

# Situational Analysis of Water, Sanitation, and Hygiene in Health-care Facilities of a District in Central India

## Abstract

**Background:** Water, sanitation, and hygiene (WASH) in health-care facilities is fundamental for providing quality, people-centered care and critical to achieving quality and accessible health services. This study aimed to assess the status of the WASH infrastructure in health-care facilities of Raipur district, Chhattisgarh, India. **Methodology:** This was a hospital-based cross-sectional study carried out in all public health-care facilities of Abhanpur block, Raipur district, Chhattisgarh, India, between 2019 and 2020 using an adapted version of joint monitoring program's (JMP) core questions, indicators, and service ladder framework. **Results:** A total of 2 community health centers (CHCs), 7 primary health centers (PHCs), and 34 subhealth centers (SHCs) were included in the present study. All CHCs (100%) had essential water, sanitation, hygiene, and waste management services. Among PHCs, 85.7% had water from improved and hygienic sources, only 57.1% had basic sanitation, and 100% had vital essential waste management services. Among SHCs, 55.9% had essential water, 2.9% had basic sanitation, 20.6% had basic hygiene, and 35.3% had necessary waste management services. Overall, it was found that 62.8% of health-care facilities had necessary water services, 16.3% had basic sanitation services, 34.9% had essential hygiene services, and 48.8% had basic waste management services. **Conclusion:** The status of WASH infrastructure in health-care facilities of Raipur district is either limited or not available, especially concerning sanitation services, hygiene, and waste management services. It is the need of the hour to ensure a coordinated response that in all health-care facilities, WASH services are made available and accessible.

**Keywords:** Chhattisgarh, health-care facility, India, water, sanitation, and hygiene

## Introduction

Water, sanitation, and hygiene (WASH; by the International Water and Sanitation Centre)<sup>[1,2]</sup> is the core of infection prevention and control (IPC), making it a critical public health issue to focus on, especially as a part of providing essential health-care services.<sup>[3-5]</sup> It has the potential to improve health, life expectancy, gender equality, and other vital issues of international development.<sup>[6,7]</sup> The United Nations Sustainable Development Goal (SDG), importantly SDG 6, strives to ensure the availability and sustainable management of water and sanitation for all, together with hygiene.<sup>[8]</sup> Other SDGs associated directly or indirectly with WASH are SDG 3 (to ensure healthy lives and promote well-being for all at all ages), SDG 1, SDG 4, SDG 7, SDG 11, and SDG 13.<sup>[9]</sup>

The World Health Organization and United Nations International Children's Emergency

Funds have been monitoring WASH through the joint monitoring program (JMP) since global transitions in climate, demographics, health, and rapid urbanization characterized 1990<sup>[10]</sup> till 2016.<sup>[3,11]</sup>

Globally, more than one in four or around two billion individuals lack access to a safely managed drinking water service. That is, they use a drinking water source contaminated with excreta.<sup>[7,12]</sup> Regarding sanitation, only about 39% had safely managed sanitation services, and 29% had essential sanitation services.<sup>[13]</sup>

In India, more than 8% of the population lacks essential water services; in absolute terms, 665 million people lack piped water supply.<sup>[14]</sup> Basic sanitation and hygiene services are available and accessible only to about 60% of the population.<sup>[15]</sup> Globally, out of 1.4 million diarrheal deaths in 2016 (3.6% of total disability-adjusted life years), it was reported that 34.6% were attributable to inadequate water, 30.8% were attributable to poor sanitation, and 11.8%

**Abhiruchi Galhotra,  
Arvind Shukla,  
Madhu Balan  
Ganesan<sup>1</sup>,  
Sanjana Agrawal<sup>2</sup>**

*Department of Community and Family Medicine, All India Institute of Medical Sciences, <sup>2</sup>Health Systems Strengthening, State Health Resource Centre, Raipur, Chhattisgarh, <sup>1</sup>Public Health Specialist, Airport Health Organisation, Indore, Madhya Pradesh, India*

