

Assessing PMGSY-Driven Infrastructure and Socio-economic Transformation in Ghatampur Tehsil (2000–2020)

Nidhi Kumari^{1*}, Dr. Anjana Srivastava²

¹Research scholar, Department of Geography, D. G. P. G. College, Civil Lines, Kanpur (UP)

²Assistant Professor, Department of Geography, D. G. P. G. College, Civil Lines, Kanpur (UP)

*Email: 28101996n.k@gmail.com

ABSTRACT

Rural road networks are vital for rural development because they dramatically improve connectivity enabling communities to reach markets, health centers, schools, and employment hubs more effectively. This enhanced mobility supports increased agricultural productivity, strengthens social service access, and helps alleviate poverty. This study assesses the role of the Pradhan Mantri Gram Sadak Yojana (PMGSY) in enhancing rural connectivity and catalyzing socioeconomic transformation in Ghatampur Tehsil, Kanpur Nagar from 2000 to 2020. Leveraging exclusively secondary data sources including Census 2001 & 2011 village directories, district- and state-level PMGSY implementation reports, and national scheme assessments this research maps the evolution of road infrastructure and its broader impacts on rural development. Our findings suggest that PMGSY contributed significantly to Ghatampur's infrastructure landscape, indirectly supporting key development outcomes.

Keywords: Rural, Development, Socio-economic, Transformation

INTRODUCTION

Rural development discourse, road connectivity is universally regarded as foundational infrastructure that facilitates access to vital services and markets, thereby underpinning broader economic and social progress (World Bank, 2022; ILO, 2017). The introduction of the Pradhan Mantri Gram Sadak Yojana (PMGSY) in December 2000 marked a transformative initiative to provide all-weather rural roads to previously underserved villages, targeting 178,000 habitations with a population of over 500 in the plains and 250 in hilly regions (Ministry of Rural Development, 2024; Wikipedia, 2025). Extensive evaluations, including those by the World Bank (Dappe et al., 2021) and the International Labour Organization (2017), have documented significant improvements in agricultural input accessibility, school and healthcare attendance, labor market integration, and overall livelihood diversification in connected villages. However, much of existing research concentrates on national or state-level trends, leaving a research gap at the tehsil level, where geographic,

administrative, and implementation nuances can materially affect outcomes. Through a focused study on Ghatampur Tehsil in Kanpur Nagar, this paper examines the period from 2000 to 2020 to assess how PMGSY influenced rural infrastructure and related socioeconomic indicators using secondary data sources, thereby contributing important granularity to the understanding of rural connectivity interventions.

Pateriya and Kumar (2014) highlighted that PMGSY incorporates five-year maintenance clauses to ensure long-term road reliability, though they note state-level funding gaps threaten sustainability. Planning, technology-driven monitoring, and integration with habitations-based network design further add robustness to PMGSY's architecture (Pateriya & Kumar, 2014; Pateriya & Bhushan, 2014).

Rural road infrastructure is widely acknowledged as a crucial driver of rural development, enhancing residents' ability to access markets, healthcare, education, and employment, and thereby fostering agricultural diversification and poverty reduction (Jain & Biswas, 2021; Kumar et al., 2025)

Khuvung and Odyuo (2023), in Wokha District, Nagaland, identified robust positive links between PMGSY road projects and a range of socioeconomic outcomes, including increases in agricultural income, expansion of non-farm enterprises, better health access, and improved school enrolment—demonstrating the program's wide-reaching benefits.

Lendo and Nayak (2021) in Arunachal Pradesh, confirmed that PMGSY roads were associated with enhanced health outcomes in mountainous communities, reinforcing the connection between improved rural connectivity and better access to healthcare. Though specific findings weren't cited here, national assessment reports highlight increased institutional deliveries, reduced child mortality, and broader preventive health benefits tied to road improvements.

