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Research Paper

Assessing Infrastructure and Health Services Impact on Socio-Economic Development: Insights from Ambedkar Nagar District, Uttar Pradesh

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Abstract: *Socio-economic development is intricately linked to the availability and quality of infrastructure and healthcare services. Utilizing an integrated analytical framework, this study assesses the role of physical infrastructure, such as roads, electricity, and sanitation, and health service accessibility in influencing key socio-economic outcomes in the socio-economic advancement of Ambedkar Nagar District, Uttar Pradesh. Employing a mixed-methods design, this study combines a quantitative analysis of secondary data with qualitative insights from field surveys and stakeholder interviews. The results indicate that both infrastructure and health services exert a significant and complementary impact on socioeconomic development, with health services acting as a mediating factor in enhancing human capital and productivity. The findings also reveal intra-district disparities in the distribution and utilization of essential services in the region. The results further demonstrate that infrastructural improvements enhance mobility and economic participation; however, persistent deficiencies in healthcare infrastructure and service quality constrain human capital development. By situating Ambedkar Nagar within the broader discourse on regional disparities, this study contributes empirical evidence to academic debates on rural development while also offering actionable recommendations for policymakers. Strengthening healthcare systems, aligning infrastructure investments with human development goals, and adopting integrated policy interventions are critical pathways to achieving sustainable and inclusive growth in rural India. This study contributes to the existing literature by providing a local, district-level perspective that integrates infrastructure and health dimensions within a unified framework. This underscores the need for coordinated and decentralized policy interventions to strengthen rural infrastructure and healthcare systems to achieve inclusive and sustainable development.*

Keywords: *Health Services; Socio-Economic Development; Rural Development; Human Capital; Uttar Pradesh*

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I. Introduction

Socio-economic development is fundamentally dependent on the essential pillars of infrastructure and health services, which collectively facilitate human capital formation, productivity improvement, and equitable growth (Pillay, 2006). In developing economies, robust transportation networks, reliable energy access, and quality sanitation reduce transaction costs and connect remote populations to markets, whereas effective health systems mitigate disease burdens and enhance workforce participation (Abdulqadir et al., 2024). Infrastructure, which broadly encompasses roads, electricity, drinking water, sanitation, and digital connectivity, serves as the foundational scaffold for economic activity and social mobility. It provides a physical framework that supports economic activity, while health services ensure the well-being of the population, thereby strengthening human capital (Hallegatte et al., 2019). Together, they form the foundation for sustainable and inclusive growth in the economy. In India, the relationship between infrastructure development and economic growth has been widely acknowledged, with investments in transportation, electricity, and communication networks playing critical roles in enhancing productivity and market integration (Ghosh, 2017; Satish, 2007). Health infrastructure significantly contributes to human capital formation by improving life expectancy, reducing morbidity, and enhancing labor productivity (Bhargava et al., 2005). Addressing these issues is essential for realizing the national vision of inclusive growth and sustainable development. The United Nations Sustainable Development Goals (SDGs) underscore this synergy: SDG 9 targets resilient infrastructure, SDG 3 focuses on health and well-being, and SDG

1 aims to eradicate poverty through such enablers (United Nations, 2015). Despite these linkages, regional disparities in infrastructure and healthcare access remain persistent challenges. Uttar Pradesh, one of India's most populous states, exhibits significant inequalities in socioeconomic development across districts (Biswas et al., 2024). Contributing only 8.4% to the national GDP despite 16.5% of the population, UP grapples with low human development indices: a literacy rate of 73% (below the national 77.7%) and an infant mortality rate of 38 per 1,000 live births (Sample Registration System, 2022). Infrastructure deficits compound health vulnerabilities; for instance, only 62% of rural UP households have all-weather road connectivity, correlating with a 15% higher maternal mortality rate in unconnected areas (UP Health Department, 2023). Rural regions experience deficiencies in healthcare facilities, shortages of trained personnel, and inadequate infrastructure connectivity (Bhandari & Dutta, 2007; Sreenu, 2019). Ambedkar Nagar District, established from Faizabad in 1995, exemplifies these challenges. These disparities have direct consequences on developmental outcomes, including income levels, educational attainment, and overall quality of life. Most extant studies have concentrated on macro- or state-level analyses, frequently neglecting localized variations that are crucial for effective policy formulation. District-level analyses are essential for capturing heterogeneity in development patterns and identifying context-specific challenges.

