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Assessing The Influence Of Healthcare Infrastructure On Infant Mortality In Urban And Rural Uttarakhand: An Overview

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Abstract: This review examines how healthcare infrastructure affects infant mortality rates (IMR) in urban and rural Uttarakhand, focusing on maternal care services. Despite maternal health progress, rural-urban disparities persist, driving higher rural IMR. Government initiatives like Janani Suraksha Yojana (JSY) and Janani Shishu Suraksha Karyakram (JSSK) promote institutional deliveries and financial support, linking improved maternal care to lower IMR. Recommendations include strengthening rural healthcare, enhancing maternal services, and improving nutrition to reduce disparities and improve outcomes. Sustained government and community efforts are vital.

Keywords: Healthcare, Infrastructure, Infant Mortality, Maternal Care Services, Public Health Policy, Urban-Rural Disparities.

Introduction

Uttarakhand a hilly Indian state has made significant strides in healthcare infrastructure particularly through the National Health Mission (NHM 2021). However, disparities between urban and rural areas persist especially in maternal care services (Bhatia et al 2021). Infant mortality a critical health indicator (IIPS and ICF 2021) is influenced by socioeconomic and healthcare factors. Uttarakhand's diverse topography presents unique challenges and opportunities for healthcare delivery particularly in maternal care. This article examines the correlation between healthcare infrastructure and infant mortality rates in Uttarakhand focusing on the availability and accessibility of maternal care services (Government of India 2022).

This article seeks to explore the intricate relationship between healthcare infrastructure and infant mortality rates in Uttarakhand with a specific focus on the availability and accessibility of maternal care services.

Methodology

The review assessed healthcare infrastructure's impact on IMR in Uttarakhand using PubMed, Scopus, and Google Scholar. Studies from the last 3-5 years on Uttarakhand were included, focusing on disparities, accessibility, and outcomes. Data highlighted rural healthcare limitations, staffing shortages, and urban advantages. Gaps in long-term policy impact were noted, with recommendations for rural infrastructure and training.

Healthcare infrastructure in Uttarakhand

Urban areas like Dehradun have better healthcare access than rural regions, where PHCs and Sub-centres are under-resourced (Bhatia et al 2021). NFHS-5 shows rural challenges in maternal and child health, worsened by terrain. Table 1 lists facilities: 18 District Hospitals, 7 Sub-District Hospitals,

394 PHCs, 715 SHCs, 1147 HWCs, 38 UPHCs, 78 CHCs, 5 Medical Colleges, and 69 Nursing Schools (NHM Uttarakhand). RCH camps target 95 blocks to improve services and reduce TFR from 2.55 to 2.1 (Dhiman & Pandey 2022). (Table 1).

Table 1. Healthcare infrastructure in Uttarakhand

Healthcare Facility	Number of Units	Details	Source
District Hospitals	18	Provide general medical care and services; located in key districts like Dehradun Nainital and Haridwar.	NHM Uttarakhand
Sub-District Hospitals	7	Planned in districts like Pauri and Rudraprayag offering 50-200 beds.	NHM, Uttarakhand; The Pioneer 2023
Primary Health Centres (PHCs)	394	PHCs provide primary healthcare services and are being upgraded under the NHM to meet Indian Public Health Standards.	NHM Uttarakhand
Sub Health Centres (SHC)	715	SHCs implement various national health initiatives.	NHM Uttarakhand
Health and Wellness Centres (HWC)	1147	HWCs are providing services to improve healthcare accessibility.	NHM Uttarakhand
Urban Primary Health Centres (UPHC)	38	UPHCs functioning focusing on urban populations.	NHM Uttarakhand
Community Health Centres (CHCs)	78	CHCs are higher referral centers that provide specialized healthcare and are critical in rural and semi-urban regions.	NHM Uttarakhand
Medical Colleges	5	Includes government medical colleges like the one in Srinagar under development to improve healthcare capacity and blood bank facilities.	NHM Uttarakhand
Nursing Schools	69	Nursing education programs affiliated with government hospitals and private institutions.	District
Maternity Centres	Various	Under the Janani Shishu Suraksha Karyakram (JSSK) these centers focus on maternal and infant healthcare.	NHM Uttarakhand