A comprehensive review highlights PMGSY's success in expanding all-weather roads since 2000, enhancing rural infrastructure in India, although sustainability challenges remain regarding maintenance, fund allocation, and project completion (Chatterjee & Sharma, 2021).

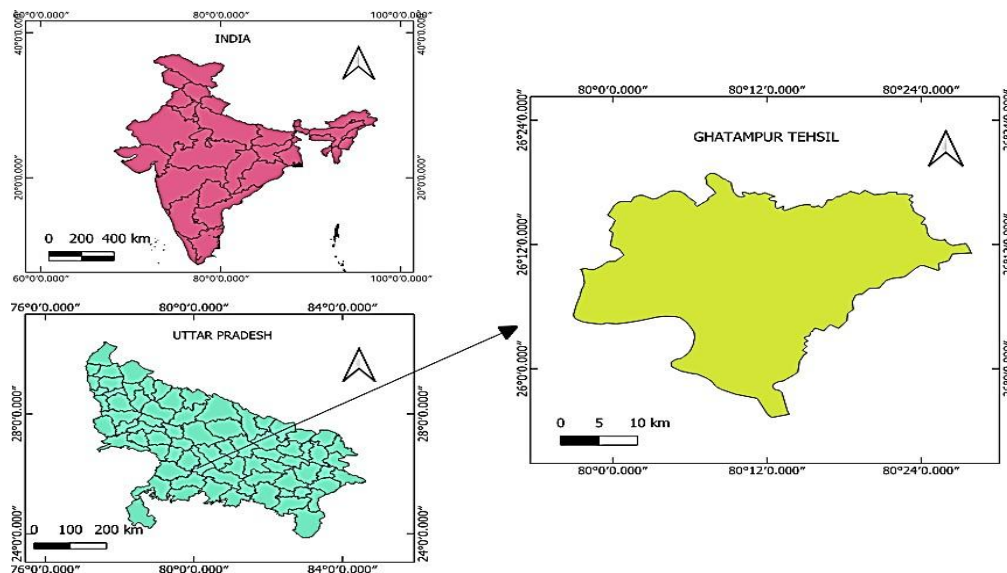
Lakshmanasamy (2021) used a fuzzy regression discontinuity design to show that PMGSY connectivity led to increased antenatal care, hospital deliveries, contraceptive use, and health awareness among rural women—demonstrating direct health benefits. The ILO (2017) similarly reported improvements in rural development metrics linked to PMGSY implementation. NRIDA (2024) documented substantial gains in agriculture: increased fertilizer and mechanization usage, rise in cash-crop cultivation, improved income, and reduced transportation costs—though impacts on livestock remained modest. Kumar and Shobana (2025) reinforced this, linking efficient scheme implementation with enhanced agri-market integration. While national and state-level evaluations affirm PMGSY's positive impacts, analyses at the tehsil level reflecting finer administrative and geographic variations are limited.

STUDY AREA

Ghatampur Tehsil (Vikash Khand) lies in south-eastern part of Kanpur plain, a subdivision of Lower Ganga- Yamuna Doab, in Upper Ganga Plain. This Tehsil unit ($25^{\circ} 55' N$ - $26^{\circ} 12' N$ latitude and $79^{\circ} 58' E$ - $80^{\circ} 16' E$ longitude), with an area of 521 Km^2 lies in the extreme south- east of Kanpur (R)* district of Uttar Pradesh in India (Fig. 1. 1). According to the 2011 census data, Ghatampur tehsil in Kanpur Nagar district spans an area of 1,165 square kilometers, with rural areas covering 1,160.85 square kilometers and urban areas covering

4.00 square kilometers. The total population of Ghatampur tehsil is 580,909 people, out of which 40,623 reside in urban areas and 540,286 in rural areas. The population density is approximately 499 inhabitants per square kilometer. There are a total of 110,734 households, comprising 7,407 urban households and 103,327 rural households. (Ghatampur Tehsil Population, Caste, Religion Data-Kanpur Nagar District Uttar Pradesh, N.D).