National programs such as the Pradhan Mantri Gram Sadak Yojana (PMGSY), Jal Jeevan Mission (JJM), Swachh Bharat Mission (SBM), and Ayushman Bharat have allocated substantial resources to districts such as Ambedkar Nagar. However, implementation gaps, governance constraints, and spatial inequities within the district have resulted in the uneven realization of the intended developmental benefits. Against this backdrop, the present study aims to assess the impact of infrastructure and health services on socio-economic development in Ambedkar Nagar district. Specifically, it seeks to (i) evaluate the status of physical and social infrastructure, (ii) analyze the accessibility and utilization of health services, and (iii) examine their combined influence on socioeconomic outcomes. Several factors motivated the selection of Ambedkar Nagar as the focus of this study. First, the district represents a typical rural context where infrastructural and healthcare challenges intersect with socioeconomic outcomes. Second, examining Ambedkar Nagar provides insights into the regional disparities within Uttar Pradesh, one of India's most populous states. Third, the developmental challenges of the district underscore the need for integrated policy interventions that address both physical infrastructure and human capital simultaneously. By assessing the impact of infrastructure and health services on socioeconomic development, this study seeks to contribute to the academic discourse on development studies while also offering practical recommendations for policymakers. The findings are expected to inform strategies for inclusive growth, emphasizing the importance of aligning infrastructure investments with healthcare improvements.

II. Review of Literature

Infrastructure has long been acknowledged as a catalyst for socioeconomic advancement. Roads, electricity, sanitation, and communication networks constitute the backbone of economic activity, facilitating mobility, reducing transaction costs, and expanding access to markets and services. Studies indicate that road connectivity in rural India significantly enhances agricultural productivity and market integration, while electrification improves educational outcomes and household productivity (Devi, 2025). Ghosh (2017) also emphasized that rural infrastructure, particularly roads and communication systems, substantially enhances employment opportunities and income levels. Similarly, Satish (2007) contended that infrastructure development is essential for integrating rural economies into the broader growth process.

A healthy population is more productive, better able to engage in education and employment, and less burdened by preventable diseases than an unhealthy population. However, India's healthcare infrastructure remains underfunded and unevenly distributed, particularly in rural areas. Empirical evidence suggests that health infrastructure contributes to economic growth through human capital improvements. Varkey et al. (2020) demonstrate that better health outcomes, facilitated by improved healthcare infrastructure, enhance labor productivity and economic performance. However, the literature also highlights significant challenges in rural healthcare delivery. Bhandari and Dutta (2007) identified gaps in the availability and distribution of healthcare facilities in rural India, while Dey et al. (2013) underscored systemic deficiencies such as inadequate funding and regional imbalances. Sreenu (2019) observed that issues of accessibility, affordability, and quality continue to impede effective healthcare delivery in rural areas. An investigation into public health expenditure found that despite rising allocations, healthcare infrastructure continues to lag behind, with significant regional disparities in service delivery (Das and Guha, 2024). This reinforces the argument that investments in health are not merely social expenditures but also drivers of economic growth. The State of Healthcare in Rural India Report (2024) revealed persistent challenges, such as shortages of medical staff, inadequate facilities, and high out-of-pocket expenditures.

A significant body of literature highlights the interdependence between physical and social infrastructure. Srivastava et al. (2023) argue that education and health infrastructure are vital for socio-economic development, as they directly affect human capabilities. Similarly, Mohanty and Nayak (2016) demonstrate that the development

of infrastructure has a considerable impact on human development indicators. Additionally, Sharma and Kumar (2023) provide further evidence that integrated infrastructure development leads to improved socio-economic outcomes in rural areas.

III. Objectives

The study is guided by the following objectives:

- To assess the status of infrastructure and health services in Ambedkar Nagar District, covering road connectivity, electricity, sanitation, and the availability, accessibility, and quality of healthcare.
- To analyze the relationship between infrastructure, health services, and socio-economic outcomes such as education, employment, and income generation.
- To recommend evidence-based policy measures for strengthening infrastructure and healthcare systems to promote sustainable socio-economic growth.

IV. Significance of the Study

This research holds multifaceted significance, bridging gaps in knowledge, policy, and practice for socio-economic development in rural India. From an academic perspective, the study provides empirical evidence on the interplay between infrastructure, health services, and socio-economic development in a rural district context. It enriches the literature on development studies by highlighting the multidimensional nature of progress and the importance of integrated approaches. By identifying specific gaps and recommending targeted interventions, the research aims to support efforts toward inclusive and sustainable development in Ambedkar Nagar and similar districts across India.

V. Study Area

Ambedkar Nagar district, situated in the eastern region of Uttar Pradesh, India, is part of the socio-economically significant yet relatively underdeveloped Purvanchal area. Geographically, it is located between approximately 26°09′ to 26°40′ North latitude and 82°12′ to 83°05′ East longitude, bordered by Faizabad (Ayodhya) to the west, Sultanpur to the south, Azamgarh to the east, and Sant Kabir Nagar to the north (Fig 1). Several rivers, including the Ghaghara, traverse the district, influencing agricultural practices and providing water. According to the 2011 census, Ambedkar Nagar district has a population of approximately 2,397,888, ranking 186th in India (out of 640). The district has a population density of 1,021 inhabitants per square kilometer. A significant portion of the workforce is engaged in agriculture and related activities. The population growth rate between 2001 and 2011 was 18.35%. The district has a sex ratio of 976 females per 1,000 males and a literacy rate of 74.37%. Although literacy levels have improved over time, they remain below the national average, with noticeable gender disparities (Gupta et al., 2011; Singh, 2022). Administratively, the district comprises five tehsils (Akbarpur, Jalalpur, Tanda, Alapur, and Bhiti), nine blocks, 927 g panchayats, and 1,745 villages.

