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

Palamaner, Chittoor, Andhra Pradesh

With the objective of assessing the critical water supply situation, governance, and service delivery in the small and medium towns of India, and of providing recommendations to municipal bodies, water utilities, and governments, WaterAid India conducted a study in 2019 in six towns spread across India. Palamaner town in Chittoor district of Andhra 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 an assessment of the quantity and quality of the water supplied.

2. To understand sanitation systems at 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 around critical service gaps and suggest solutions, especially in the context of the poor and other marginalised populations in the small and medium towns of India.

METHODOLOGY

In order to capture the households’ and community’s perspective on the water supply and sanitation situation in Palamaner, a survey was conducted in 240 households spread across four wards of the town. This was followed by interviews with six key informants (KI) using a structured questionnaire, and focus group discussions (FGDs) with community members. Laboratory-based quality testing of 19 drinking water samples from select water sources was also conducted.

For the household-level survey, four wards were shortlisted—one from the central area of the town, second from the periphery, and the third and fourth wards were located between the two. 60 sample households were surveyed from each of these four wards. The sampling criteria ensured coverage of: i) households with access to piped water supply (PWS), and ii) households using other types of water sources. Families from marginalised communities or people living in slums or informal settlements were also identified and covered. Key Informant interviews (KIIs) mainly covered broader perspectives of the town; service delivery provisions, water conservation, and water quality monitoring measures. FGDs were also conducted to supplement and triangulate the findings from the survey and interviews.

These findings were supplemented by testing samples from shortlisted water sources in an NABL-accredited laboratory. 19 such samples (13 from source and six user-level samples) were tested as part of the study.
The criteria for short listing water sources included:

- Samples from each type of drinking water source including individual households and public water points used for drinking water.
- Samples from water sources at varying ground level depths ranging from a hand pump at 50ft to deep boring at a depth of 250ft.
- Samples from different locations that present a mix of potentially safe and unsafe sanitary sites.

The entire study process was conducted between September and November 2019.

**BACKGROUND**

**Policies and regulations for urban water supply and management in Andhra Pradesh**

The former state of Andhra Pradesh (AP) was bifurcated into two states; Telangana and Andhra Pradesh in June 2014. Andhra Pradesh, situated on the south-eastern coast of India, is its eighth largest state in terms of area (1,60,205sqkm) and the tenth most populous, with a population of around 49 million.

The state is divided into 13 districts with 110 urban local bodies (ULBs) consisting of 16 corporations, 70 municipalities of all grades, and 24 nagar panchayats. The net increase of urban population between 2001 and 2011 was approximately 5.4 per cent. Vijayawada and Vishakhapatnam are major cities in the state. The urban areas contribute close to 65 per cent of the economic growth in the state.

Andhra Pradesh is the ninth lowest urbanised state with an urban population of 29 per cent. Only 48 per cent of these are connected to the piped water supply (PWS) system whereas the sewerage system is almost non-existent except in seven ULBs which provide partial coverage (15 per cent of the population). Unsafe water supply systems and inadequate sanitation constitute major health risks and hazards for the population.

Drinking water supply monitoring cells have been constituted in every municipality and municipal corporation to receive complaints on drinking water problems and address them immediately. However, grievances such as pipeline leakage or water stagnation take between seven to 90 days to get resolved depending on the scale of the problem. A GPS-enabled mobile app is also being implemented for online tracking and real time monitoring of drinking water supply through tankers.
Table 1

Various water and sanitation related policies in the state

**Andhra Pradesh State Water Policy, 2009**
*Source:* [http://www.ielrc.org/content/e0817.pdf](http://www.ielrc.org/content/e0817.pdf)

The focus is on key areas of water management, which include: building an enabling environment; implementing a range of institutional tools, including local capacity building and participatory approaches; and integrating new management tools and systems such as the integrated data systems, water demand management, and a new communication system.

**Andhra Pradesh Water, Land and Trees Act (WALTA) Policy, 2002**

The salient features of this policy with respect to water includes registration of wells, prohibition of water pumping in certain areas, prohibition of commercial exploitation in certain areas, and promoting rain water harvesting and reuse.

