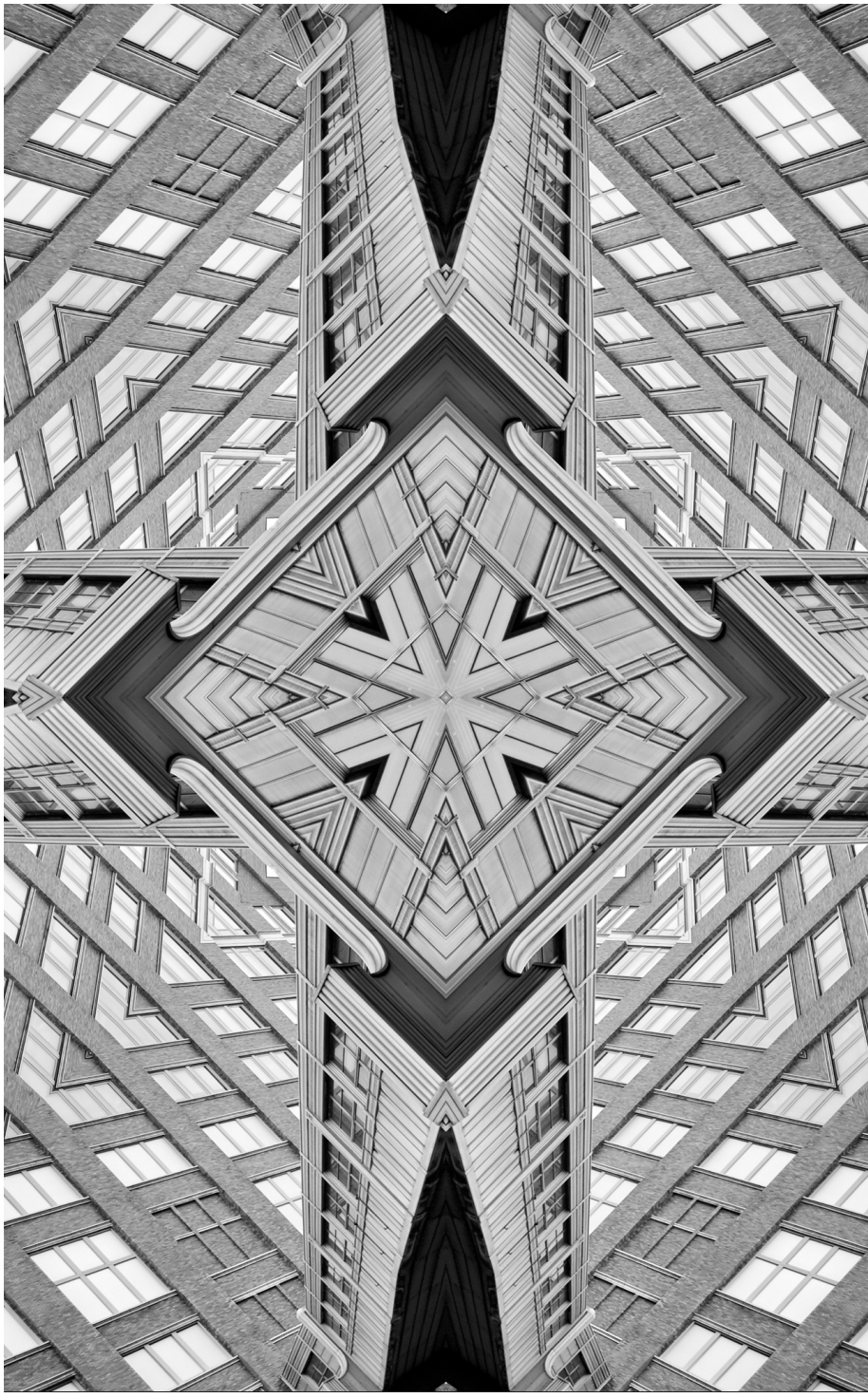
Issue Brief

ISSUE NO. 753
NOVEMBER 2024

ORF OBSERVER RESEARCH FOUNDATION



Water and Sewage Quality in Delhi: Persistent Challenges and Ways Through

Rumi Aijaz

Access to safe drinking water and sanitation is essential for maintaining good health and well-being. However, empirical studies undertaken in several Indian cities reveal deficiencies in the quality of water and sanitation services provided by city governments. This brief focuses on the state of water and sewage systems in the National Capital Territory of Delhi, which contains India's capital city, New Delhi. The brief highlights that many quality assessment parameters do not meet prescribed norms, and citizens often receive unsafe drinking water. It recommends ways to address the gaps in governance practices and ensure the provision of safe water and sanitation services.

