

# Assessment of the status, service delivery infrastructure and governance of drinking water supply in small and medium towns



WaterAid/ Prashanth Vishwanathan



Dindori,  
Madhya Pradesh

August 2020



## Dindori, Madhya Pradesh

**With the objective of assessing the critical water supply situation, governance, and service delivery in small and medium towns of India and of providing recommendations to municipal bodies, water utilities, and governments, WaterAid India conducted a study in six towns spread across India in 2019. Dindori town, in Dindori district of Madhya Pradesh, was one of the small towns selected for the study.**

### OBJECTIVES

1. To assess the drinking water supply situation and service delivery in four small and two medium towns. This included assessment of the quantity and quality of the water supplied.
2. To understand sanitation systems at the individual and household (HH) levels as well as community levels from a drinking water safety point of view.
3. To understand the current mandates as well as policy, regulatory, and legal framework, specific functions, finances, and functionaries allocated to the local bodies in order to fulfil these mandates.
4. To consolidate learning and suggest solutions, especially in the context of the poor and other marginalised populations in the small, medium, and census towns of India.

### METHODOLOGY

In order to capture the households' and community's perspective on the water supply and sanitation situation in Dindori town, a survey was conducted of 180 households spread across three wards of the town. This was followed by interviews with five key informants (KI) using structured questionnaires and focus group discussions (FGDs) with community members. Laboratory-based water quality testing of 40 drinking water samples from select water sources was also conducted.

For the household-level survey, three wards were shortlisted—one from the central area of the town, second from the periphery of the town and the third from a ward between the centre and the periphery. 60 sample households were surveyed from each of the three wards. The sampling criteria for choosing households ensured coverage of: i) households with access to piped water supply (PWS), and ii) households using all other types of water sources. Families from marginalised communities and people living in slum or informal settlements were also identified and covered. Key informant interviews mainly covered the broader perspectives; service delivery provisions, water conservation, and water quality monitoring measures. The FGD was conducted in Birsa Munda (Ward 15) as it had a mix of different water sources.

The findings of the study were supplemented by testing samples from shortlisted water sources in an NABL-accredited test lab. 40 such samples (27 from source and 13 user-level samples) were tested as part of the study.

The criteria for selection of water sources included:

- Samples from each type of drinking water source including individual households, public water points, piped water supply source, and surface water bodies.
- Samples from water sources at varying ground level depths ranging from a private hand pump at 30ft to a submersible pump at 120ft and deep boring at a depth of 250ft.
- Samples collected from different locations that present a mix of potentially safe and unsafe sanitary sites.

The entire study was conducted between September and November 2019.

## BACKGROUND

### Policies and regulations in urban water supply and management in Madhya Pradesh

Though an increase of 2.29 percentage points has been recorded in the urban population of Madhya Pradesh (MP) from 2001 to 2011, the level of urbanisation (27.63 per cent) in 2011 was quite low compared to the all-India figure of 31.16 per cent<sup>1</sup>. The state has 16 municipal corporations, 98 municipal councils, and 265 nagar panchayats, with a total urban population of 2,00,69,405 (2011 Census data). According to Census 2011, the four major cities with a population of more than ten lakh were Indore, with a population of 19,60,631; followed by Bhopal (17,95,648); Jabalpur (10,54,336); and Gwalior (10,53,505)<sup>2</sup>. The development of new centres for industrial and commercial activities, thermal power stations, and creation of new urban local bodies (ULBs)

contributed to the emergence of new towns within the proximity of large cities. A rapid growth in the number of towns (compared to the national average) was recorded in the last decade. The number of towns in MP has increased from 253 in 1981, to 350 in 1991, 368 in 2001 and 476 in 2011<sup>3</sup>.

In terms of service delivery arrangements, 51 per cent of all urban households in the state have water supply connections. At present, water supply is 88 litres per capita per day (lpcd) as against the standard of 135lpcd. Only 11 per cent of urban households have sewerage network services<sup>4</sup>.

<sup>1</sup>Handbook of Urban Statistics, 2019

<sup>2</sup><http://censusmp.nic.in/censusmp/All-PDF/3Trends in urbanization 21.12.2011.pdf>

<sup>3</sup>[http://amrut.gov.in/upload/uploadfiles/files/25SAAP\\_Madhya\\_Pradesh-1.pdf](http://amrut.gov.in/upload/uploadfiles/files/25SAAP_Madhya_Pradesh-1.pdf)

<sup>4</sup><https://pib.gov.in/newsite/printrelease.aspx?relid=130250>



Table 1

**Water and sanitation-related policies in the state**

**State Water Policy, 2003**

**Source:** <http://www.mpwrd.gov.in/documents/18/229525/01++State+Water+Policy>

The facility of sufficient drinking water is to be extended to the urban and rural population. The quality of surface and groundwater is to be tested on a regular basis by the concerned department. Treatment of industrial and urban waste is to be made mandatory before flowing into streams.

**State Level Policy for Waste Water Recycle & Reuse and Faecal Sludge Management (FSM), 2017**

**Source:** <http://www.indiaenvironmentportal.org.in/files/file/StateLevelPolicy.pdf>

Through the provision of sustainable sanitation services and protection of environment, the scheme aims to ensure the improved health status of the urban population, specially the poor and underprivileged.

