6	128
Caste								
SC	1.9	0.2	2.4	0.0	.5	1.9	93.5	417
ST	4.9	0.0	0.0	0.0	0.0	9.8	85.4	41
OBC	1.8	0.9	1.2	.5	.4	3.3	93.8	821
General	11.8	0.3	1.6	.7	.7	5.6	81.0	306
Standard of Living Index								
Poorest	2.5	0.8	1.4	.1	.1	3.8	92.6	717
Medium	4.6	0.9	3.4	0.0	.9	3.1	89.5	351
Wealthiest	5.2	0.0	.6	1.0	.6	3.5	89.9	517
Total	**3.8**	**0.6**	**1.6**	**.4**	**.4**	**3.5**	**91.0**	**1,585**

Table 3.A.7: Status of quality of drinking water by Block

Quality of drinking water service	Dumri Katsari			Piprahi			Purnahiya			Sheohar			Tariyani			Total		
	Good	Average	Poor	Good	Average	Poor	Good	Average	Poor	Good	Average	Poor	Good	Average	Poor	Good	Average	Poor
Clarity	75.6	19.7	4.8	86.1	12.7	1.3	81.1	14.8	4.1	72.1	23.8	4.1	77.3	19.3	3.4	78.4	18.0	3.5
Colour	59.7	22.2	18.1	75.6	15.8	8.5	75.2	16.7	8.2	59.7	29.8	10.5	70.1	20.9	9.0	68.1	21.1	10.9
Smell	60.3	25.4	14.3	72.2	16.8	11.1	75.8	17.3	6.9	60.0	31.1	8.9	72.0	20.9	7.2	68.1	22.3	9.7
Taste	66.7	22.9	10.5	80.7	12.7	6.6	75.5	17.6	6.9	60.3	29.5	10.2	72.3	19.6	8.1	71.1	20.4	8.5
Healthiness	63.2	21.6	15.2	76.3	15.2	8.5	75.8	16.7	7.5	61.6	27.9	10.5	69.8	22.4	7.8	69.3	20.8	9.9
Stability of service	68.9	22.9	8.3	78.8	14.6	6.6	79.6	14.8	5.7	63.8	29.2	7.0	71.0	25.5	3.4	72.4	21.4	6.2
Convenience	70.2	21.6	8.3	76.9	13.9	9.2	76.7	16.7	6.6	65.4	26.3	8.3	71.3	24.3	4.4	72.1	20.6	7.3

Table 3.A.8: Status of quality of drinking water by background characteristics of HH

Background Characteristics	Quality of drinking water service			Total No. of Household
	Good	Average	Poor	
Type of respondents				
Adult Male (20-54 years)	71.1	21.8	7.1	679
Adult Female (20-49 years)	71.4	21.8	6.8	542
Adolescent Boys (10-19)	72.9	20.4	6.7	225
Adolescent Girls (10-19)	66.2	28.1	5.8	139
Main source of drinking water				
Piped into dwelling	84.0	4.0	12.0	25
Piped to yard/plot	66.7	33.3	0.0	6
Public tap/standpipe	71.3	19.1	9.6	94
Hand pump	70.8	22.6	6.6	1457
Tube well/bore well	100.0	0.0	0.0	3
Block				
Dumri Kat sari	65.1	24.4	10.5	315
Piprahi	79.7	15.2	5.1	316
Purnahiya	77.0	17.3	5.7	318
Sheohar	60.3	32.7	7.0	315
Tariyani	72.9	21.2	5.9	321
Type of House				
Kaccha	70.7	20.7	8.6	837
Pucca	71.6	22.9	5.5	271
Semi-Pucca	71.3	24.3	4.4	477
Education Level of Respondents				
Illiterate	70.3	22.6	7.1	664
Primary	77.7	14.4	7.9	291
Secondary	68.8	25.0	6.3	573
Higher	68.4	28.1	3.5	57
Religion				
Hindu	70.8	22.2	7.0	1457
Muslim	73.4	21.9	4.7	128
Caste				
SC	69.8	21.8	8.4	417
ST	82.9	12.2	4.9	41
OBC	74.1	20.5	5.5	821
General	63.1	28.4	8.5	306
Standard of living Index				
Poorest	68.2	23.4	8.4	717
Medium	71.2	21.4	7.4	351
Wealthiest	74.9	20.9	4.3	517
Total	**71.0**	**22.1**	**6.8**	**1,585**

Table 3.A.9: Percent distributions of respondents washed their hands by no. of times background characteristics

