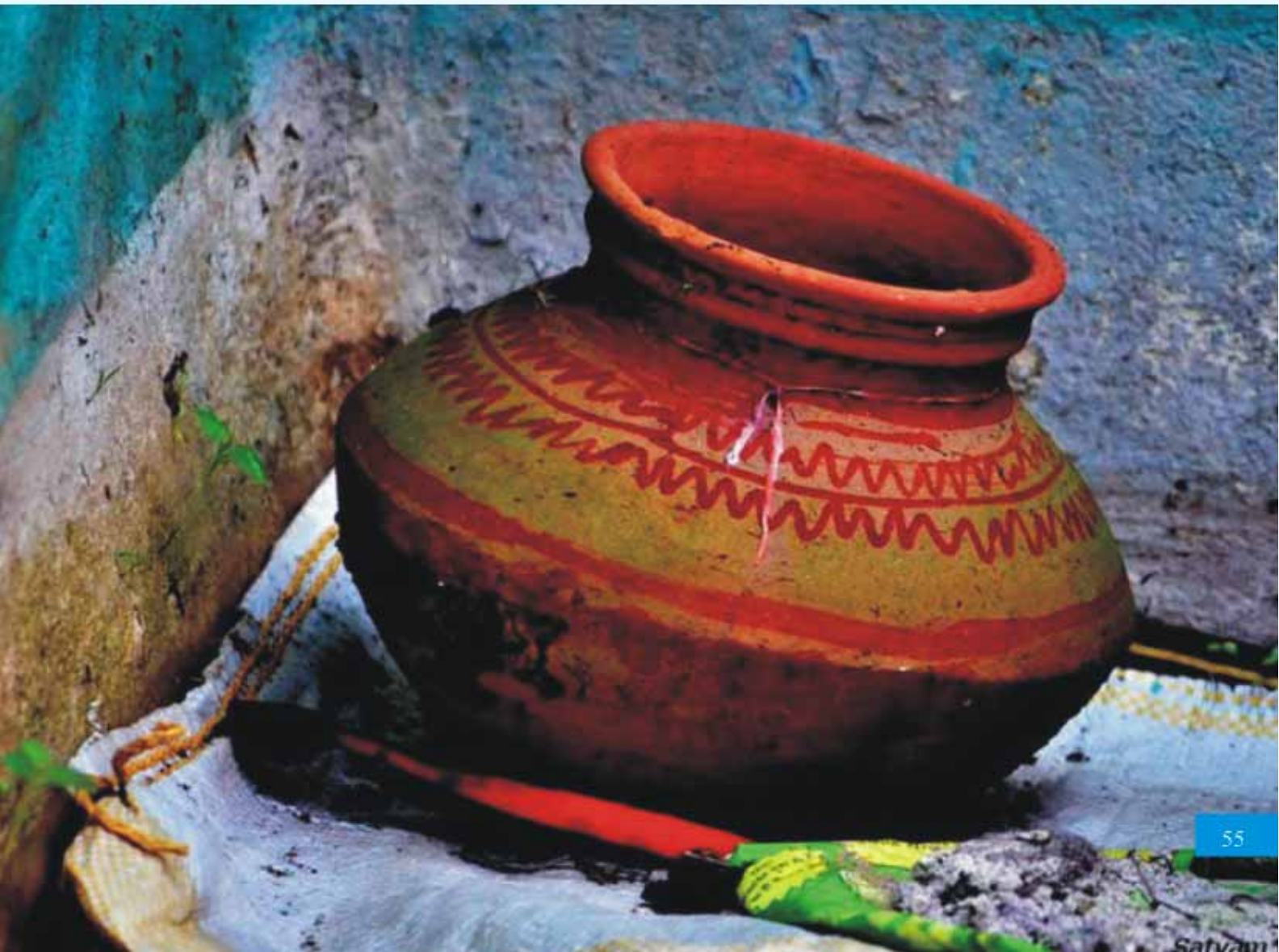
SECTION-II
WATER AND SANITATION



2 Water And Sanitation

In 2010, the United Nations recognised universal access to clean water as a basic human right as well as a vital step towards improving living standards[36]. Clean drinking water is a fundamental and essential element of life. Without it, people cannot be healthy or productive. Drinking unsafe water leads to illness, which reduces attendance in school for children and results in lost economic and work opportunities for adults. Where water is not easily accessible, the collection of water becomes a time-consuming process that takes time away from other activities.

Water supply and sanitation in India continue to be inadequate, despite longstanding efforts by various levels of government and communities to improve coverage. According to the Millennium Development Goals India country report 2009, the 2015 target for the proportion of households with access to safe drinking water (83%) was achieved by 2007-08[37]. Census data for 2011 indicates that 82.7% of rural households receive water from a tap or hand pump[38]. Thus, while the share of those with access to an

[36] http://www.un.org/apps/news/story.asp?NewsID=36308. Last accessed on 2/01/12.
[37] Millennium Development Goals India Country Report, 2005.
[38] 2011 Census Data: http://www.censusindia.gov.in/2011census/hlo/Data%20sheet/Drinking%20Water.pdf

improved water source is relatively high, water quality and reliability remain an issue. For example, most wells that serve as primary water sources for households are uncovered. Further, less than half of the households have access to drinking water within their premises[39].

The lack of sanitation is a major cause of disease throughout the world. Improving sanitation is known to have a considerable positive impact on health in households and across communities[40]. The sanitation situation in India is grave, particularly in rural areas. According to census data 2011, 69% of rural households have no latrine[41]. In fact, the WHO and UNICEF Joint Monitoring Programme estimated that 638 million people living in India practice open defecation – 58% of the worldwide total.

Goal 7C: Reduce by half the proportion of people without sustainable access to safe drinking water and basic sanitation

Target 7.8: Proportion of population using an improved drinking water source

Target 7.9: Proportion of population using an improved sanitation facility

National Rural Drinking Water Programme (NRDWP)

Goal: "To provide every rural person with adequate safe water for drinking, cooking and other domestic basic needs on a sustainable basis. This basic requirement should meet minimum water quality standards and be readily and conveniently accessible at all times and in all situations."

(Source: NRDWP FAQs, http://rural.nic.in/sites/downloads/our-schemes-glance/FAQsNRDWP.pdf)

Total Sanitation Campaign (TSC)

Features

- A nominal subsidy in the form of an incentive is given to rural poor households for construction of toilets.
- Emphasis on Information, Education and Communication (IEC), Capacity Building and Hygiene Education for effective behaviour change with involvement of PRIs, CBOs, and NGOs.
- Key interventions: Individual household latrines (IHHL), School Sanitation and Hygiene Education (SSHE), Community Sanitary Complex, Anganwadi toilets supported by Rural Sanitary Marts (RSMs) and Production Centers (PCs).

Source: Total Sanitation Campaign, http://tsc.gov.in/RuralSanitationNew/HomePage.aspx

[39] 2011 Census Data: http://www.censusindia.gov.in/2011census/hlo/Data%20sheet/Drinking%20Water.pdf
[40] http://www.who.int/topics/sanitation/en/. Last accessed on 29/02/12.
[41] 2011 Census data: http://www.censusindia.gov.in/2011census/hlo/Data%20sheet/Latrine.pdf

Water and sanitation in PAHELI 2011 survey: The approach

For PAHELI 2011, it was important to be able to create measurable indicators that could be used by ordinary people. We worked with Arghyam, our partner for this section, to identify basic and essential indicators that were easily measurable and subsequently field tested them in a series of pilots. Based on recommendations from Arghyam and the field pilot experience, we chose to explore the following domains through interactions with households, communities, schools and anganwadis.

HOUSEHOLDS Water	COMMUNITY Water	SCHOOL and ANGANWADI Water
• Quality: Bacterial contamination (faecal coliform testing); satisfaction regarding quality of water. • Ease of access: Type of source, distance from home, time taken to collect water. • Reliability: Duration for which water is available every day; periods of scarcity. • Quantity: Quantity of water available for drinking and other purposes as compared to international standards.	• Location: Mapping water sources in the village. • Quality: Testing fluoride levels at five primary water sources in the village. • Provision: Whether the village has government water supply. • Regularity/dependability: If the water sources in the village provide water throughout the year.	• Quality: Bacterial contamination (faecal coliform testing). • Provision: Whether schools have drinking water facilities (and whether they work).
Sanitation	**Sanitation**	**Sanitation**
• Where household members defecate. • Whether the household has toilets and if they are in use. • Whether the toilets were built under a government scheme. • Perceptions related to causes of diarrhoea.	• Mapping open defecation areas. • Observing the common methods of waste disposal.	• Whether schools and anganwadis have useable toilet facilities. • Whether schools have useable girls' toilets. • If children were observed washing their hands with soap before eating on the day of the survey.

In addition, national standards and international guidelines, including the Rajiv Gandhi National Drinking Water Mission (RGNDWM), the Total Sanitation Campaign (TSC), WHO drinking water guidelines[42] and BIS standards for drinking water[43] have been used for benchmarking purposes.