**Madhya Pradesh Bhumi Vikas Rules, 2012**

**Source:** <http://mptownplan.nic.in/act%20&%20Rules/2012-06-01-258-English.pdf>

Rooftop rainwater harvesting is mandatory for all types of buildings with a plot size of more than 140sqm.

**Chief Minister's Urban Drinking Water Scheme, 2012**

**Source:** <http://www.mpurban.gov.in/?page=3zQ6ju6qTnwc6j7dcSqF3w%3D%3D>

State provision of the project costs under the scheme was 20 per cent for cities with a population of more than 50,000 and 30 per cent of for cities with less than 50,000 people. The remaining 80 per cent and 70 per cent of the amount is in the form of loans taken by ULBs.

**Right to Water Act, 2019 (draft)**

(not in public domain)

Table

**Legal framework and category of ULBs<sup>5</sup>**

Key legal frameworks	Administrative body	Numbers	Per cent of urban population
Madhya Pradesh Municipal Corporation Act, 1956	Municipal Corporations	16	48.8 %
Madhya Pradesh Municipalities Act, 1961	Municipalities	98	30.3 %
Madhya Pradesh Municipalities Act, 1961	Nagar Parishads	265	20.9 %
<b>Total</b>		<b>379</b>	<b>100.0 %</b>

<sup>5</sup> <http://www.indiaenvironmentportal.org.in/files/file/StateLevelPolicy.pdf>

## FINDINGS OF THE STUDY

### Introduction to Dindori town

Dindori is a nagar panchayat (declared in the year 1995) in the Dindori district of Madhya Pradesh. According to a report by Census India 2011, the town has 15 wards with a total population of 21,323, of which 10,864 are males and 10,459 are females. The population of the town at the time of the study in 2019 was 23,500 and the total number of households was 4,907. The population is predominantly tribal and the economy of the district is mainly dependent on forest products and agriculture. Dindori is located near the banks of the river Narmada, and therefore depends on the surface water body for its piped water supply.

### Water supply and sanitation arrangements

Under the Chief Minister's Urban Drinking Water Scheme (2012), almost all the wards in Dindori town have access to the treated surface water (from the river Narmada) piped water supply system<sup>6</sup>.

Before the Chief Minister's PWS scheme was launched, Dindori had a single town-based scheme which started in the early 1990s with a 10km long pipeline supplying water exclusively to the town. This scheme was implemented by Jal Nigam and operated and maintained by the nagar parishad. Under the CM's Urban Drinking Water Scheme, a piped network coverage of 40km was planned. Of this, nine kilometres have been laid and integrated with the old 10km pipeline. Municipal authorities are now awaiting approval of the remaining cost of the pipeline from the state government.

The water supply plant has been installed on the banks of the Narmada and is a mere 1.5kms from the office of the nagar parishad. There is a water quality monitoring laboratory at the water treatment plant with the latest equipment. Qualified lab technicians conduct water tests on a daily basis and maintain records.

In 2019, according to the data available with the nagar parishad, of the total 4,907 households in Dindori, 2,997 had access to piped water through an individual connection. The town also has approximately 200 commercial connections. Apart from the connection charges, a household also pays for the material (pipes, taps, etc) that cost a minimum of INR 1,500 while the labour charges are borne by the nagar parishad.

For providing water connections, the nagar parishad follows a slab-based cost structure:

- For APL households: A new PWS connection costs INR 2,500<sup>7</sup> while the monthly tariff is INR 80.
- For BPL households: A new PWS connection costs INR 2,500 while the monthly tariff is INR 80.
- For commercial water connections: A new PWS connection costs INR 4,000 with an additional charge of INR 1,000 as labour cost. The monthly water tariff is INR 250.

New PWS connections are available either by applying at the Lok Seva Kendra (at the district headquarters) or at the nagar parishad office, while the monthly water tariff can be paid at the nagar parishad office. All the 15 wards of the town have been covered with PWS but coverage is not 100 per cent in each ward due to expanding habitation.

<sup>6</sup> <http://www.mpurban.gov.in/?page=3zQ6ju6qTnwc6j7dcSqF3w%3D%3D>

<sup>7</sup> The water connection fee was INR 4,000 earlier but it has been reduced to INR 2,500. This was done to motivate households to take new connections.



There are no free riders as payment of tariffs is mandatory and non-payment has led to cases of disconnection in the past. However, local residents shared that illegal tapping of water through underground pipes is prevalent in the town. According to official estimates, other than PWS, there are 75 public tap posts or standposts, 36 (33 functional) public hand pumps, and four public borewells in the town.

In the summers, the nagar parishad supplies water free of cost through tankers to water-stressed wards. This is for meeting water shortage needs at the household level and not for allied activities like construction, weddings, or other events. Private tankers (4,000 litre capacity) are also available at a cost of INR 500.

The nagar parishad has a total staff of 68, of which 35 are permanent while the rest are contractual. With an average staff size, PWS-related tasks face operational issues particularly at the level of the pump operator.

The total budgetary provision for water in 2018–2019 was INR 272.5 lakh (3.55 per cent of the total budget of INR 76.73 crore). An advisory committee; ‘Aawas, Paryavaran, Lok Nirman Vibhag evam Jan Sampark’, has been constituted by the parishad to address issues related to water and sanitation within the municipal boundaries.