Figure 1.1: Location of the study area.

VI. Research Methodology

6.1 Research Design

This study adopts a mixed-methods approach, combining quantitative and qualitative techniques to capture the multidimensional impact of infrastructure and health services on socio-economic development in Ambedkar Nagar District, Uttar Pradesh. Quantitative data provide measurable indicators of infrastructure and health outcomes, while qualitative insights capture lived experiences, perceptions, and contextual nuances.

6.2 Sampling Framework

Given the district's geographical diversity and administrative structure, a stratified random sampling approach was adopted to ensure representativeness across different blocks. The study was conducted across nine development blocks in Ambedkar Nagar District, selected to represent diverse geographical, economic, and infrastructural conditions.

- **Primary Data**: A total of 200 households were surveyed across 9 blocks. Structured questionnaires were administered to selected households through face-to-face interviews. The questionnaire was developed and pre-tested with 30 households in a village not included in the main sample. Based on feedback and pilot results, the instrument was refined for clarity. Data collection was conducted over four months from July 2025 to November 2025. The questionnaire comprised sections addressing:
  - ✓ Infrastructure Facilities
  - ✓ Health Services
  - ✓ Perception and Satisfaction
- **Secondary Data: Secondary Data**- Census 2011 data, NITI Aayog and RBI datasets, Ministry of Health & Family Welfare reports, and district statistical handbook.

Ethical Considerations:
Informed consent was obtained from all participants before data collection. The objectives of the study, the voluntary nature of participation, and the measures undertaken to ensure confidentiality were clearly communicated to each respondent. Particular attention was paid to the inclusion and protection of vulnerable groups, including women, older adults, and individuals from marginalized communities. No personally identifiable information was collected, and all data were fully anonymized during processing and analysis. Interviews were conducted at times and locations convenient for participants, with due regard for cultural norms and sensitivities throughout the data collection process.

VII. Findings and Results

7.1 Socio- Economic Profile of the Study Area

Table 1 presents a comparative analysis of selected socio-economic and demographic indicators across the Community Development (CD) blocks of Ambedkar Nagar district. At the outset, literacy levels across the blocks exhibit moderate variation, ranging from 69.73% in Bhiti to 72.94% in Baskhari. While the differences are not stark, a gradual improvement can be observed in blocks such as Baskhari, Ramnagar, and Jalalpur, suggesting relatively better educational access and outcomes. Population density reveals more pronounced spatial variation, with Jalalpur and Baskhari emerging as the most densely populated blocks, while Bhiti and Katehari remain comparatively less dense. Higher density levels typically indicate greater pressure on land, infrastructure, and public services, potentially constraining development outcomes if not matched by adequate resource provisioning. Conversely, lower-density areas may face issues of accessibility and service delivery due to dispersed settlements. The proportion of Scheduled Castes and Scheduled Tribes (SC/ST) population is consistently high across all blocks, varying between 23.39% and 29.74%. Blocks such as Jalalpur, Tanda, and Jahageerganj exhibit relatively higher concentrations, pointing to the socio-economic significance of marginalized communities within the district. Workforce participation, measured as the percentage of main workers to the total population, remains relatively low across all blocks, ranging from 15.62% in Jahageerganj to 19.09% in Tanda. This limited participation suggests a high dependency ratio and indicates the prevalence of disguised unemployment and informal labour arrangements.

Table 1. Socio-Economic Indicators across CD Blocks of Ambedkar Nagar

Sl. No.	Name of CD Block	Literacy Rate	Population density per sq. km.	% of SC/ST to total population	% of total main workers to total population	% of workers engaged in agriculture to total main workers
1.	Bhiti	69.73	787.7	23.39	19	76.76
2.	Katehari	70.75	804.23	23.97	18.6	68.44
3.	Akbarpur	70.53	900.06	23.49	18.59	74.36
4.	Tanda	71.84	856.89	29.64	19.09	61.29
5.	Baskhari	72.94	980.64	26.58	17.9	68.52
6.	Ramnagar	72.72	949.16	26.64	16.87	67.98
7.	Jahageerganj	72.46	893.11	28.69	15.62	64.49
8.	Jalalpur	72.62	1007.06	29.74	17.79	65.7
9.	Bhiyaon	70.52	980.46	26.13	18	72.13

(Source: District Statistical Gazetteer)

7.2 Profile of the Respondents

The socio-demographic characteristics of the sampled households provide an overview of the study population. The household survey included 200 respondents across 9 blocks in Ambedkar Nagar District. The results indicate that the majority of respondents belong to the working-age group, with a significant proportion engaged in agriculture and informal sector activities. Educational attainment remains moderate, with a

considerable share of respondents having primary or secondary level education, while higher education levels are relatively low (Fig 2).

