CHAPTER-IV
WATER QUALITY MANAGEMENT & SERVICE LEVEL BENCHMARKS

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4.1 Water Quality Management under *HGNJ yojana*

The aim of *HGNJ yojana* under *Saat Nischay* was to provide potable tap water to all households in the State by March 2020. For ensuring, supply of optimum quality of potable piped water to every household under the Scheme, the implementing departments (PRD, PHED and UD&HD) of GoB had issued guidelines for water quality testing before supplying the same to households. For achieving this aim of providing potable tap water, the following steps were mandated:

- Installation of Water Treatment Plants (WTPs) in QA rural & urban wards for mitigation of contaminants in ground water.

- To guarantee provision of safe drinking water, its disinfection was to be ensured and chlorinators[1] were to be installed in all water supply schemes under *HGNJ yojana.*

Issues related to non-coverage of QA wards, non-functioning or non-installation of WTPs, non-provision of chlorinators, lesser number of tests being conducted due to inadequate infrastructure for water quality testing *etc*., were noticed during Audit and are discussed in the succeeding paragraphs:

4.1.1 Coverage of quality affected rural wards

As per the vision and strategy document of PHED (January 2016), there were nine[2] arsenic affected, 10[3] fluoride affected and nine[4] iron affected districts in Bihar. Later, PHED additionally identified (July 2018) Sitamarhi, Bhagalpur, Bhojpur, Patna and Vaishali as arsenic affected, Nawada as fluoride affected and Munger & Bhagalpur as iron affected districts.

Hence, of the 38 districts in the State, a total of 28[5] districts were affected by poor quality of water (July 2018).

Percentage of QA and NQA wards in the State as of July 2018 shown in **Chart 4.1**:

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1 *A chlorinator is a device designed for feeding chlorine to a water supply for disinfection of supplied water.*

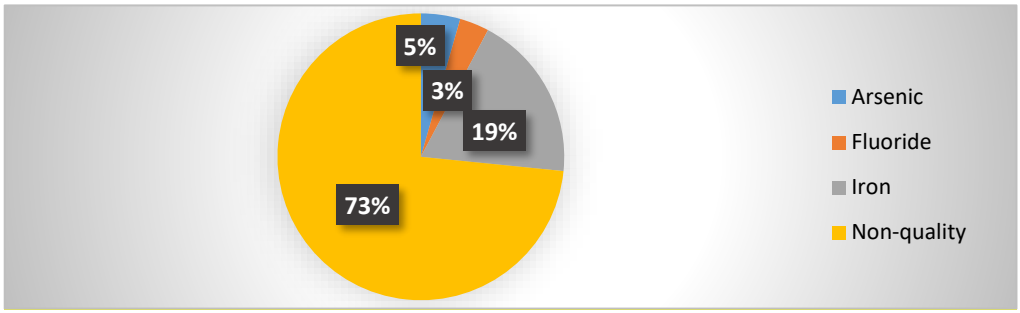
2 *Begusarai, Buxar, Darbhanga, Katihar, Khagaria, Lakhisarai, Munger, Samastipur and Saran.*

3 *Aurangabad, Banka, Bhagalpur, Gaya, Jamui, Kaimur, Munger, Nalanda, Rohtas, and Sheikhpura.*

4 *Araria, Begusarai, Katihar, Khagaria, Kishanganj, Madhepura, Purnea, Saharsa and Supaul.*

5 *Sitamarhi was treated as non-quality affected district, as out of 3,836 wards, only four wards were quality affected.*

Chart 4.1: Status of Quality/Non-quality affected wards in Bihar



As per decision taken by GoB (December 2016), PHED was to execute *HGNJ* schemes in all QA rural wards of Bihar. PHED fixed a target of covering all 30,207 quality affected wards (Arsenic: 4,709 Fluoride: 3,789 and Iron: 21,709) in the State to be completed till October 2020 with suitable mitigation measures under *HGNJ yojana*.

Coverage of quality affected wards in the State by PHED (as of November 2023) is given in **Table 4.1**.

Table 4.1: Target and achievement of quality affected wards reported by PHED

Contaminants	Wards			Households (in lakh)		
	Targeted wards	Covered wards (as of November 2023)	Uncovered wards (as of November 2023)	Targeted Households (October 2020)	Coverage of Households (as of November 2023)	Households left Uncovered (as of November 2023)
Arsenic affected	4,709	4,681	28	6.98	6.74	0.24
Fluoride affected	3,789	3,780	09	4.67	4.64	0.03
Iron affected	21,709	21,282	427	36.03	35.13	0.90
Total	**30,207**	**29,743**	**464**	**47.68**	**46.51**	**1.17**

(Source: *Data provided by PHED)*

It is evident from **Table 4.1** that 464 quality affected wards were uncovered under *HGNJ* schemes as of November 2023, depriving 1.17 lakh households of potable and safe tap water. Further, in test-checked districts, it was noted that WTPs were either not installed or remained non-functional, resulting in supply of contaminated water as elaborated in the subsequent paragraphs.

PHED accepted the audit observation and stated (June 2025) that tender has been invited to cover the left out *tolas*/wards.

4.1.1.1 Incomplete schemes executed in quality affected rural wards by PHED

As per para 7.1 of Central Public Health and Environmental Engineering Organisation (CPHEEO) Manual on Water Supply and Treatment (1999), the aim of water treatment was to produce and maintain hygienically safe and palatable water supply, in an economic manner. The method of treatment to be

employed would depend on the nature of raw water constituents and the desired standard of water quality to be achieved.

Piped water supply in quality affected rural areas was to be provided through PHED. Accordingly, the Department issued administrative approvals (December 2016 to November 2023) for execution of *HGNJ* scheme in QA areas which included the setting up of WTPs for mitigation of fluoride, iron and arsenic contaminants in ground water.