**Submitted:** 01-May-2023

**Revised:** 10-Sep-2023

**Accepted:** 12-Oct-2023

**Published:** 08-Dec-2023

### Address for correspondence:

*Dr. Abhiruchi Galhotra,  
All India Institute of Medical Sciences, Raipur,  
Chhattisgarh, India.  
E-mail: abhiruchigalhotra@aiimsraipur.edu.in*

### Access this article online

**Website:**  
<https://journals.iw.com/IJAB>

**DOI:**  
10.4103/ijabmr.ijabmr\_204\_23

### Quick Response Code:



**How to cite this article:** Galhotra A, Shukla A, Ganesan MB, Agrawal S. Situational analysis of water, sanitation, and hygiene in health-care facilities of a district in central India. *Int J App Basic Med Res* 2023;13:204-11.

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were attributable to poor hygiene practices.<sup>[16,17]</sup> Similarly, in the under-five age group, it was reported that 62.2% of diarrheal deaths were attributable to inadequate WASH practices.<sup>[18]</sup> In India, it is no different. The mortality rate due to unsafe WASH practices is 18.6/lakh population.<sup>[15]</sup>

WASH in health-care facilities is fundamental for providing quality, people-centered care. WASH is a critical component to achieving quality and accessible health services.<sup>[19]</sup> Provision of clean and potable drinking water, water for cleaning purposes, availability of adequate functional toilet, waste segregation, demarcation for waste disposal, and hygiene-related health education are necessary for improving the work performance, protecting staff and patients, and upholding the dignity of vulnerable populations such as pregnant women and people with disabilities.<sup>[20,21]</sup> The benefits of WASH practices in health-care facilities are not limited to diseases; it improves patient safety and health by reducing hospital-acquired infections, antimicrobial resistance, and health-care costs.<sup>[22-25]</sup>

In India, the public health standards for every health-care facility have been framed under the National Health Mission (NHM). Kayakalp, under NHM as an extension of the Swachh Bharat Mission, sets standards for monitoring facilities concerning IPC efforts.<sup>[26,27]</sup>

Against this background, the primary objective of this study was to assess the status of the WASH infrastructure in health-care facilities of Raipur district, Chhattisgarh, India.

## Methodology

### Study type

This was a hospital-based cross-sectional study.

### Study setting

This study was conducted in all public health-care facilities of Abhanpur block, Raipur district, Chhattisgarh, India.

### Study duration

The study duration was 2019–2020.

### Sampling

The Abhanpur block was selected by simple random sampling using the lottery method from four different administrative blocks of the Raipur district (Arang, Dharsiwa, Tilda, and Abhanpur).

### Inclusion criteria

The Abhanpur block was served by 2 community health centers (CHCs), 7 primary health centers (PHCs), and 37 subhealth centers (SHCs). It was found that three SHCs were nonfunctional at the time of the survey; therefore, we included 2 CHCs, 7 PHCs, and 34 SHCs in the present study [Figure 1].

### Study tool

JMP core questions and indicators were used.<sup>[28]</sup> We also adapted these questions and indicators using Kayakalp guidelines for monitoring IPC in health-care facilities.<sup>[29]</sup> Additionally, we had a comment column with every question in the questionnaire to note any peculiar feature either noted in health-care facilities or reported by health-care providers. JMP's service ladder framework for WASH in health-care facilities was used.<sup>[30,31]</sup>

### Data collection

Each health-care facility was visited at least twice to ensure maximum inclusion in the study.

### Data analysis

The data were entered in Microsoft Excel and analyzed using the IBM SPSS Statistics for Windows, version 23 (IBM Corp., Armonk, N.Y., USA). Descriptive analysis was presented using numbers and percentages. Appropriate graphs were used as necessary.