**Andhra Pradesh State Sanitation Strategy, 2016**
*Source:* [http://www.urbansanitation.org/live/hrdpmp/hrdmaster/hrdp-asem/content/e30293/e31169/e49811/e65195/FINAL_AndhraPradeshSSS-Releasedversion.pdf](http://www.urbansanitation.org/live/hrdpmp/hrdmaster/hrdp-asem/content/e30293/e31169/e49811/e65195/FINAL_AndhraPradeshSSS-Releasedversion.pdf)

The objective of the strategy is to i) ensure 100 percent hygienically safe and sanitary treatment and disposal of solid and liquid waste, ii) achieve open defecation free cities iii) enhance awareness and sustained behavioural change, and iv) achieve technological efficiency and appropriateness

**Andhra Pradesh Building Rules, 2017**

This Act applies to buildings in all urban areas, SEZs, and gram panchayat areas covered under the general town planning schemes. Under the Green Building component, provision for water conservation and management mandatory for mandatory for residential and non-residential building size 300 sq m and above.

**The Andhra Pradesh Metropolitan Region and Urban Development Authorities Act, 2016**

The Authority is to prepare a master plan within three years of its constitution or within such time as the government may extend, which will include proposals and policies for watershed management, water supply, water harvesting, recharge of ground water, flood control, and prevention of air and water pollution.

Table 2

Legal framework and category of ULBs

<table>
<thead>
<tr>
<th>Key legal frameworks</th>
<th>Administrative body</th>
<th>Total numbers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Andhra Pradesh Municipal Corporations Act, 1994</td>
<td>Municipal Corporations</td>
<td>16</td>
</tr>
<tr>
<td>Andhra Pradesh Municipalities Act, 1965</td>
<td>Municipal Councils</td>
<td>70</td>
</tr>
<tr>
<td>Andhra Pradesh Town Planning Act,1920</td>
<td>Nagar Panchayats</td>
<td>24</td>
</tr>
</tbody>
</table>
Findings of the Study

Introduction to Palamaner town

Palamaner is the sixth largest ULB in the Chittoor district of Andhra Pradesh (AP) with 24 wards. Palamaner was established as a Grade III municipality in 2005. According to the 2011 Census, Palamaner has 12,283 households and a population of 51,163. This increased to 13,446 households with a population of 56,473 by the time of this study in 2019. Out of the 13 districts in AP, five (Anantapur, Kadapa, Chittoor, Kurnool, and Prakasam) are drought-prone districts. Failure of monsoons coupled with depleting groundwater sources, increase in the number of households, and lack of long-term planning have made the unmet demand for drinking water a major concern for the municipality.

Water supply and sanitation arrangements

Palamaner is divided into 24 wards and each ward has access to piped water supply (PWS). PWS services were introduced in 2012–2013 and the municipality looks into its operations and maintenance (O&M). The main source of PWS is groundwater. As per the municipality water supply report, there are 94 (80 functioning) power bore wells available with the municipality. Water is drawn from the ground and stored in five elevated service reservoirs (ELSRs) and one sump well and supplied through PWS once in two days. Water quality is ensured by chlorinating water at the filter house before supply.

According to official records, in 2019, around 8,100 households or 60.2 per cent households in the municipality had access to piped water supply inside their premises. The town has commercial connections too. Along with a connection charge, an additional cost of INR 1,000 is borne by the household as labour and material costs for the necessary fittings. This charge varies depending on the distance of the house from the distribution line. The municipal office sanctions new tap connections to residential houses under three schemes:

- For APL households: A new piped water supply connection costs INR 7,525 while the monthly tariff is INR 100.
- For BPL households: A new piped water supply connection costs INR 200. The monthly tariff charged is INR 100.
- For commercial connections: Under the ‘own your tap scheme’, a new PWS connection costs up to INR 12,500. The monthly water tariff is INR 800.

In addition to PWS, there are 60 public stand posts and 52 functional public hand pumps across the town, which meet the demand for water. The municipality collected revenue of INR 51.44 lakh from 1st April, 2019 to 1st Dec, 2019 from water charges alone. Around 15 per cent of the households are free riders, i.e., they have a household level connection but do not pay for access to water.

To areas not covered by piped water supply or public hand pumps, the municipality regularly supplies water through tankers. There are three municipal tankers and ten private tankers contracted by the municipality to supply water. Each tanker makes ten trips per day to supply water to the wards in the periphery of the town or in the slums at the rate of INR 100 per month. Additionally, private tankers of 5,000 litres capacity are available at a cost of INR 650 per tanker.