The key aspects of the healthcare infrastructure in Uttarakhand are listed in Table 2

Table 2. Key aspects of healthcare infrastructure in Uttarakhand

Facility Type	Details
Primary Health Centres (PHCs)	Spread across the state with improvements underway as part of the National Health Mission (NHM) to meet public health standards in every block (https://nhm.uk.gov.in/).
Community Health Centres (CHCs)	Multiple CHCs are being upgraded to provide better healthcare services particularly in underserved regions (https://nhm.uk.gov.in/; The Pioneer 2003).
Sub-District Hospitals	New 50-bed hospitals approved in Thalisain (Pauri) Guptkashi (Rudraprayag) and Kashipur (200-bed) (The Pioneer 2023).
Medical Colleges	Government Medical College in Srinagar is being developed to include a center of excellence for a blood bank (The Pioneer 2023).
District Hospitals	New developments in Nainital and Rudraprayag districts to expand healthcare services including OPD buildings medicine stores and transit hostels (The Pioneer 2023 https://www.dailypioneer.com/2023/state-editions/centre-approves-rs-1-100-crore-for-improving-state-s-health-infrastructure.html).
Maternal & Child Health	Programs like Janani Shishu Suraksha Karyakram (JSSK) aim to reduce maternal and infant mortality (https://nhm.uk.gov.in/).
Specialty Healthcare	Proposals approved for cardiac care units TB sanatorium upgrades and specialist doctor recruitments (The Pioneer 2023; https://nhm.uk.gov.in/).

Public Healthcare System

Uttarakhand's public healthcare operates through a tiered system: PHCs and CHCs provide basic services, immunizations, and maternal/child care; District Hospitals offer advanced care; Sub-District Hospitals and FRUs handle complex deliveries. Challenges include insufficient staff in rural areas, limited diagnostic facilities, and geographical barriers affecting access.

National Health Mission (NHM) in Uttarakhand

NHM enhances healthcare access, focusing on maternal, neonatal, and child health (Government of Uttarakhand 2021). Key initiatives: JSY and JSSK promote institutional deliveries; RCH Camps provide antenatal care and family planning in remote areas; Ayushman Bharat (PMJAY) targets vulnerable populations.

Healthcare in Rural vs. Urban Areas

Urban areas (e.g., Dehradun, Haridwar) have better healthcare access, including private facilities, diagnostics, and emergency care. Rural areas (e.g., Chamoli, Pithoragarh) face poor connectivity, staffing shortages, and limited infrastructure, leading to higher maternal and infant mortality (NHM 2021).

Private Sector Healthcare

Private healthcare, concentrated in urban areas, offers specialized care but is costly, posing challenges for rural residents reliant on public systems.

Challenges and Government Interventions

Challenges include staff shortages, poor transport, and rural inequity. The UKHSDP strengthens infrastructure, especially rurally (IIPS 2021). Despite NHM and UKHSDP progress, geographic and socio-economic barriers persist, requiring focus on rural maternal/child health (Kumar & Gupta 2020).

Urban vs. Rural disparities in healthcare access

Urban areas have 88.6% institutional deliveries versus 73.2% in rural areas (NFHS-5), reflecting better infrastructure and staffing. Rural regions face shortages, poor roads, and limited ANC, increasing IMR (NHM 2021). Telemedicine is limited rurally due to connectivity issues.

Healthcare Infrastructure and Availability

Urban Areas: Cities and towns typically have better healthcare infrastructure with access to multispecialty hospitals private clinics advanced diagnostic facilities and specialist doctors. Urban centres such as Dehradun Haridwar and Haldwani in Uttarakhand have a higher concentration of medical facilities making healthcare more accessible and diverse (NHM 2021).

Rural Areas: Villages and remote areas in the hilly regions of Uttarakhand often suffer from a shortage of healthcare centres especially secondary and tertiary care hospitals. Primary healthcare services in rural areas are usually limited to Primary Health Centres (PHCs) and Community Health Centres (CHCs) which often lack advanced medical equipment diagnostic services and specialist doctors (NHM 2021).