Fig. 1.1 Study area map using QGIS technique.



The climate in this region is primarily dictated by its latitudinal position in the lower Ganga-Yamuna Doab of the upper Ganga plain, adjacent to the Bundelkhand area. This region is characterized by monsoonal and seasonal variations (Singh, 1986). In Summers, Ghatampur experiences hot and dry climate type. May and June are the typically the hottest month of the year. During the season, two types of winds prevail: the westerly winds, known as ‘Loo’, which are hot and dusty and occur in May and June; and the easterly winds, which are relatively cooler and typically blow during the month of April. In the study area, month of July and September is considered as the Monsoon month of the year.

The population of Ghatampur Tehsil is notably diverse comprising individuals from various ethno-linguistic, social and religious background. According to 2011 census, the total population of Ghatampur tehsil is 580909 persons, where 540286 lives in rural areas and 40623 in urban areas. Total rural population of the Kanpur district is 1565623 and urban population is 3015645 (65.8%).

The distribution of Scheduled Castes and Scheduled Tribes population as well as their percentage to total population at tahsil level in rural and urban areas of the district. Of the 4,581,268 total population of the district, 17.83 per cent of the total population belongs to the Scheduled Castes and negligible per cent of Scheduled Tribes.

OBJECTIVES

- To quantify PMGSY infrastructure development in Ghatampur Tehsil (2000–2020).

- To evaluate socioeconomic outcomes linked to road connectivity.
- To provide future insights and policy recommendation.

DATA BASE AND METHODOLOGY

This research utilizes data collected from a combination of primary and secondary sources. Important secondary information sources include the Ministry of Rural Development's annual PMGSY reports, the PMGSY Online Monitoring Information System (MIS), data from the Uttar Pradesh Rural Road Development Agency (UPRRDA), and satellite-based platforms like ISRO's Bhuvan geoportal and Google Earth. These sources provided data on road lengths constructed, number of habitations connected, project-wise progress, and spatial attributes of rural connectivity. Additionally, demographic and habitation-level data from the 2001 and 2011 Census of India were utilized to align population clusters with corresponding infrastructure developments. Field-level surveys were carried out during 2024–25 in selected villages of Ghatampur Tehsil to obtain primary data. Using purposive sampling, 3 villages (Bhitargaon, Saraiya, and Rasoolpur) were selected to represent different phases of PMGSY implementation across the two-decade period. This included a mix of Scheduled Caste/Scheduled Tribe dominated villages, geographically remote settlements, and larger gram panchayats. GPS- based ground verification of road alignments was carried out to cross-verify mapped data with actual on-ground conditions. Additionally, semi-structured interviews were conducted with over 60 stakeholders, including panchayat leaders, local residents, women, and elderly community members, to assess the social and economic impact of improved road connectivity.

Quantitative analysis was carried out using Microsoft Excel for time-series tabulation and trend analysis. Statistical software such as SPSS was used to analyze budget utilization, project completion rates, and connectivity coverage. Geographic Information System (GIS) software, such as QGIS, was used to map the Study Area.

Qualitative insights were derived from the thematic coding of interview transcripts. The interviews examined how the construction of PMGSY roads affected access to healthcare, education, job prospects, and market connectivity. Observations were also made regarding the maintenance status of roads and the level of community participation in project monitoring.

While the study provides valuable insights into the scale and impact of PMGSY in Ghatampur Tehsil, it acknowledges certain limitations. These include the unavailability of complete archival data before 2005, reliance on official data for financial utilization figures, and logistical difficulties encountered during fieldwork in remote hamlets, especially during the monsoon season.