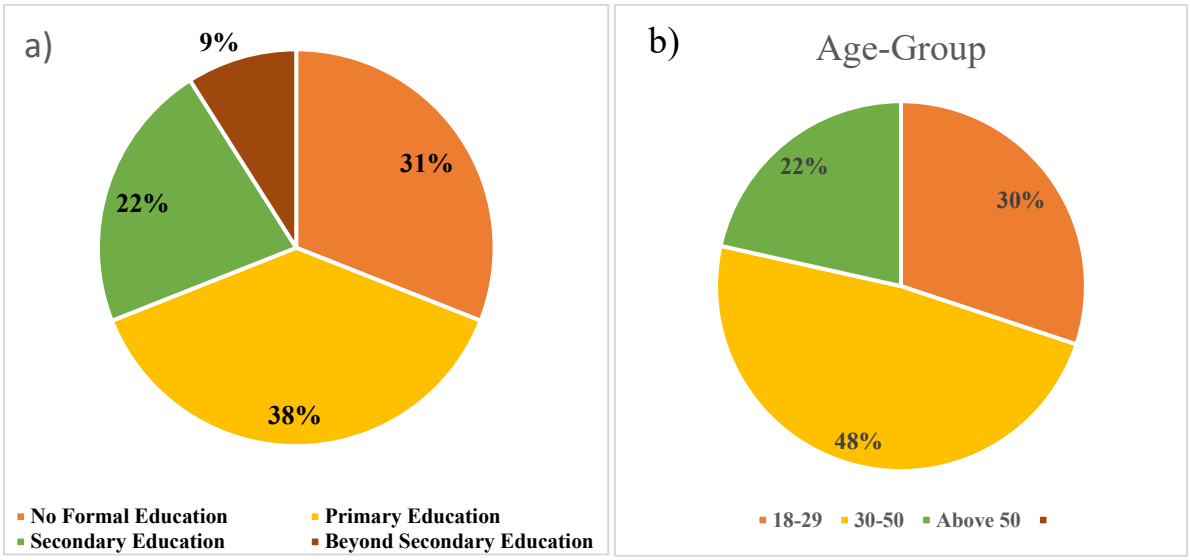

Figure 2. Profile of the Respondents: a) Educational Qualification, b) Age Group

7.3 Status of Infrastructure Facilities

7.3.1 Road Connectivity

Infrastructure plays a decisive role in shaping socio-economic outcomes, particularly in rural contexts where connectivity directly influences access to markets, services, and opportunities. The findings indicate that although basic infrastructural elements are present in most parts of the district, their quality, accessibility, and reliability vary considerably across blocks. Road connectivity, which serves as a key enabler of mobility and market access, shows partial adequacy. While major settlements are connected through all-weather (pucca) roads, interior and peripheral villages continue to face challenges related to seasonal inaccessibility and poor road conditions.

Table 2. Temporal growth of paved road length and village connectivity across the district

Year	Length of Paved Roads (km)		Number of villages connected by all-weather roads (population-wise)		
	Total	PWD	Villages with population less than 1000	Villages with population between 1000 and 1499	Villages with population more than 1500
2021-2022	5223	3950	889	266	446
2022-2023	5563	3945	886	263	445
2023-2024	6408	4725	886	263	445

(Source: District Statistical Gazetteer)

Table 2 presents the temporal growth of paved road length and village connectivity across the district for the period 2021–2024. A clear upward trend is observed in the total length of paved roads, which increased from 5,223 km in 2021–22 to 6,408 km in 2023–24, reflecting substantial investment in physical infrastructure. The expansion is particularly evident in roads maintained by the Public Works Department (PWD), which rose from 3,950 km to 4,725 km during the same period. However, despite this expansion, the data on village connectivity indicates stagnation in the number of villages connected by all-weather roads. Villages with a population of less than 1000 declined slightly from 889 to 886, while those in higher population categories remained constant.

Table 3. Block-wise distribution of road infrastructure (2023-24)

Sl. No.	Name of CD Block	Length of Paved Roads (km)		Number of villages connected by all-weather roads (population-wise)		
		Total	PWD	Villages with population less than 1000	Villages with population between 1000 and 1499	Villages with population more than 1500
1.	Bhiti	541	420	117	26	33

2.	Katehari	552	459	112	24	45
3.	Akbarpur	890	680	75	41	78
4.	Tanda	662	532	147	39	51
5.	Baskhari	623	503	58	18	42
6.	Ramnagar	602	553	107	31	49
7.	Jahageerganj	609	461	144	28	29
8.	Jalalpur	720	601	57	33	69
9.	Bhiyaon	578	474	69	23	49
Total Rural		5777	4683	886	263	445
Total Urban		631	42	0	0	0

(Source: Executive Engineer, Public Works Department (PWD), Provincial Division, Ambedkar Nagar)

The block-wise distribution of road infrastructure further highlights significant intra-district disparities (Table 3). The total paved road length varies considerably across blocks, with Akbarpur and Jalalpur recording the highest levels of road development, while Bhiti and Katehari lag behind. The distribution of villages connected by all-weather roads also reveals important patterns. Blocks like Tanda and Jahageerganj have more small villages (population <1000) connected by roads, indicating relatively better outreach to smaller settlements. On the other hand, blocks such as Baskhari and Jalalpur exhibit lower connectivity in this category, suggesting that smaller, possibly more remote villages remain underserved. The data further reveals a pronounced rural–urban divide in infrastructure distribution. Out of the total paved road length, 5,777 km is located in rural areas, compared to only 631 km in urban areas, indicating the predominantly rural character of the district.