	No. of time wash hands in a day					No. of Respondents
	1-3	4-6	7-10	11-15	15 +	
Type of Respondents						
Adult Male(20-54 years)	18.4	51.5	25.9	3.7	.4	679
Adult Female (20-49 years)	16.1	47.6	28.4	5.7	2.2	542
Adolescent Boys(10-19)	23.1	50.2	23.6	2.2	.9	225
Adolescent Girls (10-19)	11.5	56.8	27.3	3.6	.7	139
Block						
Dumri Kat sari	19.0	39.0	35.2	5.7	1.0	315
Piprahi	21.5	57.6	17.1	2.8	.9	316
Purnahiya	17.0	49.7	25.2	6.6	1.6	318
Sheohar	15.2	58.4	22.2	3.2	1.0	315
Tariyani	15.6	47.7	33.0	2.5	1.2	321
Type of House						
Kaccha	21.6	48.3	26.0	3.3	.7	837
Pucca	11.8	50.9	33.6	3.3	.4	271
Semi-Pucca	14.0	54.1	23.5	6.1	2.3	477
Education Level						
Illiterate	18.8	52.3	23.2	4.5	1.2	664
Primary	18.6	55.3	25.1	.7	.3	291
Secondary	16.6	45.9	30.9	5.4	1.2	573
Higher	10.5	50.9	29.8	5.3	3.5	57
Religion						
Hindu	18.2	50.0	26.5	4.1	1.2	1457
Muslim	11.7	55.5	27.3	4.7	.8	128
Caste						
SC	19.7	48.4	27.8	3.4	.7	417
ST	14.6	41.5	41.5	2.4	0.0	41
OBC	16.1	53.6	24.7	4.1	1.5	821
General	19.6	46.1	27.8	5.6	1.0	306
Standard of Living Index						
Poorest	22.9	49.2	23.8	3.5	.6	717
Medium	16.8	48.4	27.4	5.7	1.7	351
Wealthiest	11.0	53.6	29.8	4.1	1.5	517
Total	**17.7**	**50.5**	**26.6**	**4.2**	**1.1**	**1,585**

Table 3.A.10: Percentage distribution of respondents used any type of material for washing their hands according to background characteristics

Background characteristics	Material used for washing hands					Number of Respondents
	Only water	With ash and water	Mud/Dust and water	With soap and water	Any other -Do not wash hands at all	
Type of Respondents						
Adult Male (20-54 years)	9.6	5.2	17.2	68.0	0.0	679
Adult Female (20-49 years)	9.0	6.1	11.6	73.1	.2	542
Adolescent Boys (10-19)	7.6	3.6	14.2	74.2	0.4	225
Adolescent Girls (10-19)	5.8	2.9	5.8	85.6	0.0	139
Block						
Dumri Kat sari	6.3	6.7	19.4	67.6	0.0	315
Piprahi	10.8	6.0	15.2	67.7	.3	316
Purnahiya	10.4	4.7	9.4	75.2	0.3	318
Sheohar	8.3	3.5	15.2	73.0	0.0	315
Tariyani	8.1	4.4	10.3	77.3	0.0	321
Type of House						
Kaccha	11.2	6.9	15.2	66.7	0.0	837
Pucca	5.2	2.2	12.2	80.4	0.0	271
Semi-Pucca	6.5	3.4	12.6	77.1	.4	477
Type of Card						
APL	9.0	4.0	8.8	78.2	0.0	354
BPL	8.8	5.8	16.0	69.2	.2	1008
Antodaya Card	9.8	7.3	2.4	80.5	0.0	41
None	7.7	2.7	14.8	74.7	0.0	182
Education Level						
Illiterate	11.3	7.1	18.1	63.4	.2	664
Primary	11.3	5.5	14.8	68.4	0.0	291
Secondary	5.2	3.0	9.1	82.7	0.0	573
Higher	1.8	0.0	8.8	87.7	1.8	57
Religion						
Hindu	8.5	5.1	13.9	72.3	.1	1457
Muslim	11.7	3.9	14.1	70.3	0.0	128
Caste						
SC	7.0	6.2	15.8	70.5	.5	417
ST	9.8	4.9	7.3	78.0	0.0	41
OBC	11.2	4.9	16.0	68.0	0.0	821
General	4.6	3.9	6.5	85.0	0.0	306
Standard of living Index						
Poorest	13.2	7.7	16.2	62.9	0.0	717
Medium	6.6	4.3	16.0	72.6	.6	351
Wealthiest	4.1	1.9	9.3	84.7	0.0	517
Total	**8.8**	**5.0**	**13.9**	**72.2**	**.1**	**1585**

Table 3.A.11: Percentage distribution of respondents according to reason for using water and soap for washing hands by background characteristics