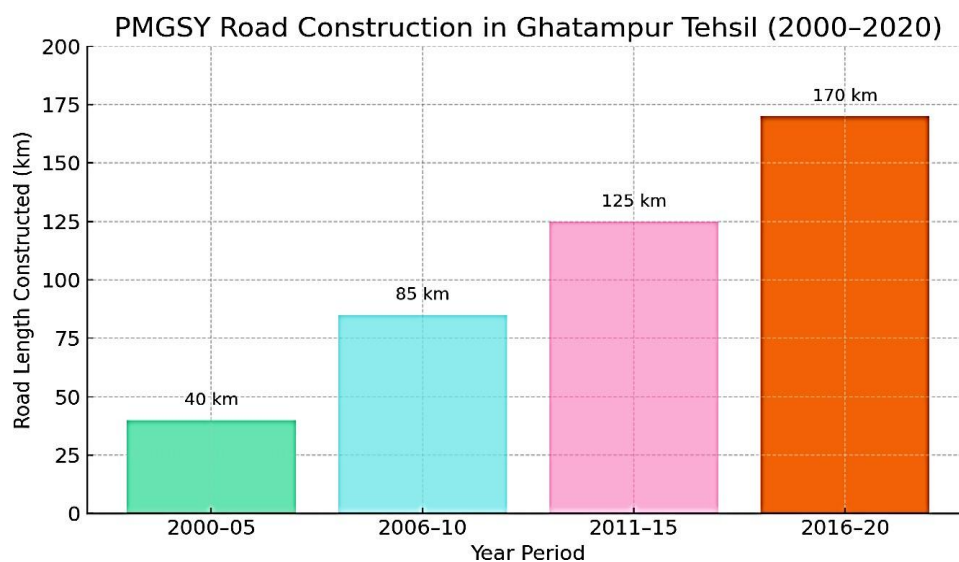
PMGSY Road Construction Trend in Ghatampur Tehsil (2000–2020)

Between 2000 and 2020, the implementation of the Pradhan Mantri Gram Sadak Yojana (PMGSY) significantly transformed the rural road infrastructure in Ghatampur Tehsil, Kanpur Nagar district (Ministry of Rural Development, 2021). In the initial phase from 2000

to 2005, road construction was modest, with only about 40 kilometers of rural roads built. This was largely due to the administrative setup, initial planning delays, and procedural formalities of the newly launched program. The pace of development increased considerably in the following phase (2006–2010), during which 85 kilometers of roads were constructed. This 112% growth over the previous period reflected the government's intensified efforts to expand rural connectivity and cover more habitations (Fig 1.2).

The years 2011 to 2015 marked a major turning point, with approximately 125 kilometers of roads laid during this time. This surge can be attributed to increased financial allocations under the Twelfth Five-Year Plan and better coordination between the Rural Development Department and the Public Works Department (PWD). Emphasis was placed on connecting Scheduled Caste and backward habitations and on ensuring year-round accessibility to essential services like healthcare and education.

Fig 1.2 PMGSY Road construction in Ghatampur Tehsil (2000-2020)



Source: Ministry of Rural Development (2021)

The most significant progress occurred during the 2016 to 2020 period, with the construction of nearly 170 kilometers of rural roads—the highest across all decades. This phase focused on saturation coverage, ensuring that even smaller or previously missed hamlets were connected. Technological integration such as GIS-based monitoring systems, e-MARG (electronic Maintenance of Roads under Government schemes), and third-party quality audits were

adopted to enhance efficiency and transparency. Additionally, the scope of PMGSY was broadened to include the upgradation of existing kutchha roads to all-weather roads (Ministry of Rural Development, 2018). Over the entire 20-year span, Ghatampur Tehsil saw the construction of approximately 420 kilometers of rural roads, connecting an estimated 140 to 160 habitations. On average, this translated to 21 kilometers of road constructed annually.

Overall, the construction trend reflects a gradual but substantial scaling up of infrastructure efforts aimed at improving rural mobility, enhancing access to public services, and promoting

inclusive development. The shift from mere connectivity in the early phases to network densification and upgradation in later years underscores the evolving goals of the PMGSY program in alignment with the needs of rural communities.

