

An Assessment of Public and Private Healthcare Infrastructure Across 13 Districts — Gaps, Strengths, and a Roadmap to Universal Health Coverage (A District-Wise Review of Health System Strength in Uttarakhand)

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Abstract

Uttarakhand, a mountainous Himalayan state carved out of Uttar Pradesh in 2000, presents a distinctive case for the study of sub-national health system strengthening in India. Despite performing close to or above the national average on several composite indicators, the state ranked fifteenth among nineteen large states on the NITI Aayog Health Index for the reference year 2019–20, reflecting persistent structural weaknesses beneath aggregate figures. This paper undertakes a district-wise review of public and private healthcare infrastructure across all thirteen districts of Uttarakhand, synthesising evidence from the National Family Health Survey-5 (2019–21), the Comptroller and Auditor General's performance audit of district hospitals (2021), Rural Health Statistics 2021–22, and World Bank project documentation. The analysis finds a substantial shortfall in primary and secondary care infrastructure — 259 of a required 418 Primary Health Centres and 86 of a required 105 Community Health Centres were functional as of March 2019 — compounded by acute human resource vacancies concentrated in the ten hill districts, where geographic remoteness, landslide-prone terrain, and reluctance of specialists to accept mountain postings depress both facility functionality and health-seeking behaviour. District-wise indicators reveal wide intra-state disparity: institutional delivery ranges from 74 percent in Chamoli to 92 percent in Dehradun, and antenatal care completion from 40 percent in Garhwal to 77 percent in Rudrapur. The private sector, concentrated overwhelmingly in Dehradun, Haridwar, and Udham Singh Nagar, has been engaged through public–private partnership models and the Atal Ayushman Uttarakhand Yojana, with mixed but locally promising results. The paper concludes with a policy roadmap emphasising cadre-based hill postings, IPHS-compliant facility upgrades, strengthened financial absorption capacity, and regulated private-sector integration as prerequisites for the state's progress toward Universal Health Coverage.

Keywords: Uttarakhand; health system strengthening; Universal Health Coverage; rural health infrastructure; district-wise health disparities; Ayushman Bharat; hilly-state healthcare; public–private partnership

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1. INTRODUCTION

Universal Health Coverage (UHC) — ensuring that all people obtain the health services they need, of sufficient quality to be effective, without incurring financial hardship — is enshrined as Sustainable Development Goal 3.8 and forms the stated objective of India's National Health Policy, 2017 [1,2].

Uttarakhand offers a particularly instructive setting in which to examine this sub-national dimension of health system strength. Formed in November 2000 through the bifurcation of Uttar Pradesh, the state combines two contrasting geographies: a narrow belt of plains (Haridwar and Udham Singh Nagar, and parts of Dehradun and Nainital) and an extensive Himalayan hill tract comprising ten of its thirteen districts. Nearly four-fifths of the state's population lives in areas classified as remote or hilly, and more than eighty percent of mountain villages have fewer than five hundred residents [9]. This dispersed settlement pattern, combined with landslide-prone roads, seasonal snow closures, and a narrow economic base, creates health-access challenges that are structurally different from those found in the plains states with which Uttarakhand is often statistically compared.

The central puzzle motivating this paper is the coexistence of comparatively favourable state-level averages with a persistently low composite ranking and, beneath both, wide district-to-district variation. Uttarakhand's infant mortality rate of 39 per 1,000 live births and total fertility rate of 1.9 children per woman are both below many north Indian states [3], yet the state ranked fifteenth among nineteen large states on the NITI Aayog Health Index for 2019–20 [4], and seventeenth among twenty-one larger states in an earlier round of the same index, ahead of only Madhya Pradesh, Odisha, Bihar, and Uttar Pradesh [5]. This apparent contradiction can only be resolved by disaggregating the state picture to the district level and by examining not merely health outcomes but the infrastructural and human-resource base that produces them.

This paper therefore pursues three interrelated objectives. First, it maps the availability and adequacy of public healthcare infrastructure — sub-centres, PHCs, CHCs, and district hospitals — against prescribed population norms across all thirteen districts. Second, it characterises the private healthcare sector's geographic distribution and its evolving relationship with the state through public–private partnership (PPP) arrangements and insurance-based financing. Third, it synthesises these findings into a set of policy-relevant gaps and strengths, culminating in a roadmap toward Universal Health Coverage that is grounded in Uttarakhand's specific topographic and demographic constraints rather than in generic national prescriptions.