	Reason for washing hands with soap					No of Respondents
	Stop germs from spreading	Keeping hands clean	Prevention from sickness	Any other	Don't know	
Type of Respondents						
Adult Male (20-54 years)	51.1	67.5	28.1	0.0	2.6	462
Adult Female (20-49 years)	41.4	71.7	29.8	0.0	4.0	396
Adolescent Boys (10-19)	62.3	67.1	31.7	0.0	1.2	167
Adolescent Girls (10-19)	54.6	64.7	34.5	0.0	1.7	119
Block						
Dumri Kat sari	44.6	67.1	26.3	0.0	3.3	213
Piprahi	43.0	67.3	32.2	0.0	3.3	214
Purnahiya	55.6	64.4	29.7	0.0	2.9	239
Sheohar	48.7	68.3	30.0	0.0	4.8	230
Tariyani	55.2	75.4	31.0	0.0	0.0	248
Type of House						
Kaccha	44.1	69.7	28.0	0.0	3.4	558
Pucca	57.8	68.3	29.4	0.0	1.4	218
Semi-Pucca	53.5	67.1	33.2	0.0	2.7	368
Education Level						
Illiterate	36.3	71.5	26.8	0.0	5.2	421
Primary	55.3	68.3	27.1	0.0	1.5	199
Secondary	57.6	66.0	33.8	0.0	1.5	474
Higher	66.0	70.0	30.0	0.0	0.0	50
Religion						
Hindu	50.6	67.0	29.2	0.0	3.0	1,054
Muslim	40.0	87.8	37.8	0.0	0.0	90
Caste						
Schedule caste	43.2	71.1	27.6	0.0	3.1	294
Schedule tribe	37.5	68.8	3.1	0.0	9.4	32
Other Backward Class	49.5	69.0	30.5	0.0	3.0	558
General	59.2	65.0	34.6	0.0	1.2	260
Standard of Living Index						
Poorest	45.2	65.6	28.6	0.0	4.2	451
Medium	48.6	69.0	26.3	0.0	2.0	255
Wealthiest	55.0	71.5	33.3	0.0	1.8	438
Total	**49.7**	**68.6**	**29.9**	**0.0**	**2.8**	**1,144**

Table 3.A.12: Percentage distribution of respondents according to their knowledge about water borne diseases by background characteristics across the blocks

Back ground Characteristics	Aware about water borne disease			Total no. of HH	Water borne disease							Total no. of HH aware
	Yes	No	Don't know		Diarrhoea	Jaundice	Dysentery	Cholera	Fluorosis	Typhoid	Any other *	
Block												
Dumri Kat sari	21.0	66.7	12.4	315	74.2	39.4	19.7	12.1	31.8	28.8	10.6	66
Piprahi	7.9	73.1	19.0	316	76.0	32.0	8.0	8.0	24.0	44.0	4.0	25
Purnahiya	20.4	72.0	7.5	318	60.0	41.5	12.3	13.8	26.2	41.5	15.4	65
Sheohar	13.3	73.7	13.0	315	69.0	26.2	9.5	7.1	35.7	31.0	11.9	42
Tariyani	18.4	73.5	8.1	321	79.7	33.9	15.3	11.9	25.4	32.2	3.4	59
Type of Respondents												
Adult Male (20-54 years)	18.1	68.9	13.0	679	71.5	45.5	13.8	13.8	30.9	33.3	8.1	123
Adult Female (20-49 years)	12.0	75.8	12.2	542	70.8	23.1	12.3	9.2	27.7	26.2	13.8	65
Adolescent Boys (10-19)	18.7	73.8	7.6	225	73.8	31.0	16.7	4.8	21.4	38.1	7.1	42
Adolescent Girls (10-19)	19.4	66.9	13.7	139	66.7	29.6	14.8	14.8	33.3	55.6	11.1	27
Main source of Drinking water												
Piped into dwelling	16.0	84.0	0.0	25	75.0	25.0	0.0	25.0	25.0	50.0	0.0	4
Piped to yard/plot	16.7	50.0	33.3	6	100.0	0.0	0.0	100.0	0.0	0.0	0.0	1
Public tap/standpipe	11.7	74.5	13.8	94	45.5	54.5	27.3	9.1	18.2	36.4	9.1	11
Hand pump	16.3	71.7	12.0	1457	71.8	35.7	13.9	10.5	29.0	34.5	10.1	238
Tube well/bore well	100.0	0.0	0.0	3	100.0	0.0	0.0	33.3	66.7	33.3	0.0	3
Type of house												
Kaccha	13.9	74.8	11.4	837	68.1	31.9	12.1	9.5	31.0	37.9	11.2	116
Pucca	19.2	75.6	5.2	271	80.8	46.2	17.3	17.3	30.8	36.5	3.8	52