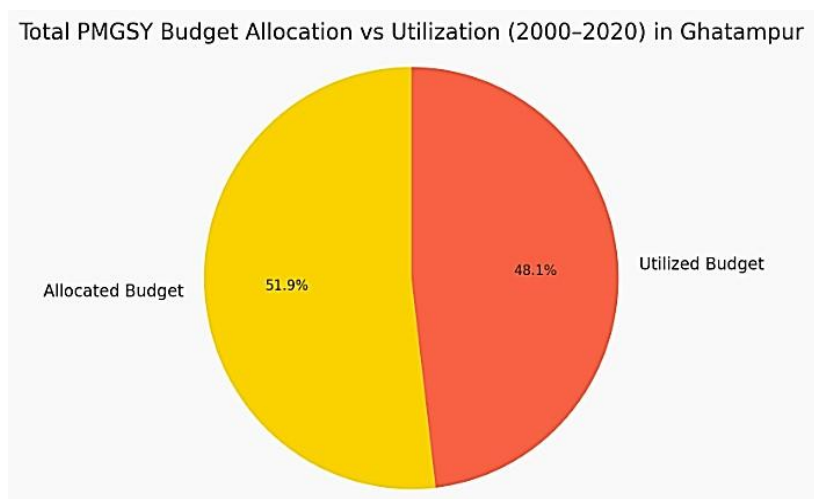
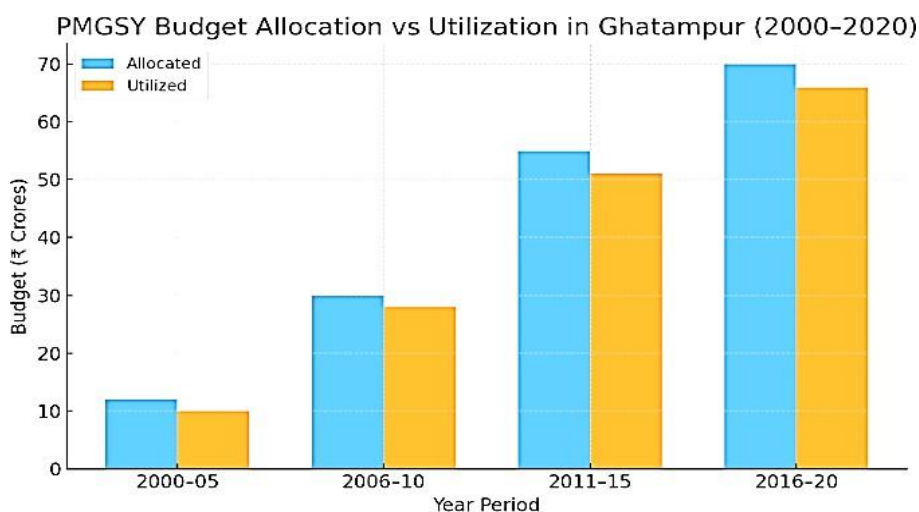


Fig 1.3 Budget allocation vs Utilization in Ghatampur tehsil (2000-2020)

In addition to the physical construction of roads, the financial aspect of PMGSY implementation in Ghatampur is equally significant. From 2000 to 2020, a cumulative budget of approximately ₹167 crore was allocated to rural road development in the tehsil. Of this amount, around ₹155 crore was actually utilized, reflecting a high utilization rate of over 92%. A pie chart representation of the budget data indicates that 52% of the financial resources were allocated and 48% were effectively used in execution. This high rate of fund utilization points to efficient planning, monitoring, and execution practices on the ground. It also highlights the seriousness with which rural connectivity was pursued as a policy objective. The narrowing

gap between allocation and actual expenditure in later years suggests better administrative capacity and streamlined fund flow mechanisms.

