CME LIVE OPEN ACCESS

CME Journal of Clinical Case Report

Research Article

ISSN: 3067- 7998

Evolution of Health Workforce Norms in India: Comparative Analysis of IPHS Guidelines 2007-2022 with WISN Based Assessment of Rajasthans Primary Secondary Care System and International Evidence

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Received: 2026 Feb 27 **Accepted:** 2026 Mar 20 **Published:** 2026 Apr 02

Abstract

Background

The World Health Organization Southeast Asia Region faces an acute health workforce shortage of 2.4 million health worker, creating an existential threat to universal health coverage achievement. Current health worker density in India stands at 22.8 per 10,000 population, substantially below the WHO recommended threshold of 44.5 per 10,000 (1). Rajasthan demonstrates a catastrophic 79.7 percent specialist shortage at Community Health centres, while facility-type-based Indian Public Health Standards potentially mask true workload-based staffing deficits.

Objective

This study applies Workload Indicators of Staffing Need (WISN) methodology to analysed health workforce adequacy in Rajasthan's primary care system, comparing evidence-based calculations with existing Indian Public Health Standards (IPHS) norms across three decades.

Design

Mixed-methods study combining WISN quantitative analysis with qualitative policy review and comparative institutional analysis.

Setting

Sikar district, Rajasthan, comprising 1 District Hospital, 4 Sub-District Hospitals, 30 Community Health centres, and 103 Primary Health centres serving 1.8 million population.

Main Outcome Measures

WISN ratios, workload pressure percentages, and staffing deficits calculated working time of 1,290.3 hours annually.

Results
WISN analysis reveals: Medical Officers ratio 0.34 with 66 percent workload pressure requiring 508 positions versus 174 current (9,10); Nursing Staff ratio 0.26 with 74 percent pressure requiring 657 versus 170 current (9,10); Pharmacists ratio 0.34 with 66 percent pressure requiring 227 versus 77 current (9,10); Laboratory Technicians ratio 0.29 with 71 percent pressure requiring 220 versus 63 current (9,10). Aggregate WISN ratio 0.30 indicates current 484 staff manage only 30 percent of required 1,612 positions, creating total deficit of 1,128 positions (9,10). WISN requirements exceed IPHS 2022 norms by 69-209 percent across cadres (7,10). True 24-hour nursing requirement reaches 3,863 positions with current 170 representing 4.4 percent adequacy.

Conclusions
WISN methodology demonstrates substantially more severe health workforce crisis than previously estimated. Policy response requires eight interventions: phased WISN adoption with National Health Workforce Observatory (11,12), geographic differentiation multipliers for tribal/hilly/desert/urban underserved areas (13), explicit 24-hour service policy decisions (8), 50 percent medical education expansion by 2030 (14), specialist deployment incentives (15), AYUSH integration, comprehensive workforce retention strategies, and district-level monitoring frameworks [1-8].

Keywords: Health Workforce Planning, WISN Methodology, IPHS Norms, India, Rajasthan, Primary Healthcare, Workforce Standards, Available Working Time and Workload Indicators

1. Introduction

1.1. Global Health Workforce Crisis Context

The World Health Organization Southeast Asia Region confronts an acute health workforce crisis with documented shortage of 2.4 million health workers, creating an existential threat to achieving universal health coverage and Sustainable Development Goal. Health worker density represents a critical determinant of population health outcomes, maternal mortality reduction, and essential health service accessibility. The Global Strategy on Human Resources for Health Workforce 2030 emphasizes evidence-based workforce planning methodologies utilizing workload assessment rather than population ratios alone. India, as the most populous country with 1.4 billion population and largest health system by patient volume, encounters particularly acute workforce challenges in primary care delivery. Current health worker density in India stands at approximately 22.8 per 10,000 population, substantially below World Health Organization recommended threshold of 44.5 per 10,000 required for adequate health service delivery. This workforce shortage manifests most severely in rural areas, particularly tribal regions and mountainous terrain, where health worker density drops to 8-12 per 10,000 population, representing approximately 73 percent deficit below international standards (1).

1.2. National Infrastructure Workforce Mismatch Crisis

Between 2005 and 2021, Community Health centres nationally increased from 3,346 to 5,481 facilities (63.8 percent growth) while specialist doctors at CHCs increased only from 3,550 to 4,405 (24.1 percent growth), creating a 39.7 percentage-point gap between infrastructure and workforce development. This systematic infrastructure expansion without commensurate workforce investment creates "hollow facilities" impressive buildings and equipment serving patients inadequately due to staff shortages. National specialist doctor shortage reaches 83 percent at Community Health centres with only 6,433 specialists working against 38,172 sanctioned positions nationally. Primary Health Centre medical officers demonstrate 6.3 percent shortfall against IPHS norms nationally, while nursing staff shortages vary by state from minimal to severe deficits. Pharmacists and laboratory technicians show vacancy rates ranging 30-45 percent across Indian states [2-5].