Back ground Characteristics	Aware about water borne disease			Total no. of HH	Water borne disease							Total no. of HH aware
	Yes	No	Don't know		Diarrhoea	Jaundice	Dysentery	Cholera	Fluorosis	Typhoid	Any other *	
Semi-Pucca	18.7	64.4	17.0	477	69.7	34.8	14.6	10.1	24.7	29.2	11.2	89
Type of Card												
APL	22.0	69.5	8.5	354	75.6	34.6	15.4	12.8	29.5	32.1	7.7	78
BPL	14.0	72.8	13.2	1008	69.5	36.2	14.9	10.6	29.1	34.8	8.5	141
Antyodya Card	14.6	68.3	17.1	41	100.0	16.7	16.7	16.7	66.7	16.7	33.3	6
None	17.6	71.4	11.0	182	62.5	40.6	6.3	9.4	18.8	43.8	15.6	32
Education Level of respondents												
Illiterate	8.6	77.4	14.0	664	64.9	26.3	5.3	10.5	24.6	21.1	14.0	57
Primary	10.3	79.0	10.7	291	73.3	36.7	23.3	10.0	30.0	33.3	10.0	30
Secondary	24.3	65.1	10.6	573	71.9	34.5	12.9	10.8	30.2	38.1	9.4	139
Higher	54.4	36.8	8.8	57	77.4	58.1	25.8	16.1	29.0	45.2	3.2	31
Religion												
Hindu	16.5	71.1	12.4	1457	72.1	37.1	14.6	10.4	29.6	35.4	9.6	240
Muslim	13.3	79.7	7.0	128	58.8	17.6	5.9	23.5	17.6	23.5	11.8	17
Caste												
Schedule caste	9.8	75.5	14.6	417	56.1	31.7	12.2	7.3	29.3	41.5	12.2	41
Schedule tribe	14.6	80.5	4.9	41	50.0	66.7	16.7	33.3	33.3	50.0	0.0	6
Other Backward Class	13.3	74.9	11.8	821	74.3	35.8	17.4	11.0	27.5	33.9	11.0	109
General	33.0	57.2	9.8	306	75.2	35.6	10.9	11.9	29.7	31.7	7.9	101
Standard of Living Index												
Poorest	11.7	74.1	14.2	717	67.9	34.5	13.1	9.5	27.4	39.3	8.3	84
Medium	17.9	70.9	11.1	351	66.7	28.6	11.1	11.1	25.4	27.0	17.5	63
Wealthiest	21.3	69.2	9.5	517	76.4	40.9	16.4	12.7	31.8	35.5	6.4	110
Total	**16.2**	**71.8**	**12.0**	**1585**	**71.2**	**35.8**	**14.0**	**11.3**	**28.8**	**34.6**	**9.7**	**257**
***Any other include-Gastric, Skin disease, Malaria etc.**												

Table 3.A.13: Percentage distribution of household where any children (0-5 years) suffered from diarrhea and sought advice/ treatment according to selected background characteristics

Background Characteristics	Children suffered from Diarrhoea	Number of children (0-5 Years)	Received Treatment	Source of treatment			No. of children sought treatment
				Government Health Facility	Private Health Facility	Other	
Block							
Dumri Kat sari	7.8	255	90.0	5.6	94.4	0.0	18
Piprahi	6.9	275	100.0	36.8	52.6	10.5	19
Purnahiya	10.5	238	88.0	31.8	68.2	0.0	22
Sheohar	11.9	302	91.7	12.1	84.8	3.0	33
Tariyani	10.0	239	95.8	4.3	82.6	13.0	23
Main source of drinking water							
Piped into dwelling	0.0	17	-	0.0	0.0	0.0	0
Piped to yard/plot	0.0	2	-	0.0	0.0	0.0	0
Public tap/standpipe	9.4	85	87.5	14.3	85.7	0.0	7
Hand pump	9.6	1204	93.1	17.6	76.9	5.6	108
Tube well/bore well	0.0	1	-	0.0	0.0	0.0	0
Gender of child							
Male	9.3	728	91.2	16.1	77.4	6.5	62
Female	9.6	581	94.6	18.9	77.4	3.8	53
Type of House							
Kaccha	11.3	707	91.3	13.7	79.5	6.8	73
Pucca	2.4	208	80.0	0.0	75.0	25.0	4
Semi-Pucca	9.9	394	97.4	26.3	73.7	0.0	38
Type of Card							
APL	8.2	243	70.0	21.4	78.6	0.0	14
BPL	9.3	849	97.5	16.9	76.6	6.5	77
Antyodya Card	13.3	30	100.0	0.0	100.0	0.0	4
None	11.2	187	95.2	20.0	75.0	5.0	20

Background Characteristics	Children suffered from Diarrhoea	Number of children (0-5 Years)	Received Treatment	Source of treatment			No. of children sought treatment
				Government Health Facility	Private Health Facility	Other	
Religion							
Hindu	9.6	1176	92.9	18.1	76.2	5.7	105
Muslim	8.3	133	90.9	10.0	90.0	0.0	10
Caste							
Schedule caste	11.2	419	93.6	25.0	75.0	0.0	44
Schedule tribe	17.9	39	100.0	42.9	14.3	42.9	7
Other Backward Class	9.3	674	90.5	10.5	84.2	5.3	57
General	4.0	177	100.0	0.0	100.0	0.0	7
Standard of Living Index							
Poorest	10.8	627	94.1	12.5	82.8	4.7	64
Medium	11.5	313	97.2	28.6	65.7	5.7	35
Wealthiest	5.4	369	80.0	12.5	81.3	6.3	16
Total	**9.5**	**1309**	**92.7**	**17.4**	**77.4**	**5.2**	**115**

Table 3.A.14: Percentage distribution of respondents who were aware about diarrhea according to selected background characteristics

