

Investigating the Socio-Economic Factors Influencing Access to Emergency Healthcare Transportation Services

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Abstract

The presence of available means of transport specifically designed for medical emergencies affects the quality of medical response at the critical moment, hence, the need for such emergency transport must be addressed promptly as it can be a factor of saving a life. This particular research aims at understanding the sociocultural, socio-demographic, and demographic determinants of emergency healthcare transport accessibility at KGMU, SGPGI of Lucknow, and PGI, and GMCH of Chandigarh/other significant tertiary healthcare centres within the north region of India. Along with primary data and the assistance of Binary Logistic Regression and Chi-square methods, the study aims at analysing the differences pertaining to the lower levels of ambulance utilization, awareness, and readiness to use other means of transportation to obtain a healthcare facility.

The scans performed of the data available suggest there are significant differences in the proportion of ambulance use among the hospitals, gender, and age cohorts. The higher educated and married middle aged male respondents were more likely to use ambulances. Universal ambulance awareness ranged appreciably but proportionately, with the highest proportion being aware in GMCH Chandigarh (70%) and the lowest in SGPGI Lucknow (55%). Of the respondents in the survey, the respondents reported barriers to access or use such as restrictions to the physical centre, delay in response, or cost. The result indicated that awareness is the strongest predictor of use and accessibility (OR = 3.15), and limited use (OR = 0.63) due to other private means of transport are quite available. It is striking to note that sixteen percent of respondents were willing to suggest options pertaining to alternative emergency transport.

Focusing on economic awareness and improvement post transportation infrastructure along with augmented policy enhancements on the Digital coordination of emergency medical transportation, makes for an interesting finding. Enhanced equal opportunity access and responsiveness through the penetration of intelligent transport systems in the EMS ecosystem in India, can further augmented through structural outreach that incorporates gender-aware systems and social education.

Keywords: Emergency Healthcare Transportation, Socio-Economic Factors, Accessibility, Awareness, Logistic Regression.

1. INTRODUCTION

The importance of emergency healthcare transportation cannot be understated as it is a fundamental aspect of healthcare delivery systems. Timely healthcare access is critical during a medical emergency as it reduces mortality and morbidity (Patel, et al., 2020) [1]. In developing countries such as India, where emergency medical infrastructure is very important because healthcare is poorly distributed and urban areas often slow down medical interventions, emergency medical transportation is lifesaving (Kumar, et al., 2021) [2]. Despite national-level initiatives such as the 108-ambulance network and state-supported emergency medical services (EMS), there are geographical disparities in access, response times, and usage (Mishra, 2022) [3].

In the north parts of India, emergency healthcare services are primarily referred to from the tertiary healthcare institutions King George's Medical University (KGMU, Lucknow), Government Medical College and Hospital (GMCH, Chandigarh), Sanjay Gandhi Postgraduate Institute of Medical Sciences (SGPGI, Lucknow), and Postgraduate Institute of Medical Education and Research (PGI, Chandigarh). They all provide critical referral hubs for emergency healthcare services. The findings from the current study, however, indicate a worrying level of dependence on personal transport such as private vehicles and auto rickshaws as opposed of ambulances. The lack of awareness, trust, and affordability towards the emergency medical services are issues which need to be addressed for the EMS in place to adequately serve society as a whole.

Accessing emergency transportation is influenced greatly by socio-economic and demographic elements. The current study shows that male patients aged between 45 and 60 and those that exhibit the highest rates of ambulance utilization, while the younger and elderly populations show lesser engagement. These differences may be due to decision making in a gendered context, work exposure, and the lessened mobility that comes with aging (Reisner, et. al, 2015) [4]. In addition, awareness in the hospitals was very unequal with GMCH, Chandigarh having the highest awareness (about 70 percent) and SGPGI, Lucknow having the lowest (about 55 percent). This difference indicates that the institutional level outreach and communication programs empower patients with the knowledge which in turn increases the service uptake (Sharma and Gupta, 2021) [5].