During Audit of two test-checked PH divisions (Gaya & Sherghati), it was noticed that three agreements were finalised (April 2017 to November 2019) with different executing agencies for water supply schemes to be taken up. The scope of work of these agreements included the installation of 45 FRPs in 45 wards, however, in 15 wards the FRPs were not installed and the schemes remained incomplete (September 2023). The details are as elaborated in **Table 4.2**.

Table 4.2: Details of non-installation of FRPs

Sl. No.	Name of PH Division	Agreement No.	Nature of contam-ination	No. of wards for which FRPs were to be installed	No. of wards for which FRPs were not installed	No. of house-holds	Expenditure incurred – without FRPs (₹ in lakh)
1	Gaya	SBD-01/2017-18	Fluoride	25	9	1,260	177.42
2	Gaya	SBD-03/2018-19		9	1	100	0.00
3	Sherghati	SBD-09/2017-18		11	5	754	0.00
		Total		**45**	**15**	**2,114**	**177.42**

(Source: Records of test-checked PH Divisions)

Table 4.2 shows that 15 *HGNJ* schemes in 15 quality affected wards, FRPs were not installed and schemes were incomplete even after a lapse of more than four years of commencement of the schemes (September 2023).

Test-checked PH division Gaya replied that in nine out of 10 wards, FRPs was not installed due to covid-19 pandemic and in one ward[6], WIMC had already executed the work without installing the FRPs. PH division, Sherghati replied that due to land disputes, FRP could not be installed in five wards.

Reply furnished is not acceptable as even after lapse of four years from the commencement of schemes, FRPs were not installed in these wards.

Hence, 2,114 households were deprived of the benefits of contamination free pipe water supply under the Scheme.

4.1.1.2 Non-functioning of WTPs in quality affected rural wards

- Under PH Division, Sherghati, Fluoride Removal Plants (FRPs) were to be installed in wards that were affected with high level of fluoride. During test-

[6] *Work was completed in 8 wards after incurring expenditure of ₹ 2.36 crore.*

check it was noticed that FRPs were installed in five fluoride affected wards[7] of GP (*Sawankala*) under PH division, Sherghati. However, scrutiny of the test report (September 2022) of the District Laboratory Gaya, showed that the media filter[8] of these FRPs were defective. Due to this presence, of fluoride was found to be between 1.54 mg/l to 2.06 mg/l, which was 54 *per cent* to 106 *per cent* higher than the acceptable limit (one mg/l). The operation and maintenance of these FRPs was also covered under the contract agreement finalised by the PH Division for this project. Despite this, the media filter had not been replaced since September 2022 *i.e.* for a period of one year, highlighting lack of proper monitoring and supervision at PH division level.

The Executive Engineer, PH Division Sherghati replied (September 2023) that the contractor was directed to replace media filter of FRPs.

- During the Water quality tests carried out in course of the JPV conducted (September 2023) of two wards[9] of PH division, Sherghati, it was noted that the fluoride level varied between 2.19 mg/l to 6.58 mg/l against the acceptable limit of one mg/l. It was further observed, in ward no. 02 of Tilaiya Panchayat that FRP was available on the site but the same was not connected to the distribution channel.

The lack of proper FRPs in such QA wards suffering from high levels of the contaminant, impacted the health of the local population. This was also corroborated by the Report (March 2022) of the National Fluorosis Control Programme under the Civil Surgeon, Gaya which states that individuals of ward no. 2 of Tilaiya GP, were suffering from fluorosis.

- During examination of records of 62 schemes under four PH Divisions, it was observed that IRPs/FRPs were installed in all these schemes. During JPV, audit conducted (June 2023 to November 2023) water quality tests of these schemes and noticed that IRPs/FRPs remained non-functional in 23 schemes as the presence of iron/fluoride was more than the acceptable limit (one mg/l) in these schemes despite installation of 23 IRPs/FRPs at a cost of ₹ 2.54 crore as detailed in **Table 4.3**.

[7] *Ward numbers 1, 5, 8, 12 and 13 of Sawankala Panchayat of Amas Block.*
[8] *Media filter is an equipment built inside the FRP to absorb the fluoride ions as water passes through them.*
[9] *Ward no. 2 and 4 of Tilaiya Panchayat of Banke Bazar Block.*

Table 4.3: Water quality found contaminated with iron/fluoride during JPV/test-report in schemes executed by PH Divisions

Units	Schemes where water sample was tested	No. of Schemes, where contaminants were found to be more than the acceptable limit	Cost of non-functional IRPs/ FRPs (₹ in lakh)	Range of contamination (in mg/l)	Acceptable limit (in mg/l)	Types of contaminants
Supaul	24	8	63.19	1.22 to 3.12	1	Iron
Aurangabad	03	03	44.00	1.5 to 2.00	1	Fluoride
Jamui	27	11	130.93	1.3 to 3.00	1	Fluoride
Gaya	08	01	16.00	1.42	1	Fluoride
Total	**62**	**23**	**254.12**	**1.22 to 3.12**		

(Source: JPV of the selected schemes)

4.1.1.3 Non-installation of WTPs in rural wards

- As per guidelines issued by PHED, FRPs were to be installed in wards affected by high levels of fluoride. In 29 wards of eight GPs (Under PH division Sherghati), the water quality test-report (October 2022) showed high levels of fluoride contamination. Fluoride was found to be between 1.49 to 10.70 mg/l, against the acceptable limit (one mg/l). However, FRPs were not installed in these wards as no provision for the same were included in the estimates prepared for these schemes **(*Appendix 4.1*)**.

