

**Assessment of Infrastructure & Manpower in selected PHC's as per IPHS standards
in two districts of Arunachal Pradesh: A Cross-sectional descriptive study**

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ABSTRACT

Introduction: Primary Health Centres (PHCs) are pivotal to India's rural healthcare network, providing essential services to communities. This study assessed the infrastructure and manpower at PHCs in Arunachal Pradesh as per IPHS 2022 standards. **Aims:** To evaluate the infrastructure and manpower components of selected PHCs in East Kameng and Papum Pare districts of Arunachal Pradesh, as per IPHS standards. **Methods and Material:** A cross-sectional study was conducted in East Kameng and Papum Pare districts, selected through convenience sampling from Arunachal Pradesh's 26 districts. Five PHCs (25%) from each district were randomly selected. Data were collected using the IPHS 2022 checklist and analyzed with Microsoft Excel and IBM SPSS (trial version 25), with results presented as frequencies and percentages. **Results:** Deficiencies were identified in both infrastructure and manpower. None of the PHCs fully met with IPHS norms. 60% of PHCs had inadequate infrastructure, with poor maintenance and shared service spaces. Only 40% had boundary walls with gates and gender-specific toilets. A major issue was the absence of staff residential quarters in 60% of PHCs. Regarding manpower: 60% of PHCs lacked staff nurses, and 40% were deficient in AYUSH doctors, lab technicians, pharmacists, and sanitation workers. Furthermore, 80% of PHCs did not have data entry operators. **Conclusions:** There are significant gaps in infrastructure and manpower at PHCs in Arunachal Pradesh, requiring urgent interventions to meet IPHS standards.

Keywords: PHCs, IPHS, Infrastructure, Manpower, Arunachal Pradesh, Quality, Human Resources, Health Services, Health Facilities.

Key Message: Ensuring adherence to IPHS norms in PHCs is vital for improving healthcare access and quality in rural areas. The findings emphasize the need for focused efforts to address deficiencies in infrastructure and manpower in Arunachal Pradesh.

Introduction

The Primary Health Centre (PHC) is a cornerstone of India's healthcare system, especially in rural and tribal areas where access to healthcare services is limited. To ensure PHCs meet necessary standards, the Indian Public Health Standards (IPHS) were introduced in 2007, with guidelines covering infrastructure, staffing, equipment, and services. The IPHS norms have been revised over time, with the latest update in 2022. The overall objective of the IPHS for PHCs is to provide healthcare that is quality-oriented and sensitive to the needs of the community. Despite these initiatives, many PHCs still face substantial challenges such as inadequate infrastructure, insufficient staffing, and shortages of essential resources, limiting their ability to meet IPHS standards and deliver quality healthcare. These barriers create healthcare disparities, particularly for rural and tribal populations, who are already disadvantaged by poverty and a high burden of disease.

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Materials and Methods

This cross-sectional descriptive study was conducted over six months, from January to June 2024, to evaluate the standards of PHCs based on the IPHS in two districts of Arunachal Pradesh, namely East Kameng and Papum Pare. The two districts were selected through convenience sampling from the 26 districts of the state, and 25% of the PHCs in each selected district (a total of 5 PHCs) were chosen using simple random sampling. Permission for the study was obtained from the Director of Health Services, Arunachal Pradesh, as communicated via letter No. MDHS-02/2023 dated 26/05/2023 and ethical approval was granted by the Institutional Ethics Committee, AIIMS Rishikesh vide letter No.- AIIMS/IEC/24/142 dated 15/03/2024. Data were collected from the PHCs using the IPHS 2022 specified checklist and assessment tool. The data were analyzed using IBM SPSS (trial version 25) and presented as frequencies and percentages.

Results

Infrastructure Facilities of the PHCs:

Among the evaluated Primary Health Centres (PHCs), 40% required more than 30 minutes of travel time from the farthest village within their catchment area. Approximately 40% of the PHCs were situated within 30 km of the nearest Community Health Centre (CHC). All PHCs had the designated government buildings, however, 60% of these facilities measured between 60–150 square meters, potentially inadequate for providing comprehensive primary healthcare services. None of the PHCs had a designated Operating Theatre (OT).

Table-1: Accessibility of PHCs (N=5)

Accessibility Issue	Available (N=5)	
	No.	%
Clear signage	3	60
Travel time >45 mins from the farthest villages	3	60
CHCs >30 kms	3	60
DHs >50 kms	2	40
Weather-sensitive road connectivity	2	40
Lack of internet connectivity	2	40

- The IPHS guidelines suggest that a CHC should be a referral center for every 4-5 PHCs, and therefore, the distance between a CHC and a PHC should be around 25-30 km.
- The DH should be located at a distance of 50-75 km from the CHC, acting as a higher-level referral center.