Access to Maternal and Child Health Services

Urban: Urban residents particularly those from higher socio-economic backgrounds generally have better access to antenatal care postnatal care and institutional deliveries. This contributes to lower maternal and infant mortality rates in urban areas with easier access to emergency obstetric care and neonatal services (National Health Mission Uttarakhand 2022).

Rural: Rural areas face significant challenges in ensuring access to maternal healthcare services. Due to poor infrastructure women in rural areas are often unable to access antenatal check-ups and are more likely to deliver at home or in under-equipped facilities. This leads to higher maternal mortality rates and infant mortality rates in rural Uttarakhand (National Health Mission Uttarakhand 2022).

Healthcare Workforce and Expertise

Urban: Urban centres tend to attract more healthcare professionals including specialists leading to shorter wait times for services and better quality of care. The availability of skilled professionals such as gynaecologist, paediatricians and surgeons in urban hospitals improves overall healthcare outcomes.

Rural: Rural regions often face a shortage of healthcare professionals including doctors' nurses and paramedics. Many rural healthcare centres in Uttarakhand lack specialist doctors which exacerbates healthcare inequalities. Additionally healthcare workers in rural areas are often overburdened and under-resourced.

Transportation and Accessibility

Urban: In cities and towns healthcare facilities are easily accessible via well-developed road networks. The availability of public transportation and ambulance services further enhances access to healthcare especially during emergencies.

Rural: Rural areas particularly in the hilly terrain of Uttarakhand suffer from poor road connectivity and limited transportation options. In many cases villagers have to travel long distances to reach the nearest healthcare facility delaying treatment and increasing the risk of adverse health outcomes.

Socio-Economic Factors

Urban: Urban populations generally have higher health literacy income levels and insurance coverage making it easier to afford and seek healthcare services. Programs such as Ayushman Bharat offer urban low-income families access to free healthcare in empanelled hospitals.

Rural: Lower socio-economic status compounded by geographic isolation affects the ability of rural populations to afford healthcare services. Out-of-pocket expenses remain high for many rural families who may not have access to government insurance schemes or free healthcare.

Digital Health and Telemedicine

Urban: Urban residents have greater access to telemedicine services which have been growing in recent years particularly after the COVID-19 pandemic. Digital health initiatives are more prevalent in urban areas due to better internet connectivity and smartphone penetration (NHM 2020).

Rural: Rural areas face digital infrastructure challenges including limited internet access and low digital literacy which hampers the adoption of telemedicine. This limits the ability of rural populations to benefit from remote consultations and digital healthcare initiatives (NHM 2020).

Policy and Government Initiatives

Urban: Government health schemes like Janani Suraksha Yojana (JSY) and Ayushman Bharat have benefited urban populations with greater awareness and accessibility to these programs (National Health Mission Government of India 2020).

Rural: While schemes like NHM (National Health Mission) aim to improve rural healthcare access their impact is often limited by logistical challenges. The Uttarakhand Health Systems Development Project (UKHSDP) is working to strengthen healthcare infrastructure in rural areas but gaps remain (NHM 2020). Addressing the urban-rural healthcare disparities in Uttarakhand requires concerted efforts to improve infrastructure healthcare workforce distribution and accessibility to services. Strengthening primary healthcare in rural areas improving transportation and telemedicine access and ensuring equitable distribution of government healthcare resources are crucial for bridging the gap.

MATERNAL CARE SERVICES: A CRUCIAL FACTOR: Maternal care (ANC, skilled birth attendance, PNC) reduces IMR. Urban areas benefit from JSY, while rural access is hindered by transport and staffing gaps (NHM 2022). Only 58% of rural mothers get PNC within 48 hours versus 78% urban (Pandey & Dhiman 2022).

Antenatal Care (ANC)

Antenatal care is vital for monitoring the health of the mother and foetus during pregnancy. It helps in identifying potential complications such as anaemia gestational diabetes and hypertension which if untreated can lead to adverse pregnancy outcomes. Regular antenatal visits also provide an opportunity for vaccinations (e.g. tetanus) nutritional advice and educational guidance

reducing risks during childbirth (Office of the Registrar General & Census Commissioner India 2021 National Institute of Health and Family Welfare 2022).