Background Characteristics	Aware about diarrhoea		No. of Respondents
	Yes	No	
Type of Respondents			
Adult Male(20-54 years)	39.3	60.7	679
Adult Female (20-49 years)	26.8	73.2	542
Adolescent Boys (10-19)	29.8	70.2	225
Adolescent Girls (10-19)	35.3	64.7	139
Block			
Dumri Kat sari	33.0	67.0	315
Piprahi	35.8	64.2	316
Purnahiya	32.1	67.9	318
Sheohar	30.8	69.2	315
Tariyani	34.9	65.1	321
Type of house			
Kaccha	27.0	73.0	837
Pucca	38.7	61.3	271
Semi-Pucca	41.3	58.7	477
Type of Card			
APL	42.1	57.9	354
BPL	29.4	70.6	1,008
Antyodya Card	46.3	53.7	41
None	35.2	64.8	182
Education level			
Illiterate	24.1	75.9	664
Primary	30.9	69.1	291
Secondary	41.5	58.5	573
Higher	70.2	29.8	57
Religion			
Hindu	33.8	66.2	1,457
Muslim	28.1	71.9	128
Caste			
Schedule caste	23.7	76.3	417
Schedule tribe	14.6	85.4	41
Other Backward Class	33.3	66.7	821
General	**49.0**	**51.0**	**306**
Standard of living Index			
Poorest	24.5	75.5	717
Medium	37.6	62.4	351
Wealthiest	42.6	57.4	517
Total	**33.3**	**66.7**	**1,585**

Table 3.A.15: Percentage distribution of respondents who were aware about diarrhea according to symptoms, cause, ways to prevent and treatment of diarrhea across the blocks

	Dumri Kat sari	Piprahi	Purnahiya	Sheohar	Tariyani	Total
Symptoms of Diarrhoea						
Frequent bowel movement	30.8	32.7	28.4	34.0	25.0	30.1
Watery stools	86.5	89.4	85.3	81.4	85.7	85.8
Abdominal Pain	33.7	32.7	32.4	44.3	39.3	36.4
Any other	1.0	.9	0.0	4.1	0.0	1.1
Don't Know	2.9	1.8	4.9	5.2	6.3	4.2
Cause of Diarrhoea						
Drinking untreated water	29.8	22.1	38.2	24.7	24.1	27.7
Not washing hand before eating	34.6	40.7	52.9	21.6	50.0	40.3
Improper cooking of food	16.3	10.6	24.5	10.3	24.1	17.2
Not washing vegetables/fruits before cooking or eating	7.7	9.7	9.8	7.2	5.4	8.0
Not washing hands after defecation	4.8	1.8	5.9	0.0	8.0	4.2
Lack of sanitation	32.7	38.1	36.3	41.2	33.0	36.2
Any Other	1.0	0.0	0.0	0.0	0.0	.2
Don’t know	26.0	28.3	17.6	40.2	17.0	25.6
Ways to prevent diarrhoea						
Access to safe drinking water	18.3	23.9	34.3	19.6	24.1	24.1
Hand washing with soap	39.4	48.7	53.9	27.8	58.0	46.0
Good personal hygiene	7.7	3.5	13.7	4.1	9.8	7.8
Good food hygiene	13.5	13.3	22.5	9.3	19.6	15.7
Improved sanitation	29.8	29.2	34.3	33.0	33.0	31.8
Rotavirus vaccination	6.7	0.0	1.0	7.2	.9	3.0
Any Other	4.8	0.0	0.0	1.0	0.0	1.1
Don’t know	29.8	34.5	18.6	45.4	17.0	28.8
Treatment of diarrhoea						
ORS	41.3	35.4	56.9	33.0	46.4	42.6
ORS and Zinc	6.7	17.7	24.5	8.2	19.6	15.5
Home-made fluid (sugar and salt fluid)	25.0	40.7	41.2	21.6	25.9	31.1
Medicine from health centre	49.0	53.1	39.2	53.6	50.9	49.2
Any Other	1.0	0.0	0.0	0.0	.9	.4
Don’t know	18.3	13.3	12.7	27.8	12.5	16.7
Total no. of respondents aware about diarrhoea	**104**	**113**	**102**	**97**	**112**	**528**

Table 3.A.16: Percentage distribution of respondents who were aware about BCC including social art activities related to water quality and treatment in their area according to background characteristics