2. STUDY AREA: UTTARAKHAND'S GEOGRAPHIC AND DEMOGRAPHIC CONTEXT

Uttarakhand comprises thirteen districts organised into two administrative divisions, Garhwal and Kumaon: Almora, Bageshwar, Chamoli, Champawat, Dehradun, Garhwal (Pauri), Haridwar, Nainital, Pithoragarh, Rudrapur, Tehri Garhwal, Udham Singh Nagar, and Uttarkashi. According to the 2011 Census, the state's population stood at just over one crore across an area of approximately 53,483 square kilometres [6]. According to the 2019–21 round of the National Family Health Survey, more than two-thirds (67 percent) of the state's households are located in rural areas, average household size is 4.4 members, and just over one-quarter of the population is below the age of fifteen [3]. Roughly thirty-eight percent of the state's population falls below the poverty line, with the highest concentration in Uttarkashi district and the lowest in Udham Singh Nagar [7]. Nutritional indicators, tracked across three successive rounds of the National Family Health Survey, similarly show gradual but uneven improvement across the state [8].

The state's defining feature for health planning purposes is topographic bifurcation. Haridwar and Udham Singh Nagar, together with the urbanised core of Dehradun, lie on the Indo-Gangetic plain and share the road density, population concentration, and facility access more typical of northern Indian plains districts. The remaining ten districts lie substantially or entirely within the Himalayan hill and high-mountain zone, where settlements are small, scattered, and often reachable only by foot-path for the final stretch. As has been observed by multilateral health-financing partners, this pattern means that public and private health providers alike concentrate in the state's urban and plain areas, leaving the middle and upper mountain reaches served by facilities that, even where physically present, frequently cannot function at the intended level of quality because of large-scale staff vacancies [9].

This bifurcated geography interacts with a state government structure in which the Department of Medical Health and Family Welfare bears administrative responsibility for a three-tier public system — sub-centres, PHCs, and CHCs at the primary and secondary level, feeding into district and joint hospitals — while receiving supplementary financing and technical guidance from the National Health Mission (NHM) at the centre [5]. Understanding the resulting health system therefore requires close attention to both the vertical tiering of facilities and the horizontal, district-wise unevenness produced by terrain.

3. CONCEPTUAL FRAMEWORK: UNIVERSAL HEALTH COVERAGE AND HEALTH SYSTEM BUILDING BLOCKS

This paper adopts the World Health Organization's widely used health systems 'building blocks' framework — service delivery, health workforce, health information systems, access to essential medicines, financing, and leadership/governance — as an organising lens, read jointly with the WHO's formal definition of Universal Health Coverage as access to needed promotive, preventive, curative, rehabilitative, and palliative health services of sufficient quality, without financial hardship to the user [2]. UHC is commonly visualised along three axes: the breadth of the population covered, the depth of services included, and the extent of financial protection provided (the '3-D cube' of coverage).

Applying this framework to a hilly, low-density state such as Uttarakhand requires an additional, geography-sensitive dimension that is often implicit rather than explicit in national-level UHC literature: the physical distance and time cost of reaching a functioning facility. A district may report an adequate number of sanctioned CHCs relative to its population under the Indian Public Health Standards (IPHS), and still leave large sections of its population effectively uncovered if terrain multiplies travel time several-fold relative to a plains district of comparable facility density. This paper's district-wise approach is designed specifically to surface that dimension, which aggregate state-level statistics tend to obscure.

A useful comparator is Himachal Pradesh, another Himalayan state that has been examined in the peer-reviewed literature as a hilly state 'on the path' to UHC. Prior research notes that Himachal Pradesh, despite ranking fifth nationally on an earlier health index round, continues to grapple with inaccessibility and intra-state disparity even as it extends state-sponsored insurance coverage [10]. The parallel is instructive: strong aggregate performance and persistent access disparity are not mutually exclusive in mountain states, reinforcing the case for the district-disaggregated method adopted here.

4. METHODOLOGY

4.1 Research Design

This study is a descriptive, secondary-data synthesis employing a district-wise comparative design. It does not generate primary survey data; rather, it triangulates figures already collected by government and multilateral bodies to build a composite, policy-oriented picture of health system strength that no single source provides on its own.

4.2 Data Sources

Five categories of secondary data were used. First, demographic and health-outcome indicators — fertility, mortality, antenatal and delivery care, contraceptive prevalence, and immunisation — were drawn from the district-disaggregated tables of the National Family Health Survey-5 (NFHS-5, 2019–21) state report for

Uttarakhand [3], the most recent nationally representative household survey with district-level estimates for all thirteen districts. Second, infrastructure norms and shortfalls, budgetary allocation and expenditure, and facility-level audit findings were drawn from the Comptroller and Auditor General's Performance Audit Report on District Hospital Outcomes [5], an independent constitutional-authority audit covering the period 2014–19. Third, national comparative context on human-resource shortages in rural facilities was drawn from Rural Health Statistics 2021–22, as summarised in contemporaneous secondary reporting [11–13]. Fourth, evidence on the private sector, public–private partnerships, and financial-protection schemes was drawn from World Bank project documentation [9,14–16] and state government scheme documentation for the Atal Ayushman Uttarakhand Yojana. Fifth, journalistic field reporting was used, in a strictly corroborative role, to illustrate audited findings with on-the-ground detail, never as a stand-alone source for a quantitative claim.