Residential staff quarters were available in only 40% of the PHCs. All PHCs utilized available spaces for displaying health promotion and education materials, yet only 40% were equipped with personal computers, and none had a fixed-line telephone connection, depending instead on mobile communication with internet connectivity. Furthermore, none of the PHCs had a dedicated vehicle for official use. Ambulance services were operational in only 40% of the PHCs.

Registration counters were available in only 20% of the facilities, functioning manually and lacking dedicated provisions for priority groups such as antenatal women or pediatric patients. Pharmaceutical dispensing services were present in all PHCs, with 60% having a dedicated pharmacy room, while the rest shared space with other functional units, including inpatient wards and laboratory services. Parking facilities were adequate in 40% of the PHCs, while separate sanitation facilities for male and female patients were observed in 80% of the centers. Suggestion or complaint boxes were available in 60% of the PHCs (Table 2).

Outpatient departments (OPDs) were operational across all facilities, with 90% providing sufficient space for clinician-patient interactions, although only 20% offered privacy through the use of curtains. Family welfare services

were integrated within the OPD areas in all PHCs. Waiting areas were available in 80% of the PHCs. Gender-sensitive sanitation facilities were present in 40%, though most centers lacked provisions for potable drinking water. Ventilation was suboptimal, with fans available in some PHCs.

Table -2: Availability of Infrastructure Facility (N=5)

Infrastructure Facility	PHCs having Facility (N=5)	
	No.	%
Accessible Location of PHC in	5	100
Own Government building available	5	100
Complete construction of building	5	100
Emergency Room/Casualty	5 (2 are Shared rooms)	100
Drug dispensing Counter	5 (2 are Shared room)	100
Registration counters	1	20
Boundary Wall with Gate	2	40
OPD rooms/cubicles	5	100
Family Welfare Clinic	1	20
Waiting room for patients	3	60
Separate wards for males and females	1	20
Labour room present	3	60
Laboratory	3	60
Separate toilet for male & Females	2	40
Complaint/Suggestion Box	2	40
IPD/Day care room	5 (1 is Shared room)	100
Dressing room/Inj. Room.	5 (All Shared with Minor OT)	100
Minor OT	5 (All Shared rooms)	100
Counselling Room	0	0
Immunization Room/EPI	5 (1 is Shared room)	100
Cold chain Facility	3	60
Backup Power Supply	4	80
Imaging (X-ray, USG)	0	0
Ancillary room/Nurses	1	20
Store room	4	80
OT Facility	0	0
Staff Resident Quarters	2	40
Ambulance	2	40

Casualty/emergency services were functional across all PHCs but lacked dedicated rooms. While All of PHCs were equipped with daycare units, only 20% provided inpatient services overnight. Dedicated male and female wards were present in only 20% of the facilities, with 80% managing admissions in general wards. Dressing and injection rooms were collaborated with OPD or casualty areas in most PHCs, lacking designated spaces. Minor OTs were operational in all PHCs, though they frequently shared space with other functions. None of the PHCs had a designated counseling room. Labor rooms were present in 60% of the PHCs, yet only 33% conducted deliveries round the clock. Immunization and EPI rooms were present in all PHCs, but 40% of these rooms were shared with other departments, and 20% of the facilities either lacked or had non-functional Ice-Lined Refrigerators (ILRs).

In terms of infrastructure for utilities, 80% of the PHCs had backup power supplies, while 20% faced power supply issues. Laboratories were present in 60% of the PHCs, though only 33% of them were operational due lacked

Laboratory Technicians in others. Imaging services were unavailable across all PHCs. ASHA rooms for community-related activities were present in only 20% of the PHCs. Lastly, 80% of PHCs had storerooms.

Availability of Human Resources at the PHCs:

In our study, the distribution of medical personnel across the PHCs demonstrated critical shortages, particularly in key positions. Medical Officers (Allopathy) were present in 80% of the PHCs, yet none of the PHCs had Medical Officers (Dental) or Dental Assistants, highlighting a significant gap in dental care services. Moreover, 40% of PHCs lacked Medical Officers (AYUSH), Pharmacists, and Laboratory Technicians. Furthermore, 60% of PHCs lacked Sanitation Staff, and 20% had no Data Entry Operators, impacting the operational efficiency of these centers.

Despite these shortages, the training of human resources appeared comprehensive, with nearly all medical and paramedical staff receiving adequate training.