Attribution: Rumi Aijaz, "Water and Sewage Quality in Delhi: Persistent Challenges and Ways Through," *ORF Issue Brief No. 753*, November 2024, Observer Research Foundation.

Introduction

Safe drinking water and proper sanitation are important public health requirements, and providing these services is the mandated duty of city governments. Certain governments perform the task effectively. For instance, in Japan, tap water anywhere is safe to drink due to rigorous testing, and multiple stages of filtration and treatment. In addition, water utilities such as Tokyo Waterworks undertake routine inspections of water treatment plants and pipelines.[1] Similarly, Singapore's National Water Agency ensures the safety of tap water such that further filtration is not required. Water samples are collected from reservoirs, waterworks and desalination plants, and distribution systems for laboratory testing. Moreover, online sensors monitor the quality at each stage in real-time, and advanced membrane technologies and ultraviolet disinfection methods are used to make wastewater ultra-clean and safe to drink.[2]

In most developing nations, in contrast, the quality of drinking water and wastewater is a serious concern. India has been making efforts to provide an improved quality of water and sanitation services to all citizens. National initiatives such as the Jal Jeevan Mission aim to provide households in all villages and statutory towns with piped water, while the Swachh Bharat Mission addresses the issue of wastewater treatment.[3] Additionally, a number of state and city governments have also implemented projects to improve water and sanitation services. Despite these measures, however, water quality-related problems persist.

This brief assesses water quality in the National Capital Territory of Delhi, which contains the capital city, New Delhi. It finds that while the city government follows a systematic approach to water quality management, consumers remain dissatisfied with the quality of services provided. The brief aims to build an understanding of the factors affecting water quality and propose plausible solutions.

Status of Water and Sewage in Delhi

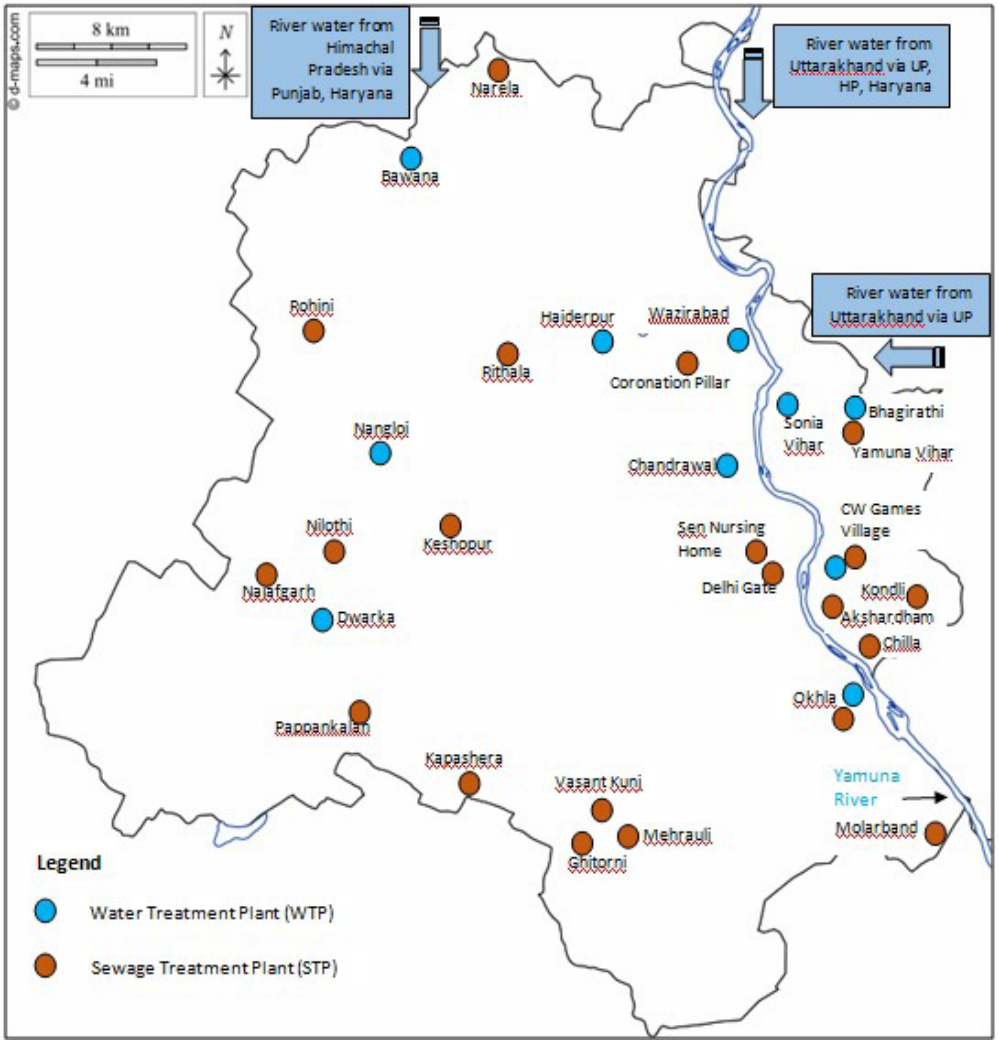
The Delhi Jal Board (DJB) is responsible for providing water and sewerage services to the city's population. To meet the drinking water needs, the DJB obtains 1,005 million gallons a day (mgd) of raw water from various sources located outside and within Delhi.[4] These include surface water, groundwater, and rainwater.[5] The raw water obtained is transferred to the 10 water treatment plants (WTPs) located across the city with a total installed (treatment) capacity of 946 mgd.[6]