At the ward level, institutions like the Mahila Arogya Samithi (MAS) have been formed under the Mission for Elimination of Poverty in Municipal Areas (MEPMA) which works on drinking water, personal hygiene, and sanitation issues. There are 76 such ward-level committees in the town, each consisting of eight to ten members.
Water service delivery

Of the six study towns, Palamaner was the only town where 100 per cent households had access to water through public service delivery. The survey revealed that 86.3 per cent of households in the town reported access to PWS through a household-level connection and 13.3 per cent and 0.4 per cent reported access to water through public stand posts/tap posts and hand pumps respectively (Graph 1). The few households that did not have access to PWS were tenant families who were not provided a piped water connection by the landlord (Graph 2). Overall, 100 per cent households accessed water from different types of public water sources—piped water within the premises, public stand posts and public hand pumps.

Palamaner suffers from a water demand and supply mismatch which was highlighted by the municipal officer. The demand is 70 litres per capita per day (lpcd) while the supply capacity of the municipality is approximately 49lpcd. Struggling with acute water shortage, almost all the households (37.7 per cent) reported that the frequency of water supply was once in two days with an average of two hours of supply each time.

Graph 1
Public water source (n=240)

Graph 2
Reasons for lack of access to PWS (n=33)
Accessibility to water

Around 13.7 per cent households do not have access to piped water supply. Majority of these are tenants, and have to fetch water from a distance of not more than 20 metres (Graph 3). The proximity of public water sources has reduced the walk for water, which is mostly undertaken by women (97 per cent) followed by boys (three per cent).

More than three-fourth (80.8 per cent) of the households reported that they did not face any disruption in provision of water supply. The major reasons for disruption (whenever caused) stated by the remaining households (Graph. 4) were inadequate distribution of water to all households (78 per cent) and limited supply by the town panchayat (22 per cent).

Since the majority of households access water from various types of public water sources, there is less reliance (8.3 per cent) on secondary sources. This dependence was mostly due to the non-availability of water from the primary drinking water source and the inadequate quantity of water supplied.
Caste-wise access to water sources

The study found that different caste groups accessed water from various water sources. Access to water through household-level PWS was reported to be highest among general category households at 94.9 per cent and lowest among the scheduled caste (SC) households at 76.8 per cent (Graph 5).

The scheduled caste households were reported to be primarily dependent on external water sources with close to one-fourth of the households (23.2 per cent) fetching water from outside.

Water storage and use

Despite piped water being supplied to each ward only once in two days, water storing practices were meagre with only 33 per cent houses storing water in large containers like tanks and drums. Others were reliant on multiple smaller containers like buckets and tubs. Unlike the other five study towns where dependence on market-based packaged drinking water was low, Palamaner witnessed a different trend with 10.8 per cent of the households purchasing water for cooking and drinking at INR 15 for a 20 litre jerry can. Thereby, a family that typically requires 30 cans per month spends up to INR 450 on an average.

- Water for drinking and cooking was generally stored in containers with lids (59.2 per cent) though a small per cent (34) stored water in containers with taps and the remaining seven per cent used water filters with a tap to store water.
- Unlike other towns, the majority (65.4 per cent) of the households in Palamaner...
kept water containers at an elevation, which is a good practice.

- Most of the households (90.4 per cent) were found to have poor water handling habits such as using non-ladle vessels for drawing water from the container. Such unhygienic habits may result in water contamination and affect the health of the family in the long run.

**Water quality monitoring**

The water supply plant at Palamaner has a chlorination and distribution unit from where piped water is supplied to the different wards. According to the officials, the municipality also follows water quality monitoring protocols as water samples are collected from various public water sources and tested for quality. The rural water supply (RWS) department of the state government monitors the drinking water quality in the sub-laboratory at Palamaner and shares their reports with the municipality. Testing is conducted pre and post monsoon, and when necessary, quarterly too. According to the feedback received from a local NGO, the laboratory has adequate financial resources but human resources are a constraint as field-level functionaries for sample collection are fewer than required and paid a mere INR 20 per sample.

Contrary to the information shared by the municipality, all the surveyed households reported that water testing was never done in their premises. Only 2.9 per cent of the surveyed households, the lowest among all the six study towns, reported facing any problems with water quality. It is interesting to learn that despite only 2.9 per cent households reporting water quality issues, a higher per cent of households were found to be purchasing drinking water cans. Officials also reported salinity in the groundwater.

Overall, only 15 per cent of the households in the town purify their drinking and cooking water (Graph 6). Out of these, the majority (77.8 per cent) boil and filter the water while 16.7 per cent only boil their water (Graph 7).

With respect to redressal of problems associated with water and sanitation, a 24x7 drinking water supply monitoring cell has been set up in the municipality. Majority of the households face problems due to the inadequate quantity and frequency of water being supplied but the municipality is not able to meet the gap between supply and demand in the town.