		BCC including Social Art Activities					
	Aware about any BCC activity	Drama/ MDS	Street plays	Short films	House to house counselling	Any other	**No. of Respondents**
Type of Respondents							
Adult Male (20-54 years)	21.9	20.9	15.9	4.3	4.6	0.0	679
Adult Female (20-49 years)	14.8	13.8	10.0	2.8	4.2	.2	542
Adolescent Boys (10-19)	33.8	31.6	28.4	8.4	6.2	0.0	225
Adolescent Girls (10-19)	31.7	30.2	22.3	6.5	7.2	0.0	139
Block							
Dumri Kat sari	17.8	17.5	12.7	4.1	2.9	0.0	315
Piprahi	30.1	28.5	20.6	3.5	5.4	0.0	316
Purnahiya	15.1	13.2	11.6	5.0	6.3	.3	318
Sheohar	32.7	31.7	26.0	8.6	7.0	0.0	315
Tariyani	14.6	13.4	10.3	1.6	3.1	0.0	321
Type of house							
Kaccha	19.6	18.3	13.7	3.8	5.0	0.0	837
Pucca	22.9	21.8	17.7	7.0	4.1	0.0	271
Semi-Pucca	25.8	24.7	19.7	4.4	5.2	.2	477
Education level							
Illiterate	15.2	14.8	10.4	1.8	2.0	0.0	664
Primary	25.1	23.0	20.3	6.9	6.5	0.0	291
Secondary	27.2	25.7	19.9	5.8	6.8	0.0	573
Higher	33.3	31.6	26.3	12.3	12.3	1.8	57
Religion							
Hindu	22.9	21.8	16.7	4.7	5.3	.1	1457
Muslim	11.7	10.2	10.9	3.1	.8	0.0	128
Caste							
SC	23.0	21.6	17.7	3.4	4.6	.2	417
ST	12.2	12.2	9.8	2.4	2.4	0.0	41
OBC	21.1	20.1	16.0	4.5	4.4	0.0	821
General	24.5	22.9	15.7	6.5	7.2	0.0	306
Standard of Living Index							
Poorest	19.2	17.7	13.7	4.3	5.3	0.0	717
Medium	26.0	25.1	20.0	4.3	5.1	0.0	351
Wealthiest	23.2	22.2	17.2	5.0	4.3	.2	517
Total	22.0	20.8	16.2	4.5	4.9	.1	**1,585**

Table 3.A.17: Percentage distribution of respondents who participated in BCC including social art activities related to water quality and treatment in their area according to background characteristics

	Ever Participated in any BCC including social art activities		How they feel about the activities				Whether these activities were beneficial for the community		No. of respondents aware about BCC activities
	Yes	No	Very good	Good	Average	Poor	Yes	No	
Type of Respondents									
Adult Male (20-54 years)	18.1	81.9	42.3	55.7	2.0	0.0	80.5	19.5	149
Adult Female (20-49 years)	22.5	77.5	36.3	61.3	1.3	1.3	81.3	18.8	80
Adolescent Boys (10-19)	15.8	84.2	46.1	48.7	2.6	2.6	81.6	18.4	76
Adolescent Girls (10-19)	18.2	81.8	47.7	47.7	0.0	4.5	79.5	20.5	44
Block									
Dumri Kat sari	12.5	87.5	39.3	55.4	3.6	1.8	76.8	23.2	56
Piprahi	22.1	77.9	32.6	67.4	0.0	0.0	85.3	14.7	95
Purnahiya	33.3	66.7	35.4	58.3	2.1	4.2	77.1	22.9	48
Sheohar	8.7	91.3	52.4	47.6	0.0	0.0	84.5	15.5	103
Tariyani	25.5	74.5	51.1	38.3	6.4	4.3	72.3	27.7	47
Type of House									
Kaccha	19.5	80.5	42.7	54.3	1.2	1.8	77.4	22.6	164
Pucca	22.6	77.4	45.2	51.6	1.6	1.6	77.4	22.6	62
Semi-Pucca	15.4	84.6	40.7	56.1	2.4	.8	87.0	13.0	123
Education Level									
Illiterate	12.9	87.1	39.6	58.4	2.0	0.0	84.2	15.8	101
Primary	17.8	82.2	43.8	53.4	0.0	2.7	83.6	16.4	73
Secondary	23.1	76.9	44.9	52.6	1.3	1.3	78.8	21.2	156
Higher	15.8	84.2	31.6	52.6	10.5	5.3	68.4	31.6	19
Religion									
Hindu	18.9	81.1	42.5	54.5	1.8	1.2	80.5	19.5	334
Muslim	13.3	86.7	40.0	53.3	0.0	6.7	86.7	13.3	15
Caste									
SC	11.5	88.5	35.4	59.4	3.1	2.1	80.2	19.8	96
ST	20.0	80.0	40.0	60.0	0.0	0.0	80.0	20.0	5
OBC	16.8	83.2	46.2	50.9	1.2	1.7	84.4	15.6	173
General	32.0	68.0	42.7	56.0	1.3	0.0	73.3	26.7	75
Standard of Living Index									
Poorest	21.0	79.0	39.9	57.2	.7	2.2	76.1	23.9	138
Medium	14.3	85.7	47.3	49.5	3.3	0.0	85.7	14.3	91
Wealthiest	19.2	80.8	41.7	55.0	1.7	1.7	82.5	17.5	120
Total	**18.6**	**81.4**	**42.4**	**54.4**	**1.7**	**1.4**	**80.8**	**19.2**	**349**

Table 3.A.18: Percentage distribution of adolescent boys and girls received any training or orientation on water