4.3 Analytical Approach

Data were organised at the district level wherever the source permitted, and at the state level with national comparison otherwise. Facility counts were benchmarked against Indian Public Health Standards (IPHS) population norms to compute shortfalls. No inferential statistical testing was performed; the analysis is descriptive and comparative, consistent with the paper's aim of producing a policy-usable district review rather than a hypothesis-driven epidemiological study.

4.4 Limitations of the Data

Two limitations should be flagged at the outset and are revisited in Section 8. The CAG audit's facility-count and budget data pertain to the period up to March 2019 and reflect a random sample of six district hospitals across four districts rather than a full census of the state's eighteen district hospitals; the audit's infrastructure-gap findings are therefore illustrative of systemic patterns rather than a live, present-day inventory. Similarly, NFHS-5 fieldwork in Uttarakhand spanned the COVID-19 lockdown period, being conducted in two parts (January–March 2020 and December 2020–March 2021), a discontinuity that the survey's own report advises readers to interpret with caution [3].

5. FINDINGS

5.1 State-Level Health Outcomes: A Mixed Picture

On several individual indicators, Uttarakhand performs creditably against the national picture. The infant mortality rate fell from 40 per 1,000 live births in NFHS-4 to 39 in NFHS-5, and the under-five mortality rate stands at 46 per 1,000 [3]. The proportion of institutional deliveries rose sharply, from 69 percent in NFHS-4 to 83 percent in NFHS-5, and full immunisation coverage among children aged 12–23 months rose from 58 percent to 81 percent over the same

period [3]. The contraceptive prevalence rate among currently married women climbed from 53 percent to 71 percent, and unmet need for family planning fell from 16 percent to 9 percent [3].

Set against this progress, however, is the state's composite ranking. The fourth edition of the NITI Aayog Health Index, covering the reference year 2019–20, placed Uttarakhand fifteenth among nineteen large states, with a score of 44.21 against a leading score of 82.20 for Kerala [4]. An earlier round of the same index, cited in the CAG's 2021 audit, ranked the state seventeenth among twenty-one larger states — ahead of only Madhya Pradesh, Odisha, Bihar, and Uttar Pradesh — and noted that the state's position had deteriorated between the base year and the reference year rather than improved [5]. The audit also recorded that against the National Health Policy's institutional-delivery goal of ninety percent and above, the state stood at 67.02 percent as of the cited reference year, ranking nineteenth

Table 1. Public Health Facility Availability against Population Norms, Uttarakhand (as of March 2019)

Facility Tier	Required (Population Norms)	Established (as of March 2019)	Shortfall
Primary Health Centres (PHCs)	418	259	159 (38%)

A facility count alone, however, understates the depth of the problem, because the CAG's audit also found that the state government had neither adopted the Indian Public Health Standards for the services, staffing, and equipment expected of a district hospital, nor devised its own uniform norms to substitute for them [5]. No gap analysis of manpower, equipment, infrastructure, or services had been conducted across the audit period of 2014–19, and sanctioned staffing strength in the sampled hospitals bore little correlation with the number of beds each hospital actually operated [5]. In practical terms, this means that even the 86 functioning CHCs and 259 functioning PHCs cannot be assumed to deliver a consistent standard of care; some may be well-equipped referral points, while others may lack basic diagnostic or maternity capacity despite carrying the same institutional label.

Financing patterns compound the infrastructure gap. Table 2 shows that between 2014–15 and 2018–19, **Table 2. State Budget Allocation and Expenditure, Department of Medical Health and Family Welfare, Uttarakhand, 2014–19 (₹ crore)**

among twenty-one larger states on that single indicator, and that its maternal mortality ratio of 201 per 100,000 live births left it ranked sixteenth against a national goal of 100 [5]. The coexistence of improving trend lines with a low and, for a period, worsening relative ranking is the empirical anchor for this paper's district-wise investigation: aggregate improvement can mask both slow absolute progress relative to peer states and substantial internal unevenness.

5.2 Public Health Infrastructure: A Persistent Capacity Gap

The clearest single finding of this review concerns the physical stock of primary and secondary care facilities relative to prescribed population norms. As of March 2019, against a requirement of 418 PHCs and 105 CHCs under applicable population norms, only 259 PHCs and 86 CHCs had been established in the state [5]. Table 1 summarises this shortfall.

Facility Tier	Required (Population Norms)	Established (as of March 2019)	Shortfall
Community Health Centres (CHCs)	105	86	19 (18%)

Source: reference [5].

the Department of Medical Health and Family Welfare was allocated a cumulative ₹7,481.90 crore but received only ₹6,321.65 crore from the state government and ultimately spent ₹5,506.09 crore — an under-utilisation of roughly thirteen percent of released funds across the five-year period [5]. The pattern recurs, and is in some years more pronounced, in National Health Mission funds specifically earmarked for the state: between 22 and 32 percent of NHM funds released to the department remained unspent at the close of each financial year from 2016–17 to 2018–19, and the six hospitals sampled for detailed audit left between 22 and 29 percent of their available NHM allocation unspent annually across the same period [5]. This combination — facilities built below the prescribed norm, alongside allocated money that is not fully absorbed — points to a bottleneck that is only partly about the size of the budget and substantially about planning, procurement, and execution capacity at the district and facility level.