The city generates 792 mgd of sewage or wastewater,[7] which is treated at sewage treatment plants (STPs) installed at 21 locations[a] with a total capacity of 667 mgd.[8] Of the total sewage generated, about 72 percent (566.9 mgd) is treated, and utilisation of STPs (i.e. actual treatment as against installed capacity) is about 84.9 percent.[9] The remaining untreated sewage flows into the Yamuna River. Further, of the total treated sewage, 16 percent (89 mgd) is supplied to various consumers for non-potable purposes, such as irrigation, horticulture, construction, and the cooling of power plants.[10] Efforts are being made to bridge the gap between sewage generation and treatment by enhancing the treatment capacity of some STPs, and providing sewer connections to all households and connecting these with the sewerage network.

Figure 1 shows the location of various WTPs and STPs in Delhi. Most of the WTPs are installed in the eastern parts of Delhi along the course of the Yamuna, while the STPs are located in several other parts of the city. The Haiderpur WTP and Okhla STP have the highest treatment capacities of 200 mgd and 140 mgd, respectively.[11]

a As of December 2023, there were 38 STPs across the city (see Figure 1). Certain plant sites have more than one STP: six in Okhla; four in Kondli; three each in Keshopur, Coronation Pillar, and Yamuna Vihar; and two each in Nilothi, Vasant Kunj, Delhi Gate, Papankalan, and Rithala. Kapashera, Chilla, Akshardham, Narela, Mehrauli, Molarband, Ghitorni, Najafgarh, and Rohini have one STP each.

Figure 1: Water and Sewage Treatment Plants in Delhi



Source: Author's own; WTP/STP names obtained from Economic Survey of Delhi, 2023-24[12] and the Delhi Jal Board's daily analysis report;[13] base map obtained from d-maps.[14]

Treatment Process

Water quality across India is to be maintained as per the norms adopted by the Bureau of Indian Standards (BIS).[15] For this purpose, various characteristics

of water are assessed, such as colour, odour, potential of hydrogen (pH) value, taste, and turbidity. In addition, water is checked for the presence of substances (such as aluminium, ammonia, calcium, chloride, and fluoride), toxic substances (e.g., cadmium, lead, mercury, and pesticides), radioactive substances, pesticide residues, and organisms (including coliform bacteria).

The DJB collects around 1,700 samples of raw water[16] every day from various sources,[b] studies the status of physical, chemical, and bacteriological parameters,[c] and takes steps to ensure the quality complies with prescribed standards. This exercise checks whether collected water samples contain bacteria, viruses, and biological organisms. Water quality is tested through various techniques and technologies in nine laboratories at the WTPs and eight zonal laboratories.[d] In addition, some WTPs have functional Internet of Things-based systems that offer real-time data on the quality of water. At the Bhagirathi WTP, supervisory control and data acquisition (or SCADA) technology is used to monitor the operation and performance of equipment in real-time. Further, independent agencies support the water testing process.[e] The WTPs treat impurities in raw water. For example, up to one part per million (ppm) of ammonia is treated through chlorination. At some WTPs (such as Bhagirathi, Haiderpur, and Wazirabad), water recycling plants are set up to treat water wasted during the treatment process.