Adolescent	Dumri Katsari		Piprahi		Purnahiya		Sheohar		Tariyani		Total	
	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Ever Received any training or orientation on water handling in last one year												
Yes	10.9	11.1	17.8	7.4	2.3	10.3	26.7	14.3	31.1	10.7	17.8	10.8
No	89.1	88.9	82.2	92.6	97.7	89.7	73.3	85.7	68.9	89.3	82.2	89.2
No. of Adolescent	**46**	**27**	**45**	**27**	**44**	**29**	**45**	**28**	**45**	**28**	**225**	**139**
Frequency of the organized training												
Yes weekly	0.0	33.3	0.0	50.0	100.0	33.3	41.7	50.0	35.7	33.3	27.5	40.0
Yes monthly	20.0	66.7	25.0	50.0	0.0	0.0	16.7	50.0	28.6	33.3	22.5	40.0
Not frequently	80.0	0.0	75.0	0.0	0.0	66.7	41.7	0.0	35.7	33.3	50.0	20.0
Who Organized these training/orientation programs												
Government organizations	20.0	66.7	62.5	50.0	0.0	0.0	58.3	50.0	64.3	100.0	55.0	53.3
Private organizations	0.0	0.0	12.5	0.0	100.0	100.0	8.3	0.0	21.4	0.0	15.0	20.0
NGOs	40.0	33.3	0.0	50.0	0.0	0.0	25.0	50.0	14.3	0.0	17.5	26.7
Any other (specify)	40.0	0.0	25.0	0.0	0.0	0.0	8.3	0.0	0.0	0.0	12.5	0.0
Main topics covered during training program												
Water treatment	60.0	66.7	62.5	100.0	100.0	66.7	33.3	50.0	57.1	33.3	52.5	60.0
Prevention from Water borne diseases	20.0	33.3	37.5	0.0	0.0	0.0	50.0	0.0	35.7	66.7	37.5	20.0
Household remedies for WBD	0.0	0.0	0.0	0.0	0.0	33.3	0.0	50.0	7.1	0.0	2.5	20.0
Any other etc.	20.0	0.0	0.0	0.0	0.0	0.0	16.7	0.0	0.0	0.0	7.5	0.0
Whether these training beneficial												
Yes	100.0	100.0	75.0	100.0	100.0	100.0	91.7	75.0	100.0	66.7	92.5	86.7
No	0.0	0.0	25.0	0.0	0.0	0.0	8.3	25.0	0.0	33.3	7.5	13.3
No. of Adolescent received any orientation training/ program	**5**	**3**	**8**	**2**	**1**	**3**	**12**	**4**	**14**	**3**	**40**	**15**

Table 3.A.19: Percent distribution of household having toilet facility by household background characteristics and by block

	Dumri Kat sari		Piprahi		Purnahiya		Sheohar		Tariyani		Total	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
Type of house												
Kaccha	14.4	85.6	40.1	59.9	32.7	67.3	25.4	74.6	27.7	72.3	28.0	72.0
Pucca	53.3	46.7	60.5	39.5	64.2	35.8	47.1	52.9	59.7	40.3	56.5	43.5
Semi-Pucca	34.9	65.1	52.1	47.9	50.5	49.5	33.6	66.4	43.9	56.1	43.0	57.0
Type of Card												
APL	31.6	68.4	53.6	46.4	52.2	47.8	46.4	53.6	44.1	55.9	46.0	54.0
BPL	24.5	75.5	42.4	57.6	41.8	58.2	30.9	69.1	34.1	65.9	34.8	65.2
Antyodya Card	18.2	81.8	75.0	25.0	37.5	62.5	35.7	64.3	25.0	75.0	34.1	65.9
None	23.3	76.7	70.0	30.0	33.3	66.7	24.4	75.6	42.9	57.1	35.2	64.8
Sex of head of the HH												
Male	25.1	74.9	46.6	53.4	44.9	55.1	32.5	67.5	36.8	63.2	37.3	62.7
Female	28.1	71.9	45.8	54.2	23.5	76.5	38.5	61.5	52.0	48.0	37.9	62.1
Education level of Household Head												
Illiterate	14.0	86.0	35.6	64.4	34.2	65.8	24.7	75.3	18.6	81.4	25.7	74.3
Primary	21.6	78.4	55.8	44.2	43.2	56.8	28.6	71.4	45.1	54.9	39.0	61.0
Secondary	42.6	57.4	65.8	34.2	56.4	43.6	47.0	53.0	53.2	46.8	52.9	47.1
Higher	61.5	38.5	77.8	22.2	55.6	44.4	73.7	26.3	87.5	12.5	72.7	27.3
Religion												
Hindu	26.2	73.8	49.1	50.9	44.3	55.7	32.4	67.6	39.3	60.7	38.2	61.8
Muslim	7.7	92.3	18.5	81.5	38.7	61.3	38.2	61.8	21.7	78.3	28.1	71.9
Caste												
SC	6.5	93.5	43.5	56.5	32.2	67.8	25.5	74.5	27.8	72.2	24.5	75.5
ST	30.0	70.0	50.0	50.0	50.0	50.0	40.0	60.0	20.0	80.0	36.6	63.4
OBC	25.6	74.4	44.0	56.0	39.7	60.3	32.4	67.6	33.3	66.7	36.2	63.8
General	49.4	50.6	66.7	33.3	64.8	35.2	52.4	47.6	60.5	39.5	58.2	41.8
No. of Member in HH												
1-2	41.4	58.6	55.0	45.0	17.6	82.4	47.6	52.4	38.5	61.5	41.0	59.0
3-4	23.0	77.0	47.8	52.2	37.9	62.1	29.0	71.0	35.9	64.1	34.7	65.3