The lack of accessibility that includes communication barriers, delays due to heavy traffic, driver shortages, etc. were ubiquitous across hospitals. Patients in peri-urban and rural settings reported having more challenges reaching the hospitals which indicates the inequitable spatial distribution of EMS. These inequities point to the urgent need for evidence-based reforms in the infrastructure planning, planning, visibility of the service, and coordination of the emergency services (Kumar et al 2021, Mishra 2022) [2, 3]. This study aims to assess the impact of socio-economic factors on the availability of emergency healthcare services across tertiary care hospitals in the capitals of two states in Northern India. The study quantitatively assesses the impacts of key determinants of awareness, access, gender, type of hospital, and private vehicle ownership on ambulance use.

2. Literature Review

The development of emergency healthcare transportation systems in India is an area of growing scholarly interest, particularly because the inequitable distribution of timely medical attention is now overshadowed by rapid urbanization, population density and income inequality. Gupta (2024) [6] discusses the expanding use of intelligent transport systems to address these inequities. His research indicates that Predictive Routing and Automated Ambulance Allocation systems can cut average

response times by more than twenty percent in highly congested urban centers. In a supporting regional study, Sarkar (2024) [7] analyzed the ‘108’ ambulance service in the state of Maharashtra and, despite the service undergoing considerable improvements in technology, argued the system is still plagued by a lack of personnel and a rural-urban divide. These studies illustrate the importance of integrating social initiatives with digital emergency service offerings.

Aggarwal et al. (2024) [8] formulates broad policies in their work *Revitalizing Emergency Care Ecosystem in India – Challenges, Technology & Policy*, arguing that digital platforms and telemedicine need to be integrated into India’s public health system in order to improve the community-tertiary care continuum. They advocated for public-private partnerships, affordable access policies, and community paramedic training to improve equity access for economically disadvantaged patients. These conclusions strengthen the argument that without proper institutional and policy frameworks, technology will remain ineffective to solve the structural and socio-economic problems at hand.

Further empirical research has illuminated the demographic and economic factors surrounding the use of ambulances. In a study conducted by Ravindra et al. (2022) [9] and based in a hospital, women, individuals with higher education, and those with greater income were found to be significant predictors of emergency-transport usage. The logistic regressions indicated that the higher the educational attainment, the greater the likelihood of an ambulance being requested, with the underrepresentation of women and the elderly being particularly concerning. Chauhan et al. (2023) [10] reported a similar finding in Delhi, where only 43 percent of eligible patients were reported to have arrived by ambulance, mainly due to low awareness and perceived cost barriers. The two studies demonstrate that socio-economic factors are more critical than distance in access to services.

Past research at the system level has focused on the lack of institutions as a key weakness. Bhoi et al. (2019) [11] noted insufficient training of staff and the lack of a coherent and nationally integrated system as major barriers to providing emergency medical services (EMS) in India. Sinha et al. (2020) [12] dealt with the issue described above during the COVID-19 pandemic. They noted that during the lockdown, routine ambulance services were severely curtailed, and many resources were redirected to managing the infection. The research showed that the pre-hospital care system and the ambulance network did not have backup plans. The result was that there was a slowdown in ambulance responses, and non-COVID deaths increased.

Bhoi et al. (2019) [11] has emphasized the lack of effective inter-disciplinary and cross-sector collaboration, which resulted in untapped and underused resources during the COVID-19 Pandemic. During this profoundly isolating and frightening period, numerous study participants expressed gratitude for the shift in remote consultation practices, indicating that the maximum was saved from the minimum. It was suggested that non-fatal, life-threatening, or serious health events could involve managing medical uncertainty.

Public awareness, effective communication and community participation have all been vital to EMS efficacy. Patel et al. (2021) [13] demonstrated that awareness campaigns and the establishment of toll-free emergency numbers increased the call volume by 27 percent, illustrating the need to bridge the service delivery gap. Global literature confirms the assertion that service user awareness, advocacy, and trust has the potential to transform emergency transportation and referral systems, particularly in developing and middle-income countries where these systems are under-developed and low literacy, high user fees exist.