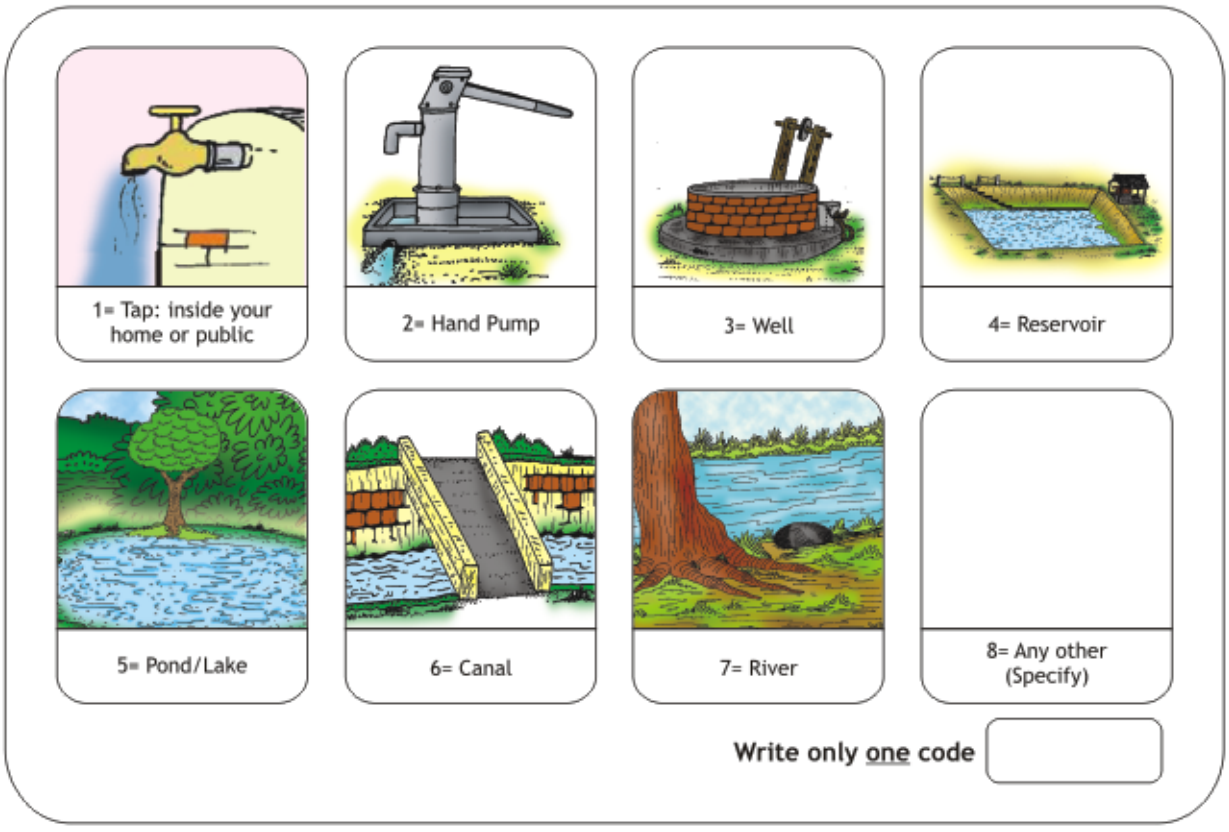
[42]WHO Guidelines for Drinking-Water Quality, 4th Edition: http://www.bis.org.in/cert/REQUIREMENTSIS14543.htm

[43]BIS standards for drinking water: http://www.bis.org.in/cert/REQUIREMENTSIS14543.htm

Methods and tools

PAHELI 2011 tool

The PAHELI 2011 tools were designed, for the water and sanitation section, to be easy to use, understand and explain–employing pictorial tools wherever possible. During piloting we observed that pictures generated more interest in the villages and made it easier to engage individuals and households. The field pilots were informative, which allowed us to improve the visuals and refine the questions.



Mapping and activity based assessments

Besides pictorial tools, other activity-based assessments also played an important role in generating interest and discussions among individuals and households in the village.

Village water and sanitation mapping

A mapping of community water sources was carried out for each sampled village. Of these, water from five major community sources was also tested for fluoride. The PAHELI 2011 exercise indicated that water mapping is a very good preparatory step in villages — as the process engaged villagers assisting in the mapping exercise spurring discussions surrounding water and sanitation. Similarly, the charting of open defecation areas helped to create awareness and generate curiosity and interest. A few questions asked

of the community at large and some village-level observations by surveyors also helped illuminate some broader issues of relevance for the entire village—such as availability of government water sources and methods of waste water disposal.

Water quality testing

Two types of water quality testing were carried out: fluoride and microbial/bacterial contamination. Five community water sources in every village were tested for fluoride. Microbial/bacterial contamination (faecal coliform) testing was performed in the surveyed households as well as in schools and anganwadis. People were particularly interested in the process of testing and in the results. At the point of data collection, there was a great deal of discussion on water quality, how one could know whether water was safe or clean and what the process of testing entailed. The fluoride levels were available soon after testing allowing us to convey the results to community members who enquired. However, as the microbial testing took 36 hours, it was not always possible to share the results. Going forward, it will be important to devise mechanisms to share the results of the household water quality testing with the households as well as to discuss simple solutions related to water purification and water handling practices.

Findings

A. Water

Sample description

The survey covered 8,080 households across seven districts. In addition, it covered 1,336 households in Bhilwara district. For this specific section, households were mainly asked a series of questions about water and sanitation use and practices. The respondent in each case was an adult female. A breakdown of households throughout the surveyed districts is shown in Table 1. Further, facilities related to water and sanitation in schools, anganwadi centres and health sub-centres were visited. Descriptions of the facilities sampled are provided in Tables 2 to 4.

TABLE 1: HOUSEHOLD SAMPLE DESCRIPTION				
District	**Villages visited**	**community drinking water sources tested for fluoride**	**Households surveyed**	**Households where water was tested**
Gumla	59	123	1,190	821
Hardoi	58	222	1,180	1,178
Korba	60	216	1,178	1,089
Nalanda	57	254	1,067	1,044
Rajgarh	59	161	1,178	1,087
Sundargarh	54	117	1,167	1,005
Udaipur	56	111	1,120	1,116
Total**	**403**	**1,204**	**8,080**	**7,340**
Bhilwara	68	85	1,336	1,211

*** Does not include Bhilwara district.*

TABLE 2: ANGANWADI SAMPLE DESCRIPTION				
District	**Villages visited**	**Anganwadis visited**	**Anganwadis where water was tested**	**Anganwadis where toilet-related data was collected**
Gumla	59	59	48	56
Hardoi	58	56	28	53
Korba	60	55	50	55
Nalanda	57	49	43	48
Rajgarh	59	54	29	51
Sundargarh	54	50	29	43
Udaipur	56	50	34	49
Total**	**403**	**373**	**261**	**355**
Bhilwara	68	55	41	54

*** Does not include Bhilwara district.*

TABLE 3: SCHOOL SAMPLE DESCRIPTION				
District	**Villages visited**	**Schools visited**	**Schools where water was tested**	**Schools where toilet-related data was collected**
Gumla	59	57	43	52
Hardoi	58	56	35	56
Korba	60	59	51	59
Nalanda	57	54	50	53
Rajgarh	59	58	33	54
Sundargarh	54	52	28	49
Udaipur	56	56	35	55
Total**	**403**	**392**	**275**	**378**
Bhilwara	68	65	44	63

*** Does not include Bhilwara district.*

TABLE 4: HEALTH SUB-CENTRE SAMPLE DESCRIPTION			
District	**Villages visited**	**Health sub-centres visited**	**Health sub-centres where toilet-related data was collected**
Gumla	59	14	14
Hardoi	58	13	11
Korba	60	14	12
Nalanda	57	14	14
Rajgarh	59	13	11
Sundargarh	54	13	13
Udaipur	56	25	23
Total**	**403**	**106**	**98**
Bhilwara	68	19	18

*** Does not include Bhilwara district.*

In the survey, questions related to water were based on a few main themes: Quality (fluoride and bacterial contamination, perceptions of water quality), access (in terms of water sources used, distance from water sources and time spent collecting water), reliability (water availability and summer water shortages) and quantity (consumption- litres per capita). The analysis in this section has been divided accordingly and treats each point separately[44].

Quality

Unsafe drinking water is extremely hazardous to health and can lead to widespread acute and chronic illnesses. Diarrhoeal diseases such as cholera, typhoid and dysentery, caused by unsafe water and poor sanitation, are common across the developing world—killing 4,000 children every day[45].

One source of contamination in water is bacteria. Unlike other types, the probability of bacterial contamination is high along the entire water supply chain including at the source and during collection, storage or handling. However, as users do not always purify water, it is difficult to ascertain the point of contamination. Therefore, we decided to test water at the point of use in the surveyed households.

PAHELI 2011 surveyors were instructed to collect drinking water in each surveyed household and test it. An H2S strip test was used to detect the presence of faecal coliform in the water. This test took 36 hours, therefore surveyors were required to label the water sample bottles, store them in kits provided and note down responses at the appropriate time. Table 5 shows levels of contamination in tested samples.

[44] Comparisons to other sources of information (Ministry of Water Resources, Ground Water Board, NSS, NFHS) have been made where possible.