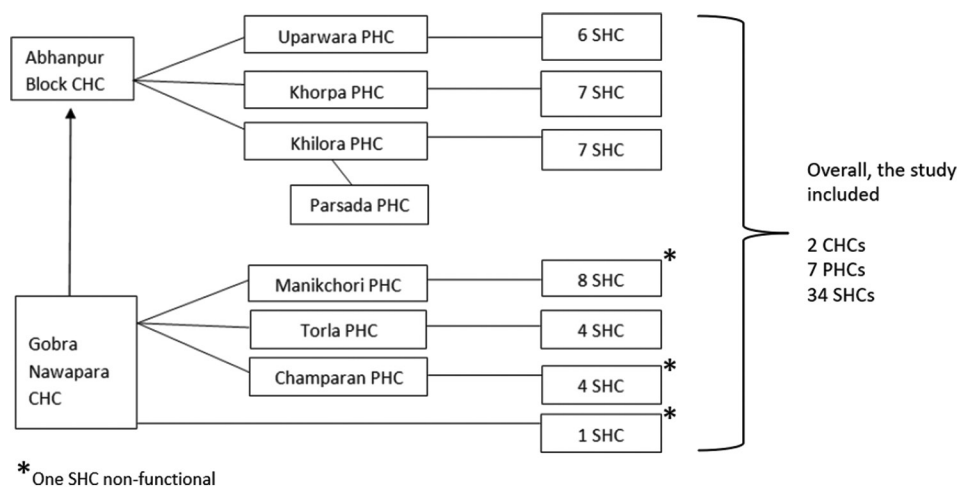


Figure 1: Administrative structure of health-care facilities in Abhanpur block and health-care facilities included in the present study. CHC: Community health center; PHC: Primary health center; SHC: Subhealth center

### Ethical clearance

The study was approved by the Institute Ethics Committee, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India (Reference number: 586/IEC-AIIMSRRP/2019 dated March 02, 2019).

### Results

A total of 43 health-care facilities (HCFs) were assessed for their WASH infrastructure, and the majority (79.1%) were subhealth centers. Inpatient facility was available in 83.7% of the facilities; 67.4% had one to three beds, and 16.3% of the facilities were more than three beds. The average number of beds available in PHCs was 5. The labor room was available in 86% of the HCFs; 75.7% of HCFs were SHCs, and all PHCs and CHCs had labor rooms. Operation theater facility was available in both the CHCs. In the month before the survey date, the number of deliveries conducted in the two CHCs included was 60 and 19, respectively. An average of nine deliveries were achieved in the PHCs. No deliveries were performed in 41.2% of the SHCs, and an average of three deliveries were conducted in the remaining 58.8% of SHCs [Table 1].

### Indicators of water

The community health centers ( $n = 2$ ) had an improved water source. However, only 85.7% of PHCs supplied water from an improved water source, groundwater, with a piped water supply [Table 1]. The most used unimproved source of water was open wells. An SHC (2.9%) reported no source of water supply, improved or unimproved. Overall, 95.4% of HCFs had an improved source of water supply, 2.3% of HCFs had an unimproved source of water supply, and 2.3% of HCFs lacked water supply. Although 97.1% of SHCs had an improved water source, only 63.6% had it within the premises; the rest had to obtain it from a municipal water tank available for 2 h every day or through hand pumps located outside the premises. However, the distance of the water source from all HCFs was <500 m. Water was stored in overhead tanks in all CHCs, PHCs, and 38.2% of SHCs. Buckets or campers were the most used water storage devices in HCFs (30.2%), particularly SHCs. All CHCs and PHCs had a drinking water point with a label and ladle; however, only 20.6% of SHCs had such a facility. A functional rainwater harvesting system was available only in 28.6% of PHCs and 2.9% of SHCs. Notably, none of the CHCs had an operating rainwater