Similarly, for sewage, samples are collected from various sources (the Yamuna River and STPs) and sewage parameters[f] are analysed in eight quality control labs. Thereafter, appropriate technologies[g] are applied to maintain

b Water sources include the river, canals, lakes, ponds, WTPs, distribution network (pipelines), reservoirs, booster pumping stations, tube wells, Ranney wells, water tankers, public hydrants, taps in schools, dispensaries, and households.

c Water parameters include colour, odour, pH value, taste, iron, chlorine, ammoniacal nitrate, pesticides, turbidity, electrical conductivity, total dissolved solids, alkalinity, hardness, dissolved oxygen, fluoride, and heavy metals.

d Techniques and technologies for water analysis include inductively coupled plasma-optical emission spectroscopy (ICP-OES) for heavy metals, gas chromatography for organic contaminants, total organic carbon (TOC) analyser for organic carbon, high-performance liquid chromatography (HPLC) for pesticides, Kjeldahl method for total nitrogen, real-time reverse transcription-polymerase chain reaction (RT-PCR) for microbiological analysis, and laboratory information management system (LIMS) software for managing samples and data.

e The National Environmental Engineering Research Institute and Council of Scientific and Industrial Research undertake (in their laboratories) quality tests of water samples collected from various locations in Delhi, and the results are shared with DJB.

f Sewage parameters include total suspended solids (TSS), biological oxygen demand (BOD), chemical oxygen demand (COD), ammoniacal nitrogen, phosphate, sulphide, potential of hydrogen (pH), and faecal coliform.

g Techniques and technologies for sewage analysis and treatment include IoT-based technology for chemical enhanced dosing, remote-controlled automatic sampling units for composite sampling of sewage, laboratory information management system (LIMS) software for managing samples and data, activated sludge process (ASP), sequencing batch reactor (SBC), membrane bioreactor (MBR) system, extended aeration, BioFor, DensaDeg.

sewage quality as per the standards prescribed by the Delhi Pollution Control Committee (DPCC). For example, the standards provide that the biological oxygen demand and total suspended solids in treated wastewater should be less than 10 milligrams per litre (mg/l).[17] Many private companies have been involved in the treatment process, including Ayyappa Pvt. Ltd., Toshiba Water Solutions Pvt. Ltd., and Veolia India.[18] For example, Veolia was chosen by DJB in 2012 to design, build, and operate an innovative green wastewater treatment plant of 20 mgd capacity in the Nilothi area in west Delhi.[19] For treatment, Azenit (a biological process based around the activated sludge principle) is used for the removal of nitrogen, phosphorous, chemical oxygen demand, biological oxygen demand, and suspended solids.

Potential Risk Areas

There is potential for contamination during the water collection and distribution process. Often, raw water received at treatment plants from surface sources (i.e. rivers, canals, lakes, and ponds) or extracted from the ground contains impurities. This happens due to the release of untreated wastewater by various water consumers (including industries and informal settlers) into surface water bodies, the neglect of water bodies by citizens and the administration, and the presence of animal carcasses. At the treatment plants, water supply agencies encounter difficulties in cleaning raw water as some viruses and organisms become resistant to disinfectants. Additionally, certain pipelines carrying treated water develop cracks over time (a common phenomenon in urban India), increasing the risk of contamination. In many instances, the pipelines are old and have not been replaced. Thus, the impurities (including mud and sewage) enter through the cracks and pollute treated water in the pipelines. This also leads to the growth of pathogenic organisms inside the pipes. The consumers are also unsure about the quality of water received from municipal pipelines and, thus, as a precautionary measure, may use some form of a water purification device, such as a reverse osmosis system or a simple water filter, to remove bacteria, harmful chemicals, and other substances.

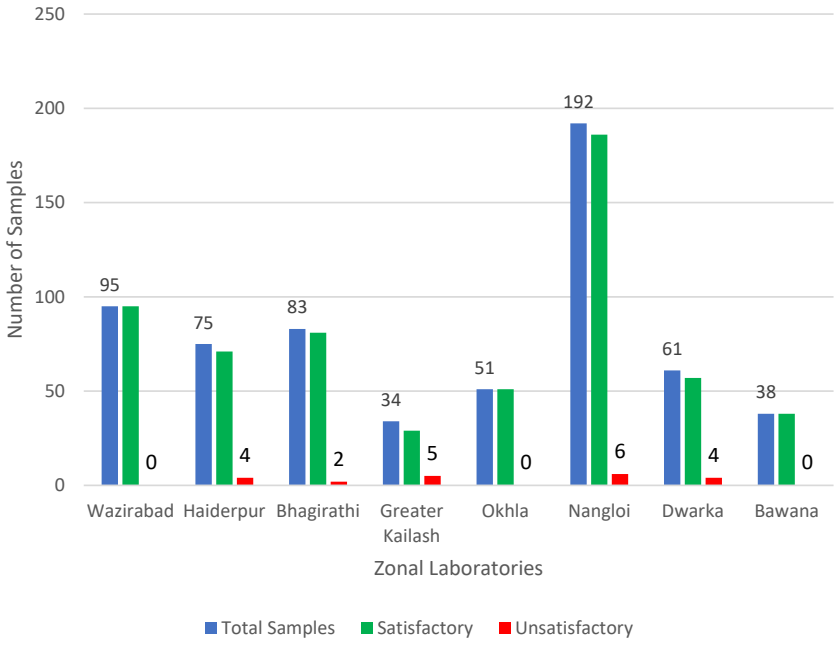
Another problem is the forced extraction of water from the pipelines by consumers. Generally, less water is supplied by the civic agencies and the pressure is also low. Therefore, to meet their requirements, many people have installed electric motors to pull greater quantities of water. During this process, impurities (including mud) in the pipelines are also pulled in.