[45] http://www.wateraid.org/international/what_we_do/the_need/6067.asp. Accessed on 30/12/11.

TABLE 5: BACTERIAL CONTAMINATION OF DRINKING WATER					
District	No. of respondents	Percentage of households by drinking water quality			
		Contaminated	Not contaminated	No data	Total
Gumla	1,190	58.7	10.3	31.0	100.0
Hardoi	1,180	82.7	17.1	0.2	100.0
Korba	1,178	76.8	15.6	7.6	100.0
Nalanda	1,067	71.4	26.4	2.2	100.0
Rajgarh	1,178	76.9	15.4	7.7	100.0
Sundargarh	1,167	59.7	26.4	13.9	100.0
Udaipur	1,120	75.1	24.6	0.4	100.0
Total**	**8,080**	**71.6**	**19.3**	**9.2**	**100.0**
Bhilwara	1,336	76.9	13.8	9.4	100.0

** H_2S strip test was used to detect the presence the faecal coliforms. ** Does not include Bhilwara district.*

On an average, across all districts, close to 70% of households were found to be using drinking water with bacterial contamination. In Hardoi district, the figure was extremely high at 82.7%. Given the background of poor health and malnutrition, the poor quality of water is a critical problem that needs urgent attention. Water quality in terms of bacterial contamination is affected by season. Besides, the location of the testing site and any activity around it (open defecation etc.) may also impact water quality. Additionally, the depth of wells and hand-pumps is also an influencing factor as the deeper they are, the lesser the chance is of contamination (due to more filtration by deeper soil layers). Information on all these influencing factors however, was beyond the scope of PAHELI 2011.

The first few steps towards addressing poor water quality include developing an understanding of safe water, realising the implications of drinking unsafe water and learning about effective methods to purify water before consumption.

Respondents in PAHELI 2011 were also asked about their satisfaction with the quality of water.

TABLE 6: SATISFACTION WITH DRINKING WATER						
District	No. of HH	Percentage of households by level of satisfaction				
		Fully satisfied	Partly satisfied	Not satisfied	No data	Total
Gumla	1,190	73.0	23.9	2.1	1.0	100.0
Hardoi	1,180	79.6	15.2	4.7	0.6	100.0
Korba	1,178	75.5	21.6	2.3	0.6	100.0
Nalanda	1,067	69.1	20.5	9.3	1.1	100.0
Rajgarh	1,178	56.5	36.7	5.4	1.4	100.0
Sundargarh	1,167	78.9	18.4	1.5	1.2	100.0
Udaipur	1,120	37.9	45.8	15.4	1.0	100.0
Total**	**8,080**	**67.4**	**25.9**	**5.7**	**1.0**	**100.0**
Bhilwara	1,336	70.7	19.6	8.9	1.0	100.0

*** Does not include Bhilwara district.*

One can see a large disparity between the actual quality of water and perceptions regarding it. While 71.6% of the households across the seven districts were found to have contaminated water, 67.4% of the households reported that they were fully satisfied with the water quality. Another 25.9% reported being partially satisfied. Only 5.7% of the surveyed households were not satisfied with the quality of drinking water. This indicates that more efforts need to be made to spread awareness about what safe drinking water is and how people can determine whether their drinking water is safe.

In the case of Bhilwara, 76.9% of the surveyed households had contaminated water and 70.7% of the households were fully satisfied with the quality of water.

Given the relatively high levels of satisfaction with drinking water, it was not surprising that people did not feel the need to purify water. Table 7 gives a summary of the water purification techniques that were observed in the sampled households.

TABLE 7: PURIFICATION OF DRINKING WATER

District	Sample size	Percentage of HH that purify water			Percentage of HH using each purification method*			
		Do not purify	Use at least one purifying method	No data	Boiling	Adding chlorine tablets/alum	Filter through a cloth	Use filter water
Gumla	1,190	56.7	43.0	0.3	35.3	0.8	15.1	0.4
Hardoi	1,180	98.9	0.8	0.3	0.4	0.3	0.0	0.1
Korba	1,178	27.9	63.7	8.4	3.0	1.2	45.8	2.0
Nalanda	1,067	97.5	2.0	0.6	0.4	0.3	1.0	0.3
Rajgarh	1,178	29.6	69.6	0.8	0.3	0.6	68.5	0.0
Sundargarh	1,167	68.6	29.9	1.5	6.8	0.9	21.9	0.6
Udaipur	1,120	5.9	93.9	0.2	0.0	0.1	93.8	0.1
Total **	**8,080**	**54.8**	**43.5**	**1.8**	**6.8**	**0.6**	**35.2**	**0.5**
Bhilwara	1,336	14.5	82.2	3.4	0.2	0.1	81.7	3.4

** Multiple responses were allowed; so percentages do not add up to 100. Filtering through a cloth has been listed as a method of "purification" based on respondents' perceptions. ** Does not include Bhilwara district.*

In Udaipur and Rajgarh, a majority of households purified water using at least one method. However, a closer look at these numbers reveals that almost all the households in these districts only filtered water through a cloth. It is important to note that filtering through a cloth removes suspended particles and

this removes the pathogens attached to the particles to a limited extent. In essence, filtering is the first step, which has to be followed by further disinfection to purify water. Overall, 35.2% of the surveyed households across the seven districts reported only filtering through a cloth. In this respect, Gumla was the only exception with 35.3% of the households reporting that they boiled water. In some districts, such as Hardoi (98.9%) and Nalanda (87.5%), hardly any households purified water through any method.

Other sources of water contamination that can be a cause of concern are fluoride and arsenic[46]. In low concentrations, fluoride has beneficial effects on teeth. However, too much exposure to fluoride in drinking water, or a combination of exposures from different sources, can have negative effects on health. These range from mild dental fluorosis to crippling skeletal fluorosis, depending on the level and time span of exposure. The latter is a considerable cause of morbidity in several parts of the world[47].

As fluoride contamination can only be found at the level of water sources and not in the supply chain, we tested for fluoride contamination only at the village water sources. However, it was not feasible to test every water source in the village as some villages have up to 60 sources. Thus, after all water sources were mapped, the community was consulted and requested to identify five primary water sources in the village. If there were no primary sources in the community (such as in villages with one hand pump for every few houses), five water sources from the village that were representative of smaller sections were selected for testing. Easy to use, fast fluoride tests were procured to reduce the margin of error. Apart from the task of explaining the testing process during training, groups of surveyors were also required to try this test during practice visits to the field in order to familiarise themselves with the procedure. Apart from this, pictorial and written explanations were provided with the survey material.

TABLE 8: FLUORIDE LEVELS IN COMMUNITY WATER SOURCES

District	Percentage of community water sources with fluoride above permissible limits			
	Sample size	Below or equal to permissible limit (1.5 mg/l)	Above permissible limit (1.5 mg/l)	Total
Gumla	123	91.9	8.1	100.0
Hardoi	222	99.1	0.9	100.0
Korba	216	94.4	5.6	100.0
Nalanda	254	89.4	10.6	100.0
Rajgarh	161	94.4	5.6	100.0
Sundargarh	117	92.3	7.7	100.0
Udaipur	111	81.1	18.9	100.0
Total**	**1,204**	**92.5**	**7.5**	**100.0**
Bhilwara	85	76.5	23.5	100.0

** Where possible, five main water sources were tested in each village. Results are based on the number of water sources that were eventually tested. ** Does not include Bhilwara district.*

[46] Fluoride in Drinking Water, WHO, 2006.
[47] Fluoride in Drinking Water, WHO, 2006.

On average, fluoride contamination above permissible levels was recorded in 7.5% of the samples collected across the seven districts. Samples collected from Udaipur (18.9%), Nalanda (10.6%), Gumla (8.1%) and Sundargarh (7.7%) showed substantial levels of fluoride contamination. These are important results, especially because Nalanda and Gumla are listed as fluoride-affected districts by the Ministry of Water Resources (MoWR), Government of India[48]. However Sundargarh does not feature as a fluoride-affected district on the list at the MoWR website. Hence, the results call for an intensive fluoride monitoring exercise in Sundargarh to identify the extent of contamination.

To summarize, microbial/bacterial contamination was high across all districts. Efforts need to be made towards inculcating hygienic practices among the people for collecting, transporting, storing and handling water. In addition, simple purification methods that they can adopt and practice regularly need to be introduced. Fluoride contamination in Sundargarh is an important finding as it does not feature as a fluoride-affected district on the list at the MoWR website. Further research needs to be carried out to understand the extent of contamination.

(In later sections, this report will discuss the findings of bacterial contamination in drinking water in schools and anganwadi centres. The incidence of bacterial contamination in these institutional drinking water sources was also high.)

Access

Access to water is an important issue. If the water source is far from where people live, different members of the household, especially girls and women, spend a lot of time and effort in collecting water.

All households in the survey were asked questions on the primary source of water in order to understand access issues. More importantly, the type of source has a direct bearing on whether water is available throughout the year as well as on the quality of water. For example, while a hand pump may be usable throughout the year, lakes and rivers may dry up for some months in the year leading to scarcity. On the other hand, stagnant ponds may not be a source of clean water.

Table 9 shows the distribution by type of water source for all households, by district.