**Table 1: Performance of health-care facilities based on indicators of water**

Water	CHC ( $n=2$ ), $n$ (%)	PHC ( $n=7$ ), $n$ (%)	SHC ( $n=34$ ), $n$ (%)	Total ( $n=43$ ), $n$ (%)
Source of water				
Improved	2 (100)	6 (85.7)	33 (97.1)	41 (95.4)
Unimproved	0	1 (14.3)	0	1 (2.3)
No source	0	0	1 (2.9)	1 (2.3)
Accessibility				
On-premises	2 (100)	7 (100)	21 (63.6)	30 (71.4)
Out of premises	0	0	12 (36.4)	12 (28.6)
Distance of source (m)				
<500	2 (100)	7 (100)	33 (100)	42 (100)
>500	0	0	0	0
Available at survey				
Yes	2 (100)	7 (100)	26 (76.5)	35 (81.4)
No	0	0	8 (23.5)	8 (18.6)
Stored in				
Tank	2 (100)	7 (100)	13 (38.2)	22 (51.2)
Drums	0	0	7 (20.6)	7 (16.3)
Buckets/camphor	0	0	13 (38.2)	13 (30.2)
No	0	0	1 (2.9)	1 (2.3)
Drinking water point				
Available	2 (100)	7 (100)	7 (20.6)	16 (37.2)
No	0	0	27 (79.4)	27 (62.8)
Rainwater harvesting				
Yes	0	2 (28.6)	1 (2.9)	3 (7.0)
No	2 (100)	5 (71.4)	33 (97.1)	40 (93.0)
Scarcity of water				
Yes	0	1 (14.3)	20 (58.8)	21 (48.8)
No	2 (100)	6 (85.7)	14 (41.2)	22 (51.2)

CHC: Community health center; PHC: Primary health center; SHC: Subhealth center

harvesting system. Water scarcity was reported by 14.3% of PHCs and 58.8% of SHCs.

### Indicators of sanitation

All 43 HCFs were assessed for their sanitation services. Overall, 86.1% of HCFs had an improved toilet facility available for patients [Table 2]. It was found that 2.9% of SHCs had an unimproved toilet facility lacking a pit and water supply, and 14.7% of SHCs had no toilets available for patients. At least one bathroom was present in 90.7% of HCFs; however, only 81.4% were functional. It was also noted that 8.8% of toilets in SHCs had no doors. Almost one-third (30.2%) of HCFs had no dedicated toilets for staff, and more than three-fourth (79.1%) of HCFs had no sex-separated toilets, of which 5.9% were PHCs and 94.1% were SHCs. Almost one in four HCFs (23.3%) had menstrual hygiene facilities in bathrooms, but only 8.8% of SHCs had such facilities. There were limited mobility toilets in 20.9% of HCFs; however, these toilets were incomplete and lacked rails for support in doors and walls. All the HCFs with a functional bathroom had an available, septic tank.

### Indicators of hygiene

All the CHCs and PHCs had functional hand hygiene stations at points of care, but only 26.5% of SHCs

had operational hand hygiene facilities at points of care [Table 3]. Lack of either soap or water was observed in 11.7% of SHCs at points of care hand hygiene stations, 14.3% of PHCs, and 35.3% of SHCs at handwash points near toilets. Importantly, no handwashing facility was near toilets in 14% of HCFs. Handwashing instructions were available in walls of 65.1% of HCFs. Cobwebs and dust were present on the walls of 74.4% of HCFs. Only one-third (34.9%) of HCFs were mopped with wet mops twice daily. Protocols for cleaning were available and followed at CHC (100%) and PHC (85.7%) only. Regarding training concerning environmental cleaning, only 50.0%, 42.9%, and 26.5% of CHCs, PHCs, and SHCs, respectively, were trained entirely. SHCs had no staff dedicated to cleaning.

### Indicators for waste management

Biomedical wastes are segregated into at least three bins in 67.4% of HCFs [Table 4]. Notably, in 35.3% of SHCs, scraps were not segregated correctly based on existing recommendations and color codes, bins had no lids, or the covers were broken. In all CHCs and PHCs, infectious and sharp wastes were disposed either through deep burial or sharp pits or collected for offsite disposal. In 44.1% of SHCs, infectious waste was disposed of by other methods,