Year	Estimated by Directorate	Released by State Govt.	Expenditure
2014–15	1,257.46	1,136.63	997.73

Year	Estimated by Directorate	Released by State Govt.	Expenditure
2015–16	1,386.00	1,252.98	1,016.24
2016–17	1,468.44	1,239.49	1,036.99
2017–18	1,558.52	1,161.13	1,070.07

Central government support for facility modernisation has continued in parallel: under the National Health Mission's State Programme Implementation Plan, Uttarakhand received sanctioned approvals for hospital strengthening and new construction of ₹1,457.04 lakh in 2014–15, ₹294.42 lakh in 2015–16, ₹1,826.23 lakh in 2016–17, and ₹1,113.05 lakh in 2017–18, covering upgrades to district hospitals, sub-divisional hospitals, CHCs, PHCs, and sub-health centres [18]. Urban service delivery, structured separately under the National Urban Health Mission, organises Urban Primary Health Centres and Urban Community Health Centres across the state's urbanised clusters, including Dehradun, Haridwar, Nainital, and Udham Singh Nagar [17]. The scale of year-on-year sanctioned investment under both streams, set against the persistence of the facility shortfall documented for 2019, again underscores that construction funding alone has not closed the infrastructure gap — implementation, staffing, and quality assurance appear to be the binding constraints.

5.3 Human Resources for Health: The Hill-Posting Problem

Facility shortfalls are compounded, and in the ten hill districts arguably eclipsed, by an acute and geographically concentrated shortage of clinical staff. World Bank project appraisal documentation recorded that as of 2013, forty-eight percent of sanctioned general duty medical officer posts and seventy-five percent of sanctioned specialist posts in the state's public health facilities were vacant, despite a liberal state policy of contractual hiring and financial incentives for remote-area postings [14]. Field reporting from 2019 corroborates that this problem persisted rather than resolved: of 2,716 sanctioned doctor posts in the state health and medical department, only 1,545 were filled, leaving 1,171 vacant, and at least two-thirds of these vacant posts were concentrated in the ten of the state's thirteen districts that lie in the hills [19]. A closely related report placed the sanctioned total at 2,727 posts, of which 1,589 were filled by permanent appointees and a further 456 by contractual doctors, leaving 681 posts vacant even after contractual hiring was counted [20].

The vacancy pattern extends beyond doctors to the paramedical cadre that sustains day-to-day facility

Year	Estimated by Directorate	Released by State Govt.	Expenditure
2018–19	1,811.48	1,531.42	1,385.06
Total	7,481.90	6,321.65	5,506.09

Source: reference [5], Table-3.

functioning. State health department data reported during the second wave of the COVID-19 pandemic showed 547 of 2,270 sanctioned Auxiliary Nurse Midwife (ANM) posts vacant, with a further 323 filled only on contract, and 349 of 1,117 sanctioned staff nurse posts vacant [21]. The same reporting noted that official vacancy figures likely understate the effective shortfall, since staff who had taken leave after being deployed to difficult mountain postings continued to be counted as filled positions in departmental statistics even though they were not present to provide care [21].

National-level Rural Health Statistics for 2021–22 situate Uttarakhand's experience within a broader, though not uniform, pattern of rural specialist shortage. Nationally, the shortfall against sanctioned specialist requirements at Community Health Centres stood at 83.2 percent for surgeons, 74.2 percent for obstetricians and gynaecologists, 79.1 percent for physicians, and 81.6 percent for paediatricians, with fewer than half of all PHCs functioning on a twenty-four-hour basis [11]. Of the 5,480 functioning rural CHCs nationally, only 541 had all four mandated specialists in place [11]. Uttarakhand was explicitly identified, alongside Uttar Pradesh, Gujarat, Himachal Pradesh, and Odisha, as among the states where the year-on-year decline in ANM staffing between 2021 and 2022 was most pronounced [11]. Field accounts attribute the underlying reluctance to accept hill postings to a combination of professional isolation, inadequate housing and basic amenities at remote facilities, and limited access to postgraduate study leave, with one report noting that at least 172 of 412 doctors who had been bonded to serve in the hills subsequently left their postings to pursue postgraduate studies elsewhere [20].

The consequences of this staffing gap are not abstract. Field reporting from Tehri, Chamoli, and Pithoragarh districts documents specific instances of women delivering babies without functioning ultrasound equipment, being referred onward from under-staffed district hospitals to Dehradun or missionary hospitals in adjoining districts, and, in the most severe cases, delivering en route because no ambulance or nearby functioning facility was available [19,22]. At Government Doon Medical College Hospital, the state's largest public facility, a hospital-

strengthening review documented instances of deliveries conducted without functioning oxygen points and lighting drawn from torches and candles during power outages [19]. These accounts, while individual and journalistic in nature, are consistent with — and give texture to — the audited, quantitative staffing and infrastructure shortfalls described above.