[48]http://indiawater.gov.in/IMISReports/NRDWPBlockMain.aspx?IDistrict=0065&DtName=NALANDA
http://indiawater.gov.in/IMISReports/NRDWPDistrictMain.aspx?IState=034&StName=JHARKHAND

TABLE 9: PRIMARY WATER SOURCE							
District	No. of households	Percentage of Households by Water Source					
		Tap inside the household	Hand pump	Well (open and borewells)	others	No data	Total
Gumla	1,190	0.6	46.2	49.2	2.2	1.8	100.0
Hardoi	1,180	69.6	25.3	4.7	0.1	0.3	100.0
Korba	1,178	5.7	69.2	19.3	2.7	3.1	100.0
Nalanda	1,067	6.2	85.3	8.2	0.0	0.4	100.0
Rajgarh	1,178	3.5	52.5	32.3	6.7	5.0	100.0
Sundargarh	1,167	2.9	71.1	18.9	4.8	2.3	100.0
Udaipur	1,120	12.1	51.8	25.2	9.6	1.3	100.0
Total**	**8,080**	**14.5**	**56.7**	**22.8**	**4.0**	**2.0**	**100.0**
Bhilwara	1,336	21.3	40.9	24.0	13.3	0.5	100.0

** Results are based on the number of households where surveyors got a response to this question. ** Does not include Bhilwara district.*

Hand pumps were the primary source of water (56.7%) for a majority of households in the sample, followed by wells (22.8%). Of the sample, only 14.5% households reported taps (private or public in their homes) as their primary source of water. The 'other'category in the table refers to ponds/lakes, reservoirs, canals and rivers. These have not been classified individually as very few households reported using them.

According to Government of India norms, safe drinking water should be available within a walking distance of 1.6 km or elevation difference of 100 metres in hilly areas. These norms are different if the terrain is arid, semi-arid or mountainous. For the purpose of keeping the tool simple to use and understand, we did not divide distances according to the above classification. However, a broad categorisation was used. Table 10 describes the situation based on distance from primary water source.

TABLE 10: DISTANCE FROM PRIMARY WATER SOURCE							
District	Sample size	Percentage of households according to distance from primary water source					
		In or just outside home	Within 250 m	250 m - 1 km	1 km or more	NA	Total
Gumla	1,190	24.6	54.4	17.5	1.0	2.5	100.0
Hardoi	1,180	79.2	19.9	0.4	0.0	0.4	100.0
Korba	1,178	38.6	47.6	9.5	0.3	3.9	100.0
Nalanda	1,067	69.2	24.7	4.7	0.0	1.5	100.0
Rajgarh	1,178	18.3	42.4	22.9	9.9	6.5	100.0
Sundargarh	1,167	27.4	56.0	12.6	0.3	3.8	100.0
Udaipur	1,120	24.4	44.5	24.0	5.5	1.7	100.0
Total**	**8,080**	**40.3**	**41.4**	**13.0**	**2.4**	**2.9**	**100.0**
Bhilwara	1,336	28.3	39.4	26.4	4.6	1.4	100.0

** Results are based on the number of households where surveyors got a response to this question. ** Does not include Bhilwara district.*

According to the NSS 65th round, drinking water facilities within household premises were available in nearly 41% of rural households. On an average, 40.3% of households in PAHELI 2011 districts reported drinking water facilities in or just outside the home. In addition, 41.4% of households reported collecting drinking water within 250 metres of their home. Of the surveyed households, 13% had their primary water source within a distance of 250m-1 km. However, there was variation among districts in the last category—24.0% households in Udaipur, 22.9% in Rajgarh and 17.5% in Gumla reported collecting water from a primary source 250m-1 km away. Overall, it was heartening to note that the proportion of households who had to travel 1km or more to collect water was low at 2.4%. Here too, Rajgarh recorded the highest number of such households at 9.9%, followed by Udaipur at 5.5%.

Another dimension of access to water is the time taken to collect it from the source. Information on this was gathered by asking respondents how much time they spent on each trip to collect water from the primary water source. This task is usually done by women and girls in the family and in cases where the source of water is located far away, this exercise can be physically taxing and lead to a loss of time that can be spent on other activities.

TABLE 11: TIME TAKEN TO COLLECT WATER FROM PRIMARY WATER SOURCE

District	No. of Households	Percentage of households by time taken to collect water					
		< 15 min	Between 15 min and 1 hour	Between 1 and 2 hours	More than 2 hours	No data	Total
Gumla	1,190	60.8	35.6	1.1	0.4	2.1	100.0
Hardoi	1,180	91.8	7.5	0.0	0.1	0.7	100.0
Korba	1,178	65.1	30.5	1.2	0.0	3.2	100.0
Nalanda	1,067	79.9	17.2	0.8	0.7	1.4	100.0
Rajgarh	1,178	31.2	42.7	16.8	4.1	5.2	100.0
Sundargarh	1,167	64.3	32.2	0.8	0.2	2.6	100.0
Udaipur	1,120	34.6	54.8	6.7	2.6	1.3	100.0
Total**	**8,080**	**61.0**	**31.5**	**3.9**	**1.1**	**2.4**	**100.0**
Bhilwara	1,336	38.1	52.7	7.3	1.1	0.8	100.0

*** Does not include Bhilwara district.*

Relatively speaking, a large number of households in Rajgarh spent more than 15 minutes in fetching water. (Only 31.2% of the households reported that it took them less than 15 minutes for each trip.) For 42.7% of the households in Rajgarh, the trip took between 15 minutes to an hour, for 16.8% between one and two hours, and for 4.1% more than two hours. Hardoi had the best access with 91.8% of the households reporting that each trip took less than 15 minutes and almost all the rest saying it took between 15 minutes to an hour.

In summary, the most common types of water sources used by households were hand pumps (50%), wells (22%) and taps (14%). On the whole, only a small number of households travelled more than 1 km to collect water. However, the variations across districts were large—Rajgarh and Udaipur had many more

households in this category. Similarly, in the time taken to collect water, only 1.1% of the households reported taking more than two hours to collect water per trip and 3.9% reported taking between one and two hours.

Reliability

While the data from the sampled villages and households indicates reasonably good access to water, it is useful to explore the reliability of these water sources. In some cases, water sources may be in close proximity but the water supply is not necessarily regular.

TABLE 12: FREQUENCY OF DRINKING WATER AVAILABILITY

District	Sample size	Percentage of households by frequency of availability					
		All the time	Once everyday	Alternate days	Once a week or less	No data	Total
Gumla	1,190	78.6	16.7	0.3	2.4	1.9	100.0
Hardoi	1,180	97.4	1.4	0.5	0.3	0.4	100.0
Korba	1,178	92.6	1.2	0.3	2.3	3.6	100.0
Nalanda	1,067	91.9	5.6	0.2	1.5	0.8	100.0
Rajgarh	1,178	72.5	18.9	1.1	1.9	5.6	100.0
Sundargarh	1,167	93.7	2.7	0.2	0.2	3.3	100.0
Udaipur	1,120	85.6	6.5	5.0	2.7	1.3	100.0
Total **	**8,080**	**87.3**	**7.7**	**1.1**	**1.6**	**2.4**	**100.0**
Bhilwara	1,336	81.8	6.0	7.2	4.3	0.7	100.0

*** Does not include Bhilwara district.*

87.3% of the households across the seven districts reported that water from their primary source was available all the time, while 7.7% reported it was available only once a day. The number of households that got water only once every day was very high in Rajgarh and Gumla at 18.9% and 16.7% respectively. In comparison, 97.4% of the Hardoi households received water all the time. At 5.0%, Udaipur had the largest proportion of households receiving water on alternate days.

In Bhilwara, 4.3% of the households reported receiving water once a week or less and 7.2% of the households reported receiving water on alternate days.

Households also face problems with specific types of water sources. For example, hand pumps can stop yielding water due to a dip in the water table during summer months. It is for this reason that respondents were asked whether they faced such shortages/scarcity in the summer months and how long these periods of scarcity lasted.

TABLE 13: WATER SHORTAGES IN SUMMER MONTHS							
District	Sample size	Percentage of households by duration of summer water shortages					
		None	Less than a week	1-4 weeks	More than a month	No data	Total
Gumla	1,190	49.6	10.8	4.9	30.6	4.2	100.0
Hardoi	1,180	62.8	29.2	3.6	4.0	0.3	100.0
Korba	1,178	51.8	27.6	8.1	8.7	3.8	100.0
Nalanda	1,067	41.5	29.5	8.3	19.7	1.0	100.0
Rajgarh	1,178	13.0	25.4	12.7	43.0	5.9	100.0
Sundargarh	1,167	20.6	43.0	21.5	6.3	8.7	100.0
Udaipur	1,120	50.2	26.9	11.2	10.2	1.6	100.0
Total **	**8,080**	**41.3**	**27.4**	**10.0**	**17.6**	**3.7**	**100.0**
Bhilwara	1,336	54.1	28.1	6.7	10.6	0.6	100.0

*** Does not include Bhilwara district.*

Across the seven districts, 41.3% of the households were found to have no water shortages in the summer. However there were enormous variations among the districts. Only 13% of the households in Rajgarh faced no water shortages, while in Hardoi 62.8% did. These variations were also seen in responses by households facing water shortages for over a month. In Rajgarh it was 43.0%, while in Gumla it was 30.6%. Close to 20% of the surveyed households in Nalanda, a drought prone district, also reported water shortages for more than a month, followed by Udaipur (10.2%). Close to one-fourth of the surveyed households in Sundargarh reported water shortages for one to four weeks.