- Similarly, mitigation measures to limit the level of contaminants were also not taken by PH Division Jamui in case of 106 water supply schemes implemented under the *HGNJ yojana*. Water quality tests conducted during the JPV (September 2023), revealed that water was contaminated with fluoride (1.02 to 2.23 mg/l) beyond the acceptable limit (one mg/l) in 28 of these schemes **(*Appendix 4.2*)**.

- As per PHED's Report (2018), 19 wards of Puraini South and Puraini North Gram Panchayats under Jagdishpur Block of Bhagalpur district, were affected with fluoride contamination. PH Division Bhagalpur West executed (February 2022) an agreement for the execution of a water supply scheme to cover 26 wards, which included the aforesaid 19 QA wards. An expenditure of ₹14.09 crore was incurred on the completion (June 2023) of this scheme. During scrutiny of the agreement Audit noted that the provision for FRPs was not included in the scope of work of the agreement. Further, water quality tests conducted during JPV (October 2023), also revealed that the supplied water was contaminated with three mg/l quantity of fluoride contamination against acceptable limit of one mg/l. Thus, despite incurring an expenditure of ₹14.09 crore, 5,455 households residing in these 19 wards were deprived of safe potable water.

- During test-check of the water sample register (for the period July 2020 to February 2021) of the District Laboratory under PH Division Aurangabad, it was found that in 44 wards, presence of fluoride was more (1.04 mg/l to 3.28 mg/l) than the acceptable limit (one mg/l). Further analysis showed that in 27 out of 44 wards, FRPs were installed but despite this, the presence of fluoride was at an unacceptable level. In addition, in the remaining 17[10] wards, no contaminant mitigation measures (such as installation of FRP) were taken up by PHED and PRD **(*Appendix 4.3*)**.

4.1.1.4 Short provisions of capacity of FRPs

Directions issued by PHED for the preparation of DPRs stated that the capacity of FRPs (to treat fluoride contamination) would be calculated based on population of wards & service level demands (*i.e.* 81 lpcd, and minimum eight hours of water supply).

In this context, Audit analysed the capacity of FRPs that had been installed in 99 fluoride affected wards of two PH divisions[11] and noticed that in 38 out of 99 wards, while the required capacity of the FRP was 81 lpcd, water in the range of 41 to 77 lpcd only could be treated in these Plants. Hence, the capacity of these FRPs was five *per cent* to 49 *per cent* lesser than the requirement **(*Appendix 4.4*)**.

Due to installation of FRPs with lesser capacity the desired quantity of water after mitigation of fluoride could not be provided.

4.1.2 Coverage of quality affected Urban wards

As per UD&HD guidelines (December 2018) for Urban Water Supply Schemes, iron, arsenic and fluoride removal plants were to be installed as per requirement, in the water quality affected urban wards. Accordingly, provision was to be made in the model estimate of schemes to be taken up for these wards.

4.1.2.1 Non-installation of IRPs/FRPs in Urban wards

Scrutiny of records in 56 quality affected wards of five test-checked ULBs revealed that in 26 out of 56 wards, where water supply schemes had been completed after incurring an expenditure of ₹ 4.38 crore, despite lapse of one to five years from completion, IRPs/FRPs that were required to mitigate water quality affected with iron/fluoride, were not set up. Hence, 5,632 households covered under these schemes in these 26 wards, were at the risk of being provided contaminated water ***(Appendix 4.5 A)***.

Further, Audit noticed that in seven of 30 non-quality affected urban wards, where IRPs were not required, the same were installed at a cost of ₹68.10 lakh, leading to wasteful expenditure. Status of installation of IRPs/FRPs in urban wards is given in **Table 4.4** below and details are included in ***(Appendix 4.5 B)***.

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[10] *Scheme implemented by PH Division Aurangabad: 13, Scheme implemented by PRD: 4.*
[11] *Public Health Division, Jamui and Gaya.*

Table 4.4: Status of IRPs installed in quality/non-quality affected wards of test-checked ULBs (June 2023 - November 2023)

Sl. No	ULBs	Non- installation of IRPs in quality affected wards			Installation of IRPs in non-quality affected wards	
		No. of wards	IRPs not installed in wards (expenditure; ₹ in lakh)	No. of HHs	No. of wards	IRPs installed in wards (wasteful expenditure on WTP in lakh)
1	Benipur (Iron)	04	1 (42.28)	450	14	5 (42.90)
2	Birpur (Iron)	13	2 (53.53)	500	0	Nil
3	Jhanjharpur (Iron)	00	Nil	NA	16	2 (25.20)
4	Khagaria (Iron)	26	11 (132.02)	2,049	0	Nil
5	Jhajha (Iron)	13	12 (210.05)	2,633	NA	Nil
	Total	**56**	**26 (437.88)**	**5,632**	**30**	**07 (68.10)**

(Source: Records provided by test-checked ULBs)

4.1.2.2 Non-functioning of IRPs in quality affected urban wards

HGNJ yojana water supply schemes were undertaken by Nagar Parishad Khagaria at a cost of ₹ 6.11 crore for 26 water quality affected wards, which included a provision for the setting up of 26 IRPs for these schemes. However, it was noticed (June 2023) that in case of seven[12], out of 15 wards where schemes were completed, while the IRPs had been installed, these were not functional as they had not been connected to the water supply system. Therefore, the water being supplied to 1,598 households in these seven wards was at a high risk of contamination. Besides risking the health of local households, this also defeated the overall objective of *HGNJ yojana* to supply safe drinking water.

4.1.3 Water quality tests and functioning of water testing laboratory

Water quality tests were to be carried out twice a year (pre *monsoon* & post *monsoon*) mandatorily against 15 water quality parameters by District/Sub-divisional laboratories. In case of arsenic and fluoride affected wards, these tests were to be carried out monthly, while in case of iron affected wards, the tests were to be done once in three months. In case of non-quality wards, water quality tests were to be carried out by District/Sub-divisional laboratories once in four months.