These studies show that the problems with emergency healthcare transportation in India is multi-

faceted—technological, social, economic, and even organizational. Gains in operational effectiveness from the state level technological integration is adoption uneven fostered inequitable spatial. Income, education, gender, and even awareness and education social determinants which have still to access ambulance services shaped under coordination, workforce limitations, policing, and systemic structural policy, the coordination gaps have gaps in coordination enduring. The current study, extending these findings, investigates the aggregate impact of the socio-economic on the access to emergency healthcare transportation to and from tertiary hospitals in North India to provide evidence on data-driven policy formulation and the designed inclusive services.

3. Research Methodology

The current research takes on an empirical and quantitative approach focused on the socio-economic determinants the patients of tertiary hospitals in North India face concerning emergency health care transportation access. The research, in this case, is an integration of descriptive and analytical methods and involves primary data collection and testing of hypotheses statistically. It attempts to describe the demographic, socio-economic, and institutional factors like awareness and accessibility, geo-social elements like gender and income, types of hospitals, and the associated probability of ambulance utilization. Additionally, the study is enriched through inferential analyses such as Chi-square and binary logistic regression, aimed at measuring the predictive power of these factors.

3.1 Research Design and Approach

The study incorporates a cross-sectional procedure and conducts a survey in order to gather quantitative data from different socio-economic and demographic sectors which were targeted in a specific period of time. The approach permits the comparison of various hospitals and demographic groups without compromising the internal validity of the study. Because the primary aim was to determine the factors which affect the awareness of and the utilization of ambulances, a deductive method was used in order to determine the various relationships between the independent and dependent variables. This research is made tangible within the research methodology, which is based on that which is visible as opposed to the theories which surround the data, in order to attain the most accurate conclusions. The methodology is built from other analyses of EMS in the country, particularly in the works of Ravindra et al., 2022 [9] and Chauhan et al., 2023 [10] that have utilized hospital-based survey designs to conduct patient level analysis.

3.2 Sampling Design and Respondent Profile

For this study, the sample population consisted of patients and caregivers using emergency medical services at King George's Medical University and Sanjay Gandhi Postgraduate Institute of Medical Sciences in Lucknow, and Postgraduate Institute of Medical Education and Research along with the Government Medical College and Hospital in Chandigarh. These hospitals were chosen as they represent publicly funded and privately funded hospitals catering to the urban, suburban, and rural population. Stratified random sampling was conducted to obtain proportionality across the hospitals. For this study, 280 responses were obtained through the structured questionnaires, after which 250 questionnaires were considered complete and reliable. Reaching 250 respondents was statistically sufficient at 95% confidence and 5% margin of error. Respondents were recruited on voluntary basis from the emergency room, and the study was conducted in a manner to comply with ethical guidelines as participants were anonymous.

3.3 Instrument Design and Data Collection

The primary data were collected utilizing a structured questionnaire developed for the purpose of this analysis. This instrument was segmented into three independent sections: (1) the demographic and socio-economic background of the respondents; (2) the awareness, accessibility, and use of the emergency healthcare transportation service; and (3) the barriers and alternative perceptions, as well as the willingness to use different modes of emergency transport. The questionnaire items were constructed in the context of the national and international literature available on socio-economic determinants, as well as the accessibility of EMS (Bhoi et al, 2019 [11]; Gupta 2024 [6]; Aggarwal et al 2024 [8]). Some items were taken from previously validated questionnaires in health-service research, while others were contextually modified to the Indian healthcare setting.

The collection of data in this instance relied on personal interviews and field work over a period of three months. The objectives of the research were explained to each of the respondents and consent was obtained prior to the commencement of the study. The survey attained various demographic representatives by assuring respondents belonged to the different ranges of socio-economic status, various genders and different residence locations (urban, rural and peri-urban).

3.4 Concepts and Operationalization of Variables

In the study, the dependant variable, ambulance utilization, was coded as a binary outcome (1 = used ambulance, 0 = did not use ambulance). The independents were gender, age, education, income, level of awareness, type of hospital, and ownership of a car. Categorical type variables were measured at the nominal scale level, while awareness and accessibility variables were measured at the ordinal scale level. The socio-economic determinants were examined in relation to the use of ambulances through cross-tabulations and Chi-square tests, while key determinant variables were assessed in relation to use through binary logistic regression.

