

ACCESS TO SAFE DRINKING WATER IN PRIMARY SCHOOLS IN RURAL BIHAR

A Fact Finding Report



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Background

Access to safe drinking water particularly in rural areas remains a major cause of concern. People struggle for the bare minimum required quantity of safe drinking water for their survival. In India groundwater plays the pivotal role in fulfilling the demands of domestic, industrial and agriculture sectors. The rural drinking water supply is mainly dependent on groundwater but over exploitation and contamination deteriorate the ground water quality. The health burden of poor water quality is enormous. Unsafe water makes the children prone to water born diseases like diarrhoea, jaundice, cholera etc. It is estimated that around 37.7 million Indians are affected by waterborne diseases annually, 1.5 million children are estimated to die of diarrhoea alone and 73 million working days are lost due to waterborne disease each year. The resulting economic burden is estimated at 36,600 crore a year.¹ However, apart from pathogenic contamination, problem of chemical contamination is also prevalent in India. The major chemical parameters of concern are fluoride and arsenic. Iron is also emerging as a major problem with many habitations showing excess iron in the water samples.² Chemical contaminants are toxic and carcinogenic. It causes serious health problem and children are more vulnerable to water contamination.

The provision of clean drinking water has been given priority in the Constitution of India. Article 47 of the constitution confers the duty of the State to provide clean drinking water and to improve the public health standards to the State. Water is state subject and rural water supply is included in the Eleventh Schedule of the Constitution among the subjects that may be entrusted to Panchayats by the States. The government has undertaken various programmes since independence to provide safe drinking water to

1 <http://www.downtoearth.org.in/news/unsafe-water-stunting-growth-of-indian-children-report-40391>

2 Drinking water quality in rural India: Issues and approaches: Indira Khurana and Romit Sen, WaterAid

the rural masses but it is also true that despite such expenditure lack of safe and secure drinking water continues to be a major hurdle and a national economic burden. On one hand the pressure of development is changing the distribution of water in the country; access to adequate water has been cited as the primary factor responsible for limiting development. The average availability of water is reducing steadily with the growing population and it is estimated that by 2020 India will become a water stressed nation. Groundwater is the major source of water in our country with 85 percent of the population dependent on it.³

Drinking Water Quality of Bihar

Groundwater is the main source of drinking water and it constitutes more than 90 per cent of drinking source in rural Bihar. The groundwater sources were considered safe for drinking water but over the past few years it became contaminated and polluted. Drinking water supply services in rural areas consist of hand-pumps and pipe water schemes (tube-well based or canal based) provided by the Government. As per census data, only 1.4 percent of the households used to get tap water in 2001 in rural areas which increased to 2.5 percent in 2011.⁴

However, the overall coverage of drinking water through tap water sources in Bihar is 4.4 percent of households. Hand pumps remain the major source of drinking water in rural areas supplying water to 91.4 percent households. Trend analysis of the sources of drinking water for the last 10 years shows that wells which used to constitute nearly 23 percent of the primary drinking water sources have now become obsolete. Only less than 1 percent households depend on wells for their drinking water needs. Similarly, the dependence on ponds, river and streams has declined during the last 10 years from 10.7percent to 3.06 percent. Most households have shifted to hand pumps for the sake of better

3 Safe drinking water status in the state of Bihar, India: Challenges ahead by D.S. Mishra,

4 <http://phed.bih.nic.in/Docs/CIMP-Report-18-05-2013.pdf>

quality of water throughout the year. Hand pumps and tube wells are the primary sources of drinking water even among the marginalized communities in rural areas of Bihar. Even after being rich in water reserves, the summer is water stressed in the southern part of the state. Floods in rainy season in the northern Bihar make drinking water unsafe due to fecal contamination causing increase in incidents of diseases like diarrhea, dysentery, typhoid fever, intestinal helminthiasis, jaundice, cholera etc. The emergence of chemical contamination in the groundwater also posing challenges in providing safe drinking water.

Ground water in 28 out of 38 districts is contaminated with arsenic, fluoride and iron. As per the official data 13 districts have excessive arsenic, 11 have fluoride and nine have iron.