For the initial screening of water contamination, Field Test Kits (FTKs) were to be used by pump operators of the scheme.

Audit noticed lesser than required number of tests being conducted, issues related to inadequate infrastructure for testing, non-utilisation of FTKs/ mobile testing laboratories *etc*. as discussed in the succeeding paragraphs:

[12] *Wards 4,5,10,12,19,23 and 24 of NP Khagaria.*

4.1.3.1 Lesser water quality tests conducted by water testing laboratory

To test the quality of water supplied to households in both rural as well as urban areas; State, District as well as Sub-divisional laboratories were set up by PHED. Audit observed that as of February 2024, one State, 38 District level and 76 sub-divisional laboratories were functioning in Bihar. The capacity of a District Laboratory was to conduct 300 tests in a month, while 125 tests a month could be carried out by Sub-divisional laboratories. Hence, 38 district level laboratories could conduct a maximum of 11,400 tests in a month and 76 sub-divisional laboratories could conduct upto 9,500 tests during a month.

It was observed (February 2024) that District and Sub-divisional laboratories of only five[13] out of 38 districts, had the capacity to conduct water quality tests of all the schemes being implemented in these districts. Further, District and Sub-divisional laboratories of the remaining 33 districts had six *per cent* to 68 *per cent* less monthly capacity to carry out water quality test, as against the required numbers mandated by PHED ***(Appendix 4.6)***.

4.1.3.2 Shortage of Chemist and lab assistant

Audit noted that shortage of manpower was one of the reasons for lower efficiency of Government testing Laboratories.

During Audit, test-check of records of 10 out of 12 District laboratories[14] and 20 Sub-divisional laboratories showed that in case of District laboratories, against the sanctioned strength of 10 Chemists and 19 lab assistants, only seven Chemists and nine lab assistants were working. Further, in case of the 20 Sub-divisional PH laboratories, against a sanctioned strength of 20 Chemists and 20 lab assistants, only two Chemist and two lab assistants were working (June 2023 to November 2023) vide details given in **Table 4.5**.

Table 4.5: Sanctioned strength and Men-in-position (June 2023 to November 2023) of Chemist and lab assistants in test-checked laboratories

Sl. No.	Sanctioned post	Sanction Strength		Person-in- position		Vacant posts	
		District lab	Sub-div. lab	District lab	Sub-div. lab	District lab	Sub-div. lab.
1	Chemist	10	20	7	2	3	18
2	Lab. Assistant	19	20	9	2	10	18
	Total	**29**	**40**	**16**	**4**	**13**	**36**

(Source: Data provided by test-checked PH Divisions) ***(Appendix 4.7)***

As a result of these shortages, in ten test-checked districts, it was noticed that an average of 3,550 tests per month only, were conducted during 2023-24, against the minimum mandated 11,528 tests as depicted in **Table 4.6**.

[13] *Arwal, Jehanabad, Lakhisarai, Sheikhpura and Sheohar.*
[14] *PH division Gopalganj did not produced record of men-in position in laboratories.*

Table 4.6: Shortfall in water quality test in test-checked districts

Name of District	Total no. of Schemes in the district (as on April 2023)	Minimum monthly test required	Total test done by the laboratories of district concerned in the year (2023-24)	Average test conducted in a month	Shortfall
A	**B**	**C**	**D**	**E=(D/12)**	**F=(C-E)**
Aurangabad	2,898	792	3,438	287	505
Bhagalpur	3,177	1,513	4,716	393	1,120
Darbhanga	4,473	1,142	3,236	270	872
Gaya	4,652	1,313	3,335	278	1,035
Jamui	2,013	1,037	3,006	251	786
Katihar	3,281	1,164	6,013	501	663
Khagaria	1,890	936	5,630	469	467
Madhubani	5,398	1,350	3,495	291	1,059
Saran	4,725	1,217	5,960	497	720
West Champaran	4,256	1,064	3,757	313	751
Total	**36,763**	**11,528**	**42,586**	**3,550**	**7,978**

(Source: Data provided by test-checked PH Divisions)

Hence, shortage of Chemists and lab assistants negatively impacted the capacity of these laboratories to carry out required tests and 69 *per cent* tests could not be conducted in these 10 test-checked districts during 2023-24.

The Engineer-in-chief cum Special Secretary, PHED accepted the audit observation and replied (June 2025) that the Department was in the process of recruiting manpower through outsourcing.

4.1.3.3 Lack of infrastructure required for water quality test

As per information made available by the State Level Water testing laboratory, a total of 17 types of equipment[15] were required for carrying out Physio-Chemical analysis of water in laboratories. Audit noticed that in four out of 12 test-checked PH district laboratories (where records were made available), only 39 equipment against the required 68 were available (June 2023 to November 2023). Details of the same are given in **Table 4.7**.

[15] *Analytical weight Box, Digital Balance, Glass Thermometer, Hot Air Oven, Hot Plate, pH meter, Precision Thermometer Digital with RTD Probe, Refrigerator, Turbidity Meter, Water Bath, Wet & Dry Thermometer, Conductivity meter, Ion Meter, Fume Hood, Membrane Filter Assembly with vacuum Pump, Magnetic Stirrer and UV-Spectrophotometer.*

Table 4.7: Shortfall in water quality test due to lack of infrastructure

Name of District	Status of infrastructure			Minimum monthly tests required (2023-24)	Average number of tests conducted monthly	Shortfall (E-F)
	Available	Functional	Non-Functional			
A	B	C	D	E	F	G
Aurangabad	13	12	1	792	287	505
Darbhanga	9	9	0	1,142	270	872
Madhubani	8	7	1	1,350	291	1,059
West Champaran	9	8	1	1,064	313	751
Total	**39**	**36**	**3**	**4,348**	**1,161**	**3,187**

(Source: Data provided by test-checked PH Divisions)

Further, against a minimum of 4,348 tests required to be conducted monthly, on an average only 1,161 tests were conducted in a month by these test-checked laboratories, during 2023-24 ***(Appendix 4.8)***. Thus, even minimum number of water quality tests could not be undertaken due to lack of required infrastructure in laboratories.