In urban areas access to antenatal services is generally more robust with specialized care available in multi speciality hospitals. Most urban women have access to four or more ANC visits as recommended by the World Health Organization (WHO 2021).

In rural areas however geographical barriers poor transport infrastructure and a shortage of healthcare facilities limit access to proper ANC. The NFHS-5 data highlights a gap in the number of ANC visits between urban and rural mothers contributing to higher maternal and infant mortality rates in rural regions (WHO 2020).

Skilled Birth Attendance and Institutional Deliveries

The presence of skilled birth attendants during delivery significantly lowers the risk of complications such as obstructed labour excessive bleeding or infection. Institutional deliveries supported by adequate healthcare infrastructure and emergency obstetric care are key to reducing maternal and neonatal deaths (Office of the Registrar General & Census Commissioner India 2021).

Urban Uttarakhand has a higher rate of institutional deliveries with access to better-equipped hospitals and skilled healthcare professionals. The Janani Suraksha Yojana (JSY) has been instrumental in promoting institutional deliveries among urban populations (NHM 2021).

In rural Uttarakhand institutional delivery rates are lower mainly due to long distances to healthcare facilities and inadequate transportation. Traditional home births with untrained midwives are still prevalent in remote areas increasing the risk of maternal and infant mortality (NHM 2021).

Postnatal Care (PNC)

Postnatal care is essential for monitoring the health of both mother and newborn in the critical weeks following delivery. Early postnatal care can prevent complications such as infections post-partum haemorrhage and neonatal health issues like sepsis and pneumonia (Pandey & Dhiman 2022).

In urban areas postnatal services are better utilized due to higher awareness and easier access to healthcare services.

In rural regions the uptake of postnatal care services is significantly lower. Women in remote villages often do not receive the recommended postnatal check-ups leading to undetected complications that can cause maternal or neonatal fatalities.

Government Initiatives

Several government initiatives have been implemented to improve maternal care services and ensure safer deliveries across both urban and rural areas (NHM 2020; 2021; Pandey & Dhiman 2022):

Janani Shishu Suraksha Karyakram (JSSK): A scheme to provide free maternity services including institutional deliveries and emergency care for pregnant women.

Pradhan Mantri Matru Vandana Yojana (PMMVY): A conditional cash transfer scheme aimed at pregnant and lactating mothers incentivizing antenatal care and institutional deliveries.

Maternal care services are a cornerstone of healthcare infrastructure and have a direct impact on infant mortality rates. While urban areas in Uttarakhand benefit from better access to healthcare services rural regions still face significant challenges. Addressing these disparities through improved infrastructure increased healthcare workforce availability and enhanced maternal care services is crucial for reducing both maternal and infant mortality in the state (Puri & Chauhan 2018; Sharma et al. 2019; Pandey & Gupta 2020; Rawat et al. 2020; Pandey & Dhiman 2022).

INFANT MORTALITY AND MATERNAL CARE CORRELATION

Uttarakhand's IMR is 30/1000 live births (NFHS-5), higher rurally due to preventable causes like asphyxia and sepsis, linked to poor maternal care (Puri & Chauhan 2018). Adequate ANC, institutional deliveries, and PNC lower risks, but

rural gaps persist (Sharma et al. 2021).**Antenatal Care (ANC) and Infant Mortality**

Adequate antenatal care ensures that health complications during pregnancy are detected and managed early which is crucial for improving birth outcomes. The World Health Organization (WHO) recommends at least four ANC visits during pregnancy. Studies consistently show that mothers who receive fewer ANC visits are at a higher risk of experiencing complications during delivery which in turn can result in stillbirths or neonatal deaths (Sharma & Chhabra 2020; NHM 2021).

Urban vs. Rural Access: In urban areas of Uttarakhand more women receive the recommended ANC contributing to lower infant mortality rates. In contrast rural women often have limited access to these services due to geographical barriers poverty and a shortage of healthcare facilities resulting in higher infant mortality rates (NHM 2020; 2021).