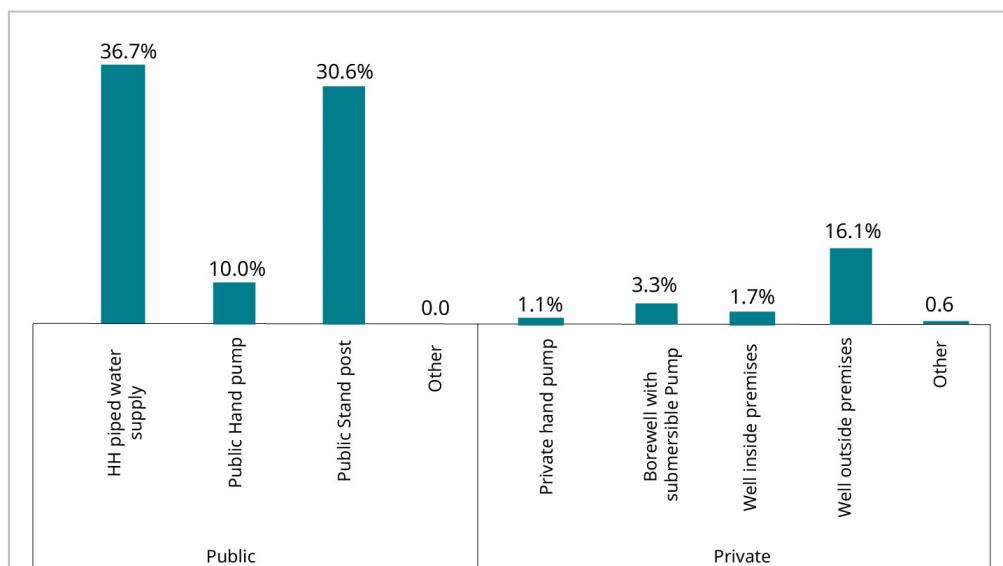
The town also follows a grievance redressal mechanism to resolve water and sanitation issues wherein the complaint can be registered with the nagar parishad. However, the preferred mode is to take the grievance directly to the elected members or ward members. Despite provisions, only 2.7 per cent of the total surveyed households have ever reported drinking water issues to administrative or elected representatives, reflecting a lack of trust on the authorities.

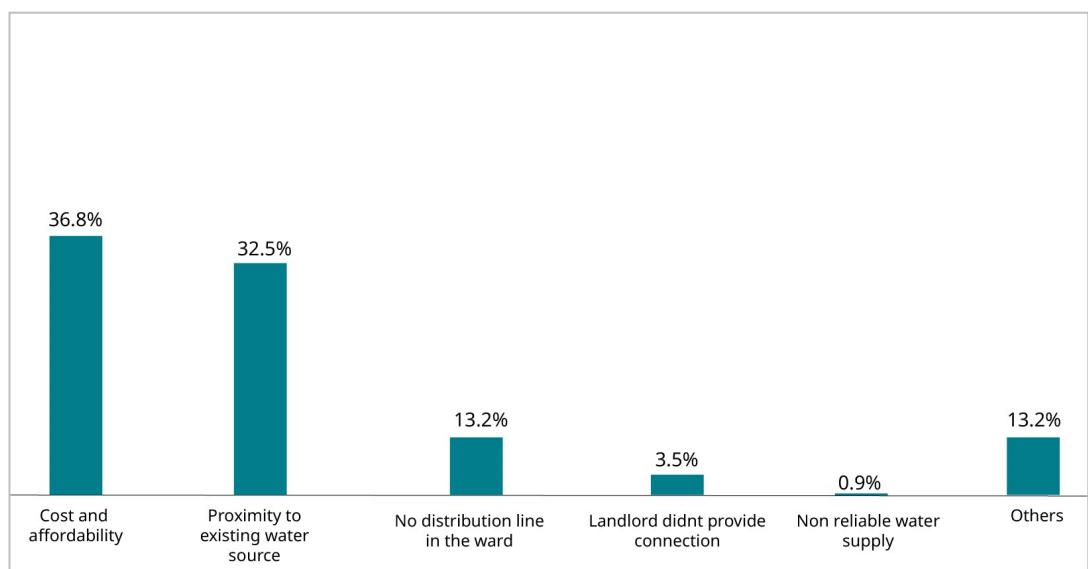
The water connection fee was INR 4,000 earlier but it has been reduced to INR 2,500. This was done to motivate households to take new connections.

## Water service delivery

While interviews with officials gave the impression of a well-functioning piped water supply system with 61.1 per cent households with piped water supply, the survey results revealed that only 36.7 per cent of the households have access to PWS within their premises, while 30.6 per cent accessed piped water through standposts or tap posts and ten per cent through public hand pumps (Graph. 1). Therefore, a total of 77.3 per cent of the surveyed households access water through public delivery systems (piped water supply within premises, stand post, and hand pumps).

**Graph 1**  
**Public versus private water sources (n=180)**



**Graph 2****Reasons for lack of access to PWS (n=99)**

According to an interview with an official and as captured in the survey, nearly 1,910 of the total 4,907 households in the town have not taken a piped water connection. The primary reason associated for lack of access to PWS as reflected in the survey is high cost and affordability, followed by proximity to alternate water sources like public stand posts and public hand pumps near their premises, which do not have a monetary cost associated with access (Graph. 2).