This was corroborated by the reply received from PH divisions Bettiah (West Champaran) and Darbhanga, wherein they stated that in the absence of required machines/equipment and chemicals, 15 parameters could not be tested.

The Engineer-in-chief cum Special Secretary, PHED accepted the audit observation and replied (June 2025) that the Department was in the process of installing required instruments and machines.

4.1.3.4 Accreditation from National Accreditation Board for Testing and Calibration Laboratories (NABL)

National Accreditation Board for Testing and Calibration Laboratories (NABL) accreditation is a procedure by which an authoritative body gives formal recognition of technical competence for specific tests/ measurements, based on third party assessment. Formal recognition of competence of a laboratory by NABL in accordance with international criteria has many advantages *e.g.* increased confidence in Testing/Calibration reports issued, accuracy and reliability of results; better control of laboratory operations *etc*.

As per resolution issued (September 2016) by PHED, the Department directed PH district laboratories to obtain NABL accreditation but even after a lapse of nine years (June 2025), only the State laboratory and 11 district laboratories[16] of 38 District laboratories were NABL accredited. It was noted that no NABL accreditation was obtained by the remaining 27 district laboratories.

[16] *Saran, Saharasa, Purnea, Nalanda, Muzaffarpur, Munger, Gaya, Bhagalpur, Ara, Banka and Sasaram.*

In case of the 12 test-checked PH district laboratories, only three were NABL accredited and four out of nine remained non-accredited[17] due to lack of requisite infrastructure.

The PHED accepted the audit observation and replied (June 2025) that the Department had furnished all requirements for the accreditation and had filed applications for the remaining 27 district laboratories for NABL accreditation.

4.1.3.5 Utilisation of test kits

Field Test Kits (FTKs) and H_2S vials serve the purpose of initial screening of water contamination. Multi parameter FTKs are used for testing PH level, alkalinity, chloride level, arsenic/fluoride/iron content *etc*., while H_2S vials are used for bacteriological testing.

PHED approved (April 2021) procurement of 16,99,800 H_2S vials and 9,000 multi parameter FTKs for 8,386 GPs of the State. Further, 100 water quality tests were to be done using one FTK and one test was to be done using each H_2S vial. These procurements were made by PHED through two agreements at a cost of ₹2.92 crore as details given in **Table 4.8**.

Table 4.8: Details of agreement of Test Kits

Name of test Kit	Agreement No.	Agreement value (₹ in crore)	Date of agreement	No. of units to be supplied	No. of tests that could be conducted
FTKs	SBD-20/ 21-22	1.40	03/12/2021	9,000	9,00,000
H_2S vials	SBD-19/ 21-22	1.52	16/11/2021	16,99,800	16,99,800
	Total	**2.92**			

(Source: Information provided by PHED)

In test-checked divisions, FTKs and H_2S vials were supplied between January 2022 to March 2023 by designated agencies, as finalised by PHED.

The expiry date of these kits was two years from date of manufacturing. However, without taking this into consideration, it was observed that the Standard Operating Procedure (SOP) for use of FTKs and H_2S vials were issued by PHED only on 8 November 2022 *i.e.*, 11 months after the execution of agreements and 10 months after first supply. This indicated that, almost half the time of the validity period of these kits had passed before the divisions could ensure efficient utilisation of these kits.

Further, in case of 12 test-checked PH divisions (February 2024) it was seen that only 19,935 out of 5,85,200 (3.40 *per cent*) H_2S vials were utilised. It was also noticed that only 19,510 out of 3,08,700 (6.32 *per cent)* mandated tests

[17] *Aurangabad, Bettiah, Madhubani and Supaul.*

were conducted using FTKs by the 12 test-checked PH divisions and more than 93 *per cent* FTKs[18] remained unutilised. As the expiry period of FTK was two years, 1,227 FTKs had expired (by February 2024) and 1,22,700 tests could not be carried out, leading to wasteful expenditure of ₹ 17.79 lakh ***(Appendix 4.9)***.

Delay in issue of SOP by the Department and non-utilisation of FTKs and H_2S vials indicated indifferent approach of PHED (and PH divisions) in using available resources efficiently. As a result initial screening of water contamination and other required water quality tests could not be carried out.

The Engineer-in-chief cum Special Secretary, PHED replied (June 2025) that all divisions had submitted utilisation certificate which reflects all FTKs had been utilised.

The reply was not acceptable as the Department did not produce any utilisation certificates in support and no reply was furnished regarding FTKs that had expired.

4.1.3.6 Non-utilisation of Mobile Water Testing Laboratories

PHED executed (May 2017) an agreement at a cost of ₹2.72 crore for O&M of four[19] existing mobile water quality testing laboratories that were to be used for carrying out water quality tests against 15 mandatory parameters, in remote and hilly areas. The O&M period of these mobile labs was for five years, *i.e.* from May 2017 to May 2022.

In addition, PHED had also executed (December 2015) an agreement at a cost of ₹ 7.14 crore for design, construction, supply, installation (and five year O&M) of five[20] new mobile water testing laboratories. The period of O&M of these new five mobile laboratories ended in June 2021.

After the end of their O&M periods, the Department did not execute any other agreement for further O&M of these nine mobile laboratories. These facts indicated that the O&M (and ongoing functionality) of these mobile laboratories was not ensured by the Department. Hence, the objective of using these laboratories to conduct water quality testing in remote and hilly areas remained unachieved.