Districts affected by Arsenic, Fluoride and Iron Contamination in Ground Water

Arsenic	Fluoride	Iron
1. Saran	1. Kaimur	1. Supaul
2. Vaishali	2. Rohtas	2. Araria
3. Samastipur	3. Aurangabad	3. Kishanganj
4. Darbhanga	4. Gaya	4. Saharsa
5. Buxar	5. Nalanda	5. Purnea
6. Bhojpur	6. Sheikhpura	6. Katihar
7. Patna	7. Jamui	7. Madhepura
8. Begusarai	8. Banka	8. Begusarai

9. Khagaria	9. Munger	9. Khagaria
10. Lakhisarai	10. Bhagalpur	
11. Munger	11. Nawada	
12. Bhagalpur		
13. Katihar		

Source- Public Health Engineering Department, Government of Bihar

Health impact of contaminated water

Bihar is well endowed with both ground water and surface water resources, but the quality and availability of water varies between districts and blocks. According to the Department of Drinking Water and Sanitation (DDWS), the ground water level is as low as 5m in the north-eastern part of the State and as high as 20m in the southern districts. Further, contamination by chemical compounds and harmful bacteria makes water in several areas unfit for human consumption. Several factors lead to contamination of water by bacteria and virus, such as improper usage and waste disposal, ground water depletion, and siltation. Often, this also results in concentration of certain chemical elements and compounds such as arsenic, fluoride, nitrate, or iron which could cause adverse health problems over the time. Contaminated drinking water affects the health. According to Public Health Engineering Department, Bihar water quality of 1590 habitations are affected by Arsenic, 4157 habitations are affected by Fluoride and 18673 habitations are affected by Iron.

Parameter	Acceptable Limit	Health Impact
Fluoride	1-1.5 mg/l	<ul style="list-style-type: none"> Immediate symptoms include digestive disorders, skin diseases, and dental fluorosis. Fluoride in larger quantities (20-80 mg/day) taken over a period of 10-20 years results in crippling and skeletal fluorosis which is severe bone damage.
Arsenic	0.01-0.05mg/l	<ul style="list-style-type: none"> Immediate symptoms of acute poisoning typically include vomiting, oesophageal and abdominal pain, and bloody 'rice water' diarrhoea.
		<ul style="list-style-type: none"> Long-term exposure to arsenic causes cancer of the skin, lungs, urinary bladder, and kidney. There can also be skin changes such as lesions, pigmentation changes and thickening (hyperkeratosis)
Iron	0.3-NR (no relaxation) mg/l	<ul style="list-style-type: none"> A dose of 1500 mg/l has a poisoning effect on a child as it can damage blood tissues Digestive disorders, skin diseases and dental problems
Nitrate	45-NR mg/l	<ul style="list-style-type: none"> Causes Methamoglobinemia (Blue Baby disease) where the skin of infants becomes blue due to decreased efficiency of haemoglobin to combine with oxygen. It may also increase risk of cancer.
Total Dissolved Solids	500-2000 mg/l	<ul style="list-style-type: none"> Objectionable taste to water. May affect osmotic flow and movement of fluids
Heavy Metals	Cadmium– 0.003-NR mg/l Zinc – 5-15 mg/l Mercury – 0.001-NR mg/l	<ul style="list-style-type: none"> Damage to nervous system, kidney, and other metabolic disruptions
Persistent Organic Pollutants	None	<ul style="list-style-type: none"> High blood pressure, hormonal dysfunction, and growth retardation.

Pesticides	Absent	<ul style="list-style-type: none"> • Weakened immunity, abnormal multiplication of cells leading to tumor formation. • Chloride content in pesticides that cause reproductive and endocrinal damage.
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Source: Central Ground Water Board and Water Aid

(For every parameter lower limit is acceptable and upper limit is permissible only in the absence of alternate source)



Drinking water quality of Schools

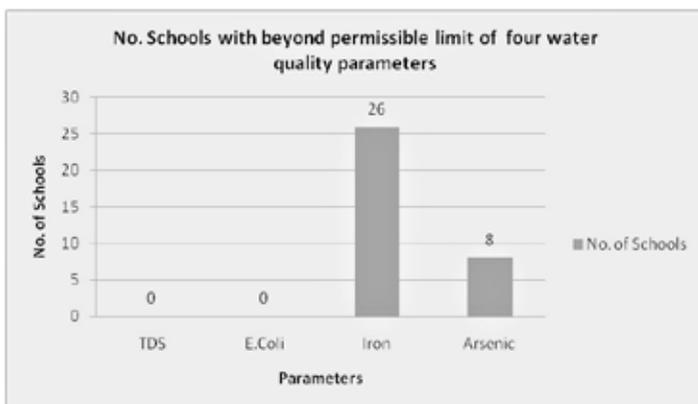
Access to safe water supply is one of the most important factors of health and socio-economic development. Drinking of contaminated water over a long period results in various health problems. Children are more vulnerable to the contaminated water. Situation is very grim in schools particularly located in remote and rural areas. Hand-pump remains to be the main source of drinking water in the schools which increases the possibility of contamination in water and, therefore, its consequences on health.