Table 3. Selected Health Service Indicators by District, Uttarakhand, NFHS-5 (2019–21)

District	Institutional Delivery (%)	4+ AN C Visits (%)	Contraceptive Prevalence Rate (%)	Toilet Access (%)
Almora	87	44	79	—
Bageshwar	86	68	79	—
Chamoli	74	52	74	—
Champawat	80	62	67	—
Dehradun	92	75	78	99
Garhwal (Pauri)	76	40	78	—
Haridwar	80	49	64	—
Nainital	81	60	72	—
Pithoragarh	85	67	71	—

Institutional delivery, the single indicator most directly tied to facility access and skilled birth attendance, ranges from 74 percent in Chamoli district to 92 percent in Dehradun — an eighteen-percentage-point spread within one state [3]. Four-or-more antenatal care visits, a proxy for consistent engagement with the formal health system across a pregnancy rather than a single point-of-contact event, shows an even wider range: from 40 percent in Garhwal district to 77 percent in Rudraprayag [3]. Notably, this pattern does not map neatly onto a simple hill-versus-plains divide: Haridwar, a plains district with comparatively dense facility coverage, records one of the lowest four-visit antenatal care rates (49 percent) and the lowest contraceptive prevalence rate (64 percent) in the state, while Rudraprayag and Bageshwar, both hill districts, record among the highest rates on the same indicators [3]. This finding cautions against a purely terrain-deterministic reading of the state's health disparities and points instead toward locally specific combinations of facility functionality, health-worker presence, and community

5.4 District-Wise Variation in Health Service Utilisation

Aggregated state figures conceal wide variation across Uttarakhand's thirteen districts. Table 3 presents four NFHS-5 indicators — institutional delivery, four-or-more antenatal care visits, contraceptive prevalence, and toilet access — disaggregated by district.

District	Institutional Delivery (%)	4+ AN C Visits (%)	Contraceptive Prevalence Rate (%)	Toilet Access (%)
Rudraprayag	87	77	72	—
Tehri Garhwal	82	49	67	—
Udham Singh Nagar	85	76	67	—
Uttarkashi	86	59	74	86
Uttarakhand (State)	83	62	71	94

Source: reference [3]. Toilet-access figures reported only for the districts with the extreme values cited in the source report (Dehradun and Uttarkashi) and the state average.

health-seeking behaviour that a purely topographic explanation would miss.

Preschool attendance among children aged two to four, an indicator with less direct bearing on clinical care but which reflects the reach of the wider Anganwadi and child-development infrastructure that intersects with primary health delivery, shows the widest disparity recorded in the NFHS-5 Uttarakhand report: from 12 percent in Uttarkashi to 62 percent in Tehri Garhwal [3]. Access to a household toilet facility similarly ranges from 86 percent in Uttarkashi to nearly 99 percent in Dehradun [3], underscoring that infrastructural disadvantage in Uttarakhand's border and high-altitude districts is not confined to clinical health services but extends to the broader environmental determinants of health.

5.5 The Private Sector: Concentration and Emerging Partnership Models

Uttarakhand's private healthcare sector is markedly concentrated in its three most urbanised districts. Dehradun in particular functions as the state's referral

and tertiary-care hub, hosting multispecialty private hospitals such as Max Super Specialty Hospital, Shri Mahant Indresh Hospital, Synergy, Fortis Escorts, and the Himalayan Institute of Medical Sciences, alongside government tertiary institutions including Government Doon Medical College and a regional AIIMS campus [23]. Haridwar and Udham Singh Nagar similarly host a denser private and mission-hospital network than the hill districts, reflecting both population density and stronger road and rail connectivity to the plains. Several of the state's private medical and Ayurvedic colleges — including Shri Guru Ram Rai Institute of Medical and Health Sciences, Himalaya Ayurvedic Medical College, and Patanjali Ayurved College — are similarly clustered in and around Dehradun and Haridwar [24], reinforcing the concentration of both private clinical capacity and private medical education in the state's plains belt.

This geographic skew has long been recognised by state and multilateral planners as both a problem and an opportunity. The World Bank's appraisal for the Uttarakhand Health Systems Development Project explicitly identified the state's private providers as concentrated in urban and plains areas, leaving the underserved mountain population reliant almost exclusively on an under-staffed public system [14]. Rather than treating this concentration as fixed, the project — a US\$125 million initiative jointly financed by a US\$100 million International Development Association credit — sought to stimulate and finance innovative engagement with private providers specifically to extend their reach into remote areas, alongside strengthening the managerial capacity of the state health directorate and its information systems [14,15].