Besides these two primary reasons for not accessing PWS connections, other reasons that came up during an interview with the Chairman, Dindori Nagar Parishad, were:

- Lack of land records to complete official formalities for access to piped water connections as payment of all dues as part of land holding tax is mandatory to obtain a new household-level water connection.
- Increased connection cost to be borne by tail end users due to the long distance from the main supply line to the houses at the periphery of the town.

This was reiterated by a respondent who said, "The pipelines are far from our houses and the officials need proof of land records for providing a connection. Most of us do not have

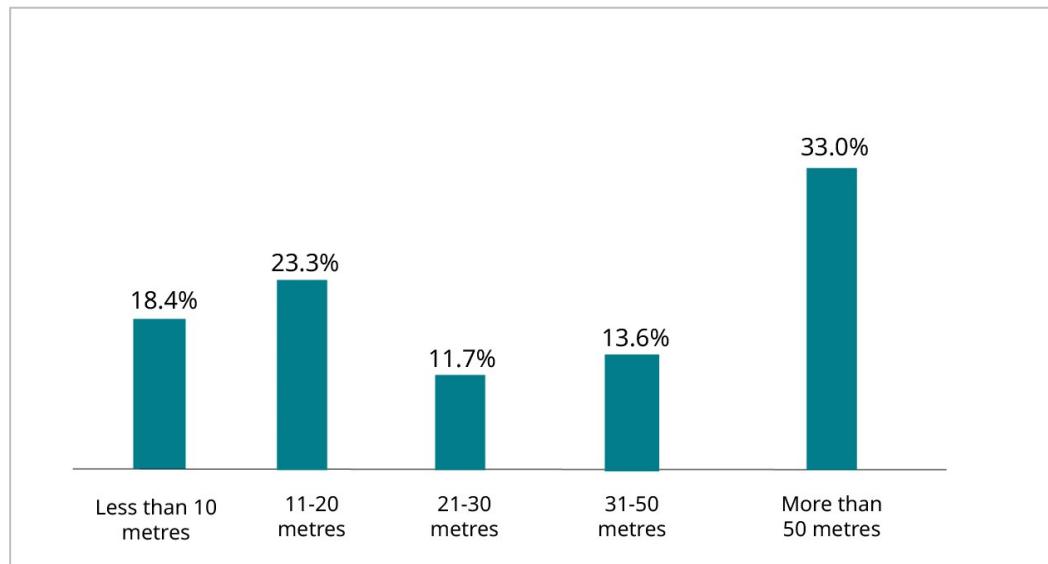
proper papers so we are not eligible to apply". Almost 21 km of pipeline still remained to be laid at the time of the study. Households at the tail end of the supply network or in the periphery of the town have to bear the cost of the additional pipeline from the main line. The absence of special provisions for tail end users increases the cost burden on the marginalised families, preventing them from piped water connections.

**Access to water**

The survey revealed that more than half of the households (57.2 per cent) do not have access to water within their premises. Of these, 46.6 per cent have to travel a distance of more than 30 metres to fetch water (Graph. 3). Moreover, one-third (33 per cent) of these households make more than five trips each day to meet their daily water requirement. In most of the households, fetching water is the responsibility of women (72.8 per cent). Interestingly, a significant number of men (15.9 per cent) also fetch water in Dindori, unlike the other study towns.



**Graph 3**  
**Households fetching water from various distances (n=103)**

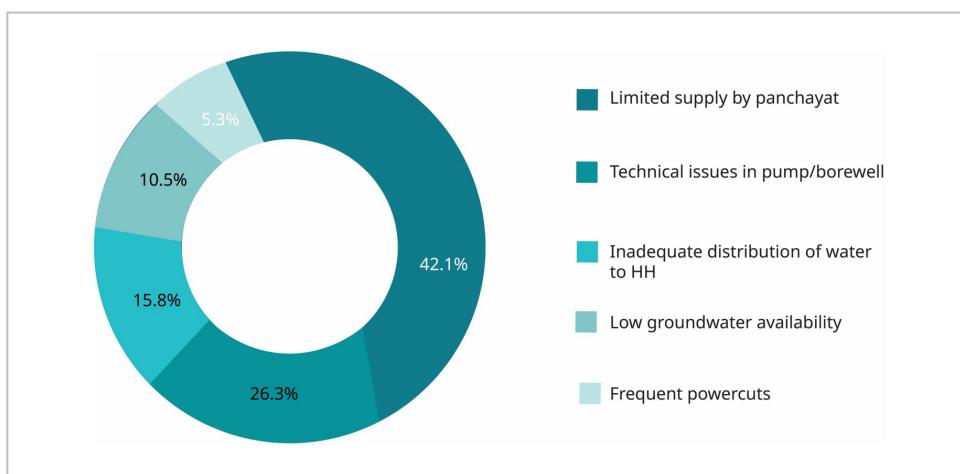


According to the interview with government officials, under the CM's drinking water scheme, households are supplied with treated piped water, which is free from any major contaminants. Of the total households surveyed, the majority (89.4 per cent) do not face any disruption in the quantity of water supplied or drawn from their respective water sources. Among the remaining households, the primary reason reported for supply disruption (Graph. 4) was limited supply by the nagar parishad (42.1 per cent). This is evident from the fact that water is supplied only for an hour once in a day. However, with 67.3 per cent households accessing piped water supply (individual connection and stand posts), reliance on secondary sources is minimal.