![Graph 6](image)

**Graph 6**

*Households practicing water purification (n=240)*
Graph 7
Types of purification measures practiced in households (n=36)

Water quality test results
According to the reports of the water quality tests conducted as part of the study, chemical contamination was detected as being above the acceptable limits in 100 per cent of the public delivery sources—PWS, stand posts, and public hand pumps, while 76.9 per cent were found to be bacteriologically contaminated. The major chemical contaminants were total dissolved solids, total hardness, total alkalinity, calcium, and magnesium. The major bacteriological contaminants were total coliform, faecal coliform, and E. coli. (Graph 8).

Graph 8
Water contamination by source (based on lab test results) (n=13)
**Source sustainability**

As mentioned earlier, Chittoor is among the five drought-prone districts in AP. Failure of monsoons has led to less recharge of groundwater and more extraction from groundwater reservoirs by the municipality and private tankers. According to the key respondents interviewed, groundwater levels are receding every year and in 2019 have reached a depth of 210m. Many of the hand pumps and power bore wells in the towns have run dry.

None of the surveyed households or government buildings in the municipality has adopted measures such as rainwater harvesting for storage or recharging, despite Andhra Pradesh Building Rules, 2017 mandating construction of rainwater harvesting structures in all commercial public buildings and new buildings on plots of 300sqm and above. Therefore, there is a need to spread awareness within the municipality and among the citizens on sustaining water sources. As stated by a respondent, “apartments in the town should have their own water harvesting and conservation plans. Agriculture pump sets should be monitored and regulated. Groundwater recharge has to go up.”

**Sanitation**

Of all the towns studied, Palamaner was the only one where 100 per cent households reported having a functional toilet at home. Out of these, 99.6 per cent of the households reported having septic tanks. Septic tanks are an environmentally safe toilet technology in terms of preventing groundwater contamination, provided they meet the design standards and the accumulated faecal sludge is periodically removed.

Proper management of faecal matter is of primary importance. According to the survey, 76.3 per cent of the toilet pits have not been de-sludged in the past; in some cases, never. This could possibly be due to faulty toilet design or deep pits. However, the norm of maintaining a safe horizontal distance of 10m between the primary groundwater source and toilet pits was found to be followed by 100 per cent households. The distance between water source and toilet pits is important since 88.8 per cent of the households use the primary source of water for drinking and cooking and 85 per cent of the households do not purify their water.
INTERVENTIONS NEEDED

• The town faces a demand-supply gap of 21lpcd wherein the current supply is 49lpcd against a demand of 70lpcd, which consequently impacts the frequency and quantity of water supply. Therefore, water budgeting, water saving, recycling of greywater, and conservation measures like creating alternative water sources that reduce reliance on a single source are necessary.

• Despite policies like the Andhra Pradesh Building Rules, 2017 and Andhra Pradesh WALTA Policy, 2002, no measures are being undertaken to reuse and recharge rainwater in the town. Residential, government, and commercial buildings and blocks of size 300sqm should have water harvesting and conservation plans. Moreover, agriculture pump sets should be monitored and regulated.

• Maintenance of rainwater harvesting (RWH) structures should be made mandatory with regular monitoring and reporting to the municipality. The operations and maintenance of RWH structures for government buildings should be budgeted annually.

• As PWS testing has reported both bacteriological and chemical contamination, regular checking for contamination in the distribution pipelines, and cleaning and chlorination of overhead tanks should be a part of water quality monitoring protocols.

• The municipality should also monitor water quality at the household level rather than only at public water sources. The test results should be shared with the households and municipality or displayed at public water points. This can also be a useful reference for the municipality to determine the functioning of the filtration unit at the PWS plant.

• There is a need to inculcate the habit of purifying drinking and cooking water. Awareness of safe handling of drinking water at the household level through increased IEC interventions should be encouraged in schools and health centres. Other activities such as wall painting and hoardings at important sites can be carried out regularly throughout the district. The state IEC cell should also engage in health education and spread awareness through mass media such as newspapers, television, and radio.

• The absence of piped water connections at the household level was found to be high in the case of tenant families. Therefore, landlords must comply with the lease agreement and ensure that basic utilities like water and electricity are installed in the property and are in working condition. Provisions should be in place for tenants to apply for a separate water connection at subsidised rates, even if the owner does not provide a ‘no objection certificate’.
Assessment of the status, service delivery infrastructure and governance of drinking water supply in small and medium towns - Palamaner, Chittoor, Andhra Pradesh
August 2020

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 South India, with support of partner NGO, People's Organization for Rural Development (PORD).