The treatment and reuse of sewage for non-potable purposes (such as horticulture and construction) is even more difficult since sewer lines and open drains contain greater volumes of impurities. In market areas and informal settlements, the disposal of waste products (including plastic bottles and plastic bags) in open drains along roads and nearby water bodies is a common practice. If sewage treatment standards are not met, the water cannot be utilised even for non-potable purposes due to the presence of disease-causing organisms.

Service Quality

According to the DJB's August 2024 water quality surveillance report, of the total 629 samples collected from taps in households and schools in select locations across Delhi, 21 (about 3 percent) were found unsatisfactory (see Figure 2).[h,20] Further, the DJB reported in 2023 that based on all samples analysed for the entire city in the four years prior, less than 5 percent of samples were unsatisfactory.[21] A proportion between 3 and 5 percent, as per the World Health Organization (WHO) guidelines, falls under the intermediate risk category for which low-priority remedial action is required.

Figure 2: Water Quality in Delhi



Source: Delhi Jal Board, as of 8 August 2024.[22]

h 'Unsatisfactory' implies that the water is not fit for drinking and there is a need to isolate impurities from water through methods such as chlorination, sedimentation, and slow sand filtration.

Other sources also frequently report various water and sewage quality concerns.

An empirical study undertaken during October and November 2017 to assess water quality in 168 households of Delhi's Shahadra locality (near the Yamuna) revealed people's dissatisfaction with the water received through pipelines and other sources, such as hand pumps, bore wells, and water tankers.[23] Respondents noted that the water was saline, contained sediments, and was yellow in colour. According to the residents, water quality was inferior due to the improper disposal of sewage, effluents, and solid waste, and consuming such unsafe water led to ailments, such as diarrhoea, cholera, skin and eye irritation, typhoid, and respiratory problems.

In November 2019, the Union government advised BIS to undertake a survey to assess the water quality at 11 locations in Delhi. The data analysis revealed that water supplied by DJB was not fit for drinking, as collected samples showed 19 parameters did not meet the prescribed standards. The DJB contested this allegation, stating that water quality was maintained and the procedure followed by the BIS to assess quality was inappropriate and lacked transparency.[24] Thereafter, media firm *India Today* conducted a study during which water samples were collected from taps in select households. The report showed that five of nine tested areas in Delhi passed the water quality test, while four failed due to the presence of bacteria in the water.[25] The BIS and *India Today* survey results do not provide information on pipeline replacements (if any) by residents from the municipal pipelines passing through the area to their houses. In such cases, there is a possibility of water contamination due to faulty joint repairs.

In 2023, the water extracted from about 25 percent of the 5,000 tube wells installed in the city did not meet prescribed water standards related to nitrate, iron, ammonia, fluoride, and other parameters.[26]

In January 2024, the Wazirabad WTP reportedly received raw water contaminated with high levels of ammoniacal nitrogen (an indicator of ammonia) up to 4.9 mg/l, as against the permissible level of 0.5 mg/l, which was difficult to treat through chlorination.[27] DJB functionaries denied this allegation. Notably, whenever ammonia levels rise, water production reduces, affecting the water supply to areas served by a particular WTP.[28] The reasons for the rise in ammonia levels need to be reviewed. Previously, this was due to

the intensive use of fertilisers and pesticides in upstream agricultural areas in the adjoining state of Haryana.[29]

A survey of 3,500 residents in various parts of Delhi was conducted in May-June 2024 by social media platform LocalCircles. The results showed that 39 percent of residents were unhappy with the quality of tap water.[30] In August 2024, residents in certain central areas of Delhi[i] reported receiving contaminated water due to, according to them, old water pipelines.[31]

A performance appraisal of STPs by the DPCC in August 2024 showed many plants[j] failing to meet the standards for parameters related to faecal coliform, biochemical oxygen demand, total suspended solids, oil and grease, and dissolved phosphates.[32] The DJB's December 2023 daily analysis report also recorded significantly higher parameter values than the prescribed standards at various STPs (see Table 1).[33] The inadequately treated water is either discharged in large drains and the Yamuna or used for horticulture. Further, there are 44 drains that carry about 450 mgd of untreated wastewater to the Najafgarh drain daily.[34] The polluted water in the drain flows towards the Yamuna.