1.3. Rajasthan State Health System Context

Rajasthan exemplifies India's national workforce crisis at the state level. The state has population of 79.5 million with annual demographic growth rate of 1.24 percent, projected to reach approximately 85.9 million by 2030. Rajasthan possesses substantial geographic, demographic, and health system diversity with 12.6 percent tribal population, extensive desert and hilly terrain representing approximately 40 percent of total state area, and 75.1 percent rural population requiring comprehensive primary care coverage. Rajasthan's health system infrastructure encompasses 13,581 Sub-centres, 2,394 Primary Health centres, and 657 Community Health centres. Yet the state faces critical infrastructure deficits including 304,336 hospital bed shortage (76.5 percent of requirement) and 7,217 diagnostic centre gaps (89.8 percent of requirement). Most critically, Rajasthan operates 657 CHCs with only 479 specialist doctors against Indian Public Health Standards norm requirement of 2,356 specialists (4 per CHC), creating catastrophic 81.8 percent specialist shortfall [2].

1.4. IPHS Workforce Norms Evolution 2007-2022

Indian Public Health Standards established 2007 and subsequently revised 2012 and 2022 provide facility-type-based minimum staffing norms calculated primarily from population coverage ratios and facility categories rather than actual service workload volume. While IPHS 2022 represents incremental improvements over previous versions, the fundamental population-based approach creates potential systematic underestimation of true staffing needs, particularly for high-utilization facilities and geographically challenged areas. IPHS evolution demonstrates recognition of 24-hour service requirements with doubling of medical officers at Primary Health centres in 2022 version and additional nursing positions formalized

in desirable category. However, Community Health Centre 30 bed specialist requirements remained static at 4 specialists across all three IPHS versions despite 63.8 percent facility expansion nationally from 2005-2021 [4].

1.5. WISN Methodology as Alternative Evidence Based Approach

The World Health Organization developed Workload Indicators of Staffing Need (WISN) methodology in 2010, providing a systematic, scientifically rigorous approach to calculate health worker requirements based on actual measured service workload rather than population ratios WISN has been successfully implemented in more than 50 countries globally, with most extensive implementation in Sub-Saharan Africa, South Asia, and Latin America WISN methodology calculates available working time accounting for leave, holidays, and administrative duties; identifies all service delivery activities with time standards; multiplies activity volumes by time standards; and divides total workload by available time to determine required staff . This transparent, workload-determined approach provides superior alternatives to population-based facility-type norms [5-11].

1.6. Study Rationale and Objectives

Previous WISN applications in India utilized available working time of 2,074 hours annually, calculated as 365 days minus 12 public holidays, 30 annual leave, 10 sick leave, and 8 training days equals 305 working days times 8 hours daily minus 15 percent administrative time. However, this calculation omitted 52 Sunday weekly offs required in government health facility operations and utilized 8-hour daily working time rather than actual 6-hour medical department outpatient operations. working time calculation yields 1,290.3 hours annually: (365 days minus 52 Sundays minus 12 public holidays minus 30 annual leave minus 10 casual/sick leave minus 8 training days equals 253 working days) times 6 hours daily equals 1,518 gross hours, minus 15 percent administrative time (227.7 hours) equals 1,290.3 net available working hours per staff member per year. This denominator fundamentally changes workforce adequacy assessments and policy conclusions. This study applies WISN methodology to Sikar district Rajasthan to: determine evidence-based workload-based staffing requirements for all major health worker cadres using proper accounting for weekly offs and actual working time. compare WISN-determined requirements against IPHS 2022 facility-type norms. analysed geographic variation in workload pressure and staffing adequacy. examine 24-hour service delivery mathematics and implications for staffing calculations synthesize international WISN implementation experiences for Indian applicability and develop comprehensive evidence-based policy recommendations for transforming health workforce planning [12-22].

2. Methodology

2.1. Study Design

This research employs a mixed-methods approach combining quantitative WISN analysis with qualitative policy document review and comparative institutional analysis The study integrates three distinct analytical components: comparative analysis of IPHS workforce norm evolution across 2007, 2012, and 2022 versions; WISN methodology application to Sikar district's primary and secondary care system using working time of 1,290.3 hours annually; and systematic synthesis of international WISN implementation experiences through published literature review [9].

2.2. Study Setting and Population

Sikar district, located in northwestern Rajasthan, represents a typical desert-region primary care system characterized by sparse population distribution, tribal and vulnerable population concentration in certain blocks, and challenging geographic terrai. District health infrastructure comprises 1 District Hospital (at Laxmangarh serving as tertiary referral), 4 Sub-District Hospitals (at Fatehpur, Khandela, Nechwa, Khatushayamji providing secondary referral), 30 Community Health centres (offering first referral services), and 103 Primary Health centres (including 85 rural and 18 urban facilities providing primary maternal and child health services), serving district population of approximately 1.8 million based on 2021 census estimates [6-10].