7.3.2 Electricity

Electricity infrastructure constitutes a fundamental component of rural development, influencing agricultural productivity, household welfare, and access to essential services. The analysis of electricity-related indicators in Ambedkar Nagar district reveals substantial progress in electrification alongside emerging structural and qualitative challenges. Table 4 presents the temporal trends in electricity infrastructure from 2021–22 to 2023–24.

Table 4. Temporal Trends in Electrification

Year	Number of electricity connections	Number of electrified Scheduled Caste Settlements	Government Tubewell and Pump Canal	Energized private tube wells/pump sets
2021-2022	0	248	0	17098
2022-2023	0	248	0	18251
2023-2024	317673	248	515	18712

(Source: Executive Engineer / Superintending Engineer, Electricity Distribution Division, Electricity Department, Ambedkar Nagar)

In terms of irrigation infrastructure, the number of government tubewells and pump canals increased to 515 in 2023–24, indicating enhanced public investment in agricultural support systems. Similarly, the number of energized private tube wells/pump sets increased from 17,098 to 18,712, reflecting growing dependence on private irrigation mechanisms.

Table 5.Spatial Distribution of Electricity Infrastructure across CD Blocks (2023-24)

Sl. No.	Name of C.D. Block	Number of electricity connections	Number of electrified Scheduled Caste Settlements	Government Tubewell and Pump Canal	Energized private tube wells/pump sets
1.	Bhiti	24621	22	126	2813
2.	Katehari	23222	24	76	2624
3.	Akbarpur	32724	38	97	3117

4.	Tanda	29714	38	29	1992
5.	Baskhari	28740	24	12	1539
6.	Ramnagar	29628	24	27	1297
7.	Jahageerganj	30712	24	41	1836
8.	Jalalpur	31715	28	69	1995
9.	Bhiyaon	29619	25	38	1277
Total Rural		258695	247	515	18490
Total Urban		58978	1	0	222

(Source: Executive Engineer / Superintending Engineer, Electricity Distribution Division, Electricity Department, Ambedkar Nagar)

While secondary data indicates substantial progress in electrification coverage, the primary survey provides important insights into the functional aspects of electricity access, particularly in terms of reliability, quality, and usage. Out of the total sampled households, 92% reported having grid connectivity, while 8% remained partially or indirectly connected, indicating the persistence of last-mile connectivity challenges. Despite high levels of connectivity, the reliability of electricity supply emerges as a major concern. A significant proportion of respondents reported frequent power outages, irregular supply hours, and voltage fluctuations, especially during peak agricultural seasons and summer months. On average, households reported receiving electricity for limited and often unpredictable hours per day, with rural areas experiencing more pronounced disruptions compared to semi-urban locations. The survey further reveals that electricity usage among households is predominantly consumption-oriented rather than productivity-driven. The majority of respondents reported using electricity mainly for:

- Lighting
- Mobile charging
- Operation of basic household appliances

For agricultural households, the availability of electricity for irrigation is crucial. However, respondents reported that irregular power supply often disrupts irrigation schedules, compelling farmers to rely on diesel-powered alternatives or incur additional costs. This highlights the gap between infrastructure provision and functional efficiency. The combined analysis of secondary and primary data suggests that electricity infrastructure in Ambedkar Nagar has reached a stage of quantitative expansion, but qualitative constraints. While widespread electrification has improved basic living conditions, its impact on socio-economic development is moderated by issues of reliability, accessibility, and productive utilization.

7.3.3 Water Supply

Water supply emerged as a critical issue among respondents in Ambedkar Nagar District, directly influencing health outcomes, sanitation practices, and socio-economic well-being. The survey revealed significant dependence on traditional sources, uneven access to piped water, and recurring concerns about quality and reliability. The provision of drinking water in the district is primarily dependent on a combination of groundwater sources (hand pumps, tube wells) and, to a lesser extent, piped water supply systems. Government initiatives over the years have contributed to expanding access to basic water sources, particularly in rural areas. Respondents indicated that during summer months, several hand pumps either yield reduced water output or become non-functional, leading to increased dependency on alternative sources. In areas with piped water supply, households reported irregular and limited-duration supply, often restricted to specific hours of the day. This inconsistency necessitates water storage practices, which may raise concerns regarding hygiene and water quality.