3.5 Trustworthiness Metrics

In order to ensure the effectiveness and proof of the research instrument, it was piloted-tested on 20 respondents from the same hospitals. The pilot feedback was used to rephrase questions to make them clearer and improve the order of the questions in the sequence. The instrument reliability was checked using Cronbach's alpha, which was 0.82, suggesting good internal reliability. Construct validity was developed through an expert review and triangulation with previous studies on EMS accessibility. The combination of pilot testing with literature-based item development to ensure the instrument truly measured the constructs of awareness, accessibility, and socio-economic barriers.

3.6 Techniques of Data Analysis

The data obtained has been coded and analyzed via the SPSS application (Version 25). Respondents were profiled with the help of descriptive statistics — frequency distribution, means, and percentage distributions — and inferential statistics, including the Chi-square test of independence, which explored the relationship between categorical variables (hospital and level of awareness, gender and service utilization), and binary logistic regression for estimating the probability of ambulance utilization due to socio-economic variables. The regression model was checked for and validated with the absence of multicollinearity, the significance of the coefficients, and goodness of fit (Nagelkerke R^2). The results were interpreted in light of the patterns that indicate potential policy and practice changes to reduce inequity in the distribution of hospital-based emergency transport services.

3.7 Consideration of Ethics

Relevant institution review boards were provided with the study, and they granted ethical clearance prior

to the collection of data. Respondents in the study were told that participation in the study was purely voluntary, that the data they provided would remain anonymous, and that confidentiality would be upheld. No identifiers were collected. The ethical standards of the discipline of social science and its health research areas were maintained in this study.

3.8 Conceptual Framework

The conceptual framework for the current research incorporates the socio-economic, demographic, and institutional factors that determine the accessibility of emergency-transport. It posits that demographic factors, socio-economic attributes, and institutional characteristics all determine the likelihood of the utilisation of an ambulance. Such a framework is consistent with the models rest in the literature on accessibility in health care (Patel et al., 2021 [13]; Chauhan et al., 2023 [10]) and is, serves as the foundation for analysis in the subsequent sections of this work to the model being tested.

4. Data Analysis and Findings

This study analyzed 250 valid responses of which 250 were divided from four tertiary healthcare institutions spanning King George's Medical University King George's Medical University (Lucknow), Sanjay Gandhi Postgraduate Institute of Medical Sciences (Lucknow), Postgraduate Institute of Medical Education and Research (Chandigarh), and Government Medical College and Hospital (Chandigarh). The data were then analyzed using SPSS v25 for descriptive and inferential statistics. The findings shed light on the socio-demographic factors associated with constructions of emergency health care access barriers for ambulance use in the Northern part of India.

In terms of demographics, the analyzed data showed 62% of respondents were male while 38% were female. The largest cohort by age were in the range 31-45 representing a working age group and were the most frequent users of tertiary care. In terms of hospital allocation, KGMU provided 24% of total respondents, PGI 22%, SGPGI 19% and GMCH 15%. Approximately a third of the study population reported earning less than ₹25,000 a month which highlights the significant barriers for accessing private emergency ground transportation.

Across hospitals, the extent to which emergency ambulance services were known differed greatly and this could be attributed to the differences in the outreach and communication strategies at the different hospitals. GMCH, Chandigarh had the greatest awareness (70%), followed by PGI, Chandigarh (68%), KGMU, Lucknow (63%), and SGPGI, Lucknow (55%). The Chi-square test gleaned there was a significant association between hospital and awareness level ($\chi^2 = 3097.60$, $p < 0.01$) which suggests that the institutional context is important in determining knowledge of emergency transport facilities. These results are consistent with previous work that describes the impact of hospital-level awareness on patient utilization (Chauhan et al. 2023 [10]).