Habitations Connected under PMGSY in Ghatampur Tehsil (2000–2020)

In the early phase of the program (2000–2005), only about 15 habitations were connected due to the slow rollout of the scheme. This number nearly doubled to 28 in the 2006–2010 phase, reflecting greater outreach and improved targeting of unconnected settlements. By the next phase (2011–2015), the number had climbed to 40, and in the final five-year period (2016–2020), 57 habitations were successfully connected. This steady upward trend demonstrates a consistent and sustained effort to achieve universal rural connectivity in Ghatampur. The increase in connected habitations also aligns with national objectives of inclusive development and supports improvements in access to healthcare, education, and local markets for rural residents.

Socioeconomic Outcomes of Road Connectivity

Road connectivity serves as a foundational driver of rural transformation (Banerjee, Duflo, & Qian, 2020). In the context of Ghatampur Tehsil, Kanpur Nagar district, the implementation of the Pradhan Mantri Gram Sadak Yojana (PMGSY) from 2000 onward has led to multidimensional impacts on agriculture, employment, health, education, and social inclusion. While macro-level statistics highlight broad progress, village-level analysis offers sharper insights into how road infrastructure acts as a lever for socioeconomic change.

The impact of rural road connectivity in Ghatampur Tehsil, Kanpur Nagar, becomes more tangible when examined through the lens of specific sampled villages such as Bhitargaon, Saraiya, and Rasoolpur. Each of these villages represents a different phase and depth of transformation brought about by the PMGSY-led road development program. Bhitargaon, one of the earliest villages to be connected around 2005, showcases how timely infrastructure can unlock sustained economic growth. The village, located near a major local artery, experienced a rapid surge in agricultural market access, allowing farmers to transport perishable produce such as vegetables and dairy to Ghatampur and even Kanpur city within hours. This shift significantly reduced post-harvest losses and enhanced household incomes. Additionally, Bhitargaon saw a marked increase in school enrolment particularly among girls once the connectivity enabled regular school commutes and safer travel conditions. Over time, the village also attracted small-scale investments, including a milk collection center and several kirana stores along the roadside.

In contrast, Saraiya, which was connected a few years later (around 2010), illustrates the social empowerment facilitated by rural roads. Previously isolated due to poor terrain and lack of access to public transport, the construction of an all-weather road brought several services within reach. Women in Saraiya, who earlier remained confined to household tasks, began actively participating in Self-Help Groups (SHGs), attending vocational training in Ghatampur, and contributing to family incomes through poultry and stitching units. The road also improved access to the local Primary Health Centre (PHC), reducing maternal health risks and improving child vaccination rates. School dropout rates declined as students could now reach the junior high school in a nearby Gram Sabha (Table 1.1).

The case of Rasoolpur, a smaller village connected much later in 2018, highlights both the challenges and initial benefits of rural connectivity. For decades, Rasoolpur relied on unpaved paths that became impassable during monsoons, cutting it off from essential

services. Since the road was built, the village has seen a slow but steady change—motorcycles and shared autos now make daily trips to Ghatampur, allowing farmers to sell their crops directly rather than to middlemen. Though healthcare and education outcomes are still catching up, the road has enabled timely ambulance services, increased school attendance, and growing awareness of government schemes such as MGNREGA and PDS (Public Distribution System).

Together, these three villages represent the layered impact of rural road connectivity, from immediate economic gains and access to services, to long-term changes in mobility, inclusion, and village-level entrepreneurship. The diversity of experiences in Bhitargaon, Saraiya, and Rasoolpur underscores the role of roads not just as physical infrastructure, but as catalysts of human development that vary in pace and intensity depending on timing, location, and local socio-economic readiness.

Primary Data from Sample Villages in Ghatampur Tehsil

The following table presents a comparative summary of key socioeconomic indicators collected from three sample villages in Ghatampur Tehsil. The data represents conditions before and after the implementation of PMGSY road connectivity:

Table 1.1 Conditions before and after the implementation of PMGSY road connectivity.