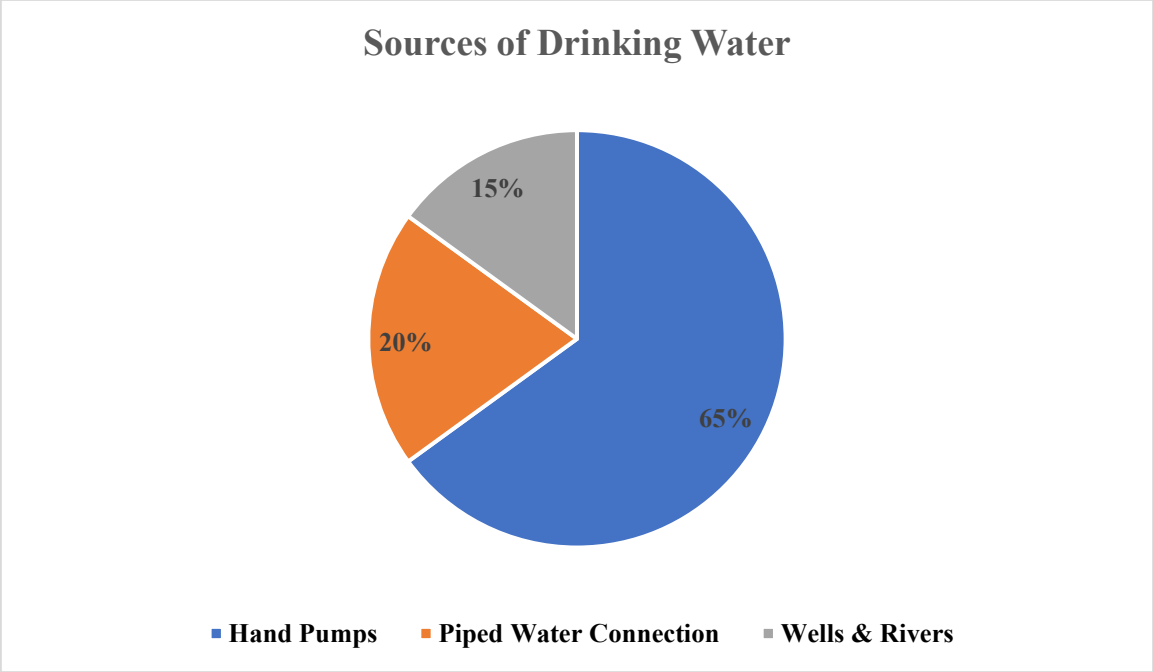

Figure 3. Sources of Drinking Water in the surveyed households

Table 6. Number and percent of rural population served by drinking water amenity, 2011

Sl. No.	Name of C.D. Block	Drinking water availability	
		Number	Percent
1.	Bhiti	173741	100
2.	Katehari	215372	100
3.	Akbarpur	305738	100
4.	Tanda	270799	99.36
5.	Baskhari	200610	100
6.	Ramnagar	229262	99.75
7.	Jahageerganj	209855	99.62
8.	Jalalpur	299897	99.84
9.	Bhiyaon	206383	99.1

(Source: Census of India, 2011)

7.4 Assessment of Health Services

The assessment of health services in the study area reveals a scenario characterized by basic infrastructural presence but significant qualitative and accessibility constraints. Health services constitute a vital component of social infrastructure, directly influencing human capital formation, productivity, and overall well-being.

Table 7. Allopathic Healthcare Infrastructure and Medical Staffing Trends (2021–2024)

Year	Allopathic Hospital/ Dispensary	Community Health Centre	Primary Health Centre	No. of Available beds in total	Total Workers		
					Doctor	Paramedical	Other
2021-2022	3	9	33	762	93	622	192
2022-2023	3	10	34	1216	179	579	482
2023-2024	3	10	35	1220	133	424	624

(Source: District Statistical Gazetteer)

The allopathic healthcare system forms the backbone of public health service delivery in the district as shown in Table 7. A significant increase is observed in the number of available beds, which rose from 762 in 2021–22 to 1,220 in 2023–24, reflecting improved capacity for inpatient care. However, trends in human resources present a mixed scenario. The number of doctors increased initially (93 to 179) but declined to 133 in 2023–24, while paramedical staff decreased significantly from 622 to 424, indicating potential shortages in service delivery capacity.

Table 8. Block-wise Distribution of Healthcare Infrastructure, 2023-24

C.D. Block	Allopathic Hospital/ Dispensary	Community Health Centre	Primary Health Centre	No. of Available beds in total	Total Workers		
					Doctor	Paramedical	Others
Bhiti	0	1	0	30	3	12	33
Katehari	0	1	3	42	8	22	39
Akbarpur	0	2	4	76	15	40	55
Tanda	0	1	4	46	26	56	102
Baskhari	0	1	2	38	7	33	21
Ramnagar	0	1	4	46	5	14	33
Jahageerganj	0	1	5	50	8	23	32
Jalalpur	0	1	6	54	12	58	42
Bhiyaon	0	1	2	38	5	18	62
Total Rural	0	10	30	420	89	276	419
Total Urban	3	0	5	800	44	148	205

(Source: District Statistical Gazetteer)

The block-level distribution of healthcare facilities reveals significant spatial disparities (Table 8). Among the blocks, Akbarpur and Tanda exhibit relatively better infrastructure, with higher numbers of PHCs, beds, and healthcare personnel whereas, blocks such as Bhiti and Baskhari show relatively lower availability of healthcare resources. Urban areas, although smaller in number, show comparatively higher concentration of healthcare facilities, including 3 hospitals and 800 beds, indicating a rural–urban imbalance in healthcare access.