2.3. Data Sources

Secondary data were collected from: Sikar District Health Office and others health institutions official records including facility infrastructure inventories, sanctioned versus working workforce positions by cadre, and comprehensive service utilization statistics covering 2021-2024 period Rajasthan State Health Department records for state-level facility counts and workforce status. Secondary data sources include: Ministry of Health and Family Welfare Rural Health Statistics 2020-21 IPHS guidelines for 2007, 2012, and 2022 versions WHO WISN User Manual and Software Manual and peer-reviewed international evidence on WISN implementation experiences from Sub-Saharan Africa, South Africa, and Peru [11-22].

2.4. Available Working Time Calculation Framework

As presented in [Table 1], available working time accounts for all statutory leave, weekly offs, and actual government health facility operational parameters. This calculation properly deducts 52 Sunday weekly offs that were omitted from previous WISN calculations in India and applies the actual 6-hour daily medical department outpatient working time reflecting government facility standard operations rather than assumed 8-hour shifts. The resulting net available working time of 1,290.3 hours annually replaces the previously incorrect 2,074 hours calculation fundamentally changing workforce adequacy assessments and policy conclusions.

2.5. WISN Calculation Methodology

This study follows the World Health Organization seven-step WISN methodology

- **Step 1:** Available working time per staff member (1,290.3 hours from Table 1).

- **Step 2:** Systematic identification of all health service delivery activities for each cadre including outpatient consultations, inpatient admissions and ward rounds, institutional deliveries, laboratory diagnostic tests, medicine dispensing, immunization sessions, and vertical program activities [10,23].
- **Step 3:** Determination of standard time required per activity unit based on direct observation, time-motion studies, WHO recommended international standards, and expert consensus validation [24].
- **Step 4:** Calculation of annual workload time by multiplying annual activity volume by standard time per activity unit and summing across all activities for each cadre to determine total annual workload hours required [10-29].
- **Step 5:** WISN Ratio and Workload Pressure calculations using formulas:

Formula 1: WISN Ratio = Current Working Staff ÷ Required Staff

Required Staff = Total Annual Workload Hours ÷ Working Time (1,290.3 hours)
Workload Pressure (%) = (1 − WISN Ratio) × 100

All WISN formulas utilize the denominator of 1,290.3 hours throughout calculations Workload pressure is classified as: low pressure (1-29%), moderate pressure (30-40%), high pressure (41-60%), very high pressure (61-80%), and extremely high pressure (>80) [29].

- **Step 6:** 24-Hour Service Delivery Mathematics for nursing and emergency services requiring round-the-clock coverage. Since government health facilities operate 6-hour shifts for outpatient services, 24-hour continuous coverage requires 4 shifts daily (4 × 6 hours = 24 hours), multiplied by 1.3 weekend/holiday factor accounting for reduced weekend staffing, multiplied by 1.13 leave replacement factor accounting for approximately 48 days annual absence, yielding 5.88 staffing multiplier for genuine round-the-clock operations
- **Step 7:** Comparative analysis framework comparing WISN-determined requirements against IPHS 2022 facility-type population-based norms, calculating percentage differences and absolute staffing gap magnitudes

2.6. Study Limitations

This study has several limitations: single-district analysis may limit generalizability to other geographic contexts; cross-sectional design does not capture seasonal workload variations; reliance on administrative data quality and completeness; time standards adapted from WHO international guidelines and Indian expert consensus rather than facility-specific time-motion studies for every activity; availability of comprehensive workload data for certain cadres relies on indirect calculation from aggregate utilization figures.

3. Results

3.1. National Health Infrastructure and Workforce Expansion 2005-2021

As demonstrated in [Table 2], Community Health Centre infrastructure expanded 63.8 percent from 2005-2021 while specialist doctor workforce grew only 24.1%, creating a critical 39.7 % that systematically undermines secondary care delivery capacity across India This divergence reflects sequential policy failures where capital budgets prioritized facility construction while revenue budgets remained constrained for workforce development and recruitment [24].

3.2. Rajasthan State Health System Profile

As shown in [Table 3], Rajasthan operates an extensive facility network with 657 Community Health Centres yet faces a catastrophic specialist shortage with only 479 specialists working against 2,628 required (4 per CHC × 657 facilities), representing an 81.8 percent deficit This severe shortage renders most Community Health Centres non-functional for secondary care services despite substantial infrastructure investment

3.3. Sikar District Facility Infrastructure

As presented in [Table 4], Sikar district facility distribution aligns reasonably with IPHS population-based norms at the aggregate level, with 103 Primary Health centres exceeding minimum population coverage requirements (6,10,27). However, aggregate alignment at facility level masks critical workforce inadequacy that becomes apparent through detailed workload analysis [25].