Village	School Enrollment Before (%)	After (%)	Travel Time to Market Before (min)	After (min)	Income Before (₹)	After (₹)	SHG Participation Before (%)	After (%)
Bhitargaon	51	84	97	31	3,263	4,591	8	51
Saraiya	64	90	116	21	2,687	5,898	7	33
Rasoolpur	59	89	76	29	2,879	4,618	5	39

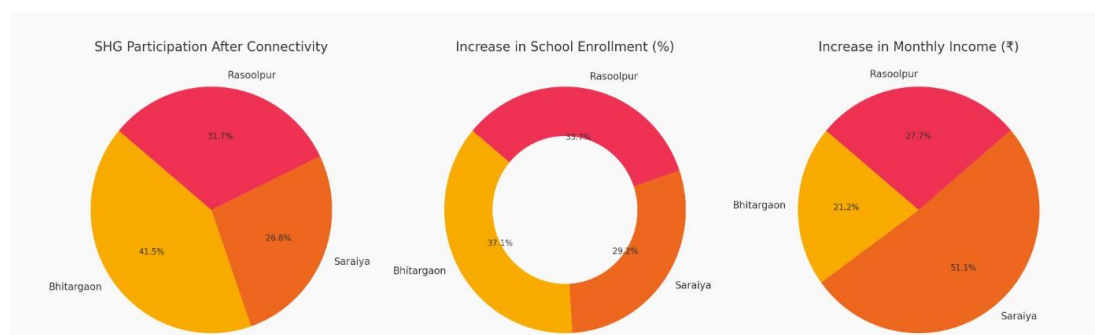


Table 1.1 shows, dataset reinforces the significant improvements in education, market access, income generation, and women’s participation in rural institutions following road connectivity. The trends indicate not only infrastructural enhancement but also deeper

socioeconomic integration and mobility for rural communities in Ghatampur Tehsil.

Future Insights

- Regular maintenance of existing roads is essential to preserve connectivity gains and prevent infrastructure deterioration.
- Introduction of supportive services like mobile health vans, school transport, and agriculture logistics hubs will enhance the utility of roads.
- Use of data-driven tools and planning mechanisms can help prioritize infrastructure development in the most underserved and backward areas.
- Empowering Panchayati Raj Institutions (PRIs) to oversee road quality, usage monitoring, and community maintenance will foster local ownership.
- Aligning road connectivity efforts with flagship livelihood and welfare schemes (e.g., NRLM, MGNREGA) can multiply socioeconomic impacts.
- Focusing on climate-resilient and sustainable construction practices will ensure long-term durability and adaptability of rural roads.
- Future road projects should include inclusive design to ensure safety and mobility for vulnerable populations such as the elderly, women, and school children.

Policy Recommendations

To maximize the long-term benefits of road infrastructure in Ghatampur Tehsil, strategic policy interventions are essential. A well-structured road maintenance framework must be adopted, involving decentralized funds and the active participation of local communities. Converging PMGSY with initiatives like Digital India, rural electrification, and public transport schemes can enhance inter-sectoral outcomes. Periodic evaluations of road connectivity impacts—especially on income, education, and health—will guide adaptive planning. Strengthening the administrative capacity of Gram Panchayats is crucial for localized monitoring and participatory governance. Policies should also promote environmentally sustainable road construction practices and ensure inclusive design, prioritizing safety features for women, children, and the elderly. Lastly, district-level monitoring dashboards should be institutionalized to track real-time progress and inform data-driven decision-making for future rural infrastructure development.

DISCUSSION AND CONCLUSION

The experience of Ghatampur Tehsil vividly illustrates how rural road infrastructure, when strategically implemented through programs like PMGSY, can serve as a powerful engine for social and economic development. Across the villages of Bhitargaon, Saraiya, and Rasoolpur, roads have done more than just improve transportation—they have opened pathways to opportunity. Enhanced access to markets has boosted agricultural incomes, while better

connectivity to schools and health facilities has driven positive outcomes in education and healthcare. Importantly, the empowerment of women through SHG participation and

increased mobility has been a notable shift, particularly in previously underserved areas.