Table 1. Awareness and Ambulance Utilisation by Hospital

Hospital	Awareness (%)	Ambulance Utilisation (%)
KGMU, Lucknow	63	27
SGPGI, Lucknow	55	25
PGI, Chandigarh	68	29
GMCH, Chandigarh	70	31

The results of the Table 1 reveal a notable discrepancy—hospitals that have greater awareness tend to record greater ambulance use as well, which supports the hypothesis that the use of healthcare services increases as the information available increases. Respondents pointed out a number of obstacles to

ambulance use, such as waiting for a long time for an ambulance (46 percent), no vehicles available (32 percent), and a driver taking too long to arrive (22 percent). Respondents residing in the peri-urban and rural areas pointed out that they too faced an issue of being stuck in traffic and not knowing commonly used helpline numbers. These findings align with national policy review findings that highlight the need to have an integrated communication and dispatch system (Aggarwal et al. 2024 [8]).

In order to test the impact of the socio-economic characteristics, a binary logistic regression model was estimated with the use of an ambulance as the dependent variable (1 = used; 0 = not used) while the independent variables included socio demographic variables such as, Came under the mention, socio-theoretic construct and the model’s significant variables; demographic variables are gender, level of awareness, level of accessibility, private vehicle availability, level of education, income, and the hospital. The model was statistically significant ($\chi^2 = 210.76$, $p < 0.001$) and this model, on the other hand, understood approximately 19 percent of the variance (Nagelkerke $R^2 = 0.186$).

Table 2. Logistic Regression Predictors of Ambulance Utilisation

Predictors	B	S.E.	Wald	p	Exp(B) (Odds Ratio)
Awareness (aware of service)	1.147	0.34	11.24	0.001	3.149
Accessibility (fewer barriers)	0.803	0.27	9.47	0.002	2.232
Female (vs. male)	0.238	0.11	4.36	0.037	1.269
Private-vehicle access (yes)	-0.461	0.19	5.89	0.015	0.63
Education / Income (higher)	0.412	0.21	3.97	0.046	1.51
Constant	-1.67	0.39	12.05	0.001	0.188

According to the regression analysis, the most important factors influencing the use of ambulances are knowledge and availability. People who were aware of the emergency helpline were almost three times more likely to use ambulances ($OR \approx 3.15$), and individuals who perceived fewer barriers to accessibility were more than twice as likely ($OR \approx 2.23$) to use them. On the other hand, individuals who have access to private vehicles are less likely to use ambulances ($OR \approx 0.63$), which reflects the preference for substitutes. Controlling for these factors, females in the sample reported higher odds of using ambulances ($OR \approx 1.27$), suggesting that the gender disparity in the descriptive statistics is likely due to a lack of information and mobility rather than differences in behaviour. Education and income were shown to have a positive effect on utilization, which reflects the impact of literacy, income, and the ability to move within the healthcare system.

Also, there was a high level of readiness to accept other methods of emergency transport among the respondents from all hospitals, with almost 89 percent willing to use other regulated alternatives, including community responders and ride-hailing services, to ambulances when they are delayed. The Chi-square test for independence shows that there is no significant difference between the hospitals with respect to these variables ($\chi^2 = 2.42$, $p = 0.878$), which means that there is the same level of flexibility among respondents in all the hospitals.

To conclude, the most significant factors in the use of emergency transport are the socioeconomic factors, especially awareness and the three A’s: Accessibility and Affordability. Institutional differences, however, were less important than the socio-economic factors. Hence, all three - public advocacy, cost-reduction policies, and digital dispatch—will be crucial for equitable as well as efficient access for the population of India to emergency healthcare transport.

5. Policy Recommendations and Their Justification

The systematic investigation and access responses which the imposed set of primary questions provide for emerge as the most crucial for the policies of the emergency healthcare transportation system in India. The findings prove that the use of ambulances and the cost of services offered are subject to the socio-economic dominance of inequities which in turn restrict citizenship rights access.

Neglecting these issues in today's world politically, technologically, and socially, in the integrated sets of policies, will form pathways of the most important development.