3.4. Sikar District Workforce Status: Sanctioned versus Working Positions

As revealed in [Table 5], Sikar district demonstrates critical staffing shortages across all major clinical cadres, with pharmacists and laboratory technicians showing highest vacancy rates exceeding 42 percent, substantially compromising diagnostic and pharmaceutical service delivery (10). Medical officer vacancy of 32 percent creates significant clinical care gaps despite being relatively lower than specialized support cadres.

3.5. Service Utilization Trends 2021-2024

As documented in [Table 6], service utilization growth ranging 11.6 to 31.6 percent across major service categories substantially exceeds Sikar district population growth rate of 1.24 percent, creating intensified workload pressure on existing workforce. This sustained utilization growth occurs concurrent with stagnant or declining workforce numbers, mathematically demonstrating basis for severe workload pressure calculations

3.6 WISN Analysis Results

3.6.1. Medical Officers

Workload Component	Annual Volume	Standard Time	Total Hours Required	Workload Component
Outpatient consultations	1,414,521 visits	10 minutes per visit	235,753 hours	Outpatient consultations
Inpatient admissions & documentation	61,878 admissions	30 minutes per admission	30,939 hours	Inpatient admissions & documentation
Ward rounds (inpatient management)	154,695 patient-days*	30 minutes per patient-day	77,348 hours	Ward rounds (inpatient management)
Program-specific activities (MCH, TB, Immunization)	Continuous allocation	15% of available time	193,545 hours	Program-specific activities (MCH, TB, Immunization)
TOTAL ANNUAL WORKLOAD	**All activities combined**	**537,585 hours**		**TOTAL ANNUAL WORKLOAD**

**Patient-days calculated as 61,878 admissions × 2.5 days average length of stay = 154,695 patient-days*

Table 1: Medical Officer Workload Components and WISN Calculation Sikar District 2023-24

3.7. WISN Calculation for Medical Officers

Available Working Time per Medical Officer: 1,290.3 hours/year (from Table 1)

Required Medical Officers: 537,585 hours ÷ 1,290.3 hours = 416.7 ≈ 417 medical officers (10)

Current Working Medical Officers: 174 (from Table 5) (10)

WISN Ratio: 174 ÷ 417 = **0.42** (10)

Workload Pressure: (1 – 0.42) × 100 = **58% (HIGH PRESSURE)** (10)

Staffing Deficit: 417 – 174 = **+243 additional medical officers needed** (10)

As documented in Table 7, medical officers in Sikar district demonstrate WISN ratio of 0.42 with 58 percent workload pressure (10). Each medical officer manages average of 8,134 outpatient visits annually (1,414,521 total visits ÷ 174 doctors) or approximately 40 consultations daily (assuming 253 working days), substantially exceeding quality consultation standards (10). Table 7 detailed workload component analysis documents systematic understaffing requiring immediate large-scale recruitment intervention (10).

3.8. Nursing Staff

Workload Component	Annual Volume	Standard Time	Total Hours Required	Workload Component
Institutional deliveries (comprehensive maternal care)	4,507 deliveries	7 hours per delivery	31,549 hours	Institutional deliveries (comprehensive maternal care)
Inpatient nursing care (direct patient care)	154,695 patient-days	4 hours per patient-day	618,780 hours	Inpatient nursing care (direct patient care)
OPD support (triage, vital signs, assessments)	1,414,521 visits	5 minutes per visit	117,877 hours	OPD support (triage, vital signs, assessments)
Immunization clinic support	40,000 estimated sessions	2 hours per session	80,000 hours	Immunization clinic support
TOTAL ANNUAL NURSING WORKLOAD	**All activities summed**	**848,206 hours**		**TOTAL ANNUAL NURSING WORKLOAD**

Table 2: Nursing Staff Workload Components and WISN Calculation Including 24-Hour Analysis Sikar District 2023-24

Citation: Rafique, M., Verma, K., Mandarwal, D., Pattanshetty, M. S., Gite, A. R., et al. (2026). Evolution of Health Workforce Norms in India: Comparative Analysis of IPHS Guidelines 2007-2022 With Wisn Based Assessment of Rajasthans Primary Secondary Care System and International Evidence. *CME J Clin Case Rep, 3*(2), 1-12.

WISN Calculation for Nursing Staff (Single-Shift)

Available Working Time per Nurse: 1,290.3 hours/year (5)

Required Nursing Staff (Daytime): 848,206 hours ÷ 1,290.3 hours = 657.4 ≈ 657 nurses (10)

Current Working Nursing Staff: 170 (10)

WISN Ratio (Single-Shift): 170 ÷ 657 = 0.26 (10)

Workload Pressure: (1 − 0.26) × 100 = **74% (VERY HIGH PRESSURE)** (10)

Staffing Deficit: 657 − 170 = **+487 additional nurses needed (daytime only)** (10)

3.9. 24 Hour Service Delivery Analysis

2 -Hour Staffing Multiplier

4 shifts/day (6 hours each) × 1.3 weekend/holiday factor × 1.13 leave replacement factor = **5.88 multiplier** (8)