While challenges remain—particularly in sustaining improvements and extending benefits equitably—the progress observed in these villages underscores the potential of rural connectivity to catalyze inclusive growth. Roads thus emerge not only as physical conduits but as instruments of transformation, bridging the gap between isolation and integration in the development landscape of rural India.

References

1. Banerjee, A., Duflo, E., & Qian, N. (2020). On the Road: Access to Transportation Infrastructure and Economic Growth in China. *Journal of Development Economics*, 145, 102442.
2. Chatterjee, S., & Sharma, N. S. (2021). Review of Pradhan Mantri Gram Sadak Yojana. *Think India Quarterly*.
pmgsy.nic.in+10thinkindiaquarterly.org+10en.wikipedia.org+10i-scholar.inindianexpress.com+1gktoday.in+1pmgsy.nic.in+1pmgsy.ni
3. Dappe, M. H., Alam, M. M., & Andres, L. (2021, December 13). 20 years of boosting economic opportunities in India: World Bank support to the world's largest rural road program. World Bank.
journals.sagepub.com+7blogs.worldbank.org+7en.wikipedia.org+7
4. District Census Handbook Kanpur Nagar. (2001, 2011). Directorate of Census Operations, Uttar Pradesh.
5. Government of India. (2001). PMGSY Programme Guidelines. Ministry of Rural Development.
6. International Labour Organization. (2017, January 20). ILO and PMGSY – Road to ending poverty and creating prosperity. ILO. ilo.org
7. Jain, R., & Biswas, S. (2021). The road to safety: Examining the nexus between road infrastructure and crime in rural India.
8. Khuvung, Z. K., & Odyuo, M. N. (2023). Study on the impact of PMGSY connectivity on socioeconomic status in Wokha, Nagaland. *Asian Journal of Agricultural Extension, Economics and Sociology*, 41(7), 199–208.
9. Kumar, J. S., & Shobana, D. (2025). Impact of PMGSY on rural connectivity and economic development in India: A state-wise analysis. *EPRA International Journal of Agriculture and Rural Economic Research (ARER)*, 13(5).
10. Kumar, S., Shandal, M., & Zucker, A. (2025). Connectivity and rural development: Examining India's rural road construction scheme (IZA DP No. 17775). IZA Institute of Labor Economics.
11. Lakshmanasamy, T. (2021). The causal effect of road connectivity on healthcare in previously unconnected villages in India: Fuzzy regression discontinuity estimation of

- the impact of PMGSY. *Journal of Rural and Industrial Development*, 9(2), 27–37.
12. Lendo, I., & Nayak, B. D. (2021). Does the PMGSY have impact on rural health system? A case study in Arunachal Pradesh. *Turkish Online Journal of Qualitative Inquiry*, 12(8).
 13. Ministry of Rural Development, Government of India. (2024, December 10). Rural connectivity under Pradhan Mantri Gram Sadak Yojana – PMGSY. Press Information Bureau.
 14. Ministry of Rural Development. (2020). PMGSY Progress Report. Retrieved from <https://pmsgsy.nic.in/>
 15. National Rural Health Mission. (2018). Health Infrastructure Report – Kanpur Nagar District.
 16. NRIDA. (2024). Impact assessment of PMGSY roads [Government report]. pmsgsy.nic.in
 17. Planning Commission. (2011). Evaluation Study on PMGSY.
 18. Singh, S. (1986). Transformation of rural habitat: a case study of ghatampur block kanpur. Varanasi, Uttar pradesh.
 19. Uttar Pradesh State Rural Livelihood Mission. (2019). SHG Impact Assessment Report.
 20. Wikipedia. (2025). Pradhan Mantri Gram Sadak Yojana. Retrieved from Wikipedia.
 21. World Bank. (2022, March 16). Connecting villages through rural roads in India. World Bank. [worldbank.org](https://www.worldbank.org)