To summarise, the majority of households received water all the time or at least once every day. However, there were disparities across districts. For example, Udaipur had more households in the "alternate days" and "once a week or less" categories.

Quantity

The Rajiv Gandhi National Rural Drinking Water Mission (RGNDWM) has fixed a minimum norm of 40 litres per capita per day (LPCD). The focus in PAHELI 2011 has been on drinking water, water for bathing and sanitation and for cooking and washing.

As it was not easy for surveyors or respondents to provide estimates in litres, questions were asked in measures frequently used such as buckets, lotas and glasses. Thereafter, volumes were calculated based on standard sizes. More details on this calculation are given in the footnote to Table 14.

TABLE 14: AVERAGE WATER CONSUMPTION IN LITRES PER CAPITA PER DAY (LPCD)						
District	**Drinking**	**Bathing**	**Toilet uses**	**Cooking**	**Washing**	**LPCD**
Gumla	1.2	30.0	3.5	6.4	24.1	65.3
Hardoi	1.5	27.0	10.6	4.0	17.7	60.8
Korba	1.6	30.0	10.5	10.7	19.6	72.3
Nalanda	1.8	26.0	6.0	8.5	21.8	64.1
Rajgarh	1.8	24.0	4.5	3.9	20.2	54.4
Sundargarh	1.4	28.0	3.0	10.1	18.9	61.4
Udaipur	1.8	25.0	4.5	5.3	18.2	54.8
Total**	**1.6**	**27.1**	**6.1**	**7.0**	**20.1**	**60.0**
Bhilwara	1.8	21.0	2.2	4.1	17.8	46.8

** Note: The challenge for an exercise like PAHELI 2011 is to be able to translate norms into easily understandable and useable indicators. Therefore, a series of systematic equivalency calculations were based on the data collected on water use employing measures that were familiar in the village. The data reported in the table above were calculated through questions 6 and 7 in the water questionnaire. Respondents were asked how much water they used on a daily basis for drinking, bathing and toilet uses in terms of glasses, lotas and buckets. These numbers were multiplied by standard sizes in litres for each type of container. The bathing question also included frequency of bathing as a response option and responses were calculated taking the bathing frequency into account. Since cooking and washing are done at a household level rather than individually, these estimates were asked for the household as a whole in terms of buckets. Once these quantities were converted to litres they were divided by household size to get an average figure for one member of the household. Thereafter, averages for different categories—drinking, bathing, toilet uses, cooking and washing—were added to get the litres per capita per day (LPCD) figure in the last column of the table. Results are based on answers from 9,416 households. Each water use was asked as a separate question. The following percentages of the entire sample were used to calculate each type of water usage—drinking (85%), bathing (78%), toilet uses (99%), cooking (93%) and washing (98%). These percentages were not 100% because households who did not respond and non-measurable water quantities (for example, from those who mentioned bathing in rivers) were excluded.*

When the data collected is translated using the process described above, the estimate for average LPCD consumption for the surveyed population across the seven districts was 60 LPCD, which is greater than that specified by the RGNDWM. The surveyed households in Bhilwara reported the lowest (about 47 litres) average per capita water consumption a day. Hence, it will be important to take another look at this minimum LPCD figure and move towards water security-based planning (as suggested by the NRDWP guidelines) to fix a locally appropriate figure. It is also important to think of how the common water quantity measures in villages can be translated into meaningful data.

B. Sanitation

The UNICEF-WHO JMP 2010 update estimates that 638 million people in India practice open defecation—this means that more than half the world's open defecation occurs in India. Due to the large number of villages practicing open defecation, the focus of the sanitation questionnaire was on locating where people were defecating: in the open, in household toilets or in community toilets. Stress was not placed on the type of toilet (whether this fell into the category of improved or unimproved sanitation). Rather, if a household toilet was located, surveyors were to observe whether it was being used.

Since the focus of the Total Sanitation Campaign has shifted to information, education and communication (IEC) rather than subsidising toilet construction, only BPL families receive subsidies to construct toilets. If a toilet was found in a surveyed household, the respondents were asked whether assistance from a government scheme had been used. Due to the shift to IEC, gauging awareness becomes a measure of the effectiveness of the campaign. Therefore, one question on perception related to diarrhoea was asked.

Sanitation is important not only to human health but also to economic and social development. The primary challenge in India is eradication of open defecation. (Under the Total Sanitation Campaign, the main goal of the Government of India is eradicating the practice of open defecation by 2017[49].) Open defecation can have several negative effects, including pollution of ground water, contamination of agricultural produce and facilitating the spread of diseases such as diarrhoea and cholera[50]. Despite these negative effects, open defecation is practiced widely in India.

TABLE 15: OPEN DEFECATION VS USE OF TOILETS

District	No. of households	Percentage of households					
		Open defecation	Household toilet	Community toilet	Others	No data	Total
Gumla	1,190	94.5	5.0	0.0	0.0	0.6	100.0
Hardoi	1,180	79.2	19.5	0.0	0.1	1.2	100.0
Korba	1,178	87.0	12.4	0.0	0.0	0.6	100.0
Nalanda	1,067	68.9	29.8	0.3	0.0	1.0	100.0
Rajgarh	1,178	88.5	9.6	0.1	0.1	1.7	100.0
Sundargarh	1,167	90.8	7.4	0.0	0.3	1.5	100.0
Udaipur	1,120	90.5	8.5	0.0	0.0	1.1	100.0
Total **	**8,080**	**85.8**	**13.0**	**0.1**	**0.1**	**1.1**	**100.0**
Bhilwara	1,336	93.6	4.9	0.0	0.0	1.4	100.0

*** Does not include Bhilwara district.*

A staggering number of surveyed persons in PAHELI 2011 practiced open defecation—85.8% across the seven districts. Only 13.0% of the surveyed population used a household toilet. Almost no households used a community toilet.

[49] http://tsc.gov.in/RuralSanitationNew/HomePage.aspx. Accessed on 30/12/11.
[50] Briefing Note: Abandoning Open Defecation, WaterAid.

In Bhilwara, 93.6% of the households reported they practiced open defecation.

A major reason for open defecation in rural areas is the lack of useable toilets, whether in households or communities. The Total Sanitation Campaign has moved away from providing financial assistance for building toilets, except to families living below the poverty line. Whilst there can be other reasons for open defecation, that fewer than one-fifth of the households in the surveyed districts had toilets indicates that toilet availability should certainly be addressed.

TABLE 16: HOUSEHOLDS WITH TOILETS

District	Number of households	Percentage of households			
		Has a toilet	Does not have a toilet	No data	Total
Gumla	1,190	16.5	75.5	8.1	100.0
Hardoi	1,180	23.1	76.3	0.7	100.0
Korba	1,178	20.5	76.9	2.6	100.0
Nalanda	1,067	34.8	46.2	19.0	100.0
Rajgarh	1,178	12.0	73.9	14.1	100.0
Sundargarh	1,167	8.1	86.0	6.0	100.0
Udaipur	1,120	13.0	86.3	0.8	100.0
Total **	**8,080**	**18.1**	**74.7**	**7.2**	**100.0**
Bhilwara	1,336	8.4	91.2	0.4	100.0

*** Does not include Bhilwara district.*

74.7% of the surveyed households reported that they did not have a toilet. As per the NFHS-3 (2005-06), 74% of the households in rural areas do not have toilets and as per the NSS 65th round (2008-2009), 65% of rural households do not have toilets. Although 18.1% of households reported that they had a household toilet, only 13% reported defecating in household toilets.

In Bhilwara, 8.4% of the households had toilets.

Studies show that despite having toilets in households, in some cases, members practice open defecation. The reasons for this vary from household to household. Often a toilet has been constructed but there is no regular water supply or proper drainage. In many cases, the constructed toilet has become a storage room. It is also important to understand cultural and social practices related to sanitation. In an attempt to understand whether besides the lack of toilets, resistance to using toilets was contributing to open defecation, the percentage of households that had a toilet not in use was also recorded. Surveyors were asked to observe this, and if it was not possible, the field was left blank.

TABLE 17: USE OF HOUSEHOLD TOILETS				
District	Sample size (households with toilet)	Of the households with toilets, percentage where toilet is in use		
		In use	Not in use	No data
Gumla	196	20.9	32.7	46.4
Hardoi	272	76.1	14.3	9.6
Korba	241	49.0	36.9	14.1
Nalanda	371	47.4	2.4	50.1
Rajgarh	141	56.0	13.5	30.5
Sundargarh	94	14.9	7.5	77.7
Udaipur	145	55.2	24.1	20.7
Total **	**1,460**	**49.0**	**18.0**	**33.1**
Bhilwara	112	63.9	36.1	25.9

*** Does not include Bhilwara district.*

Surveyors observed (where possible) that only 49% of the households with toilets were actually using them. On an average, surveyors were not able to see toilets in 33% of the surveyed households.