Institutional Deliveries and Infant Survival

Institutional deliveries where skilled healthcare professionals assist in childbirth within a healthcare facility are critical in reducing infant mortality. The presence of trained healthcare providers ensures timely interventions in case of delivery complications like obstructed labour preterm birth or neonatal asphyxia significantly improving infant survival rates.

Urban Areas: Higher institutional delivery rates contribute to improved infant survival in urban settings where access to advanced medical facilities is better. Women in urban areas of Uttarakhand have easier access to hospitals and trained healthcare personnel (Sharma & Kumar 2022).

Rural Areas: In rural areas the prevalence of home births attended by untrained birth attendants increases the risk of birth complications contributing to higher rates of neonatal deaths. Government initiatives like the Janani Suraksha Yojana (JSY) have improved institutional deliveries but gaps remain in rural Uttarakhand Sharma & Singh 2021; Sharma et al. 2021).

Postnatal Care (PNC) and Neonatal Health

Postnatal care plays a crucial role in preventing neonatal infections and other complications during the critical first weeks of a newborn's life. Lack of postnatal care has been associated with high neonatal mortality as conditions like sepsis respiratory issues and jaundice can go undiagnosed (Singh & Singh 2021).

Urban vs. Rural: While urban populations often have easier access to postnatal check-ups and paediatric care many rural mothers in Uttarakhand do not receive adequate postnatal visits due to limited healthcare infrastructure. This disparity leads to higher rates of preventable neonatal deaths in rural areas (NHM 2021).

Nutritional and Health Status of Mothers

The health and nutritional status of mothers during pregnancy significantly affect infant mortality rates. Undernourished mothers are more likely to give birth to low-birth-weight infants who are at greater risk of dying in infancy. Anemia common among pregnant women in rural areas due to poor nutrition is another risk factor for complications that can result in infant mortality (NHM 2020; 2021).

Urban Women: Urban mothers often have better access to nutritional supplements and healthcare leading to better pregnancy outcomes.

Rural Women: In contrast rural mothers in Uttarakhand face greater nutritional deficiencies and less access to health services contributing to higher rates of low-birth-weight infants and subsequent infant mortality.

Government Initiatives and Policy Interventions: Several government schemes target the reduction of maternal and infant mortality by improving access to maternal care services:

Janani Shishu Suraksha Karyakram (JSSK): Provides free services to pregnant women including free transport and delivery care.

Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA): Ensures pregnant women receive at least one comprehensive check-up in their second or third trimester. These initiatives have helped lower infant mortality rates in both urban and rural areas but more focused efforts are needed in rural

Uttarakhand to close the gap between the two regions.

The correlation between maternal care and infant mortality in Uttarakhand is clear: better access to antenatal delivery and postnatal care significantly reduces the risk of infant mortality. While urban areas benefit from better healthcare infrastructure rural areas face challenges that directly impact the survival rates of infants. Bridging the gap in maternal care services through targeted interventions is essential to reducing infant mortality across the state.

GOVERNMENT INITIATIVES AND THEIR IMPACT

JSY raised institutional deliveries to 75.7% (NFHS-5), with Dehradun at 83.5% and Garhwal at 49%. JSSK and PMSMA improve access and ANC quality, while nutrition programs address maternal health (NHM 2021). Rural impact lags due to infrastructure issues.

Janani Suraksha Yojana (JSY)

The JSY is a flagship scheme under the National Health Mission aimed at promoting institutional deliveries by providing financial assistance to pregnant women. The initiative is particularly targeted at economically disadvantaged women encouraging them to seek professional healthcare during childbirth (UNICEF India 2021).