24-Hour Nursing Requirement: 657 nurses × 5.88 = **3,863 positions** (8,10)

Current 170 nurses as % of 24-hour requirement: 170 ÷ **3,863 = 4.4% adequacy** (8,10)

24-Hour Staffing Deficit: 3,863 − 170 = **+3,693 additional nurses needed for genuine**

3.10. Round The Clock Coverage

As detailed in Table 8, nursing staff in Sikar district demonstrate WISN ratio of 0.26 with 74 percent workload pressure for single-shift daytime operations (10). More critically, documented in Table 8, 24-hour service delivery calculations show current nursing staff of 170 provides only 4.4 percent of requirement 3,863 positions for true round-the-clock coverage, creating an extremely critical maternal mortality and patient safety crisis especially during institutional deliveries when multiple simultaneous obstetric emergencies require immediate skilled nursing intervention (8,10).

3.11. Pharmacists

Workload Component	Annual Volume	Standard Time	Total Hours Required
Medicine dispensing (verification, packaging, counseling)	2,400,000 medicines (estimated)	2.5 minutes per medicine	100,000 hours
Inventory management (stock control, procurement, buffer stock)	Continuous allocation	10% of available time	129,030 hours
Drug quality assurance (adverse events, expiry tracking)	Continuous allocation	5% of available time	64,515 hours
TOTAL ANNUAL PHARMACY WORKLOAD	All activities combined	**293,545 hours**	

Table 3: Pharmacist Workload Components and WISN Calculation Sikar District 2023-24

WISN Calculation for Pharmacists

Required Pharmacists: 293,545 hours ÷ 1,290.3 hours = 227.4 ≈ 227 pharmacists (10)

Current Pharmacists: 77 (10)

WISN Ratio: 77 ÷ 227 = **0.34** (10)

Workload Pressure: (1 − 0.34) × 100 = **66% (VERY HIGH PRESSURE)** (10)

Staffing Deficit: 227 − 77 = **+150 additional pharmacists needed** (10)

Average Per Pharmacist: 2,400,000 medicines ÷ 77 = 31,169 medicines annually or 151/day (10)

As presented in Table 9, pharmacists in Sikar district demonstrate WISN ratio of 0.34 with 66 percent workload pressure (10). Each pharmacist must dispense 31,169 medicines annually or approximately 151 medicines daily (assuming 253 working days), creating systematic medication safety risks including dispensing errors, inadequate patient counselling, and insufficient quality assurance

3.12. Laboratory Technicians

Workload Component	Annual Volume	Standard Time	Total Hours Required
Laboratory test processing (collection, processing, results)	2,154,261 tests (2023-24)	2.5 minutes per test	89,761 hours
Quality control & validation (equipment, control testing)	Continuous allocation	10% of available time	129,030 hours
Report preparation & documentation (filing, communication)	Continuous allocation	5% of available time	64,515 hours
TOTAL ANNUAL LABORATORY WORKLOAD	All activities combined	283,306 hours	

Table 4: Laboratory Technician Workload Components and WISN Calculation Sikar District 2023-24

WISN Calculation for Laboratory Technicians

Required Laboratory Technicians: 283,306 hours ÷ 1,290.3 hours = 219.6 ≈ 220 technicians (10)

Current Laboratory Technicians: 63 (10)

WISN Ratio: 63 ÷ 220 = **0.29** (10)

Workload Pressure: (1 − 0.29) × 100 = **71% (VERY HIGH PRESSURE)** (10)

Staffing Deficit: 220 − 63 = +**157 additional technicians needed** (10)

Average Per Technician: **2,154,261 tests ÷ 63 = 34,194 tests** annually or 135/day (10)

As documented in Table 10, laboratory technicians in Sikar district demonstrate WISN ratio of 0.29 (the most severe among all cadres analysed) with 71 percent workload pressure. Each technician processes 34,194 tests annually or approximately 135 tests daily, substantially exceeding quality assurance benchmarks and accuracy standards, thereby compromising diagnostic service quality and turnaround time.

3.13. Comprehensive WISN Summary All Cadres

As presented in [Table 11], comprehensive WISN results summary demonstrates aggregate WISN ratio of 0.32 across all four major clinical cadres, indicating current working staff of 484 manage only 32 percent of required capacity of 1,521 positions, creating total staffing deficit of 1,037 positions Aggregate workload pressure of 68 percent across entire Sikar district health system indicates systematic clinical crisis where workforce manages less than one-third of required service delivery capacity.

3.14. WISN versus IPHS 2022 Norms Comparative Analysis

As shown in [Table 12], comparative analysis demonstrates WISN methodology determines requirements substantially exceed IPHS 2022 facility-type population-based norms by 69 to 208 percent across four major cadres, with nursing staff showing most severe 208 percent underestimation by IPHS norms. IPHS population-based approach systematically fails to account for actual service workload volume, geographic access barriers, facility-specific utilization patterns, and true 24-hour operational mathematics, creating dangerous false confidence in facility functionality when in reality workforce inadequacy renders theoretical facility capacity non-operational [10-28].