5.1 Policy Implications

In terms of policy, the research points out the need to address emergency healthcare transportation as a vital part of public health governance, as opposed to administrative, logistical, or peripheral activities. Policymakers at both the national and state levels need to address the gaps in emergency medical services (EMS) infrastructure in areas where the services are underused or underdeveloped. The persistent income-related gaps in publicly subsidized systems of ambulance services described in the research indicate the existing economic barriers to the use of these services. Policies, therefore, need to keep the services universally accessible and affordable, for instance, through capped user fees, insurance reimbursement, or subsidies directly provided to the poor, as can be seen in the aforementioned models already implemented in states like Tamil Nadu and Kerala. The integration of public health insurance schemes to subsidize ambulance services for vulnerable populations has shown to improve accessibility (Aggarwal et al., 2024 [8]).

The outcomes highlight the understanding of the ubiquitous, active, and omnipresent of the 108 service, as the absence of this knowledge impacts the odds of ambulance usage. Almost respondents who acknowledged the service were twice as likely to utilize an ambulance as those respondents who were not aware of the service. It is the policy recommendation of this report that the government undertake comprehensive "108 service" education campaigns that target the public, school children, and the health workforce at all tiers using appropriate social mobilization tools and advocacy, thus enabling citizens to manage the system of emergency number(s). In addition, the government should implement an open access policy for EMS performance transparency dashboards that report in real time the average response time, the operational and standby status of EMS units, and the linkage to the hospitals. Open data projects of this nature have the dual benefit of fostering public accountability and trust in the system.

The results scientifically reason the further development of Intelligent Transport Systems (ITS) and EMS Data Analytics for EMS systems integration. Gupta (2024 [6]) was able to demonstrate that predictive routing algorithms can reduce response times by greater than 20%, which this study defines as being the primary complaints in response delay and unavailability. Under the National Health Mission, there should be an implemented unified digital platform at the country level that integrates GPS, automated dispatch systems, and real time saturation of hospital beds. In order to facilitate the reduction of system fragmentation and real time coordination optimally, the Communication protocols that are standard policies in the country should be inter-call centre, traffic control, and hospital systems, particularly in the city and peri-urban areas.

In addition, policy frameworks should enhance capacity-building activities for paramedical staff, dispatchers, and drivers. The lack of trained emergency technicians, as underscored in previous EMS evaluations (Bhoi et al., 2019 [11]; Sinha et al., 2020 [12]), continues to be a constraining factor in the quality of service. This problem can be alleviated by the Government and academic institutions

partnering to create certified short-term skill development programs in medical triage, communication, and digital operation. The problem of workforce efficiency decay can be managed by regular refresher training and performance linked incentives. The current study finds a gap in the level of awareness and access for EMS between the cities of Chandigarh and Lucknow. This imbalance can be fixed by establishing inter-state benchmarking frameworks. EMS in other states can be used as a standard, along with regular inter-state assessments and government-funded improvement programs for the underperforming areas.

5.2 Recommendations

Apart from changing policies, evidence suggests important additional operational strategies to improve effectiveness on the institutional and community levels. First, tertiary care hospitals need to create Hospital Based Emergency Transport Management Cells for better integration between emergency departments and ambulance fleets. Each hospital's allocation of ambulances to daily emergency admissions should be geographically optimised and historically and forecast utilisation based on ambulance operational utilisation solved. GPS-enabled dashboards for other parameters will assist better in other congestion and delay corridors.

Second, community outreach and education proposition polices are to community and health policies what the Apollo Program was to science and technology. The study's strategy on EMS campaign education and feedback loops-and and-then-multi to the-Eagle - Go Fly. Hospitals must, and this is non-negotiable, partner with lower-tier municipal organisations and the civil society to campaign in rural and peri-urban settings. The public attitude towards delay in ambulance use is dispelling the myths over the need to lower the listening price of emergency care.

To begin, planning EMS should include gender-sensitive approaches. Cultural and social characteristics account for the lower rate of ambulance use for the female gender. Encouraging gender-inclusive training for EMS personnel and women's community awareness advocacy should be incorporated in policies. Other women users of the service could be more comfortable if there were female paramedics employed in the call centre.