Table -3: Availability of Human resources as per IPHS criteria (N=5)

Human resources		IPHS Norms	PHCs having norms as per IPHS Criteria (N=5)	
			Yes	
			No.	%
Healthcare Staffs	MO- MBBS	1E*	4	80
	MO –AYUSH	1D**	3	60
	MO- Dental	1D**	0	0
	Nurse-midwife (Staff-Nurse)	2E*,1D**	2	40
	Pharmacist	1E*	3	60
	Health worker (F)/ANM	1E*	5	100
	Health worker/ HA(M)	1E*	4	80
	HA(F)/LHV	1E*	4	80
	Health Educator/Counsellor	1D**	0	0
	Optometrist/Ophthalmic Asst.	1D**	0	0
	Dental Assistant.	1D**	0	0
	Laboratory Technician	1E*	3	60
Cold Chain & Vaccine Logistic Assist.	1D**	0	100	
Supportive Staffs	Sanitation Staff	1E*	3	60
	Dresser	1E*	1	20
Clerical Staffs	LDC-1/Accountant	1E*	0	0
	Data Entry Operator	1E*	1	20

E= Essential, D**= Desired*

Discussion

The infrastructure and human resource components of Primary Health Centres (PHCs) are critical for ensuring the delivery of essential healthcare services in rural areas. Our study, focused on five selected PHCs, revealed significant gaps in both infrastructure and human resources, which impacted service delivery.

Infrastructure Facilities: The infrastructure across the five PHCs reveals substantial deficiencies that could hinder effective healthcare service delivery, particularly in rural areas. A primary concern is the lack of essential utilities and adequate space for healthcare activities. Of the five PHCs, 40% were located more than 30 minutes away from the farthest villages within their catchment area, which could create barriers to timely healthcare access, especially in emergencies ¹. This aligns with findings from Singh et al.² and Sharma et al.,¹ which

underscore the importance of proximity to healthcare services for rural populations, particularly for maternal and child health.

Space adequacy within PHCs is also a concern. While all the PHCs had dedicated government buildings, 60% of the buildings measured between 60-150 square meters, which may be insufficient to provide comprehensive healthcare services.³ The absence of a designated Operating Theatre (OT) in any of the PHCs limits the ability to conduct necessary surgeries⁴, while the lack of staff quarters in 60% of the centers impacts the ability to maintain round-the-clock care⁵, a challenge emphasized by Kumar et al. (2017)⁶.

Furthermore, the lack of dedicated transportation facilities in 60% of the PHCs impedes emergency responses and timely patient referrals⁷. Additionally, 40% of the PHCs lacked laboratories, limiting diagnostic capabilities and impeding the provision of comprehensive healthcare⁸. Jain et al.⁸ highlight the need for proper diagnostic tools to ensure better health outcomes, particularly in rural settings.

Another important aspect of infrastructure is gender-sensitive facilities. While 80% of the PHCs had separate sanitation facilities for men and women, only 60% had separate waiting areas for women⁹. Such facilities are vital for promoting equitable healthcare access and improving service uptake among women¹⁰.

Human Resource: The distribution of human resources at the PHCs reveals notable deficiencies in staffing across key sectors, including dental care, laboratory services, and administrative support. While 80% of the PHCs had Medical Officers (Allopathy), none had Medical Officers (Dental), which is a significant gap in oral healthcare delivery¹¹. Additionally, the shortage of Dental Assistants, Laboratory Technicians, and Sanitation Staff across 60% of the centers limits the quality of healthcare services offered¹². These shortages could result in delayed treatments or lack of proper care, particularly in rural areas, where these services are even more essential.

The absence of Medical Officers (AYUSH) in 40% of the PHCs, as well as Pharmacists and Laboratory Technicians, also exacerbates these gaps in service provision¹³. Furthermore, some centers were also missing Data Entry Operators, which could undermine the efficiency of patient management and record-keeping systems¹⁴.

The recruitment and retention of staff, particularly in rural areas, is a persistent issue in the Indian healthcare system. As emphasized by Kumar et al.⁶, inadequate staffing in rural health centers severely impacts the quality and range of services provided.

Training efforts for medical and paramedical staff were, however, largely noted to be thorough, with 80% of the personnel having received basic and advanced training¹⁵. However, the lack of specialized staff such as Health Educators and Laboratory Technicians limits the ability of the PHCs to offer a comprehensive range of services¹⁶. As pointed out by Roy et al.¹⁷, further training and incentives could encourage the retention of health workers in underserved areas, thereby improving service delivery and healthcare outcomes.

Conclusion

The study reveals significant gaps in both infrastructure and human resources at PHCs in rural areas, which severely impact the delivery of healthcare services. Key infrastructural deficiencies include the absence of staff quarters at 60% of the centers, which limits the ability to provide round-the-clock care, and inadequate space for essential healthcare activities. Furthermore, the lack of critical facilities such as laboratories and transportation services hamper diagnostic capabilities and delays emergency responses. The human resource shortages are particularly concerning, with significant gaps in essential roles such as laboratory technicians, pharmacists, sanitation staff, and clerical support. The absence of Medical Officers (Dental and AYUSH) further exacerbates these deficiencies. Addressing these issues through improved infrastructure, adequate recruitment of specialized staff, and better retention strategies is crucial to ensuring better healthcare access and service delivery in rural areas.

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