The Department accepted the audit observation and replied (June 2025) that tendering for O&M of Mobile Water Testing Lab is under process.

4.1.3.7 Water quality tests of schemes implemented by PRD and UD&HD

As per *HGNJ* y*ojana* guidelines issued by various departments (UD&HD December 2018 and PRD January 2020), tests of quality of water, being supplied in UD&HD and PRD wards, was to be carried out in district/sub-divisional laboratories operated by PHED.

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[18] *No. of unutilised FTKs: 2,891.*
[19] *Patna-1, Muzaffarpur- 1, Bhagalpur-1 and Purnea-1.*
[20] *Patna-2, Muzaffarpur-1, Bhagalpur-1 and Purnea-1.*

Audit observed that such water quality tests were not done in respect of 393 water supply schemes implemented by 35 test-checked GPs during the period March 2016 to November 2023. Further, in case of six[21] out of 12 test-checked ULBs, (that provided information to Audit), it was noted that water quality tests were not carried out during the period of March 2017 to November 2023.

In the absence of such tests, it could not be ensured whether safe drinking water was being provided to 81,265 households in these rural and urban wards.

4.1.4 Other irregularities

4.1.4.1 Non-installation of chlorinators in HGNJ yojana schemes of GPs and ULBs /partial installation in PHED schemes.

As per Manual on Water Supply and Treatment published (May 1999) by CPHEEO, for utmost safety of water for drinking purposes, disinfection of water must be done. As per para 8.7.2 of CPHEEO manual, a chlorinator is a device designed to feed chlorine into the water supply and function as a device for disinfection of water.

Audit noticed that PRD and UD&HD had issued a model estimate (in April 2017 and January 2017, respectively) for *HGNJ* schemes to be followed by GPs and ULBs while framing estimates for works. However, provision for chlorinators was not included in this model estimates. As a result, no chlorinators were either provided for, nor installed in 295 schemes of 35 test-checked GPs and 178 schemes of eight ULBs where *HGNJ* scheme was implemented (since January 2017). Thus, 48,283 urban households and 46,067 rural households of eight ULBs and 35 GPs, respectively were provided water without chlorination.

In case of *HGNJ* schemes implemented by PHED, provision for chlorinators was made in the model estimate issued by Chief Engineer (Design), PHED (March 2019). Accordingly, the test-checked PH divisions made provisions for the same in the agreements finalised with the contractors (2019 to 2023). However, during JPV (June 2023 to November 2023) of 12 test-checked PH divisions, it was observed that chlorinators were installed in only 148 out of 190 schemes. Further, out of 148 chlorinators installed, only 81 were found to be functional (as of November 2023).

4.1.4.2 Non-coverage of quality affected wards

As per PHED report on identification of quality affected areas, (July 2018) no block of Madhubani district was ascertained as quality affected. However, as per Central Ground Water Board (CGWB) report (2019), five blocks[22] of Madhubani district were identified as iron affected. Further, scrutiny of water quality test registers of Madhubani (January 2020-April 2022) also showed that

[21] *ULBs: Benipur, Birpur, Jhanjharpur, Khagaria, Rivilganj and Tekari.*
[22] *Benipatti, Khajouli, Jhanjharpur, Ladania and Phulparas.*

there was iron contaminant in the water, beyond acceptable limit (one mg/l) in 90 schemes of 16 Blocks[23] of Madhubani district.

It was noticed that despite the fact that five blocks of Madhubani had been declared as iron affected by CGWB and therefore, as per applicable guidelines PHED had to take mitigation measures (*i.e.,* installation of required IRPs), to remove the iron contamination, no such steps were taken by PH Division Madhubani to install iron removal plant which resulted in 10.21 lakh beneficiaries being impacted with contaminated water.

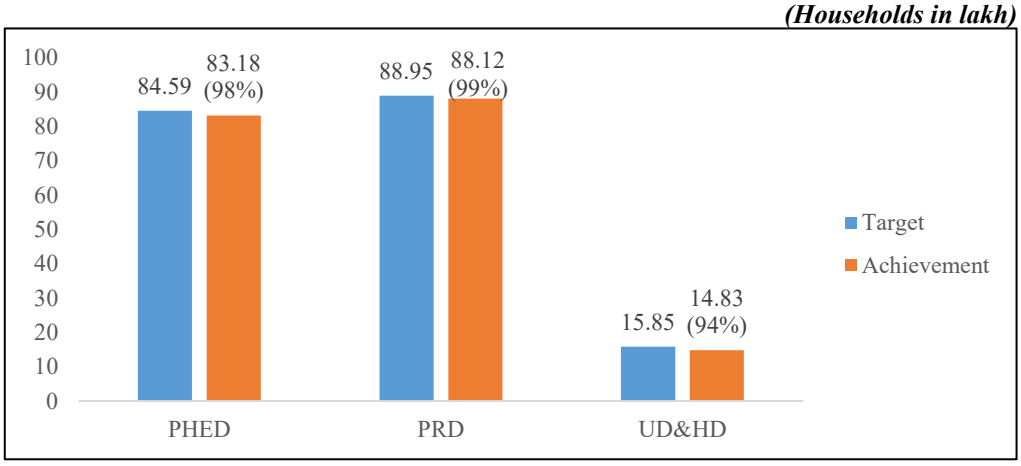
4.2 Achievement of service level benchmarks in water supply

4.2.1 Coverage of water supply connections

In terms of target of 100 *per cent* coverage of households, PHED, PRD and UD&HD reported (March 2023) achievement of 98 *per cent*, 99 *per cent* and 94 *per cent*, respectively. Details of the same are depicted in **Chart 4.2**.