Only 12.2 per cent of the surveyed households also depend on a secondary water source and the reason stated for this is non-availability of water from the primary drinking water source. During the FGDs, respondents from some of the wards also pointed towards the lack of public water sources in their vicinity.

With respect to piped water services, 97 per cent surveyed users reported that water is supplied once in a day for an average of one hour. According to the nagar parishad, the demand for water in the town is 165lpcd (39 lakh litres) while the current supply stands at 157lpcd (37 lakh litres).

**Graph 4**  
**Reasons for disruption in water supply (n=19)**



## Caste-wise access to water sources

The study found that different caste groups accessed water from various water sources. Access to water through PWS, both household-level connections and standposts, was reported to be highest among the general category households and lowest among the scheduled tribes (ST). Conversely, the use of public hand pumps was found to be highest among the ST households and non-available among the general category (Graph 5).

## Water storage and use

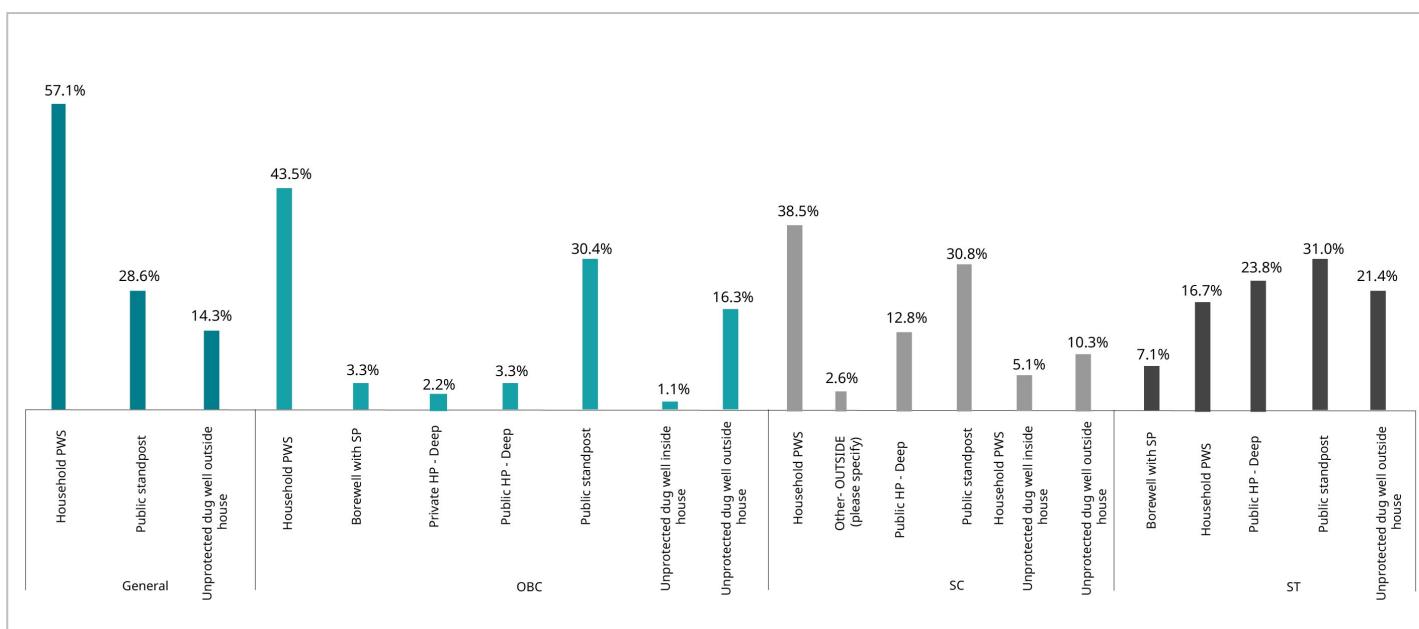
As the piped water connection service is for a limited period in a day, households commonly store water in buckets and tubs. It was also observed that large storage facilities (tanks and drums) were available with and used only by 15 per cent of the surveyed households. This indicates limited storage facilities to stock surplus water.

Water for drinking and cooking was mainly stored in containers with lids (98.3 per cent), while a small per cent of households (1.1) stored it in a water filter.

58.3 per cent of the households were reported as keeping their drinking and cooking water at the ground level. This increases the chances of contamination.

The water handling habits of households were particularly poor with a majority of them (73.9 per cent) consuming water by dipping a non-ladle vessel into the container. Such unhygienic habits could result in water contamination and affect the health of the family in the long run.

**Graph 5**  
**Caste-wise access to water sources (n=180)**





## Water quality monitoring

An automated treatment plant with a six-step purification unit and capacity of 4.95mld has been installed in Dindori, keeping in mind the projected population in the year 2037.

Water quality is monitored by different authorities for different sources. Piped water quality is monitored by the laboratory of the water treatment unit of the water supply plant. At the PWS plant, a qualified lab technician conducts water quality tests of samples collected from the plant on a daily basis and maintains records. In contrast, the water quality of public hand pumps is reported to be monitored by the Public Health Engineering Department (PHED) and tested twice a year; pre and post monsoon. However, interviews with local organisations suggest that water quality of hand pumps is tested by PHED only when a new borewell is dug or when health issues associated with drinking water are reported in the town.