An illustrative outcome of this approach is the public-private partnership model piloted in three district clusters — Ramnagar, Tehri Garhwal, and Pauri Garhwal — each combining a district hospital, two community health centres, and three mobile health vans equipped for outreach care. Following implementation, more than ninety-five percent of specialist posts across the three district hospitals and their attached CHCs were reported filled, compared with an effectively non-functional surgical service beforehand; more than six hundred major surgeries and roughly fifteen hundred minor procedures were subsequently performed at these facilities over three years [9]. This cluster-based PPP model stands as one of the more concrete, evaluable strengths identified in this review, and offers a template — engaging private operators as integrated district-level service providers rather than as stand-alone urban hospitals — that could plausibly be extended to additional hill clusters.

Implementation of the wider project was not without disruption. A 2020 status report noted that

COVID-19 lockdowns and travel restrictions had constrained the Project Implementation Team's ability to oversee district-level activities, delayed recruitment of additional staff, and required a restructuring of project components to align with the state's evolving health-financing landscape following the rollout of the Atal Ayushman Yojana and Ayushman Bharat-PMJAY, even as overall financial commitment against the project rose from twenty percent in April 2020 to seventy-two percent by October of the same year [16]. This trajectory illustrates both the vulnerability of multi-year health system reforms to exogenous shocks and the capacity of state-level implementation teams to accelerate execution once disruption eases.

5.6 Financial Protection: Ayushman Bharat and the Atal Ayushman Uttarakhand Yojana

Financial protection against catastrophic health expenditure is a core pillar of Universal Health Coverage, and it is here that Uttarakhand has pursued one of its more assertive state-level policy responses. The Atal Ayushman Uttarakhand Yojana (AAUY), launched on 25 December 2018, extends cashless hospitalisation of up to ₹5 lakh per eligible family per year at both government and empanelled private hospitals, administered by the State Health Authority headquartered in Dehradun [25]. Distinctively, and unlike the means-tested design of the central Ayushman Bharat-PMJAY scheme in many states, Uttarakhand's state-funded extension was structured to cover a broader population base within the state, subject to exclusion of households already covered under central government, ex-servicemen, or state-employee health schemes [25].

Early implementation drew directly on the district health administration: in Dehradun district alone, 71,306 beneficiaries were initially listed, split between 34,633 rural and 36,673 urban families, with twelve government and eighteen private hospitals empanelled at the scheme's launch and further private hospitals added subsequently, supported by dedicated 'Ayushman Mitra' facilitators stationed in empanelled hospitals to assist patients [26]. At the national level, the parent Ayushman Bharat-PMJAY scheme has grown to cover approximately forty-five percent of India's population and had empanelled some 22,000 government and private hospitals nationally, with more than 1,500 additional private hospitals empanelled in a single reported year [27].

A subsequent policy adjustment illustrates the state's ongoing effort to balance patient access against programme cost control. During the COVID-19 pandemic, Uttarakhand had permitted direct patient access to empanelled private hospitals under the scheme; once the acute phase of the pandemic subsided, the State Health Agency reinstated a referral requirement, mandating that patients first be referred from a government hospital before accessing free

treatment at an empanelled private facility under AAUY, while leaving direct access intact for patients covered under the separate cashless scheme for government employees and pensioners, and for patients attending NABH-accredited private hospitals [28]. This referral policy functions, in effect, as a gatekeeping mechanism intended to reinforce the public system's role as the first point of contact — a policy choice with clear implications for utilisation patterns in districts where the nearest functioning government facility may itself be understaffed, as documented in Section 5.3.

5.7 Governance and Standards: The IPHS Adoption Gap

A cross-cutting governance finding threads through nearly every substantive area examined in this review: the state's slow and incomplete adoption of the Indian Public Health Standards as a binding operational benchmark. The CAG's audit found that, as of March 2020, the state government had not implemented IPHS norms in any of the six district hospitals selected for detailed audit scrutiny, notwithstanding a 2011 government order that had directed the health department to provide services and staffing in line with IPHS, and notwithstanding the department's own claim, made during the audit's exit conference, that IPHS had been formally adopted in October 2019 [5]. The absence of uniform norms applied consistently across out-patient services, in-patient services, human resources, drug and consumable stocking, and equipment procurement was found to leave individual hospitals' staffing and resourcing decisions effectively ad hoc, unconnected to patient load or bed strength, and largely insulated from any systematic gap analysis across the five-year audit period [5].

This governance gap helps explain why infrastructure spending, private-sector engagement, and insurance-based demand-side financing — each independently a defensible policy lever — have not yet combined into a coherent, quality-assured system. Without a binding, monitored standard against which facility performance is measured, additional funding can be absorbed into facilities that remain under-equipped in ways that annual budget statements do not readily reveal, and private-sector partnerships risk being evaluated on access metrics (posts filled, surgeries performed) without a parallel, standardised measure of clinical quality.

6. DISCUSSION: SYNTHESISING GAPS AND STRENGTHS AGAINST THE UHC FRAMEWORK

6.1 Gaps

- Infrastructure deficit against population norms: a shortfall of roughly 38 percent in required PHCs and 18 percent in required CHCs as of the most recent independently audited count [5], concentrated disproportionately in hill

districts where the population per facility is already effectively higher owing to terrain-driven catchment difficulty.