**Table 2: Performance of health-care facilities based on indicators of sanitation**

Sanitation	CHC (n=2), n (%)	PHC (n=7), n (%)	SHC (n=34), n (%)	Total (n=43), n (%)
Type of toilet facility for patients				
Improved	2 (100)	7 (100)	28 (82.4)	37 (86.1)
Unimproved	0	0	1 (2.9)	1 (2.3)
Not available	0	0	5 (14.7)	5 (11.6)
At least one toilet				
Yes	2 (100)	7 (100)	30 (88.2)	39 (90.7)
No	0	0	4 (11.8)	4 (9.3)
Functional toilet				
Yes	2 (100)	7 (100)	26 (76.5)	35 (81.4)
No	0	0	4 (11.8)	4 (9.3)
NA	0	0	4 (11.8)	4 (9.3)
Private				
Yes	2 (100)	7 (100)	27 (79.4)	36 (83.7)
No	0	0	3 (8.8)	3 (7.0)
NA	0	0	4 (11.8)	4 (9.3)
Dedicated toilets for staff				
Yes	2 (100)	6 (85.7)	22 (64.7)	30 (69.8)
No	0	1 (14.3)	12 (35.3)	13 (30.2)
Sex-separated toilet				
Yes	2 (100)	5 (71.4)	2 (5.9)	9 (20.9)
No	0	2 (28.6)	32 (94.1)	34 (79.1)
Menstrual hygiene facility				
Yes	2 (100)	5 (71.4)	3 (8.8)	10 (23.3)
No	0	2 (28.6)	31 (91.2)	33 (76.7)
Limited mobility toilet				
Yes	2 (100)	4 (57.1)	3 (8.8)	9 (20.9)
No	0	3 (42.9)	31 (91.2)	34 (79.1)

CHC: Community health center; PHC: Primary health center; SHC: Subhealth center; NA: Not applicable

such as disposing of general scraps and burning them in open grounds.

When the HCFs included in the study were placed on JMP service ladders, it was found that all CHCs had essential water, sanitation, hygiene, and waste management services [Table 2]. Among PHCs, 85.7% had essential water and hygiene, only 57.1% had basic sanitation, and 100% had essential waste management services. Among SHCs, 55.9% had improved water, 2.9% had basic sanitation, 20.6% had basic hygiene, and 35.3% had essential waste management services [Figure 2].

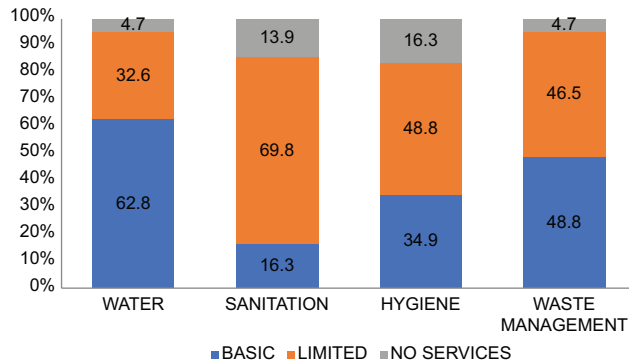


Figure 2: Joint monitoring program's ladder for water, sanitation, and hygiene services

The most common reason for the lack of sanitation and hygiene, as said by the health-care workers, was insufficient funds. Annually Rs. 10,000–30,000 was allotted to the facilities for maintenance, but the amount was inadequate. The second common reason was the lack of workers for cleaning facilities. They were paid Rs. 400–600 monthly from the above fund, which also accounts for the economic burden. In the current study, a PHC had an unimproved water source, as the primary source of water supply was an open well. It can become an improved source with a simple closure of this well.

## Discussion

The findings of this study corroborate with the results of JMP global report on WASH in health-care facilities; almost three-fourths, that is, 74% of health-care facilities globally, had essential water services.<sup>[7]</sup> Complete lack of water and sanitation services globally was 12% and 21%, respectively, higher than those reported in this study (4.6% and 16.3%, respectively).<sup>[10,32]</sup> However, similar to the findings of this study, globally, about 16% of health-care facilities lacked hygiene services.<sup>[33]</sup>

In an assessment by JMP, 94%, 76%, and 76% of Indian hospitals had essential water, hygiene, and waste management services, and 5%, 17%, 3%, and 24% had