In Bhilwara, 63.9% of the household toilets were in use.

We also attempted to understand whether households that built toilets used their own finances or relied on the Total Sanitation Campaign or some other government scheme.

TABLE 18: ASSISTANCE FROM GOVERNMENT SCHEME FOR TOILET CONSTRUCTION					
District	Sample size (households with toilet)	Percentage of households with toilets			
		Built under TSC	Not built under any scheme	Other schemes	No data
Gumla	196	45.9	32.1	0.5	21.4
Hardoi	272	67.3	27.2	0.4	5.2
Korba	241	73.9	16.6	1.7	7.9
Nalanda	371	21.6	66.3	0.0	12.1
Rajgarh	141	51.1	25.5	1.4	22.0
Sundargarh	94	45.7	20.2	2.1	31.9
Udaipur	145	39.3	43.5	0.0	17.2
Total **	**1,460**	**48.2**	**37.1**	**0.7**	**14.1**
Bhilwara	112	33.9	53.6	0.0	12.5

*** Does not include Bhilwara district.*

About 37.1% of the households with toilets constructed them without aid from a government scheme and 48.2% of the households built them under the Total Sanitation Campaign.

PAHELI 2011 made a small attempt to explore people's perceptions on the relationship of water and health. One question was included in the questionnaire about the cause of diarrhoea. A sizable

percentage of the surveyed population cited poor water (44.6%) and food quality (43.5%) as major reasons for diarrhoea. At the same time, myths such as "too much heat" also seemed to be a popular perception (31.4%). In fact, only a small percentage (8.7%) of the surveyed population cited "bacteria in the water" as one of the reasons for diarrhoea. Lack of awareness about the basic causes of diarrhoea is a cause for concern as the absence of hygienic practices could have damaging results on health, especially of children.

TABLE 19: PERCEPTIONS ON CAUSES OF DIARRHOEA

State	Sample size	Percentage of women who indicated belief*								
		Poor quality of water	Poor food quality	Not washing hands after defecation/before eating food	Evil eye	Too much heat	Less water in the body	Other diseases	Bacteria in the water	Other beliefs
Gumla	1190	45.0	34.6	6.8	6.0	8.9	9.2	2.9	13.4	0.2
Hardoi	1180	21.2	55.8	2.9	4.8	35.4	6.7	4.2	2.2	0.4
Korba	1178	57.1	51.3	6.9	3.0	40.9	5.3	3.1	4.4	0.5
Nalanda	1067	44.0	51.5	9.8	6.1	41.8	8.1	7.0	6.9	0.0
Rajgarh	1178	66.6	47.3	6.8	4.7	30.7	9.1	1.7	11.0	0.2
Sundargarh	1167	21.0	8.1	0.4	3.9	1.0	0.6	0.2	2.7	9.2
Udaipur	1120	57.6	60.8	18.7	21.1	63.4	15.3	11.6	20.7	0.2
Total **	**8080**	**44.6**	**44.0**	**7.4**	**7.0**	**31.4**	**7.7**	**4.3**	**8.7**	**1.5**
Bhilwara	1336	60.8	43.5	10.3	8.2	52.5	19.2	14.5	7.3	0.2

**Multiple responses were allowed; thus percentages will not add up to 100 in each row. ** Does not include Bhilwara district.*

In summary, the majority of households practiced open defecation. A small percentage of households had toilets (18.1%) and only half the households with toilets were using them. Half the households with toilets reported assistance from a government scheme in their construction. Perceptions on the cause of diarrhoea were not accurate. Besides investment in household toilets and community toilets, a focus on changing people's open defecation habits is also required, as well as promoting an understanding of the link between poor sanitation and diarrhoea.

C. Village-level questions

During the village water mapping process, several questions were asked about the village community. The first related to whether the village had a government water source, and further, whether water supply was available throughout the year.

Table 20 shows the availability of government water supply in the surveyed villages. Table 21 shows the status of water supply.

TABLE 20: VILLAGES WITH GOVERNMENT WATER SUPPLY

District	Percentage of villages with government water supply				
	Sample size	Available	Not available	NR	Total
Gumla	59	39.0	44.1	17.0	100.0
Hardoi	58	10.3	72.4	17.2	100.0
Korba	60	61.7	28.3	10.0	100.0
Nalanda	57	50.9	45.6	3.5	100.0
Rajgarh	59	47.5	28.8	23.7	100.0
Sundargarh	54	33.3	24.1	42.6	100.0
Udaipur	56	41.1	30.4	28.6	100.0
Total **	**403**	**40.7**	**39.2**	**20.1**	**100.0**
Bhilwara	68	38.2	38.2	23.5	100.0

**These estimates are based on reports received from villagers during the mapping process. ** Does not include Bhilwara district.*

TABLE 21: WATER SUPPLY THROUGHOUT THE YEAR

District	Percentage of villages with water supply throughout the year				
	Sample size	Yes	No	NR	Total
Gumla	59	61.0	22.0	17.0	100.0
Hardoi	58	63.8	19.0	17.2	100.0
Korba	60	65.0	23.3	11.7	100.0
Nalanda	57	59.7	35.1	5.3	100.0
Rajgarh	59	22.0	54.2	23.7	100.0
Sundargarh	54	20.4	37.0	42.6	100.0
Udaipur	56	48.2	23.2	28.6	100.0
Total **	**403**	**48.9**	**30.5**	**20.6**	**100.0**
Bhilwara	68	41.2	35.3	23.5	100.0

** This estimate is based on reports received from villagers during the mapping process. ** Does not include Bhilwara district.*

30.5% of the villages across the seven districts reported that their water sources did not provide them with water throughout the year.

In Bhilwara, 35.3% of the villages reported not having water supply throughout the year.

On the subject of sanitation, one aspect that was observed at the village level was waste water disposal. Surveyors were asked to observe methods of waste water disposal in villages and tick as appropriate.

TABLE 22: WASTE WATER DISPOSAL

District	Sample size	Soak pit	Cesspool	Drainage	Fields	Road	Surface water body	Others	NR
Gumla	59	15.3	0.0	22.0	20.3	8.5	1.7	5.1	27.1
Hardoi	58	6.9	13.8	34.5	8.6	8.6	1.7	3.5	22.4
Korba	60	23.3	0.0	13.3	13.3	16.7	1.7	6.7	21.7
Nalanda	57	12.3	0.0	47.4	21.1	1.8	7.7	1.8	8.8
Rajgarh	59	6.8	1.7	45.8	3.4	8.5	1.7	0.0	28.8
Sundargarh	54	0.0	11.1	3.7	18.5	7.4	1.9	7.4	48.2
Udaipur	56	5.4	0.0	26.8	19.6	3.6	14.3	0.0	30.4
Total **	**403**	**10.2**	**3.7**	**27.8**	**14.9**	**7.9**	**4.2**	**3.5**	**26.6**
Bhilwara	68	8.8	0.0	20.6	7.4	32.4	5.9	0.0	25.0

** During village mapping, surveyors were asked to observe where waste water flows in the village. While there could be several responses to this question, they were asked to report the two most prominent means of waste water disposal. Results are based on the number of villages where surveyors were able to observe the situation clearly. ** Does not include Bhilwara district.*

D. Water and sanitation in schools and anganwadis

Here we will discuss the provision and quality of drinking water and toilets in anganwadi centres and government primary schools and the provision of toilets in health sub-centres.

Water

The importance of safe drinking water has been stressed upon throughout this section. With close to universal school enrolment across India, it is essential to look at the quality of drinking water available in schools. In fact, the Right to Education Act mandates safe drinking water in schools.

The PAHELI 2011 exercise tested water quality in anganwadi centres and schools in the sampled villages. Refer to Tables 2 to 4 for a comprehensive description of the facilities sampled. The tables in the section below outline the key findings.

TABLE 23: BACTERIAL CONTAMINATION IN SCHOOL AND ANGANWADI DRINKING WATER										
District	Anganwadis					School				
	Sample size	Contaminated (%)	Not Contaminated (%)	No data	Total (%)	Sample size	Contaminated (%)	Not Contaminated (%)	No data	Total (%)
Gumla	59	52.5	28.8	18.6	100.0	57	49.1	26.3	24.6	100.0
Hardoi	56	26.8	21.4	51.8	100.0	56	42.9	19.6	37.5	100.0
Korba	55	69.1	18.2	12.7	100.0	59	67.8	18.6	13.6	100.0
Nalanda	49	57.1	30.6	12.2	100.0	54	72.2	18.5	9.3	100.0
Rajgarh	54	42.6	11.1	46.3	100.0	58	53.5	3.5	43.1	100.0
Sundargarh	50	32.0	20.0	48.0	100.0	52	30.8	21.2	48.1	100.0
Udaipur	50	38.0	30.0	32.0	100.0	56	32.1	30.4	37.5	100.0
Total **	**373**	**45.6**	**22.8**	**31.6**	**100.0**	**392**	**50.0**	**19.6**	**30.4**	**100.0**
Bhilwara	55	63.6	9.1	27.3	100.0	65	55.4	10.8	33.9	100.0

*** Does not include Bhilwara district.*

A fairly high percentage of bacterial contamination was recorded in water samples collected from schools (average contamination 50%) and anganwadi centres (average contamination 45.6%). For schools and anganwadis, 19.6% and 22.8% respectively showed no contamination. It must be noted that water quality testing could only be carried out in 70% of the schools and anganwadis.