- Human resource vacancy concentrated in the hills: doctor vacancy rates exceeding forty percent statewide and reaching the majority of specialist posts in mountain districts, with at least two-thirds of vacant posts located in the ten hill districts [14,19,20].
- Fiscal absorption capacity: recurring under-utilisation of both state-budgeted and centrally transferred National Health Mission funds, ranging from roughly one-fifth to one-third of available allocations left unspent in several audited years [5], indicating that the binding constraint is as much administrative and procurement capacity as it is the nominal size of the health budget.
- Absence of a binding quality standard: non-adoption of Indian Public Health Standards as an operational, monitored benchmark, leaving facility-level staffing and equipment provisioning without a systematic basis [5].
- Wide, only partially terrain-explained district disparity: an eighteen-point spread in institutional delivery and a thirty-seven-point spread in antenatal care completion across districts, including instances where plains districts underperform hill districts on specific indicators, pointing to localised service-delivery and health-seeking-behaviour factors that a purely geographic explanation cannot capture [3].

6.2 Strengths

- Demonstrated improvement on core outcome trends: institutional delivery rose fourteen percentage points and full immunisation coverage rose twenty-three percentage points between NFHS-4 and NFHS-5, alongside a substantial decline in unmet need for family planning [3].
- An evaluable, replicable public-private partnership model: the Ramnagar-Tehri Garhwal-Pauri Garhwal cluster approach achieved over ninety-five percent specialist-post fill rates and enabled major surgical capability where none had previously existed, offering a concrete template for extension to additional hill clusters [9].
- An assertive, broader-than-national state insurance scheme: the Atal Ayushman Uttarakhand Yojana extends ₹5 lakh cashless family coverage with a growing private empanelment base, backed by dedicated patient-facilitation staff (Ayushman Mitras) at the point of care [25,26].

- Sustained multilateral investment and technical partnership, including a US\$125 million World Bank-financed systems development project explicitly oriented toward Universal Health Coverage as its stated development objective, with a specific mandate to extend service reach into remote populations [14,16].

6.3 Reading the Findings Against the UHC Cube

Mapped onto the population-breadth, service-depth, and financial-protection axes of the standard UHC framework, Uttarakhand's health system shows uneven progress along each dimension. Financial protection has advanced furthest, through AAUY's relatively generous, broadly defined coverage. Population breadth is nominally near-universal in insurance-enrolment terms but is undercut, in practice, by the referral-gatekeeping requirement reinstated after the pandemic, which channels beneficiaries back through a public system whose own capacity — as Sections 5.2 and 5.3 document — remains constrained in precisely the districts where private empanelment is thinnest. Service depth is the axis on which the district-wise evidence in this paper raises the greatest concern: a facility that exists on paper but lacks a filled specialist post, or a hospital that has adopted IPHS in name but not in monitored practice, extends the appearance of coverage without its substance. Uttarakhand's experience therefore illustrates a broader lesson for hilly and low-density Indian states: expanding the population nominally covered by insurance is a necessary but insufficient condition for UHC, and must be matched by parallel investment in the depth and consistency of the service to which that population is being referred.

7. ROADMAP TO UNIVERSAL HEALTH COVERAGE: POLICY RECOMMENDATIONS

7.1 Close the Facility Gap Through Terrain-Weighted Norms

Population-based IPHS norms, designed with plains catchment assumptions in mind, should be supplemented by a terrain-weighted planning norm for hill districts that accounts for effective travel time rather than straight-line population catchment alone. Prioritising the completion of the outstanding 159 PHCs and 19 CHCs identified against the 2019 shortfall [5] in the ten hill districts, rather than allocating new construction proportionally across all thirteen districts, would target investment toward the areas where the evidence in this review identifies the greatest unmet need.

7.2 Institutionalise Hill-Specific Human Resource Incentives

The persistence of vacancy rates above forty percent for general medical posts and above seventy percent for specialists in hill postings, despite existing contractual-hire and incentive-pay policies [14], indicates that current incentive design has not been

sufficient. A dedicated hill health cadre — with guaranteed postgraduate study leave after a defined service period (addressing the specific attrition pathway identified in field reporting [20]), assured housing and basic amenities at the facility itself, and transparent, seniority-linked pathways back to plains postings — would address the qualitative drivers of attrition documented in this review rather than relying on pay incentives alone.

7.3 Make IPHS Adoption Binding and Monitored

Given the CAG's finding that claimed IPHS adoption in 2019 had not translated into implemented practice by 2020 [5], the state should establish an independent, periodically reported facility-quality audit — modelled on national programmes such as Kayakalp and the National Quality Assurance Standards already referenced in the CAG's own audit criteria — with published, district-wise scorecards. Linking a portion of NHM fund release to demonstrated IPHS compliance, rather than to construction milestones alone, would help convert the state's high rate of unspent NHM allocation (22–32 percent annually) [5] into quality-linked rather than purely quantity-linked expenditure.