Table 1: Sewage Quality in Delhi

Name of Sewage Treatment Plant (STP) and capacity	Parameter (milligram per litre)				
	Total Suspended Solids (TSS)	Biological Oxygen Demand (BOD)	Chemical Oxygen Demand (COD)	Ammoniacal Nitrogen (NH4-N)	Phosphate (PO4-P)
DPCC standards for STP	10	10	50	5	2
Keshopur, 40 mgd	50	30	250	50	5
Kapashera, 5 mgd	10	10	50	5	2

i Old Delhi, Sadar Bazar, Paharganj, parts of Karol Bagh, Malkaganj, Rajinder Nagar, Patel Nagar, and Naraina.

j The STPs that failed to meet the parameters are Keshopur, Nilothi, Najafgarh, Pappankalan, Rohini, Narela, Yamuna Vihar, Mehrauli, Vasant Kunj, Molarband, Okhla, and Ghitorni.

Status of Water and Sewage in Delhi

Name of Sewage Treatment Plant (STP) and capacity	Parameter (milligram per litre)				
	Total Suspended Solids (TSS)	Biological Oxygen Demand (BOD)	Chemical Oxygen Demand (COD)	Ammoniacal Nitrogen (NH4-N)	Phosphate (PO4-P)
Kondli, 45 mgd	30	20	250	50	5
Narela, 10 mgd	50	30	250	50	5
Okhla, 37 mgd	50	30	250	50	5
Delhi Gate, 2.2 mgd	15	10	50	5	2

Source: Delhi Jal Board, as of 1 December 2023,[35] and DPCC.[36]

Implications for Public Health

Inadequately treated drinking water and sewage has numerous health risks. These can be largely understood by reviewing the data on diseases, such as cholera, diarrhoea, dysentery, hepatitis, typhoid, and polio. For instance, the number of diarrhoea cases in Delhi rose from 15,152 in 2022-23 to 20,393 in 2023-24.[37] The National Family Health Survey (NFHS) 4 (2015-16) and 5 (2019-21) also reported a growing prevalence of diarrhoea among children below the age of five years, from 9.6 percent (NFHS 4) to 10.6 percent (NFHS 5) in the national capital.[38]

The World Health Organization (WHO) notes that diarrhoeal diseases are caused by bacterial, viral, and parasitic organisms present in contaminated food or drinking water or at unhygienic places. It is a leading cause of death among children and can be prevented through safe drinking water, adequate sanitation, and hygiene.[39]

Presently, water supply and sewer pipelines have not been laid in many residential areas across Delhi, such as informal settlements, unauthorised colonies, and rural villages. These areas also lack clean toilets and proper solid waste collection services. As such, the chances of people suffering from various diseases are extremely high in these areas.

Recommendations and Conclusion

This present study of water and sewage quality in Delhi finds that the DJB has taken numerous steps to ensure quality. These include the establishment of water and sewage treatment plants and testing laboratories at various places in the city, daily testing of samples collected from raw water sources and taps in premises, the assessment of samples by independent agencies, the application of the latest techniques and technologies for decontamination, utilising the expertise of private companies, and the expansion of water and sewer networks to uncovered areas.

Despite the various administrative measures, there is evidence of inferior water and sewage quality in several areas of the city. Primarily:

i. Several water/sewage quality assessment parameters (such as ammonia and phosphate) do not meet the standards prescribed by the BIS and DPCC.

ii. Water consumers interviewed in some parts of the city by government/ independent agencies have expressed their dissatisfaction with the quality of water and sanitation services provided by the concerned government departments. In their experience, tap water contains impurities and public areas are not sanitised properly.

iii. Most of the population relies on personal water purification devices due to quality concerns; economically weaker sections living in unplanned areas do not have adequate access to safe services and are at a high risk of falling ill.

iv. There are instances of untreated sewage being released in water bodies, drains, and land depressions.

v. Many people suffer from water, sanitation, and hygiene-related illnesses.

Therefore, the provision of safe water and sanitation services to all communities is an urgent requirement in Delhi. To overcome prevailing problems, the Delhi government must:

i. Comply with prescribed water and sewage standards.

ii. Protect surface and groundwater sources from impurities by regularly monitoring and maintaining the sources.