Bhilwara had 55.4% and 63.6% of schools and anganwadis with contaminated water respectively.

TABLE 24: DRINKING WATER FACILITIES IN SCHOOLS						
District	Number of schools	Percentage of Schools				
		No facility	Facility but drinking water not available	Drinking water available	NR	Total
Gumla	57	3.5	0.0	82.5	14.0	100
Hardoi	56	0.0	12.5	85.7	1.8	100
Korba	59	1.7	10.2	79.7	8.5	100
Nalanda	54	3.7	7.4	77.8	11.1	100
Rajgarh	58	13.8	12.1	65.5	8.6	100
Sundargarh	52	0.0	1.9	82.7	15.4	100
Udaipur	56	8.9	3.6	85.7	1.8	100
Total **	**392**	**4.6**	**6.9**	**79.7**	**8.7**	**100**
Bhilwara	65	4.6	3.1	80.8	12.3	100

** During the school visit section of the survey, surveyors were asked to observe whether schools had drinking water facilities and whether drinking water was available at these facilities. ** Does not include Bhilwara district.*

Across the seven districts, surveyors observed that 79.7% of the schools had drinking water facilities and water was available in them. There was no drinking water facility in 4.6% of the schools and 6.9% of the schools had no water despite facilities being available.

Water quality in schools and anganwadis

After adjusting for missing data, about 67% of the water samples collected from 261 anganwadis and 72% of the water samples collected from 275 schools were found to be contaminated by bacteria across the seven surveyed districts in PAHELI 2011. The BIS standard[51] for drinking water is nil contamination by bacteria. This is therefore a serious issue, particularly in the context of the Right to Free and Compulsory Education Act (RTE) which mandates "safe and adequate drinking water facility for all children". The PAHELI 2011 results reveal that most of the schools surveyed across different states fail to meet the obligations set by the respective state governments following the notification of rules under the RTE. A recent ruling by the Supreme Court of India[52] also strengthens the existing legislation on the subject and reinforces the urgency of providing safe drinking water to schools (see Box 1). While the quality of drinking water in rural households is also unhealthy as seen in the results of PAHELI 2011, attention towards school drinking water is a priority for several reasons. As of 2009, about 386,000 children[53] (which included school-going children) in India died every year due to diarrhoeal diseases, mainly caused by consumption of unsafe drinking water, poor sanitary conditions and unhygienic practices. In an atmosphere of poor health, children are unable to fulfil their education potential, which reduces their future potential as earners and perpetuates poverty. Schools are an ideal entry point in villages for the knowledge and practice of safe drinking water. Prioritising safe drinking water for children is the right thing to do. Children also act as " agents of change" to take water quality knowledge to the community[54].

Supreme Court ruling on provision of drinking water in schools

The Supreme Court on August 9, 2011 gave a week's time to the states to ensure provision of potable drinking water in every government school if they did not want to face "serious consequences". This followed a PIL filed by the Environmental and Consumer Protection Foundation, an NGO. A bench of Justices Dalveer Bhandari and Deepak Verma said water was the most basic provision that must be ensured in every school and lamented that some states like Uttar Pradesh, Bihar, Orissa and Jharkhand had not complied with its April 29 order. The court had asked the states to ensure drinking water in schools by May 31. The bench asked the chief secretaries of these four states to file compliance reports by September 15. However, it also warned other states that if it was found that there were schools where drinking water had not been made available, "very serious consequences will follow". Incidentally, PAHELI 2011 covered one district in all these four states.

[51] Standard for drinking water, Bureau of Indian Standards (BIS; IS 10500:1991)

[52] "Provide drinking water in schools within a week: SC", The Times of India, Mumbai Edition, August 10, 2011

[53] "Vaccines, hygiene could stop diarrhea deaths: U.N", Reuters A.P., U.S. Edition, October 14, 2009

[54] As per the Hon'ble Supreme Court of India, ensuring access to safe drinking water is a constitutional mandate. As discussed earlier, the RTE recently has established access to safe and adequate drinking water in schools and anganwadis as a basic right of students. India has one of the largest numbers of school-going children, especially in rural areas (as per the NFHS 3 -2006). About 81% of the children in the age group of 6-10 attend schools in rural areas. To provide safe drinking water, sanitation and hygiene education to schoolchildren, the Government of India

Sanitation

Features of the Total Sanitation Campaign include School Sanitation and Hygiene Education (SSHE) and anganwadi toilets supported by Rural Sanitary Marts (RSMs) and Production Centres (PCs). This section seeks to examine the water and toilet status in schools, anganwadi centres and health sub-centres.

Table 25 shows the status of toilets in anganwadis and health sub-centres.

TABLE 25: TOILETS IN ANGANWADIS AND HEALTH SUB-CENTRES**

	Anganwadi Centres					Health Sub-Centres				
District	Sample size	Functional and clean	Functional but dirty	Available but Not functional	No tdlet	Sample size	Functional and clean	Functional but dirty	Available but Not functional	No tdlet
Gumla	56	17.9	10.7	17.9	53.6	14	50.0	7.1	21.4	21.4
Hardoi	53	5.7	3.8	26.4	64.2	11	45.5	0.0	0.0	54.5
Korba	55	18.2	5.5	32.7	43.6	12	66.7	8.3	16.7	8.3
Nalanda	48	12.5	4.2	8.3	75.0	14	42.9	7.1	14.3	35.7
Rajgarh	51	9.8	9.8	13.7	66.7	11	72.7	9.1	9.1	9.1
Sundargarh	43	25.6	18.6	48.8	7.0	13	38.5	0.0	21.7	13.0
Udaipur	49	12.2	6.1	26.5	55.1	23	56.5	8.7	21.7	13.0
Total **	**355**	**14.4**	**8.2**	**24.5**	**53.0**	**98**	**53.1**	**6.1**	**17.4**	**23.5**
Bhilwara	54	9.3	7.4	5.6	77.8	18	100.0	0.0	0.0	0.0

** In villages where there were anganwadi centres and health sub-centres, surveyors were asked to observe whether they had functional toilets. Results are based on anganwadi centres and health centres in Gumla, Hardoi, Korba, Nalanda, Rajgarh, Sundargarh and Udaipur. ** Does not include Bhilwara district.*

Only 14.4% of all anganwadi centres visited had a functional and clean toilet; 53.0% had no toilet at all. Of all sub-centres, 53.1% had functional and clean toilets whereas 23.5% had no toilets.

Besides being a sanitary concern, a lack of useable toilets has adverse effects on education. It can result in children not attending school or being unable to concentrate as they are uncomfortable. Further, the lack of separate girls' toilets often constitutes a security risk for them apart from being a major reason for discontinuance of education among girls.

launched the school water supply, sanitation and hygiene education programme (SSHE) through the Ministry of Rural Development under the Accelerated Rural Water Supply and Swajaldhara Programmes and the Sarva Shiksha Abhiyaan of the Ministry of Human Resource Development during 1999. Almost a decade later, during 2008-09, the Ministry of Drinking Water Supply and Sanitation (MDWS; erstwhile Department of Drinking Water Supply), began the Jalmani programme which aims to install simple standalone water purification systems (SAWPS) in rural schools to enable school children to have access to safe water. As of 2009, about 386,000 children (which included school-going children) in India died every year due to diarrhoeal diseases, mainly caused by consumption of unsafe drinking water, poor sanitary conditions and unhygienic practices.

TABLE 26: TOILETS AND GIRLS' TOILETS IN SCHOOLS											
District	No. of schools	General toilet					Separate girls' toilet				
		No facility	Not useable	Useable	No data	Total	No facility	Not usable	Usable	No data	Total
Gumla	57	14.0	28.1	43.9	14.0	100	22.8	22.8	42.1	12.3	100
Hardoi	56	26.8	57.1	12.5	3.6	100	44.6	46.4	7.1	1.2	100
Korba	59	39.0	37.3	15.3	8.5	100	64.4	17.0	8.5	10.2	100
Nalanda	54	9.3	20.4	63.0	7.4	100	40.7	14.8	33.3	11.1	100
Rajgarh	58	25.9	39.7	22.4	12.1	100	50.0	15.5	22.4	12.1	100
Sundargarh	52	5.8	15.4	67.3	11.5	100	26.9	17.3	38.5	17.3	100
Udaipur	56	5.4	28.6	51.8	14.3	100	16.1	12.5	62.5	8.9	100
Total**	**392**	**18.4**	**32.7**	**38.8**	**10.2**	**100**	**28.3**	**20.9**	**30.4**	**10.5**	**100**
Bhilwara	65	4.6	20.0	66.2	9.2	100	26.2	12.3	43.1	18.5	100

*** Does not include Bhilwara district.*

Across the seven districts, only 38.8% of the schools had useable toilet facilities. Another 32.7% had unusable facilities, while 18.4% had no toilet facilities. The situation for girls' toilets was worse with only 30.4% of the schools having useable girls' toilets, 20.9% having unusable girls' toilets and 28.3% having no girls' toilet facilities. Appendix Table 1 compares the estimates above with state-level estimates from the ASER 2011 survey. A lack of basic hygienic practices can have serious consequences on children's health. PAHELI 2011 attempted to capture this information in a simple manner. Surveyors were asked to record whether children washed their hands before eating on the day of the survey.