PAIRVI has conducted a study on access to safe drinking water in the schools and analyzed the four parameters (TDS, Iron, Arsenic and E Coli) of water samples of 26 government primary schools in Vaishali and Samastipur which are arsenic affected districts of the State. The study team comprising Dinbandhu Vats, PAIRVI, Surendra Kumar, Jawahar Jyoti Bal Vikas Kendra, Samastipur, Rajiv Gautam, Akhand Ekta, Samastipur, Mithilesh

Kumar, Samajik Chetna Sashta, and Anuj Kumar, PHEET Lab, Patna visited 26 primary government schools on 17-18 July 2017 and collected the water samples. TDS, bacterial contamination, Iron and Arsenic content of collected water samples are analyzed. However, this is very small sample size but the result is very startling. Excessive amount of iron water was found in all water samples and eight schools (one-third of water samples) indicated the higher amount of arsenic level. However, TDS of all water samples was found normal and E-Coli was not found in any water sample.

Key findings

1. One-third schools had high arsenic content.
2. Excessive iron content was found in all water samples.
3. TDS was within permissible range. Only two schools had TDS above 800 mg/l.
4. Bacterial contamination was not found in any sample
5. Not a single school was found connected with water pipeline
6. Hand pump is the only source of drinking water
7. Teachers have access to bottled water which cannot be used by school children
8. Water treatment units, though installed, were non-functional in all schools



State government has announced the Har Ghar Nal Ka Jal Scheme in 2015 to connect the every household with water pipeline by 2020 reducing the dependence on hand pump. This scheme specially focuses on rural areas affected with arsenic fluoride and iron. However, situation is entirely different on ground. People in rural Bihar have no other option but to drink contaminated water. Schools are not the exception. Students often drink the ground water. They have complained about the health implication of contaminated water. Water supply in school is often a least prioritized agenda for district administration and Panchayati Raj Institutes. Head master of Government Middle School Bidupur, Vaishali informed the team that supply water is available in nearby households but not in the school. Water pipeline has crossed in front of school's premises but school is not connected with the pipeline. Teachers often opt to avoid the use of school's ground water. They carry water bottles or sometimes purchase water from local market. Girindra Pandit, Head Master of Rajkiya Utkramit Madhya Vidyalay, Bidupur said that teachers often purchase water bottle from market. The students, however, have no other option to but to drink the untreated, unfiltered ground water available in schools. The fact finding team observed that water treatment unit was installed at Primary School, Dih-Dumari , Samastipur but it was not functional and students use untreated water from nearby hand pump.

Bihar's heavy cancer burden is largely due to high levels of arsenic, a known carcinogen, in its groundwater. Pollution



standards in India peg arsenic concentrations above 50 parts per billion as harmful. This is higher than the permissible limit of 10 parts per billion of arsenic in drinking water set by the United States. Over the last 15 years, field studies in Bihar have thrown up arsenic concentrations that are far higher – up to 3,880 parts per billion. About 22,000 patients have visited Mahavir Cancer Sansthan in 2016. Many of these patients suffer from cancers of the gall bladder or liver, both which are associated with arsenic toxicity.⁵

Residents of Rasalpur village under Mohanpur Block in Samastipur district stated that three persons of the village had died battling cancer within a year. Abhishek Kumar Singh, a class 10 student had died due to blood cancer and Jitendra Prasad Singh another resident of the villages died from liver cancer. “Most of the students complained about the abdomen problem”, Amit Kumar Singh, Head Master of the Rasalpur Middle School said.

In September 2014, the central government launched the Swachh Bharat Swachh Vidyalaya (Clean India Clean School) program, “a new government roadmap for WASH (Water, Sanitation and Hygiene) in Schools”. It stresses the importance of the “provision of child-friendly and sustainable safe drinking water”, amongst other things. But the government does not track the usability of drinking water infrastructure, and nor is this addressed in various government documents on water and sanitation. The Sarva Shiksha Abhiyan (Education for all) framework for elementary education specifies that provision for safe drinking water in every school is a must.

Conclusion

At a time when the government is insisting on public and children to consume safe drinking water to keep away from diseases, potable drinking water facility in government schools is a cry

5 <https://scroll.in/pulse/835431/ignored-arsenic-contamination-in-bihars-water-has-led-to-an-explosion-of-cancer>

far from reality. Most of the students are from poor family backgrounds and buying bottled water will be an added burden on them. The stark results show that a place of learning could pose potential health risks not just in Bihar but in many other states of India. These health risks affect students' learning by forcing them to stay away from school. It is imperative to ensure access to safe drinking water to avoid the risk of health implications. There is an urgent need to connect every school with treated water supply. School administrations have demanded immediate installation of water purifiers and maintenance of already installed purifiers in their respective schools and these purifiers should address metal contamination. There should be periodical analysis of drinking water in school premises to keep a check on heavy metal and fluoride contamination. For immediate relief local authorities should provide the students from these affected schools with clean bottled water. Improved health is fundamental to ensure regular attendance of students and thus promoting their development.