Impact: JSY has significantly increased the rate of institutional deliveries in Uttarakhand contributing to lower maternal and infant mortality rates. According to the **National Family Health Survey (NFHS-5)** the percentage of institutional deliveries in Uttarakhand rose from 52.3% in NFHS-4 (2015-16) to 75.7% in NFHS-5 (2019-21). As per NFHS-5 the highest percentage is observed in Dehradun (83.5%) while the lowest is in Garhwal (49%). Overall 68.8% of women in Uttarakhand had their first ANC visit in the first trimester. Bageshwar leads with 91% and Garhwal has the lowest at 83.5%. The state average stands at 88.3% indicating good coverage for tetanus vaccinations. Dehradun shows the highest percentage (98.4%) while Garhwal is again the lowest at 90.5%. The overall state percentage is 93.6% reflecting effective maternal vaccination strategies. Champawat has the highest percentage at 57.7% while Garhwal shows the least at 40.2%. The overall state average is 46.5% suggesting room for improvement in iron supplementation. The highest percentage is found in Bageshwar (25.1%) with Garhwal at the lowest (14.9%). The average in Uttarakhand is 25% indicating variability in adherence to iron-folic acid supplementation. The data indicates (**Fig 1**) a strong performance in early antenatal care and vaccination rates especially in urban districts like Dehradun. There is variability in the uptake of IFA supplements and intestinal parasite treatments suggesting a need for targeted health education and resource allocation in districts with lower percentages. Continued efforts are necessary to enhance maternal health services particularly in areas where coverage is less than optimal.

NFHS-5 of Uttarakhand for health insurance indicates that the public health sector provides substantial coverage with 45.7% in rural areas compared to 41.1% in urban areas. This indicates a reliance on government health services especially in rural settings. The private health sector accounts for 53.5% of healthcare utilization across Uttarakhand with a higher percentage in urban areas (56.1%) compared to rural areas (52.3%). This suggests that many households prefer private facilities possibly due to perceived better quality of care. While government facilities (hospitals dispensaries and community health centres) serve a significant portion of the population their coverage is lower in urban areas compared to rural areas highlighting the challenges faced by government healthcare providers in urban settings.

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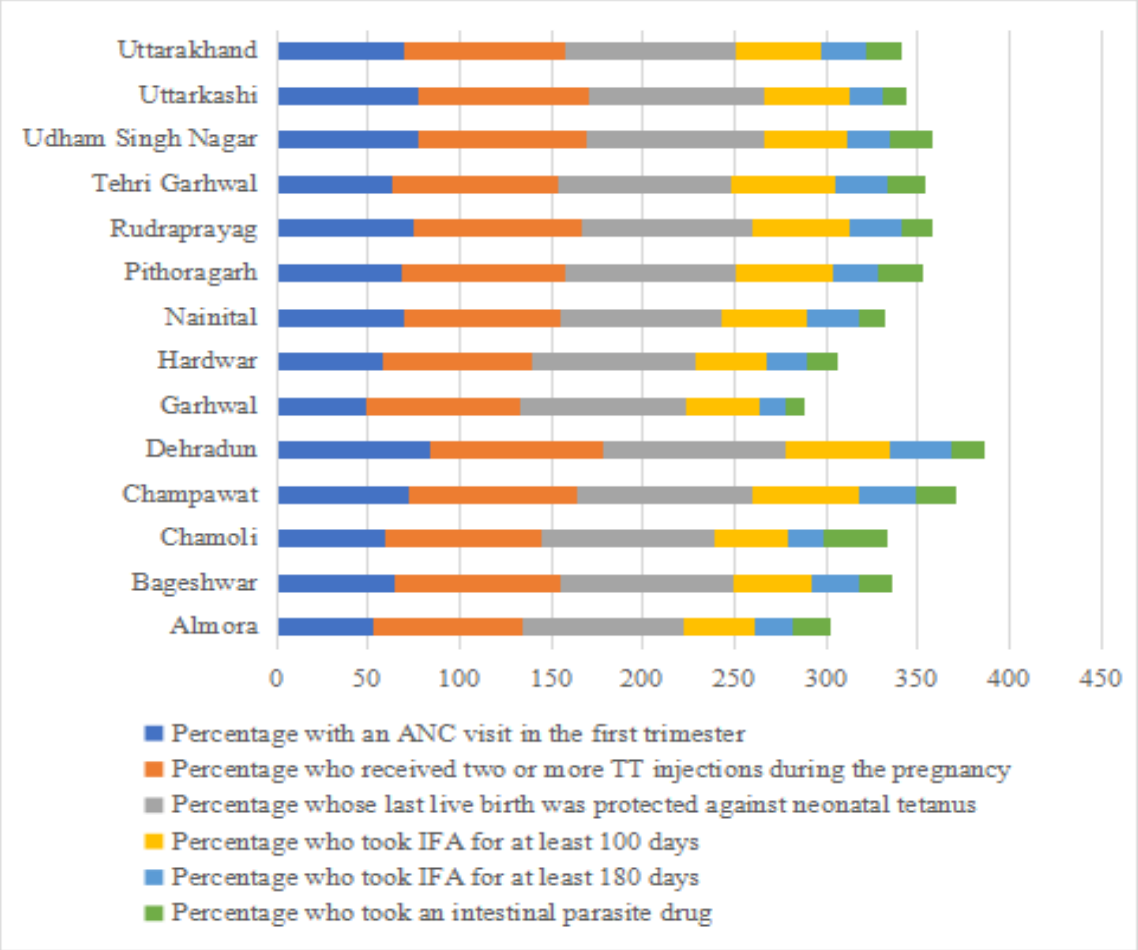