3.15. IPHS Workforce Norms Evolution 2007-2022

Position	IPHS 2007	IPHS 2012	IPHS 2022	Evolution Analysis 2007-2022
SUB-CENTER STAFFING				
Female Health Worker/ANM	1 Essential	1 Essential	1 Essential	No change across 15-year period
Male Health Worker	1 Essential	1 Essential	1 Essential	Unchanged fundamentals
PRIMARY HEALTH CENTER STAFFING				
Medical Officer (MBBS)	1 Essential	1 Essential	2 Essential	Doubled in 2022 recognizing 24-hour requirement
AYUSH Medical Officer	Not specified	1 Desirable	1 Essential	Upgraded from absent 2007 to desirable 2012 to essential 2022
Nursing Staff	3 Essential	3 + 1 Desirable	4 + 1 Desirable	Gradual increase reflecting inadequacy recognition

Citation: Rafique, M., Verma, K., Mandarwal, D., Pattanshetty, M. S., Gite, A. R., et al. (2026). Evolution of Health Workforce Norms in India: Comparative Analysis of IPHS Guidelines 2007-2022 With Wisn Based Assessment of Rajasthans Primary Secondary Care System and International Evidence. *CME J Clin Case Rep, 3*(2), 1-12.

Laboratory Technician	1 Essential	1 Essential	1 Essential	No change despite diagnostic service expansion
Pharmacist	1 Essential	1 + 1 AYUSH Desirable	1 + 1 AYUSH Essential	AYUSH pharmacy formalized
COMMUNITY HEALTH CENTER STAFFING				
Block Medical Officer/ Superintendent	1 Essential	1 Essential	1 Essential	Unchanged
Specialists (4 disciplines)	4 Essential	4 Essential	4 Essential	No increase despite 63.8% CHC facility expansion 2005-2021
General Duty Medical Officers	2 Essential	2 Essential	2 Essential	Unchanged
Nursing Staff	≈10 Essential	≈10 Essential	≈12 Essential	Modest increase inadequate for 24-hour service
Position	**IPHS 2007**	**IPHS 2012**	**IPHS 2022**	**Evolution Analysis 2007-2022**

Table 5: IPHS Workforce Norms Evolution Across Three Versions 2007-2022

As documented in [Table 13], IPHS workforce norms evolution demonstrates incremental rather than transformative change. Notably, Community Health centre specialist requirements remained completely static at 4 specialists across all three IPHS versions 2007, 2012, 2022 despite documented 63.8 percent national CHC facility expansion from 2005-2021. This fundamental disconnect between infrastructure planning and workforce norm evolution directly contributed to current national specialist shortage crisis documented in Table.

3.16. International WISN Implementation Evidence

Comprehensive multi-country study across Burkina Faso, Côte d'Ivoire, and Niger examining staffing needs for maternal and child health services documented significant geographic disparities in health worker deployment and workload pressure. In Côte d'Ivoire maternity services, three of four health facilities were understaffed based on mean observed service duration with WISN ratios ranging 0.50 to 1.0 indicating workload pressures from 0 to 50 percent . Geographic comparison across all three Sub-Saharan African countries revealed consistent pattern where rural area health services were substantially more understaffed with 30-50 percentage-point higher workload pressure compared to urban areas, demonstrating critical need for geographic differentiation in workforce allocation. South Africa experience implementing WISN methodology revealed severe financial implementation barriers WISN analysis across eight districts determined that recommended skills mix and staffing levels would require approximately 5.3 billion South African Rands in additional provincial budget allocation, creating massive affordability gap that effectively halted WISN implementation despite methodology technical rigor Peru Ministry of Health determined insufficient baseline information existed for standard WISN input parameters and rather than implementing generic international WISN developed context-specific workforce planning tool utilizing available National Register of Health Personnel and documented service utilization patterns. This approach successfully applied WISN-informed methodology to public health investment projects, tuberculosis control strategy, and specialist training program planning [30-32].

4. Discussion

4.1. Working Time Formula Fundamentally Alters Workforce Crisis Assessment

available working time calculation of 1,290.3 hours annually, accounting for proper deduction of 52 Sunday weekly offs and actual 6-hour medical department outpatient working time, fundamentally changes workforce adequacy assessments and policy conclusions Previous WISN applications in India utilizing 2,074 hours available time substantially underestimated true workforce crisis by failing to account for government health facility operational parameters. For Sikar district, aggregate WISN ratio deteriorates substantially from previously calculated 0.43 (using incorrect 2,074 hours) to 0.32, meaning current workforce manages only 32 percent of required capacity compared to previously estimated 43 percent. Total staffing deficit more than doubles from 632 positions to 1,037 positions, representing 64 percent increase in identified shortage magnitude when proper accounting for weekly offs and actual working time implemented. This mathematical correction demonstrates previous WISN applications in India using incorrect available working time assumptions substantially underestimated true workforce crisis.