Annexure

1. List of schools

Sl.	Distt.	Block	Village	School
1	Vaishali	Bidupur	Bidupur	Govt. Middle School, Bidupur
2			Shitalpur	Primary School, Block Head quarter, Shitalpur
3			Dilawar-pur Gov-ardhan	Govt. Utkramit Madhya Vidyalay , Dilawarpur Govardhan
4			Chechar	Govt. Utkramit Madhya Vidyalay , Chechar
5			Hasanchak	Utkramit Madhya Vidyalay , hasanchak
6			Jorawanpur Baraitola	Govt. Primary School, Jorawanpur Baraitola
7			Bajitpur	Govt. Middle School, Bajitpur
8			Kushawaha Bajitpur	Primary School, Kushawaha Bajitpur
9			Jurawanpur Gopalpur	Upgraded Secondry School, Jurawanpur Gopalpur
10		Sahdei Buzurga	Maniyari	Utkramit Madhya Vidyalay Maniyari
11		Mahnar	Mahanar	Govt. Utkramit Madhya Vidyalay (Boys), Mahanar
12			Lawapur	Govt Utkramit Madhya Vidyalay, Lawapur (S.C.)
13			Lawapur	Govt. Utkramit Madhya Vidyalay , Lawapur
14			Lawapur Narayan	Govt. Primary School, Lawapur Narayan
15				Mohanpur

16	Samastipur	Mohanpur	Chauthai	Govt. Primary School, Chauthai
17			Rasalpur	Govt Middle School, Rasalpur
18			Baghara	Govt. Primary School, Baghara
19			Bariyarpur	Govt Middle School, Bariyarpur
20			Dih Dumari	Govt. Primary School, Dih Dumari
21			Dumari	Primary School, Margangpar
22			Mohiud- din Nagar	Mohiud- din Nagar
23	K.G.B.V Mohiuddin Nagar			
24	Govt. Girl's Middle School, Mohiuddin Nagar			
25	Govt. Higher Secondary School, M. Nagar			
26	Nawada	Utkramit Madhya Vidyalay Nawada		

2. Summary of test report of 26 water samples collected on 17th-18th July 2017

(Parameters found exceeding their max. permissible limits have all been in bold letters)

Sl.	Name of Schools	TDS (500-2000 mg/l)	Iron (0.3-NR mg/l)	Arsenic (0.01-0.05 mg/l)	E-Coli Count /100ml
1	Govt. Middle School, Bidupur	333	0.41	0.036	nil
2	Primary School, Block Head Quarter, Shitalpur	322	2.82	0.034	nil
3	Govt. Utkramit Madhya Vidyalay , Dilawarpur Govardhan	319	2.31	0.031	nil

4	Govt. Utkramit Madhya Vidyalay, Chechar	345	0.61	0.035	nil
5	Utkramit Madhya Vidyalay, Hasanchak	345	0.69	0.038	nil
6	Govt. Primary School, Jorawanpur, Baraitola	342	3.05	0.042	nil
7	Govt. Middle School, Bajitpur	340	1.95	0.046	nil
8	Primary School, Kushawaha Bajitpur	332	0.41	0.038	nil
9	Upgraded Secndry School, Jurawanpur Gopalpur	392	10.21	0.056	nil
10	Utkramit Madhya Vidyalay Maniyari, Sahdei Bujrg	298	0.69	0.039	nil
11	Govt. Utkramit Madhya Vidyalay (Boys), Mahanar	341	0.86	0.031	nil
12	Govt Utkramit Madhya Vidyalay, Lawapur (S.C.)	356	0.78	0.037	nil
13	Govt. Utkramit Madhya Vidyalay , Lawapur	355	0.32	0.028	nil
14	Govt. Primary School, Lawapur Narayan	434	0.74	0.032	nil
15	Govt. Middle School, Mohanpur	806	16.13	0.043	nil

16	Govt. Primary School, Chauthai	323	2.16	0.065	nil
17	Govt Middle School, Rasalpur	414	0.94	0.051	nil
18	Govt. Primary School, Baghara	378	3.73	0.048	nil
19	Govt Middle School, Bariyarpur	368	10.26	0.049	nil
20	Govt. Primary School, Dih Dumari	324	2.17	0.039	nil
21	Primary School, Margangpar	354	0.96	0.068	nil
22	Govt. Alfa Middle School, Mohiuddin Nagar	384	7.52	0.055	nil
23	K.G.B.V Mohiuddin Nagar	203	1.21	0.058	nil
24	Govt. Girl's Middle School, Mohiuddin Nagar	875	0.72	0.052	nil
25	Govt. Higher Secondary School, Mohiuddin Nagar	256	4.74	0.048	nil
26	Utkramit Madhya Vidyalay Nawada, Mohiuddin Nagar	310	8.57	0.054	nil



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