Fig 1:. District wise Antenatal Care in Uttarakhand as per NFHS-5

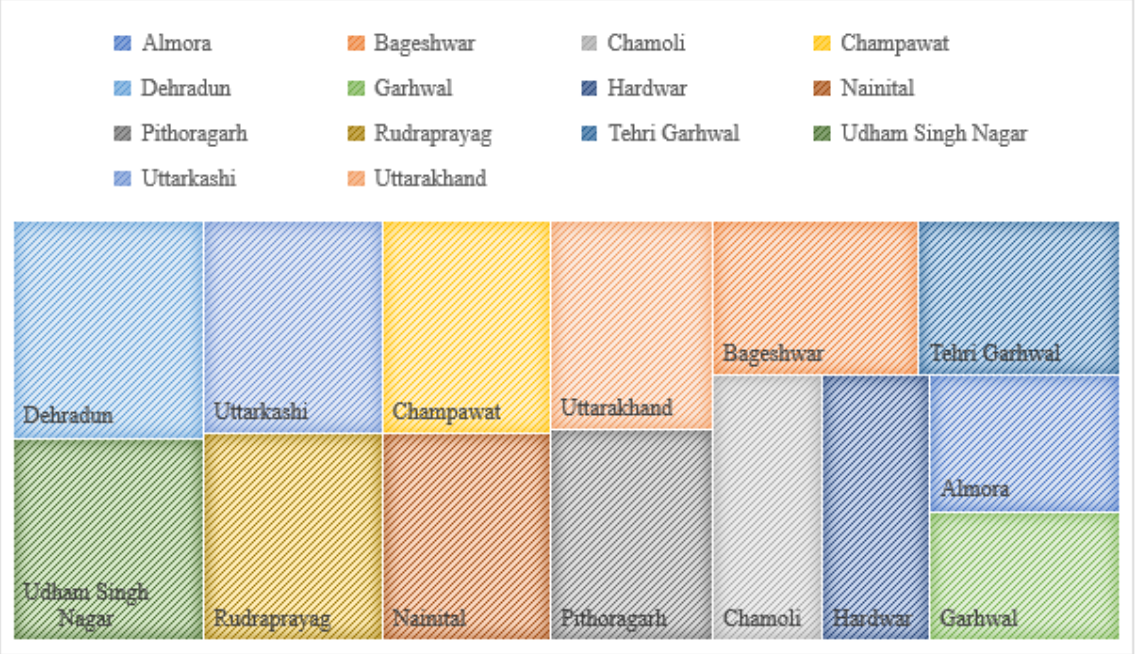

Fig 2:. District wise Antenatal Care indicators in Uttarakhand as per NFHS-5

The data shows (**Table 3**) minimal use of AYUSH (Ayurveda Yoga Unani Siddha and Homeopathy) practitioners with less than 1% of households relying on them for healthcare services. A small percentage of households (1.2% total) reported utilizing other sources for health services such as shops or home treatments which reflects a broader strategy for accessing healthcare outside formal settings. The reliance on the private health sector may indicate a demand for improved services or dissatisfaction with public facilities. Policymakers should consider strategies to enhance the quality and accessibility of public health services to ensure equitable healthcare coverage especially for rural populations.