Table 3: Performance of health-care facilities based on indicators of hygiene

Hygiene	CHC (n=2), n (%)	PHC (n=7), n (%)	SHC (n=34), n (%)	Total (n=43), n (%)
Functional hand hygiene at the point of care				
Yes	2 (100)	7 (100)	9 (26.5)	18 (41.9)
Lack of soap/water	0	0	4 (11.7)	4 (9.3)
No	0	0	21 (61.8)	21 (48.8)
Handwash point near the toilet				
Yes	2 (100)	6 (85.7)	12 (35.3)	20 (46.5)
Lack of soap/water	0	1 (14.3)	12 (35.3)	13 (30.2)
No	0	0	6 (17.6)	6 (14.0)
NA	0	0	4 (11.8)	4 (9.3)
Display of handwashing instruction				
Yes	2 (100)	7 (100)	19 (55.9)	28 (65.1)
No	0	0	15 (44.1)	15 (34.9)
Cobwebs/dust on walls				
Yes	2 (100)	3 (42.9)	27 (79.4)	32 (74.4)
No	0	4 (57.1)	7 (20.6)	11 (25.6)
Floor mopped twice				
Yes	1 (50.0)	7 (100)	7 (20.6)	15 (34.9)
No	1 (50.0)	0	27 (79.4)	28 (65.1)
Protocols for cleaning				
Yes	2 (100)	6 (85.7)	0	8 (18.6)
No	0	1 (14.3)	34 (100)	35 (81.4)
Training of staff responsible for cleaning				
Yes	1 (50.0)	3 (42.9)	9 (26.5)	13 (30.2)
Some	0	2 (28.6)	8 (23.5)	10 (23.3)
None	1 (50.0)	2 (28.6)	11 (32.4)	14 (32.6)
No staff	0	0	6 (17.6)	6 (13.9)

CHC: Community health center; PHC: Primary health center; SHC: Subhealth center; NA: Not applicable



**Table 4: Performance of health-care facilities based on indicators of waste management**

Waste management	CHC (n=2), n (%)	PHC (n=7), n (%)	SHC (n=34), n (%)	Total (n=43), n (%)
Waste is segregated into at least three bins in the consultation area				
Yes	2 (100)	7 (100)	20 (58.8)	29 (67.4)
Not all requirements met	0	0	12 (35.3)	12 (27.9)
No	0	0	2 (5.9)	2 (4.7)
Disposal of infectious waste				
Burial pit	0	7 (100)	5 (14.7)	12 (27.9)
Collected for offsite disposal	2 (100)	0	14 (41.2)	16 (37.2)
Others	0	0	15 (44.1)	15 (34.9)
Disposal of sharp wastes				
Sharp pit	0	7 (100)	3 (8.8)	10 (23.3)
Collected for offsite disposal	2 (100)	0	31 (91.2)	33 (76.7)

CHC: Community health center; PHC: Primary health center; SHC: Subhealth center

no water, sanitation, waste management, and hygiene services, respectively.<sup>[34]</sup> The variation in study findings may be attributed to the sample of hospitals included in the report (all hospitals, including private and tertiary) and the present study. We also noted certain variations in definitions for essential sanitation services (especially about menstrual hygiene facilities in toilets). The Indian Public Health Standards (IPHS) has specified the necessity of limited mobility toilets for health-care facilities (but a part of JMP assessment).<sup>[35]</sup> However, IPHS recommends the presence of toilets in the labor room, which may be considered limited mobility toilets (according to JMP, toilets used by pregnant women and women in labor are limited mobility toilets).<sup>[36,37]</sup>

Secondary data analysis in six low- and middle-income countries (LMICs) (including two Southeast Asian countries) revealed that about 47% of health-care facilities had essential water services, 37% had limited, and 16% had no water services. Regarding sanitation, 16% of health-care facilities had no sanitation services, 7% had no safe waste management services, and 37% had no secure hygiene services.<sup>[38]</sup> Similar findings were reported from National Census survey data in Indonesia that assessed WASH in health-care facilities using the JMP ladder.<sup>[30,39]</sup> These findings corroborate the results of this study and portray the alarming picture of the state of WASH in health-care facilities across LMICs.