Recommendations and Conclusion

iii. Monitor new constructions (such as houses and commercial areas) in the city to understand future sewage load, and accordingly enhance treatment capacity.

iv. Increase water and sewage treatment capacities considering growing demand.

v. Install real-time monitoring systems to check quality at water sources, after treatment, and in reservoirs and distribution lines.

vi. Provide water, sewer, and waste collection services in unplanned areas inhabited by low-income communities, and raise awareness among citizens on the proper disposal of solid waste.

vii. Provide decentralised wastewater treatment and reuse facilities in unplanned areas.

viii. Ensure the cleanliness of water and sewer pipelines and replace old and corroded pipelines.

ix. Adopt small-scale, low-cost, and environment-friendly water and sewage treatment technologies[40] developed by educational and research institutions, such as the Indian Institute of Technology and the Indian Institute of Management.[k] Establishing decentralised facilities will help reduce the length of the pipelines from treatment plants to residential areas, and will thus address the issue of contamination experienced in long-distance distribution networks.

x. Generate sufficient funds for developing and implementing innovative water and sanitation projects.

xi. Ensure consumers have access to real-time data on water/sewage quality.

Rumi Aijaz *is Senior Fellow at ORF.*

k A bioreactor installed at the IIT Madras campus in January 2022 facilitates nitrate removal from sewage to a sufficiently low level, and allows for usage of treated sewage. In Roorkee, thermal hydrolysis technology is used for treating sewage, which helps in protecting the environment from unpleasant odours, surface and groundwater contamination, and the spread of pathogens.

Endnotes

1 Jessie Carbutt, "Is tap water in Japan safe to drink," *Metropolis*, September 5, 2024, https://metropolisjapan.com/tap-water-in-japan/.

2 PUB Singapore's National Water Agency, "Water quality," https://www.pub.gov.sg/Public/WaterLoop/Water-Quality.

3 Ministry of Housing and Urban Affairs, "Jal Jeevan Mission (Urban) to provide universal coverage of water supply," *Press Information Bureau*, February 2, 2021, https://pib.gov.in/PressReleasePage.aspx?PRID=1694420.

4 Aam Aadmi Party, "Will go on hunger strike over water: Atishi writes to PM," X Post, June 20, 2024, https://x.com/AamAadmiParty/status/1803649253241446706.

5 Rumi Aijaz, "Exploring ways to fill Delhi's unmet water needs," *ORF Issue Brief No. 706*, April 2024, Observer Research Foundation, https://www.orfonline.org/research/exploring-ways-to-fill-delhi-s-unmet-water-needs.

6 Aam Aadmi Party, "Water treatment plants by Delhi govt," AAP WiKi, May 20, 2024, https://aamaadmiparty.wiki/en/Achievements/Delhi/WTP.

7 Government of NCT of Delhi, *Economic Survey of Delhi 2023-24*, Water Supply and Sewerage, Chapter 13 (Delhi: Planning Department), https://delhiplanning.delhi.gov.in/sites/default/files/Planning/chapter_13.pdf.

8 Aam Aadmi Party, "Sewage treatment plants: Building capacity by AAP Delhi govt.," AAP WiKi, August 17, 2024, https://aamaadmiparty.wiki/en/Achievements/Delhi/DelhiSewageTreatment.

9 Aam Aadmi Party, "Sewage treatment plants: Building capacity by AAP Delhi govt."

10 Government of NCT of Delhi, *Economic Survey of Delhi 2023-24*.

11 Government of NCT of Delhi, *Economic Survey of Delhi 2023-24*.

12 Government of NCT of Delhi, *Economic Survey of Delhi 2023-24*.

13 Delhi Jal Board, "Daily Analysis Report," December 1, 2023, https://delhijalboard.delhi.gov.in/sites/default/files/Jalboard/universal-tab/01.12.2023_to_31.12.2023.pdf.

14 D-maps, "Delhi (India)," https://d-maps.com/carte.php?num_car=16529&lang=en.

15 Bureau of Indian Standards, *Drinking Water Specification (Second Revision)*, 2012, https://cpcb.nic.in/wqm/BIS_Drinking_Water_Specification.pdf.

16 Government of NCT of Delhi, *Economic Survey of Delhi 2023-24*.

17 Delhi Pollution Control Committee, "Standards for treated effluent of sewage treatment plants," https://www.dpcc.delhigovt.nic.in/uploads/page/STPStandardspdf-9769efcaacc11566786ae2b364c14c56.pdf.

18 Delhi Jal Board, "Daily Analysis Report."

Endnotes

19 Veolia, "Creating value out of wastewater," https://www.veolia.in/our-services/nilothi-sewage-treatmet-plant.

20 Delhi Jal Board, "Daily water quality surveillance report," August 8, 2024, https://delhijalboard.delhi.gov.in/sites/default/files/Jalboard/universal-tab/water_samples_collection_reports_on_01.08.2024_to_08.08.2024.pdf.