Table 3. Source of health care and health insurance coverage among households

Source	Urban (%)	Rural (%)	Total (%)
Public health sector	41.1	45.7	44.2
Government/municipal hospital	25.2	18.1	20.4
Government dispensary	1.7	1.0	1.2
UHC/UHP/UFWC	0.8	0.3	0.5
CHC/rural hospital/block PHC	10.4	17.2	15.0
PHC/additional PHC	2.1	6.7	5.2
Sub-centre	0.7	1.8	1.5
Vaidya/hakim/homeopath (AYUSH)	0.1	0.5	0.4
Government mobile clinic	0.0	0.0	0.0
Other public health sector	0.1	0.0	0.1
NGO or trust hospital/clinic	0.8	0.4	0.6
Private health sector	56.1	52.3	53.5
Private hospital	17.1	13.0	14.4
Private doctor/clinic	38.7	39.0	38.9
Private paramedic	0.1	0.1	0.1
Vaidya/hakim/homeopath (AYUSH)	0.1	0.1	0.1
Other private health sector	0.1	0.1	0.1
Other source	1.5	1.1	1.2
Shop	0.0	0.0	0.0
Home treatment	0.9	0.9	0.9
Other	0.6	0.1	0.3
Total	**100**	**100**	**100**

Janani Shishu Suraksha Karyakram (JSSK)

This program provides free medical care to pregnant women and sick newborns including free transportation delivery care and postnatal services. It aims to eliminate out-of-pocket expenses for maternal and child healthcare (NHM 2020;2021).

Impact: JSSK has improved access to healthcare facilities particularly in rural areas where transportation is often a barrier. The program has led to increased awareness and utilization of maternal care services helping to decrease both maternal and infant mortality.

Pradhan Mantri Surakshit Matritva Abhiyan (PMSMA)

Launched in 2016 the PMSMA aims to provide comprehensive prenatal care to pregnant women especially during the second and third trimesters. The initiative includes monthly health check-ups and follow-ups to monitor maternal health.

Impact: The PMSMA has enhanced the quality of antenatal care services leading to

better maternal and neonatal health outcomes. It has also raised awareness about the importance of regular check-ups during pregnancy contributing to a decline in complications (NHM 2020).

Maternal and Child Health (MCH) Program

This program integrates various components of maternal and child health services focusing on improving the health status of mothers and children through enhanced healthcare delivery.

Impact: The MCH program has facilitated better coordination among healthcare providers resulting in improved service delivery and an increase in the uptake of maternal healthcare services in both urban and rural areas (NHM 2021).

Nutrition Programs

The government has also implemented nutrition-specific interventions to address issues of maternal malnutrition and anaemia which are critical factors affecting both maternal and infant health.

Impact: Programs like the Integrated Child Development Services (ICDS) and the National Nutrition Mission (NNM) focus on providing nutritional support and education to pregnant women improving their overall health and reducing the risk of low-birth-weight infants (NHM 2021).

The impact of these government initiatives in Uttarakhand has been significant in improving maternal care services and reducing infant mortality rates. By focusing on institutional deliveries comprehensive maternal healthcare and nutritional support these programs contribute to better health outcomes for mothers and infants. However ongoing challenges in rural areas necessitate continuous monitoring and enhancement of these initiatives to achieve equitable healthcare access for all (WHO 2021).

Recommendations: Enhance rural healthcare with more facilities and mobile units. Train ASHAs/ANMs, raise awareness, and expand nutrition support. Improve monitoring, intersectoral coordination, and program sustainability.

Conclusion: Uttarakhand's healthcare disparities, particularly in rural areas, contribute to high infant mortality rates (IMR). Maternal care services, critical to infant outcomes, have improved through initiatives like Janani Suraksha Yojana and Janani Shishu Suraksha Karyakram, increasing institutional deliveries. However, rural infrastructure and maternal care require strengthening, alongside training, awareness, and nutrition support. A multifaceted approach with robust monitoring and coordination can reduce IMR and enhance maternal and infant health equitably.

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