Chart 4.2: Target and achievement of *HGNJ* scheme

(Households in lakh)



(Source: Information provided by departments; PHED & UDHD and Bihar Vikas Mission (for PRD)

As per **Chart 4.2**, against targeted 189.39 lakh households total 186.13 lakh (98.28 *per cent*) were reported as covered under the Scheme, as of March 2023. This reporting included coverage of 98.70 *per cent* of the targeted rural households, as of March 2023.

Audit observed that though PHED reported a coverage of 98 *per cent* households under *HGNJ* scheme at the State level, the actual coverage was 87 *per cent,* as elaborated in ***paragraph 4.2.1.1***. Further, the actual coverage of households by PRD and UD&HD at the State level could not be verified during audit as the Departments did not furnish details of the number of left out households under the scheme. However, during test-check, Audit noticed that the percentage coverage of households in PRD wards, did not match the percentages reported by the Department for the same wards. The same has been elaborated upon in ***paragraph 4.2.1.2***.

[23] *Andhrathadi, Babubarhi, Bennipatti, Bisfi, Jainagar, Jhanjharpur, Kaluahi, Khajauli, Lakhanaur, Laukaha, Madhepur, Pandaul, Phulparas, Rahika, Rajnagar & Sadar Block.*

Department wise details of coverage of households in the test-checked units of PHED and PRD are as discussed below:

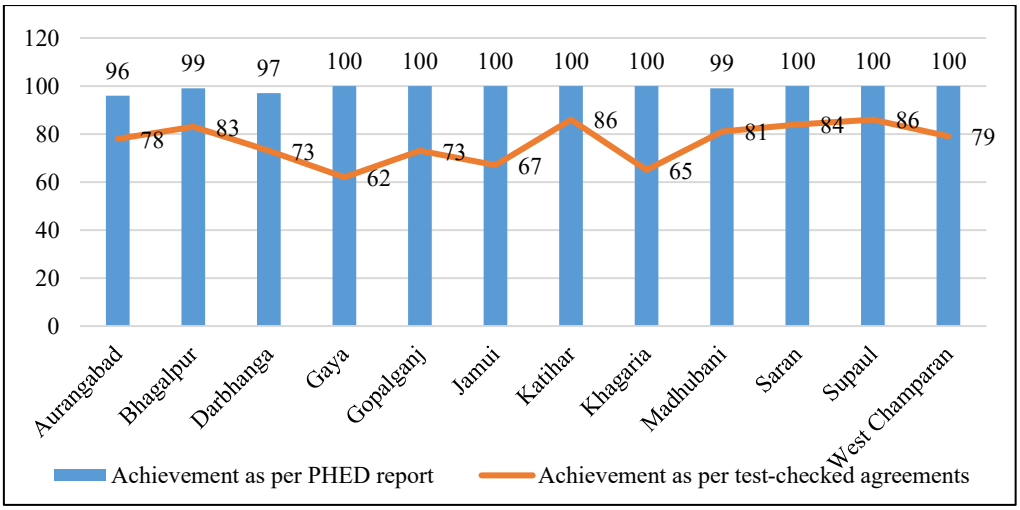
4.2.1.1 Coverage of households in PHED

As per target fixed by the GoB (July 2018), 56,079 number of households were to be covered under *HGNJ yojana* by PHED. The Department reported (April 2023) coverage of 98 *per cent* households at the State level. However, it was noted that subsequently (in November 2023), two Administrative Approvals of ₹3,642.72 crore and ₹1,063.46 crore were accorded by PHED for covering 11.22 lakh households (including 8.07 lakh households residing in quality affected wards) that had not yet been covered under *HGJN yojana*.

Thus, out of the total target of 84.59 lakh households to be covered by PHED, the Department had achieved coverage of only 87 *per cent* as 11.22 lakh households (13 *per cent*) were yet to be provided pipe water supply under *HGNJ yojana* as of November 2023.

Further, scrutiny of 304 agreements and MBs in test-checked PH Divisions revealed that the number of water supply connections provided to targeted households varied between 62 *per cent* and 86 *per cent*. However, in comparison, PHED had reported an inflated coverage of 96 *per cent* to 100 *per cent* households in the same test-checked divisions. The district-wise percentage of coverage of households reported by PHED (April 2023) and as per test-checked agreements/MBs (June-November 2023) are given in ***Appendix 4.10*** and depicted in **Chart 4.3**.

Chart 4.3: Percentage of house service connections reported by PHED and as per test-checked agreements/MBs in test-checked PH divisions



(Source: Records provided by department & test-checked divisions)

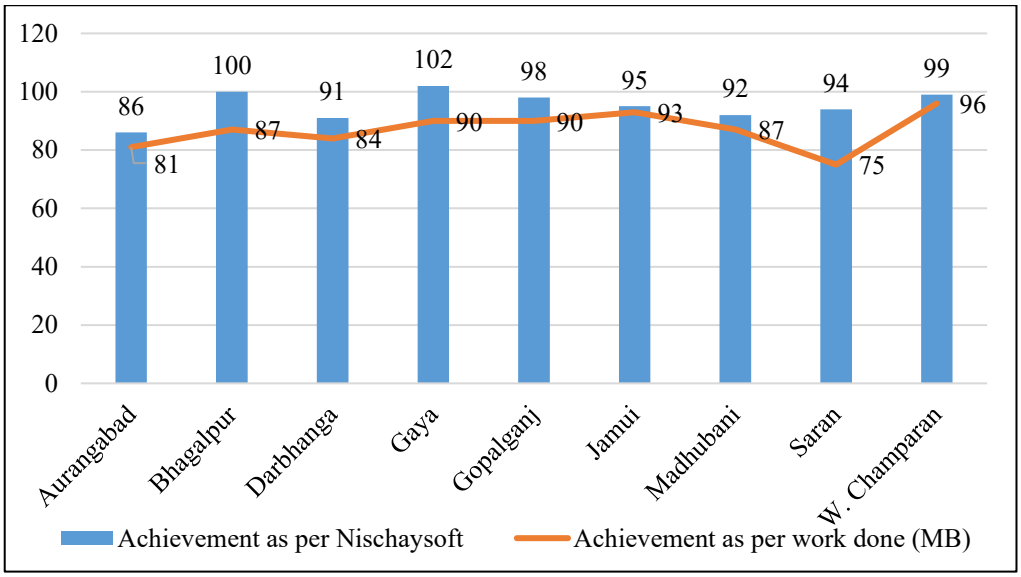
Thus, coverage reported by PHED was not reliable and the objective of *HGNJ* schemes to cover all households, was not achieved.