TABLE 27: SCHOOLS IN WHICH CHILDREN WASH HANDS WITH SOAP BEFORE EATING					
District	No. of schools surveyed*	Percentage of schools			
		Children wash hands with soap before eating	Do not wash	No data	Total
Gumla	57	25.4	54.2	20.3	100.0
Hardoi	56	5.4	85.7	8.9	100.0
Korba	59	38.2	43.6	18.2	100.0
Nalanda	54	14.3	67.4	18.4	100.0
Rajgarh	58	16.7	63.0	20.4	100.0
Sundargarh	52	84.0	10.0	6.0	100.0
Udaipur	56	42.0	50.0	8.0	100.0
Total **	**392**	**31.6**	**53.9**	**14.5**	**100.0**
Bhilwara	65	30.9	41.8	27.3	100.0

**During the school visit, surveyors were asked to observe whether children in the school washed their hands with soap before eating. ** Does not include Bhilwara district.*

Across the seven districts, the percentage of schools where children were observed washing their hands with soap before eating on the day of the survey was quite low (31.6%). It is particularly low in Hardoi at 5.4% and the highest was in Sundargarh at 84.0%.

A large percentage of schools did not have toilet facilities; however, several had facilities that were not useable. This points to the need not only for the building of toilet facilities but also ensuring that they are maintained properly. The situation was worse with regards to girls' toilets. In angwanwadis and public health centres, it was observed that toilets were not always in use. Encouraging children to wash their hands with soap before eating, a simple practice, could have a dramatic impact on their health.

Way forward

The water quality test results (of schools and anganwadis), especially for bacterial contamination, were alarming. These results warrant immediate attention. Since PAHELI 2011 was a limited survey of eight districts and a one-time effort, a more comprehensive survey is required to gauge the extent of the problem in all the states. Such a survey will help prioritise remedial action. Further, regular quality monitoring of water sources becomes extremely critical to understanding seasonal variations. Samples showing bacterial contamination should be sent to a laboratory to find the extent of contamination. Research is also needed to understand the effects of poor and unsafe water quality on children.

Drinking contaminated water is responsible for significant outbreaks of faecal-oral diseases such as cholera, typhoid, diarrhoea, viral hepatitis A, dysentery and dracunculiasis (guinea worm disease). According to UNICEF[55], factors related to water, sanitation and hygiene affect children's right to education in many ways. In an atmosphere of poor health, children are unable to fulfil their education potential. Repeated incidences of diarrhoea could also result in weight loss, stunted growth and vitamin deficiency. This heightens the chances of dropping out of school, leading to reduced earning potential, greater poverty, and impairing the capability of individuals and not just their earning potential[56].

The government at all levels, including the state governments, Panchayats and zilla parishads must treat the issue of school water quality with higher urgency. It should mandate time-bound action plans from the states to ensure all schools have a safe drinking water supply and monitor the plans to completion. An immediate mechanism for implementation is available through the Jalmani programme of the MDWS. The programme is at best partially successful as evident from the results of PAHELI 2011 as well as a study commissioned by the MDWS[57]. The performance of the Jalmani programme needs to be improved and extended to cover all the schools in the country. In fact, it could become the primary vehicle for providing safe drinking water in schools. State governments and zilla parishads need to be sensitised on the gravity of the issue and supported to take remedial action, especially in view of the effect it has on the enrolment and continuance of education, particularly in the case of girls.

[55] Water, sanitation and hygiene in schools, UNICEF India, 2011.
[56] Khurana, I. & Sen, R.; Rural water supply in India: Issues & Approaches, WaterAid India, 2008.
[57] An assessment of the Jalmani programme in rural India: A Report by the Centre of Media Studies, 2011.

Sustainability

Knowing the scale of the water quality problem, merely gauging its effects on students and supplying clean water may not solve the problem in its entirety. Only an integrated approach to water quality improvement with sanitation and hygiene education will serve the purpose. The intervention should also include studying the origin and route of contamination, assessing sanitary risk and building protection measures to reduce contamination at the source. Water quality test results of PAHELI 2011 at the surveyed households show an almost complete lack of understanding of water quality at the community level. Focusing on children and providing them with knowledge with regard to maintaining water quality and effective sanitation practices can be a first step in societal change and should help develop them as "agents of change". This will not only provide safe water and a hygienic environment in schools, the children will also convey the message back home. As "agents of change", these children will help create awareness about water quality and its link to health within the community.

Concluding thoughts : Water and sanitation

Water Quality

There was a distinct gap between popular perceptions of water quality and the reality in all the surveyed districts. On an average, about 72% of the surveyed households expressed satisfaction with the quality of their drinking water. In glaring contrast to this perception, about 71.6% of the water samples collected from these households were found to be bacterially contaminated. This indicated a lack of understanding at the users' end regarding indicators of good quality water. This also indicated widespread bacterial contamination in the surveyed locations and calls for regular monitoring of drinking water sources.

A majority (about 55% on an average) of the surveyed households did not purify drinking water. This indicated a lack of understanding about the need to purify drinking water and the effectiveness of different purification techniques. To reiterate the point made earlier, filtering water through a cloth was perceived to be an effective purification option by many households and about 36% of all the surveyed households seemed to adopt this as their most preferred option. Large-scale education and awareness generation is required on this issue.

About 67% of the water samples collected from 261 anganwadis and 72% of the water samples collected from 275 schools were found to be bacterially contaminated across the seven surveyed districts in PAHELI 2011. This is a serious issue and warrants immediate attention, especially in the context of the Right to Education Act which mandates "safe and adequate drinking water facility for all school children".

Sanitation

Almost 88% of the surveyed population across all districts defecated in the open. In addition to that, almost 80% of the surveyed households reported that they did not have a toilet. This is a serious cause for concern, especially when a centrally sponsored flagship scheme on sanitation (Total Sanitation Campaign) has been in effect in these states for more than a decade.

Appendix

•The table below compares PAHELI 2011 district-level estimates of the availability of toilet and drinking water facilities in primary schools with state-level ASER estimates.

Appendix Table 1: Comparison of School Toilet and Wa ter Facilities with ASER 2011 State-Level Data

District/State	Data Source	Toilet facilities					Separate girls' toilet facilities					Drinking water facilities				
		No facility	Not useable	Useable	No data	Total	No facility	Usable or locked	Usable	No data	Total	No facility	Available but no water	Drinking water available	No data	Total
Gumla / Jharkand	PAHELI	14.0	28.1	43.9	14.0	100	22.8	22.8	42.1	12.3	100	3.5	0.0	82.5	14.0	100.0
	ASER	19.1	43.5	37.5	-	100	23.4	40.1	36.6	-	100	11.1	8.3	80.6	-	100
Hardoi / U.P.	PAHELI	26.8	57.1	12.5	3.6	100	44.6	46.4	7.1	1.2	100	0.0	12.5	85.7	1.8	100.0
	ASER	7.4	38.8	53.9	-	100	16.6	36.0	47.4	-	100	5.4	10.2	84.4	-	100
Korba / Chhattisgarh	PAHELI	39.0	37.3	15.3	8.5	100	64.4	17.0	8.5	10.2	100	1.7	10.2	79.7	8.5	100.0
	ASER	28.9	41.5	29.6	-	100	51.8	17.5	20.0	-	100	34.7	38.5	26.8	-	100
Nalanda / Bihar	PAHELI	9.3	20.4	63.0	7.4	100	40.7	14.8	33.3	11.1	100	3.7	7.4	77.8	11.1	100.0
	ASER	19.0	35.3	45.7	-	100	37.6	27.1	35.4	-	100	6.8	9.4	83.8	-	100
Rajgarh / Madhya Pradesh	PAHELI	25.9	39.7	22.4	12.1	100	50.0	15.5	22.4	12.1	100	13.8	12.1	65.5	8.6	100.0
	ASER	24.3	43.9	31.9	-	100	43.8	32.8	23.4	-	100	19.3	12.1	68.6	-	100
Sundargarh / Odisha	PAHELI	5.8	15.4	67.3	11.5	100	26.9	17.3	38.5	17.3	100	0.0	1.9	82.7	15.4	100.0
	ASER	14.9	33.3	51.8	-	100	25.2	28.0	46.8	-	100	11.2	14.3	74.5	-	100.0
Udaipur / Rajasthan	PAHELI	5.4	28.6	51.8	14.3	100	16.1	12.5	62.5	8.9	100	8.9	3.6	85.7	1.8	100.0
		3.3	26.9	69.9	-	100	9.3	24.5	66.3	-	100	21.9	8.5	69.5	-	100
Bhilwara / Rajasthan	PAHELI	4.6	20.0	66.2	9.2	100	26.2	12.3	43.1	18.5	100	4.6	3.1	80.8	12.3	100.0
	ASER	3.3	26.9	69.9	-	100	9.3	24.5	66.3	-	100	21.9	8.5	69.5	-	100