4.2. Infrastructure Workforce Mismatch as Systematic Policy Failure

Documented in Table 2 data showing Community Health centres expanded 63.8 percent from 2005-2021 while specialist doctors grew only 24.1 percent, creating 39.7 percentage-point infrastructure-workforce gap, represents systematic policy failure to align workforce production pipelines with infrastructure investment trajectories This structural mismatch evident across all Indian states creates

facilities without functional capacity for intended services, directly undermining Universal Health Coverage goals and Sustainable Development Goal 3 Infrastructure investment without corresponding proportional workforce planning creates dangerous illusion of health system strengthening while actual service delivery capacity remains severely constrained. Ministry of Health and Family Welfare infrastructure expansion policies have not been coupled with adequate medical education capacity expansion or systematic recruitment strategy, resulting in systematic under-utilization of facility infrastructure across India [28-34].

4.3. Superiority of Workload Based WISN over Population Based IPHS Norms

Demonstrated through Tables 7 through 12 comprehensive workload analyses showing WISN methodology systematic superiority over IPHS facility-type norms by calculating requirements from actual measured service workload rather than theoretical population ratios WISN accounting for proper 52 Sunday weekly offs and actual 6-hour medical department working time shows requirements exceed IPHS 2022 norms by 69 to 208 percent with average 130 percent underestimation across four major clinical cadres IPHS facility-type population-based approach assumes uniform workload per facility category, ignoring critical variations in service utilization patterns, geographic access dynamics, epidemiological disease burden, and 24-hour operational requirements . This creates systematic underestimation particularly for high-volume urban facilities experiencing 15-20 times facility-type norms and geographically isolated rural facilities experiencing concentrated utilization due to limited alternative providers.

4.4. Twenty Four Hour Service Delivery Mathematics and Policy Decision Requirements

Documented in Table 8 nursing calculations showing 24-hour requirement reaches 3,863 positions with current 170 nurses representing catastrophic 4.4 percent adequacy. Government of India National Health Mission 24-hour service delivery policy framework for Primary Health centres and Community Health centres cannot be operationalized without addressing fundamental staffing mathematics requiring 5.88 times multiplier for 6-hour shift model Critical mathematical finding: original claimed multiplier 5.78 is mathematically invalid Correct calculation shows 3 shifts (for 8-hour operations) × 1.3 weekend/holiday factor × 1.13 leave replacement factor = 4.407 multiplier; for actual 6-hour shift operations requiring 4 shifts daily: 4 × 1.3 × 1.13 = 5.88 multiplier . Policy framework must explicitly decide: Option A accepting primarily 8-hour weekday operations with structured emergency referral arrangements, or Option B implementing genuine 24-hour coverage using multipliers with corresponding massive budget allocation. Current policy ambiguity creates impossible expectations for frontline facilities [35].

4.5. Geographic Equity and Differentiation Requirements

International evidence from Sub-Saharan Africa documenting 30-50 percentage-point higher rural workload pressure combined with India's pronounced geographic diversity including tribal areas, hilly difficult terrain, desert regions, and urban underserved slums require mandatory differentiated workforce planning approach. Base WISN requirements must be multiplied by geographic factors accounting for lower population density, complex health needs, retention challenges, infrastructure deficits, and access.

5. Policy Recommendations

Geographic Category	Multiplier	Justification	Applicable Areas
Tribal Areas (≥30% tribal population)	1.5×	Lower population density requiring greater coverage per facility; complex health needs; retention challenges; language and cultural barriers; community health worker supervision	Rajasthan: Barmer, Jaisalmer, Pali, Pratapgarh; All states ≥20% tribal population
Hilly & Difficult Terrain (>40% elevation)	1.3×	Geographic barriers limiting accessibility; poor referral pathways; weather-related disruptions; workforce retention challenges	Himachal Pradesh, Uttarakhand, Assam, Mizoram, Nagaland
Desert & Arid Regions	1.2×	Dispersed population; limited water/ sanitation infrastructure; harsh climate; higher malnutrition/heat morbidities	Rajasthan: Jaisalmer, Barmer; Gujarat desert regions
Urban Underserved/Slums	1.2×	High-density vulnerable populations; complex social determinants; higher violence/mental health burden; communication challenges	Metropolitan slums: Delhi, Mumbai, Bangalore, Kolkata, Chennai

Table 6: Geographic Differentiation Multipliers for WISN Based Workforce Planning

As specified in [Table 14], eight comprehensive policy recommendations require systematic implementation for transforming India's health workforce planning from facility-type population ratios to workload-based evidence-driven scientifically validated approach

• Recommendation 1: Phased WISN Adoption with National Observatory

Establish National Health Workforce Observatory as independent statutory body under Ministry of Health and Family Welfare with mandate for continuous workforce monitoring, technical assistance, and policy coordination Phase 1 (2026-2027) pilot implementation in 5 districts per state conducting comprehensive WISN assessments, establishing data collection systems, training district teams, validating activity standards in India-specific contexts [36].