Table 9. Block-wise Ayurvedic medical services (number) in the district, 2024

Year	Ayurvedic		
	Hospitals and Dispensaries	Number of available beds	Doctors
2021-2022	41	202	28
2022-2023	42	181	29
2023-2024	42	181	32

(Source: Regional Ayurvedic Officer, Ambedkar Nagar)

Table 10. Block-wise Unani medical services (number) in the district, 2024

Year	Unani		
	Hospitals and Dispensaries	Number of available beds	Doctors
2021-2022	1	4	1
2022-2023	1	4	1
2023-2024	1	4	1

(Source: Regional Ayurvedic Officer, Ambedkar Nagar)

Table 11. Block-wise Homeopathic medical services (number) in the district, 2024

Year	Homeopathic		
	Hospitals and Dispensaries	Number of available beds	Doctors
2021-2022	19	0	15
2022-2023	27	0	18
2023-2024	26	0	21

(Source: Regional Ayurvedic Officer, Ambedkar Nagar)

In addition to allopathic services, the district has a network of AYUSH (Ayurveda, Yoga, Unani, Siddha, and Homeopathy) institutions, which contribute to healthcare delivery, particularly in rural areas (Table 9,10 and 11). This indicates a stable and moderately developed traditional healthcare system that supplements allopathic services.

Table 12. Distribution of villages not having medical amenities, arranged by distance ranges from the places where these are available, 2011

Medical Amenity	Distance range of place from the villages where the amenity is available			
	Less than 5 kilometres	5-10 kilometres	10+ kilometres	Total
Hospital	692	535	403	1630
PHC	512	701	416	1629

(Source: District Statistical Gazetteer)

Table 12 presents the distribution of villages lacking certain amenities at the district level. Residents of these villages must travel outside their community to access these facilities. In the district, there are 1,630 villages

without hospital services and 1,629 villages lacking Primary Health Care (PHC) services. Among these, 692 villages have a hospital located within 5 kilometers. In contrast, 535 villages must cover a distance of 5 to 10 kilometers to reach a hospital, while 403 villages are situated more than 10 kilometers away from any hospital. Regarding PHC services, 512 villages have access within 5 kilometers, 701 villages are 5 to 10 kilometers away, and the remaining 416 villages need to travel over 10 kilometers to access these services.

Table 13. Number of beds in medical institutions in towns, 2011

Serial Number	Name and Urban Status of the Town	Number of Beds in Medical Institutions per 10,000 Population
1	Iltifatganj Bazar (NP)	3
2	Tanda (NPP)	7
3	Ashrafpur Kichhauchha (NP)	1
4	Bhulepur (CT)	0
5	Jalalpur (NPP)	8
6	Jalalpur Dehat (CT)	0
7	Akbarpur (NPP)	4
Total		**23**

NP= Nagar Panchayat, NPP= Nagar Palika Parishad, CT= Census Town *(Source: District Statistical Gazetteer)*
Table 13 illustrates the number of beds available in medical institutions per 10,000 people in each town of the Ambedkar Nagar district. On average, there are 23 beds per 10,000 residents in the urban areas of the district. The highest number of beds is found in Jalalpur MB, with 8 beds per 10,000 population, while the lowest is recorded in Ashrafpur Kichhauchha (NP) with just 1 bed, and Tanda (NPP) with 7 beds, followed by Iltifatgang (NP) with 3 beds. Additionally, no beds are recorded in two of the Census towns.

While secondary data indicates expansion of healthcare infrastructure, the primary survey highlights critical issues related to accessibility, utilization, and quality of services. A considerable proportion of respondents reported that health facilities are not easily accessible, particularly in remote villages. Travel time to the nearest health centre often exceeds 30–60 minutes, especially where road connectivity is weak. This limits timely access to medical care, particularly in emergencies. Respondents frequently reported a shortage of doctors and paramedical staff, especially in public health centres. In many cases, facilities were found to be either understaffed or functioning with limited operational capacity. Despite the presence of public healthcare facilities, a significant number of households reported reliance on private healthcare providers. This preference is driven by:

- Perceived better quality of care
- Availability of doctors
- Reduced waiting time

VIII. Discussion

The findings from the Ambedkar Nagar District underscore the intricate relationship between infrastructure, healthcare, and socioeconomic development. Despite advancements in the provision of basic services, ongoing deficiencies in reliability, accessibility, and equity continue to impede inclusive growth. These results align with and expand upon the existing literature on rural development in India. The expansion of road infrastructure, as evidenced by the increasing length of paved roads, signifies a substantial public investment in physical connectivity. However, the limited increase in the number of villages connected by all-weather roads indicates that infrastructure development has been biased towards upgrading rather than extending into underserved areas. This trend exacerbates existing spatial inequalities, with relatively developed blocks benefiting disproportionately. Similar patterns have been observed in the infrastructure development literature, where connectivity improvements often favor already accessible regions, resulting in uneven development trajectories. The survey revealed significant expansion in road connectivity and electrification; however, disparities persist across blocks. This is consistent with national studies highlighting the multiplier effects of rural infrastructure—roads reduce transaction costs and enhance market access, whereas electricity boosts productivity and educational outcomes (Devi, 2025).