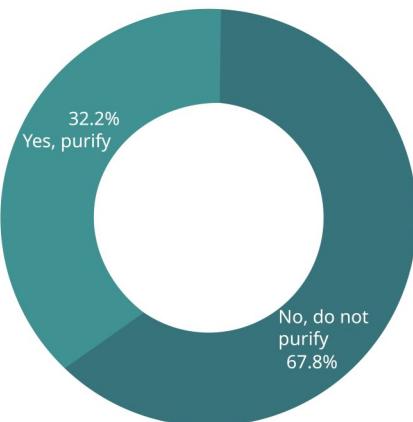
Apart from monitoring water quality at the PWS plant, officials claimed that samples are also collected at the household level from different localities twice a year and tested for quality. However, the survey revealed a lack of water quality testing mechanisms at the household level. About 97.8 per cent of the total surveyed households reported that water samples have never been collected from their house.

Of the remaining 2.2 per cent households that reported sample collection, samples were collected primarily by family members (50 per cent). 25 per cent households stated that samples were collected by government organisations and the remaining 25 per cent, by private companies. However, the results of the samples collected were mostly not shared with the households.

According to the survey, 34.4 per cent of the households reported problems with the quality of water. The quality is mostly compromised with change in taste followed by change in odour and colour. Majority of the households experienced it as a seasonal (82.3 per cent) followed by recurring (14.5 per cent) and occasional (3.2 per cent) occurrence. According to a respondent from the Birsa Munda ward, "The water supply is very muddy mainly in the rainy season and we have to filter it with a clean cloth and sometimes even boil it. The rest of the year the water is better and the colour is normal".

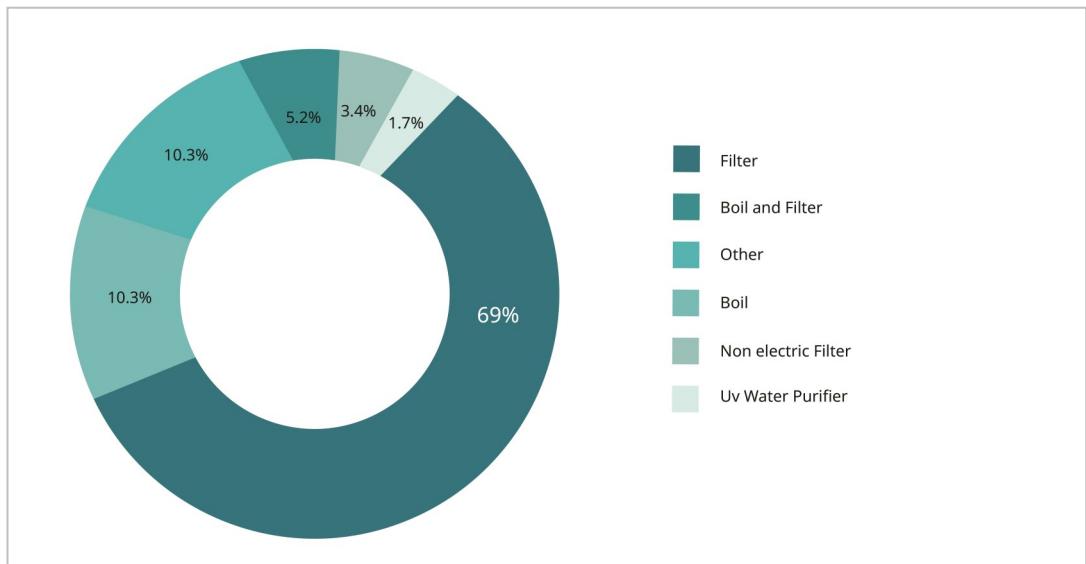
In spite of water quality problems being reported by 34.4 per cent surveyed households, only 56.4 per cent of these complainant households purify the contaminated water. Overall, of the total 180 households surveyed, only 32.2 per cent purified their drinking water (Graph. 6). Of the households that purify drinking water, the

**Graph 6**  
**Households practicing purification measures (n=180)**



**Graph 7**

### **Types of purification measures practiced (n=58)**



majority (69 per cent) practiced simple filtering or sieving followed by 10.3 per cent boiling and filtering their water (Graph. 7).

99.1 per cent of the households did not purchase water for cooking and drinking purposes. Only one of the surveyed households reported purchasing water and paid an average of INR 900 per month.