• Recommendation 2: Geographic Differentiation Applying Multipliers

• Systematically apply geographic multipliers specified in Table 14 to WISN base requirements creating equity-oriented differentiated workforce allocation framework (13). Tribal areas receive 1.5× multiplier, hilly terrain 1.3×, desert regions 1.2×, urban underserved 1.2× with budget allocations proportionally increased

• Recommendation 3: Explicit 24-Hour Service Policy Decision

Government must transparently decide which facility types will provide genuine 24-hour round-the-clock services versus daytime-only operations with structured emergency referral arrangements. For 24-hour operations, apply staffing multiplier 5.88 for actual 6-hour shifts using Table 8 nursing calculations as template.

• Recommendation 4: Medical Education Capacity Expansion 50% by 2030

Increase annual MBBS seats from current approximately 100,000 to 150,000, expand postgraduate specialty seats from 50,000 to 100,000, expand nursing education from 80,000 to 240,000 graduates annually (14,37). Prioritize establishment in Tier 2/3 cities facilitating local retention (14,37).

• Recommendation 4: Specialist Deployment & Retention Incentives

Implement financial incentives (50-100% rural salary premium, 25% hardship allowance, enhanced retirement benefits) and non-financial incentives (government housing, spouse employment assistance, professional development) for specialist deployment (15,38). Integrate telemedicine support reducing professional isolation [38].

• Recommendation 5: AYUSH Integration for Workforce Augmentation

Formally integrate AYUSH practitioners into primary care delivery with clear scope of practice, co-location with allopathic physicians, integrated treatment protocols, emergency care authorization, and National Health Program participation This approach potentially addresses 30-40 percent of documented medical officer shortage [39].

• Recommendation 6: Comprehensive Workforce Retention Strategy

Implement rapid recruitment mechanisms reducing hiring timelines to maximum 3 months, improve working conditions through functional equipment and adequate supplies, establish career progression pathways, provide mental health support, and implement workplace safety protocols. Address current 30.4 percent aggregate vacancy rate documented in Table 5 [40].

• Recommendation 7: District-Level Monitoring Framework

Establish District Health Workforce Planning Committees with quarterly WISN analysis updates, annual comprehensive gap assessments, public reporting, and performance-based grant allocation linking funding to workforce adequacy improvements

Conflict of Interest Statement: The authors declare no conflicts of interest.

Funding Statement: This research received no specific grant from any funding agency in the public, commercial, or not-for-profit sectors.

6. Conclusion

WISN analysis accounting for proper 52 Sunday weekly offs and actual 6-hour medical department working time demonstrates Sikar district, Rajasthan, confronts substantially more severe health workforce crisis than previously estimated. Aggregate WISN ratio of 0.32 indicates current working staff of 484 manage only 32 percent of required capacity of 1,521 positions, creating total staffing deficit of 1,037 positions compared to previously calculated 632 positions using incorrect available working time formula, representing 64 percent greater shortage magnitude. Average workload pressure of 68 percent across all four major clinical cadres represents systematic crisis where each staff member manages workload equivalent to three full-time positions, fundamentally threatening quality of care, patient safety, and health worker wellbeing. WISN-determined requirements exceed IPHS 2022 facility-type population-based norms by 69 to 208 percent with average 130 percent underestimation, demonstrating fundamental inadequacy of current workforce planning approach. True 24-hour nursing operations require 3,863 positions with current 170 representing catastrophic 4.4 percent adequacy, indicating mathematical impossibility of genuine round-the-clock primary care under current staffing levels Policy response requires eight comprehensive interventions: phased WISN adoption with National Health Workforce Observatory establishment geographic differentiation using Table 14 multipliers for tribal, hilly, desert, and urban underserved areas transparent explicit 24-hour service policy decisions with corresponding staffing using 5.88 multiplier, massive medical education

expansion (50% MBBS, 100% specialty, 200% nursing by 2030) comprehensive specialist deployment and retention incentives formal AYUSH integration addressing 30-40 percent medical officer gap, comprehensive workforce retention strategy addressing 30.4 percent aggregate vacancy rate, and district-level monitoring with performance accountability frameworks This research provides rigorous empirical foundation and mathematical framework for transforming India's health workforce planning from facility-type population ratios to workload-based evidence-driven scientifically validated approach essential for achieving Universal Health Coverage, Sustainable Development Goals, and constitutional commitment to health as fundamental right, WISN methodology reveals crisis substantially more severe than government estimates, indicating urgent need for political commitment, massive resource mobilization, and transformational health systems reform.

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