Healthcare outcomes in Ambedkar Nagar reveal systemic weaknesses, including limited availability of public facilities, reliance on private practitioners, and high out-of-pocket expenditures. These findings mirror the national evidence that India's healthcare infrastructure remains underfunded and unevenly distributed, particularly in rural areas (Das and Guha, 2024). Although there has been an increase in healthcare infrastructure, particularly

in terms of PHCs and bed capacity, the effectiveness of the system is undermined by shortages of medical personnel, uneven distribution of facilities, and reliance on private healthcare providers. The coexistence of multiple healthcare systems (Allopathic and AYUSH) adds to the diversity of services but does not necessarily translate into comprehensive healthcare access, particularly in rural areas.

Reliance on private care and financial strain among households confirm the argument that weak public healthcare perpetuates poverty cycles. The district's maternal and child health challenges resonate with the State of Healthcare in Rural India Report (2024), which highlighted staff shortages and uneven immunization coverage. Preventive care gaps further illustrate the limited reach of awareness campaigns, reinforcing the literature's call for community-based "Neighbourhoods of Care" models

The results demonstrate that infrastructure, healthcare, and water supply are not isolated domains but mutually reinforcing. Villages with better road connectivity reported higher utilization of healthcare services, while reliable electricity was critical for the functioning of health centres. Similarly, poor water quality directly increased healthcare costs and reduced productivity. These findings support the argument that integrated investments yield multiplier effects, as highlighted in development economics literature. Ambedkar Nagar exemplifies how deficits in one sector (e.g., water quality) can undermine gains in another (e.g., healthcare), reinforcing the need for holistic approaches. Addressing these issues is essential for translating infrastructural investments into meaningful socio-economic development outcomes.

IX. Conclusion and Policy Recommendations

The results from Ambedkar Nagar confirm and extend existing literature on rural development in India. Infrastructure, healthcare, and water supply are deeply interlinked, and deficits in one domain undermine progress in others. While national programs have expanded coverage, persistent gaps in quality, reliability, and equity constrain socio-economic development. By situating district-level findings within broader theoretical and empirical debates, this study underscores the need for integrated, context-specific interventions that strengthen human capital and foster inclusive growth. However, the analysis also reveals that development outcomes are constrained by qualitative deficiencies, including: Inadequate reliability of electricity supply, uneven distribution of infrastructure across blocks, Limited accessibility to healthcare facilities, Shortage of medical personnel, continued dependence on agriculture and limited economic diversification

Based on the findings, the following policy recommendations are proposed:

i. Strengthening Last-Mile Connectivity: It is imperative to ensure the expansion of all-weather road connectivity to unserved and remote villages, with a focus on the equitable distribution of infrastructure across all blocks.
ii. Improving the Quality and Reliability of Electricity Supply: A stable and uninterrupted power supply must be ensured, particularly in rural areas. It is essential to strengthen maintenance and distribution systems to promote the productive use of electricity in agriculture and rural enterprises in the region.
iii. Enhancing Water Supply Systems: The coverage of piped water supply should be expanded. Mechanisms for monitoring and treating water quality must be implemented, and seasonal water scarcity should be addressed through sustainable groundwater management strategies.
iv. Strengthening Healthcare Infrastructure and Human Resources: Recruitment and equitable distribution of doctors and paramedical staff should be enhanced. Existing primary health centers (PHCs) and community health centers (CHCs) require upgrades with improved equipment and facilities to provide better services. Emergency and referral services, especially in rural areas, require improvement.
v. Targeted Interventions for Marginalized Groups: Addressing caste and gender disparities is crucial to ensure inclusive growth.

The study emphasizes that infrastructure and health services must progress beyond quantitative expansion towards qualitative transformation, ensuring that development is not only widespread but also equitable, efficient, and sustainable.

X. Limitations of the Study

This study has several limitations. It partly relies on secondary data (census and district reports) that may lag behind current realities. The household sample of 200, though block-representative, cannot capture the full diversity of a district with over 2.3 million residents, limiting generalizability. The cross-sectional design offers only a snapshot, without tracking trends or establishing causality over time. Self-reported household data may carry recall or social desirability bias, especially on sensitive issues. The analysis also excludes external factors like policy implementation gaps, political influences, environmental conditions, and migration. Consequently, findings are specific to Ambedkar Nagar and may not generalize to other regions.

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