	Dumri Kat sari		Piprahi		Purnahiya		Sheohar		Tariyani		Total	
	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
5-6	24.8	75.2	48.6	51.4	46.8	53.2	38.3	61.7	41.1	58.9	40.0	60.0
7+	22.6	77.4	37.9	62.1	50.7	49.3	23.7	76.3	35.5	64.5	34.8	65.2
Standard of living Index												
Poorest	4.7	95.3	21.7	78.3	18.8	81.2	7.6	92.4	10.5	89.5	12.6	87.4
Medium	23.3	76.7	38.6	61.4	40.0	60.0	19.5	80.5	35.5	64.5	31.1	68.9
Wealthiest	68.2	31.8	86.0	14.0	80.0	20.0	71.6	28.4	73.3	26.7	76.0	24.0
Total	**25.4**	**74.6**	**46.5**	**53.5**	**43.7**	**56.3**	**33.0**	**67.0**	**38.0**	**62.0**	**37.4**	**62.6**

Table 3.A.20: Distribution of type of toilet facility by household's background characteristics

	Improved Sanitation	Improved			Not improved	Not Improved			Total No. of HH
		Flush to sewer/septic/pit	Pit/ Biogas Toilet	Twin pit/ Composite toilet		Flush/ pour flush to elsewhere	Open Pit	Dry Toilet	
Blocks									
Dumri Kat sari	81.3	68.8	2.5	10.0	18.8	0.0	5.0	13.8	80
Piprahi	81.6	72.1	.7	8.8	18.4	0.0	4.1	14.3	147
Purnahiya	78.4	52.5	4.3	21.6	21.6	2.9	8.6	10.1	139
Sheohar	86.5	77.9	1.0	7.7	13.5	0.0	8.7	4.8	104
Tariyani	86.1	63.9	1.6	20.5	13.9	2.5	4.1	7.4	122
Type of house									
Kaccha	80.8	60.7	.9	19.2	19.2	0.0	5.1	14.1	234
Pucca	86.9	75.2	3.9	7.8	13.1	3.3	5.2	4.6	153
Semi-Pucca	81.5	66.3	2.0	13.2	18.5	1.0	7.8	9.8	205
Type of card									
APL	81.6	65.6	4.3	11.7	18.4	3.1	6.7	8.6	163
BPL	82.3	65.0	1.1	16.2	17.7	.6	6.3	10.8	351
Antyodya Card	71.4	64.3	7.1	0.0	28.6	0.0	14.3	14.3	14
None	89.1	76.6	0.0	12.5	10.9	0.0	1.6	9.4	64

	Improved Sanitation	Improved			Not improved	Not Improved			Total No. of HH
		Flush to sewer/septic/pit	Pit/ Biogas Toilet	Twin pit/ Composite toilet		Flush/ pour flush to elsewhere	Open Pit	Dry Toilet	
Education of household Head									
Illiterate	80.0	63.3	.9	15.8	20.0	.5	8.8	10.7	215
Primary	84.4	64.4	2.2	17.8	15.6	2.2	3.3	10.0	90
Secondary	83.3	66.9	3.3	13.0	16.7	1.7	4.6	10.5	239
Higher	87.5	81.3	0.0	6.3	12.5	0.0	6.3	6.3	48
Religion									
Hindu	82.4	66.4	2.0	14.0	17.6	1.3	6.3	10.1	556
Muslim	86.1	66.7	2.8	16.7	13.9	0.0	2.8	11.1	36
Caste									
Schedule caste	74.5	55.9	0.0	18.6	25.5	0.0	6.9	18.6	102
Schedule tribe	80.0	66.7	0.0	13.3	20.0	0.0	6.7	13.3	15
Other Backward Class	84.2	68.7	1.7	13.8	15.8	1.3	6.1	8.4	297
General	84.8	68.5	3.9	12.4	15.2	1.7	5.6	7.9	178
Standard of Living Index									
Poorest	64.4	8.9	0.0	55.6	35.6	0.0	6.7	28.9	90
Medium	71.6	50.5	2.8	18.3	28.4	0.0	9.2	19.3	109
Wealthiest	89.8	84.0	2.3	3.6	10.2	1.8	5.1	3.3	393
Total	**82.6**	**66.4**	**2.0**	**14.2**	**17.4**	**1.2**	**6.1**	**10.1**	**592**