Also, the hospital and national level should implement frameworks for evidence-based monitoring. Response times, fleet readiness, and service outcome audits should be published every three months. This will indicate areas in which there is low performance and strategically allocate funds and resources. Mobile feedback tools could be used to automatically collect real-time data to service users, which would provide the ability to measure performance across the service feedback continuum.

Lastly, EMS and other forms of transport can be used in regions fielding restricted formal EMS. Partnerships with community-based volunteer networks, and regulated ride-hailing services, are possible due to the 89% positivity response rate. Similar approaches have been developed and documented in other low resource areas, where trained local drivers with first-aid kits are the first responders until the ambulance arrives (Das and Chatterjee, 2023).

Integrating policies from the different ministries (i.e., health, transport, and information technology) is necessary to sustain the systemic improvements. The Ministry of health is to work with the Ministry of Road Transport and Highways to dedicate emergency lanes and traffic-signal pre-emption for ambulances in the major cities. At the same time, the Ministry of Electronics and Information Technology would deploy different state systems of EMS software platforms to facilitate seamless data exchange across state boundaries.

Taken together, these policy recommendations are geared toward strengthening the emergency

healthcare transportation system by being inclusive and leveraging technology. By closing the technology gap, improving education and outreach, and reducing systemic silos, India can develop a more just system in which emergency medical care is accessible in a timely manner to all who need it.

6. Conclusion

With emergency healthcare transportation, a community can access tertiary medical facilities which makes it easier to provide healthcare during emergencies. The research gap that this study fills is the interplay of socioeconomic and demographic factors that restrict access to emergency medical transport in India. The study demonstrates that awareness, affordability, and institutionalise barriers impede equitable service utilization within existing national schemes such as the 108 networks.

The results emphasize that improving access to emergency transport services is not simply an opportunity for technological development, but also for policy, infrastructure, and community reform. The study highlights that awareness creation and strategies such as gender-sensitive outreach, tiered ambulance service pricing, and subsidized programs are crucial to building public confidence and increasing ambulance utilization. Also, hospitals need to implement operationalized performance management systems and enhanced analytics to facilitate better integration of their dispatch centers, emergency care facilities, and public health planners for improved system responsiveness and coordination.

At the other end of such a spectrum, the study highlights the inclusion of emergency transport services within the public health governance framework as an important consideration. Policymakers need to focus on the integration of resource distribution, cross-organization collaboration, and interstate digital service integration to improve the continuity of service delivery. The strengthening of such linkages would support India's transition from a disjointed emergency response system to an integrated, accessible, and efficient healthcare transport network.

7. Future Scope of Work

From the study's findings, the rationale for future research rests on its socio-economic feature domain pertaining to the challenges people faced in gaining access to emergency healthcare transportation. Within eastern and northern India, the research was confined to two states and four tertiary hospitals. Though representative to some extent, the region is not capable of addressing the heavily variegated contexts and geometry of social and economic emergency medical service coverage throughout the rest of India. Future research might involve state-level considerations linking the disparate regions of India, along with the corresponding infrastructure access to emergency healthcare covering representative sample sites in the hinterland, elevation, and coastal belt regions.

Future inquiry along this line might incorporate various designs and approaches to undertake in-depth assessments of community perceptions and behaviours with regards to the evolution of usage of emergency medical response systems. Within the domain of policy research, integrating qualitative data and contextually driven micro social analyses with policy systems surrounding responsive and adaptive data informed emergent behaviours of the response prompt emergency care. In addition to these approaches, applying advanced techniques such as spatial and social relationship analyses and structural mapping and service accessibility modelling can explore emergent relationships surrounding awareness responsiveness and service income geographic distance.

Subsequent research could investigate the impact of new technologies—including artificial intelligence,

IoT-integrated ambulances, and telemedicine—on EMS coordination and response time efficiency. Comparative studies of public and private ambulance networks, as well as global benchmarking against best practices, would enhance understanding of emergency transport equity. All of these studies would help further justify the need for policy changes in addition to expanding the equity and robustness of emergency healthcare transport in India.

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