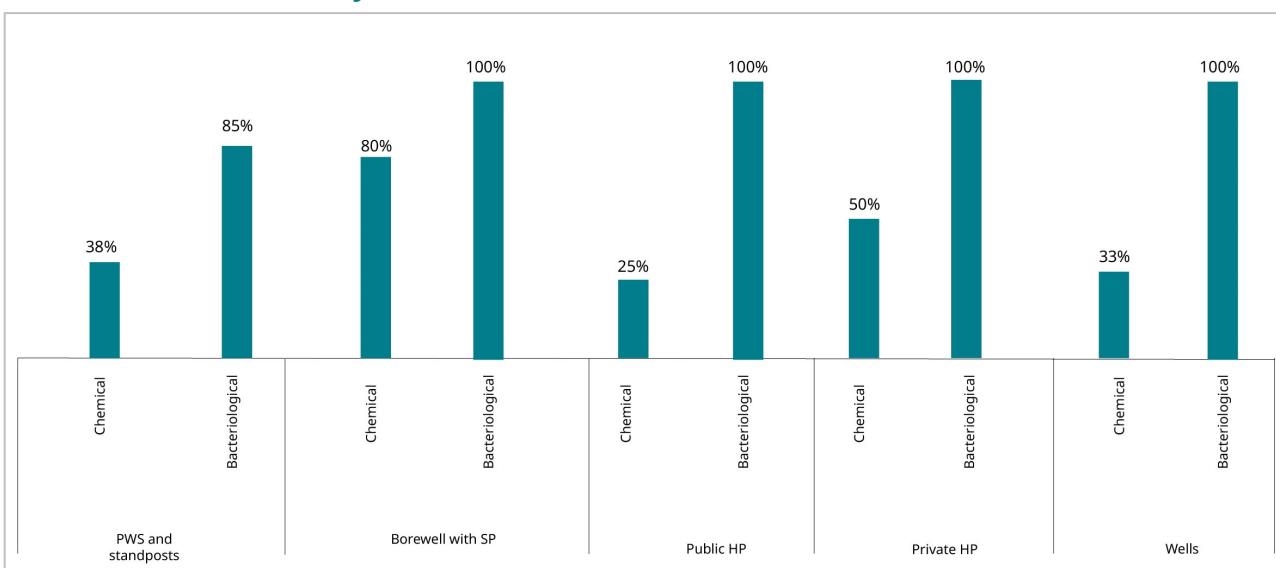
92.5 per cent were bacteriologically contaminated above acceptable limits. While the major chemical contaminants were total dissolved solids, total hardness, total alkalinity, magnesium, and calcium; the major bacteriological contaminants were total coliform, faecal coliform and E. coli. Moreover, all the 3 public water sources (PWS, standposts, hand pumps) reported cases of both chemical and bacteriological contamination. 38 per cent samples from PWS sources (household-level connections and stand posts) were detected with chemical contamination while 85 per cent samples had bacteriological contamination above acceptable limits (Graph 8).

### **Water quality test findings**

Water quality tests from different sources revealed that 44.4 per cent of the source samples were chemically contaminated while

**Graph 8**

### **Water contamination by source (based on lab test results) (n=27)**





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## Sustainability measures

In the absence of a state-level groundwater regulation act, a district-level circular has been passed by the district administration, wherein digging of new borewells is prohibited for two months during the summers i.e., from 15 April to 15 June. However, this circular can be easily flouted by obtaining a 'no-objection certificate' from the office of the sub-divisional magistrate. However, as the town is primarily reliant on surface water for its domestic needs, groundwater depletion is limited with sub-surface water being available at a depth of 90–140 metres.

Madhya Pradesh Bhumi Vikas Rules, 2012 mandates construction of a rooftop rainwater

harvesting structure in all buildings with a plot size of more than 140sqm. Following this mandate, the nagar parishad has installed rainwater harvesting units in new government buildings but their operations and maintenance is not being looked into. This has also not been scaled up to other public, commercial, or residential buildings.

Of the total surveyed households, 32.2 per cent were found to be dependent on groundwater for meeting their domestic water needs. Out of these, 93.2 per cent stated that they have not re-drilled or deepened their borewells. With the exception of one surveyed household, measures to recharge the groundwater table have not been adopted by the residents of the town.

Two major reasons emerged during the FGDs for not prioritising water conservation: i) availability of good ground and surface water resources as the town is situated on the banks of the river Narmada, and ii) lack of awareness regarding water conservation measures. As one respondent said, "we are aware of the water crisis being faced by everyone all across the globe but we are not aware of what we can do or how to save and conserve water". To this end, wall painting and IEC activities for water conservation awareness have been undertaken intermittently.