In reply, PHED accepted the audit observation and stated (June 2025) that the uncovered wards are now being covered under left out *tolas*/wards and are under tender process.

4.2.1.2 Coverage of households by PRD

PRD reported (March 2023) coverage of 99 *per cent* households under *HGNJ* scheme but scrutiny of records by Audit in 295 wards of 35 test-checked GPs revealed that only 46,067 out of 52,210 households (88 *per cent*) were provided piped water connections, indicating that the achievement figures of the Department may have been inflated. Further, as per data reflected on *Nischaysoft*[24], only 2,031 households remained uncovered while as per records (scheme files, MBs and reports furnished by GPs) test-checked during audit, 6,143 households still remained to be covered ***(Appendix 4.11)***. Details are given in **Chart 4.4**.

Chart 4.4: Percentage of coverage of households as per *Nischaysoft* and as per records of test-checked WIMCs of GPs



(Source: Records as per Nischaysoft & test-checked Gram Panchayat)

Thus, coverage of households as reported by PRD was not a reliable representation as all targeted households were not provided with access to piped water supply.

In addition to the above, Audit noted that as per dashboard of *Jal Jeevan* Mission-*Har Ghar Jal* portal[25], against total 167.55 lakh rural households of Bihar, only 160.36 lakh (95.71 *per cent*) were having tap water supply, as of November 2025.

4.2.2 Per capita supply of water

As per *HGNJ yojana* scheme guidelines 70 lpcd and 135 lpcd water was to be provided to households residing in rural and urban areas respectively, for meeting their basis needs. Further, as per Para 2.2.8.1 of the CPHEEO Manual, piped water supply for domestic needs should provide adequate water for drinking, cooking, bathing, washing, flushing, gardening *etc*.

[24] *For online monitoring of the scheme of Panchayati Raj Department, a website was established by Panchayati Raj Department in collaboration with National Informatics Centre (NIC).*

[25] *Maintained by the Department of Drinking Water and Sanitation, Ministry of Jal Shakti, GoI.*

With respect to the above, during the beneficiary survey conducted (June 2023 -November 2023) wherein 2,283 number of beneficiaries were covered, 53 *per cent,* 48 *per cent* and 58 *per cent* beneficiaries covered under schemes implemented by PHED, WIMCs and ULBs, respectively stated that the water supply did not fulfil their domestic needs.

4.2.3 Continuity of water supply

The model estimate of *HGNJ* scheme prepared by PHED, provided for eight hours' operation of the motor pump and 10,000 litre water tanks for storage of water to achieve the aim of providing continuous supply of water in rural areas where schemes were implemented by PHED.

In case of water supply scheme implemented by WIMCs of GPs, the PRD decided to supply water to households for eight hours daily and later (September 2019) reduced to four hours in a day.
To ensure 24 x 7 continuous supply of water in urban areas, UD&HD made a provision for 16 hours operation of motor pumps and 10,000 litre water tank for storage of water.

However, scrutiny of model estimates prepared revealed that although implementing Departments had made a provision for 10,000 litre water tanks for storage of water in each ward, the same was not sufficient for providing continuous supply of water to the population of rural as well as urban areas. Audit observed that, in PHED and PRD wards, for 100 to 200 households, 13,712 to 27,398 litre water storage tanks were required ***(Appendix 4.12)***, highlighting that a provision for only a 10,000 litre tank was not adequate, as per local needs.

Similarly, in ULBs, 29,062 to 1,74,375 liters water storage tank was required for continuous supply of water to 250 to 1,500 households however, UD&HD made uniform provision of only 10,000 litre water tank for storage of water ***(Appendix 4.13)***.

Audit conducted JPV (June 2023 to November 2023) along with officials of test-checked units. In this course, it was observed that in 74 out of 190 schemes implemented by test-checked PH divisions, water was supplied for less than six hours. During JPV in test-checked ULBs, it was observed that supply of water was even less than six hours in 76 (56 *per cent*) out of 135 schemes.

Conclusion

Despite implementation efforts under *HGNJ yojana*, water quality management in Bihar remained deficient. Many quality-affected wards were not covered or lacked functional WTPs. Even where WTPs were installed, they were often non-functional or under-capacity. Chlorinators were largely absent in PRD and ULB schemes, compromising disinfection standards. Water quality testing was inadequate due to infrastructure gaps, manpower shortages, non-utilisation of

test kits, and non-operational mobile labs. NABL accreditation remained limited to a few laboratories. Consequently, a significant number of households were exposed to unsafe water, defeating the scheme's fundamental objective.

Recommendations

Recommendation 7: The State Government may ensure coverage of all quality affected wards with functional WTPs to provide safe drinking water to targeted households.

Recommendation 8: The State Government may ensure focus on improving testing facilities by upgrading infrastructure of laboratories and deploying adequate manpower. The Departments may strengthen its supervision and monitoring mechanism to ensure that all required water quality tests are carried out.

Recommendation 9: The State Government may ensure taking timely and appropriate remedial/mitigation measures in cases where contamination via presence of more than permissible limits of Arsenic, Fluoride, Iron, are detected.