21 Government of NCT of Delhi, *Economic Survey of Delhi 2023-24*.

22 Delhi Jal Board, "Daily water quality surveillance report."

23 Harish Kumar et al., "Understanding drinking water quality problems in Shahadra region of Delhi," *Journal of Interdisciplinary Cycle Research*, XII (VII), 1311-1323, September 2020, https://www.researchgate.net/publication/344287456_UNDERSTANDING_DRINKING_WATER_QUALITYPROBLEMS_INSHAHADRA_REGION_OF_DELHI.

24 "Delhi Jal Board refutes Centre's report of tap water being unfit for drinking," *The Times of India*, November 17, 2019, https://timesofindia.indiatimes.com/city/delhi/djb-refutes-centres-report-of-tap-water-being-unfit-for-drinking/articleshow/72090419.cms.

25 Isha Gupta et al., "Operation paani: Half of Delhi's water unsafe, finds India Today's test drive," *India Today*, January 25, 2020, https://www.indiatoday.in/india/story/operation-paani-delhi-water-not-entirely-safe-finds-india-today-test-drive-1637799-2020-01-17.

26 "Delhi jal board tasked with 5-year water plan as quality concerns persist," *The Economic Times*, April 7, 2024, https://economictimes.indiatimes.com/news/india/delhi-jal-board-tasked-with-5-year-water-plan-as-quality-concerns-persist/articleshow/109100824.cms?from=mdr.

27 Siddhanta Mishra, "Water quality under lens at Wazirabad plant," *The Times of India*, January 12, 2024, https://timesofindia.indiatimes.com/city/delhi/water-quality-under-lens-at-wazirabad-plant/articleshow/106744674.cms.

28 Aam Aadmi Party, "Water treatment plants by Delhi govt."

29 "Bad water," *Down to Earth*, March 31, 1998, https://www.downtoearth.org.in/environment/bad-water-21446.

30 "Delhi water crisis: 39 % residents complain about quality of piped water, call it very poor; only 25 % of households rate it as good," *Business Today*, June 13, 2024, https://www.businesstoday.in/india/story/delhi-water-crisis-39-residents-complain-about-quality-of-piped-water-call-it-very-poor-only-25-of-households-rate-it-as-good-433141-2024-06-13.

31 Paras Singh, "In dilemma, Delhi picks poor water quality over shortage: Report," *Hindustan Times*, August 12, 2024, https://www.hindustantimes.com/cities/delhi-news/in-dilemma-delhi-picks-poor-water-quality-over-shortage-report-101723399488246.html.

32 Kushagra Dixit, "21 of 37 sewage treatment plants don't meet standards in Delhi: Report," *The Times of India*, September 20, 2024, https://timesofindia.indiatimes.com/city/delhi/21-of-37-sewage-treatment-plants-dont-meet-standards-in-delhi-report/articleshow/113507294.cms.

Endnotes

33 Delhi Jal Board, "Daily Analysis Report."

34 Siddhanta Mishra, "7 STPs being upgraded to be ready by Dec 2025," *The Times of India*, November 9, 2024, https://timesofindia.indiatimes.com/city/delhi/delhi-upgrades-7-sewage-treatment-plants-to-combat-yamuna-pollution-by-december-2025/articleshow/115094636.cms.

35 Delhi Jal Board, "Daily Analysis Report."

36 Delhi Pollution Control Committee, "Standards for treated effluent of sewage treatment plants."

37 Siddhanta Mishra, "DJB asked to increase water testing as cases of diarrhoea rise in Delhi," *The Times of India*, July 15, 2024, https://timesofindia.indiatimes.com/city/delhi/cases-of-diarrhoea-on-the-rise-in-new-delhi-djb-urged-to-increase-water-testing/articleshow/111738607.cms.

38 Ministry of Health and Family Welfare, *Stop Diarrhoea Campaign*, Operational Guidelines, 2024, https://health.delhi.gov.in/sites/default/files/Health/circulars-orders/guidance_document_on_stop_diarrhoea_campaign_2024.pdf.

39 WHO, "Diarrhoeal disease," March 7, 2024, https://www.who.int/news-room/fact-sheets/detail/diarrhoeal-disease.

40 Saraswati 2.0, "Pilot 1 – UASB and deammonification," https://projectsaraswati2.com/pilot-sites/pilot-1-uasb-and-deammonification/.

Images used in this paper are from Getty Images/Busà Photography.

ORF OBSERVER RESEARCH FOUNDATION

Ideas . Forums . Leadership . Impact

20, Rouse Avenue Institutional Area,
New Delhi - 110 002, INDIA
Ph. : +91-11-35332000. **Fax :** +91-11-35332005
E-mail: contactus@orfonline.org
Website: www.orfonline.org