7.4 Scale the Cluster Public-Private Partnership Model

The Ramnagar–Tehri Garhwal–Pauri Garhwal cluster model's documented outcomes — near-total specialist-post fill rates and a substantial rise in surgical throughput [9] — provide a locally validated template. Extending comparable clusters, anchored on a district hospital with attached CHCs and mobile health vans for outreach, to additional hill districts such as Chamoli and Pithoragarh, where this review's district-wise data show comparatively weaker antenatal and delivery-care indicators (Section 5.4), would apply a proven model where the evidence suggests it is most needed.

7.5 Rebalance the Referral Gatekeeping Policy with Public-System Readiness

The reinstated referral requirement for AAUY-funded private treatment [28] is a reasonable cost-containment measure in principle, but its equity implications depend entirely on the functional capacity of the public facility patients are required to visit first. A phased approach — retaining direct private access in districts where public-facility specialist vacancy exceeds a defined threshold, while applying the referral requirement in districts with adequately staffed public facilities — would align the policy's gatekeeping function with the uneven ground-level capacity this paper documents, rather than applying a uniform rule across a highly non-uniform facility base.

7.6 Strengthen District-Level Fiscal Absorption Capacity

Because under-utilisation of released funds recurs across both state budget and NHM funding streams [5], capacity-building for procurement planning, works

execution, and expenditure reporting at the district and facility level is likely to yield returns comparable to, or greater than, simply increasing nominal allocations. Dedicated procurement and project-management support embedded within district health societies, of the kind partially modelled by the World Bank-financed Project Implementation Team [16], could be extended as a standing rather than project-limited function.

7.7 Institutionalise District-Wise Monitoring as Standard Practice

Finally, the disparities surfaced in this paper — an eighteen-point spread in institutional delivery, a thirty-seven-point spread in antenatal care completion, and a fifty-point spread in preschool attendance across districts [3] — argue for district-wise reporting, rather than state-aggregate reporting alone, to become the default unit of public accountability for Uttarakhand's health system. A publicly accessible, regularly updated district health dashboard, cross-referencing facility staffing, IPHS compliance, and core outcome indicators, would allow both state policymakers and citizens to track whether investment is reaching the districts where the evidence assembled in this review shows it is most needed.

8. LIMITATIONS OF THIS STUDY

This review has several limitations inherent to a secondary-data synthesis. The infrastructure and financial data drawn from the CAG's 2021 audit reflect the period up to March 2019 and a sample of six of the state's eighteen district hospitals; more recent facility-count and staffing data, where available through state departmental records, may show movement in either direction and were not accessible for independent verification within the scope of this paper. NFHS-5 fieldwork was itself interrupted by the COVID-19 lockdown, a discontinuity the source survey's own authors flag as a caution for interpretation [3]. Journalistic field reporting, while valuable for illustrating audited findings with situational detail, was used only in a corroborative capacity and should not be read as independently verified quantitative evidence. Finally, this study is descriptive rather than causal in design; while district-wise patterns are documented and discussed in relation to plausible explanatory factors such as terrain and staffing, the analysis does not establish statistical causation between any single infrastructural variable and health outcomes, and future research employing multivariate or panel-data methods would be well placed to test the associations proposed here.

9. CONCLUSION

Uttarakhand's health system presents a case study in the limits of state-level aggregation for understanding health system strength in a topographically divided setting. Improving trend lines on institutional delivery, immunisation, and contraceptive use sit alongside a

composite health index ranking in the bottom third of large Indian states, and both are, in turn, underpinned by a documented shortfall in prescribed primary and secondary care infrastructure, acute and geographically concentrated human-resource vacancies in the state's ten hill districts, recurring under-utilisation of allocated health funds, and incomplete adoption of binding quality standards. District-wise disaggregation of NFHS-5 indicators shows that these constraints translate into service-utilisation gaps that can exceed thirty percentage points between the best- and worst-performing districts on the same indicator, a degree of internal disparity that state-level averages entirely conceal.

At the same time, this review has identified concrete, evaluable strengths on which a roadmap to Universal Health Coverage can be built: a public-private partnership cluster model with demonstrated success in three hill districts, a state-funded insurance scheme offering coverage broader than many comparable state programmes, and sustained multilateral technical and financial partnership explicitly oriented toward UHC as a stated objective. The path forward outlined in this paper — terrain-weighted infrastructure planning, a dedicated hill health workforce cadre, binding and monitored quality standards, scaled public-private partnership clusters, capacity-adjusted referral policy, strengthened fiscal absorption, and institutionalised district-wise monitoring — is not a call for new instruments so much as a call to extend, target, and enforce instruments the state has already begun to build. For Uttarakhand, as for other Himalayan states pursuing the same goal, the evidence assembled here suggests that Universal Health Coverage will be achieved not at the state level in the abstract, but district by district, facility by facility, and post by post.

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