## Sanitation

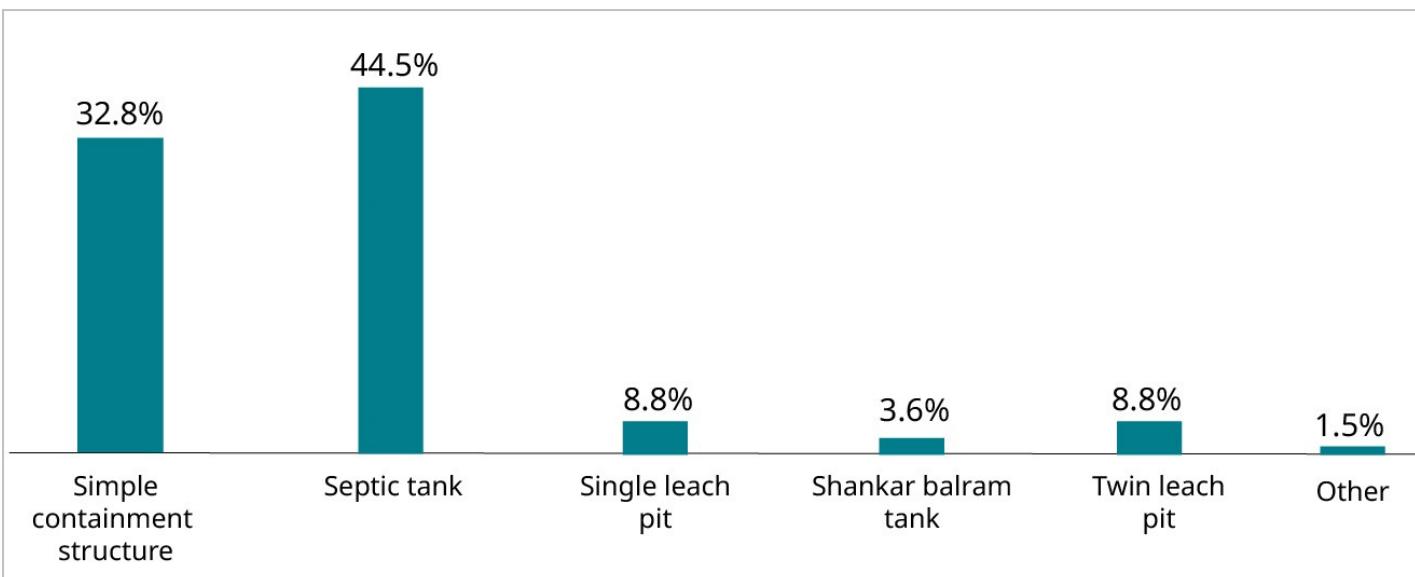
The town achieved the open defecation free (ODF) status in 2018. The total budgetary provision made in 2018–2019 for sanitation was INR 285.5 lakh (3.72 per cent of the total budget of INR 76.73 crore). However, it was observed that only 76.1 per cent of the surveyed households have functional toilets. Of these, only 44.5 per cent had septic tanks, which are a comparatively safe sanitation

option, provided they meet the design standards and the accumulated faecal sludge is removed periodically (Graph. 9)<sup>8</sup>.

Untreated wastewater is discharged into rivers while faecal waste goes into open drains. Excreta management even at the household level was found to be poor, as according to the survey, 92 per cent of the toilet pits have not been de-sludged. This shows faulty toilet construction and excessive use of water for flushing. Despite unsafe toilet technology, most households (94.7 per cent) have maintained the safe horizontal distance of ten metres between the primary groundwater source and the nearest toilet pit. Maintaining a safe distance between the water source and toilet pits is important as households use their primary source of water for drinking and cooking and only a mere 32 per cent of these households purify their water.

**Around 94.7 households have maintained the safe horizontal distance of ten metres between the primary groundwater source and the nearest toilet pit.**

Graph 9  
Types of toilets technology (n=137)



<sup>8</sup> The data presented is based on the responses of the respondents; verification of toilet sub structure was not possible.



WaterAid/ Prashanth Vishwanathan

## INTERVENTIONS NEEDED

- A fair system of tariffs should be established to provide piped water at subsidised rates to the marginalised/BPL population. Currently, both APL and BPL households pay the same connection charges and monthly tariff. Alternately, a provision of credit or payment in small manageable instalments for applicants of a new connection will offer an advantage to resource-constricted families.
- The mandatory provision of payment of all dues as part of land holding tax for a new household-level water supply connection should be scrapped as it is a barrier for slum dwellers and those inhabiting informal settlements to access piped water within the premises. A new connection should be provided if the applicant is able to deposit the connection charges with the necessary supporting documents.
- Prioritising the pipeline coverage for tail end users, especially in the new habitations, will help increase access to PWS for the new residents.
- Illegal commercial connections taken as household connections should be identified, fined, and charged with the appropriate tariff.
- Metering of PWS is essential as unregulated water is also being used for non-potable purposes by small commercial establishments at a nominal charge.
- Institutions related to water supply delivery, like connections, tariff collection, complaints and grievances should be strengthened to remove the barriers faced by the people.
- A groundwater monitoring mechanism is absent at the nagar parishad level. A frequent monitoring system for the groundwater table should be introduced.
- In addition, provisions for recharging groundwater sources in a scientific manner should be made.
- While there is a functional water quality monitoring lab in the town, the results of the water quality tests conducted as part of the study suggest that the piped water supply quality is compromised at the receiving end in a majority of cases. This may be due to damaged pipelines that are prone to contamination or unclean overhead tanks. It will, therefore, be prudent for the authorities to clean the overhead water tanks, revise the current water quality monitoring protocols, and conduct water quality tests at the household level too.
- Awareness regarding water conservation is critical for sustainability. The nagar parishad has installed rainwater harvesting units in all government buildings but this needs to be scaled up in the resident colonies, schools, public parks, and large commercial spaces like malls.
- There is a need to inculcate the habit of purifying water before consumption, especially because quality issues are indicated and water handling practices are unsafe in most cases.
- A faecal sludge treatment plant that caters to the needs of the town should be established because a large number of toilet substructures require periodic emptying and treatment of waste. Systems for safe emptying, transportation, and treatment of faecal waste should be put into place along with necessary regulatory arrangements to prevent contamination of the river basin and other water bodies.



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Report prepared by Nirma Bora with review inputs from Chanchal Kumar Modi, Anurag Gupta and Chandra Ganapathy, under overall guidance of VR Raman. We acknowledge Trios Development Support (P) Ltd for conducting the household survey and key informant interviews, and Equinox Lab for conducting the water quality tests. The study was facilitated by WaterAid India's Regional Office for West India, with support of partner NGO, National Institute of Women, Child and Youth Development (NIWCYD).

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