In the present study, 97.1% of SHCs reported having an improved water source. However, only 2.9% of SHCs had a facility for rainwater harvesting, and more than half (58.8%) said water scarcity. IPHS recommends the availability of piped water supply and storage facility (over-head tank) in SHCs.<sup>[37]</sup> However, the purification methods to ensure safe water and modus operandi to ensure continuous water supply are at the State's or Panchayat's discretion. Similarly, regarding sanitation, though IPHS recommends one toilet facility each in the labor room, wardroom, and waiting area as an essential criterion, 88% of SHCs in the present study had at least one toilet, and only 76% were

functional. The IPHS recommendations for PHCs were similar to SHCs regarding water; however, PHCs should be provided with separate toilets with adequate water supply for males and females.<sup>[36]</sup> However, in the present study, 85.7% of PHCs had improved water sources, only 28.6% had rainwater harvesting facilities, and little above two-thirds (71.4%) had sex-separated toilets.

The Rural Health Statistics report for 2020–2021, released in 2022, showed better results for the availability of sex-separated toilets in SHCs and PHCs and the availability of regular water supply in PHCs compared with the present study. However, the rural health statistics (RHS) report shows that the lack of water supply in SHCs is higher than in the current study. According to the RHS, the SHCs and PHCs without regular supply in Chhattisgarh were 6.9% and 1.7%, respectively. The SHCs and PHCs without separate toilets for males and females were 53% and 12.5%, respectively, which is way lower than the current study result of 94% and 28.6%. There are a couple of reasons why these differences might exist. One possibility is that the facilities improved their infrastructure after the study was conducted. Another reason could be that the study had a small number of samples. For example, out of seven PHCs studied, only two didn't have separate toilets for men and women (28.6%).<sup>[40]</sup>

Under the Kayakalp initiative, all the HCFs are assessed for their infrastructure, services, and cleanliness. For 2022–2023, 27 out of the 34 SHCs, all the PHCs, and CHCs included in the current study were assessed internally, and 11 out of these 27 SHCs and 2 PHCs crossed the score of 70% and external assessment was done for these facilities. Both the CHCs failed to cross the score of 70%. A score of  $\geq 75\%$  was achieved by 9 out of these 11 SHCs in the thematic areas B and C, i.e., sanitation and hygiene and waste management, while both the PHCs crossed the same. All the 11 SHCs scored  $\geq 75\%$  in the infection control maintenance in the HCF.<sup>[41]</sup>

In a study reported from Chhattisgarh aimed at evaluating the impact of the implementation of Kayakalp Yojna

across all 27 district hospitals, it was found that only eight hospitals scored more than 70%.<sup>[42]</sup> The study also highlighted the need for repeated assessments of health-care facilities, which led to improvement in the IPC infrastructure, as 37% of facilities had at least a 25% improvement from the initial assessment scores.<sup>[42]</sup>

## Conclusion

Although much work has been done and improvement has been made, there is still a lack of WASH infrastructure in HCFs of Raipur district, especially sanitation services. The Kayakalp assessment shows promises of improvement of facilities, but a few factors, such as availability of water, menstrual hygiene facility in toilets, and availability of sex-separated bathrooms and toilets for staff, should be added to the assessment. Repeated assessments of the facilities should be done, focusing on those facilities lacking WASH services. Overall, there are limited data on WASH in health-care facilities regarding the geographic scope and in describing the types of existing services. In addition, training and capacity building is needed to ensure sufficient resources and personnel to operate and maintain WASH facilities and enable health-care staff to deliver hygiene behavior change messages. Through coordinated, global action, with leadership from the health sector, ensuring that all health-care facilities have WASH services is an aim that can be realized.

## Limitations

Including health-care facilities from one block in a particular district limits the generalizability of the study findings. Second, the study failed to route the causes of the lack of WASH services in health-care facilities. The study tool used was an adapted version of the JMP core questionnaire (based on the WHO standards for a health-care facility), but the health-care facilities in India are lined under IPHS standards. Microbiological assessment of water would have added much to the existing evidence.

## Ethical statement

The study was approved by Institute Ethics Committee, All India Institute of Medical Sciences, Raipur, Chhattisgarh, India (Reference number: 586/IEC-AIIMSRRPR/2019 dated 02/03/2019).

## Financial support and sponsorship

Nil.

## Conflicts of interest

There are no conflicts of interest.

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