

# Dealing with Medical Emergencies in Rural Areas Using Geospatial Techniques

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**Abstract:** Villages are prevalent throughout India. Our population is heavily concentrated in rural areas, where there are few quality hospitals and medical facilities. They must travel to another neighbouring location whenever they experience any medical issues. A quality medical facility is frequently lacking in adjacent locations. Numerous lives must be lost as a result of this. In order to assist people in remote areas, this paper's concept is to design the Geospatial medical app "medical emergency." This app is primarily for people who are in life-threatening medical situations, such as heart attacks, oxygen deprivation, childbirth, etc., who need prompt medical attention.

**Keywords:** GIS, GPS, Geospatial Technique

## Introduction

In an emergency referral system, a transportation network based on a geographic information system (GIS) may assist shorten wait times for medical attention and improving survival rates [1]. Finding the shortest route to a health center and overcoming geographic obstacles are both made possible by geographic information systems (GIS). Few studies have used GIS to develop or improve referral systems in low- and middle-income countries [8,9], despite the fact that GIS has been widely employed in public-health applications [2,3,4–7]. The identification of healthcare service needs was given priority in GIS-based studies, which also addressed the particular requirements of the research locations.

## Literature Survey

Providing high-quality healthcare to the rural population in developing nations like India is a crucial, albeit under-addressed topic. Numerous healthcare indicators, including the ratio of beds to patients, the number of certified medical and paramedical professionals to patients, and the standard of other medical facilities, all show serious problems that need to be fixed in a number of different ways. These occurrences are not exclusive to India. Exhibit 1 displays major healthcare indicators for India [10].

**Exhibit 1**  
**Status of Healthcare in India – Some indicators**

Sl. No.	Country	No. of physicians (per 10,000)	No. of health workers (per 10,000)	Hospital Beds (per 10,000)
1	Germany	33.70	100.50	89.00
2	USA	27.90	97.20	34.00
3	Australia	24.70	91.20	40.00
4	UK	21.30	54.00	42.00
5	Singapore	14.00	44.50	29.00
6	China	16.40	9.60	25.00
7	Malaysia	7.00	18.10	19.00
8	India	5.90	13.80	9.00

Despite recent general increases in public health care spending in India, the gap between supply and demand is still wide. It's not difficult to imagine the reasons behind such little infrastructure growth. Infrastructure for healthcare delivery in rural areas has mostly been developed by the government [10].

Limited resources, such as infrastructure, training, and infrastructure; restricted access to higher levels of care in rural areas; distance and topography; low population density; and communication difficulties. "Health Club Page from Rural Information" [11]

Reading the literature has made it quite evident that India is far behind other countries in terms of emergency medical care. The plan is to develop a smartphone app that handles medical crises in remote locations.

By using analytical techniques at the level of epidemiological surveillance and assessing the spatial inequality of access to healthcare, Geographic Information Systems (GIS) technology has helped to address these concerns. As a result, analyzing healthcare planning difficulties and acknowledging the function of GIS are essential to pertinent investigations. Such studies will advance our knowledge of how to use analytical techniques to address GIS-based healthcare planning challenges.

### **Proposed Solution**

- To prepare an app for a medical emergency in rural areas.
- There will be three kinds of users, admin, hospital, and rural people.
- People will register on this App to use it.
- Registration will be linked with their Aadhar card or some valid id.
- If somebody is having a medical emergency then any (registered) person from that location can open this app and can click on the medical emergency option of the app.
- If somebody will click on a medical emergency, then he will see the option to record a message regarding a medical emergency.
- The GIS/GPS will search for the nearest government hospital which has this application installed. (which are registered for this application)
- Then an alarm will be generated in the hospital and the location of the person (mobile), and details will be displayed.
- After listening to the message, the designated staff of that hospital can contact the person and required medical resources can be sent to the location.
- There can be so many further options to deal with the emergency
- Data collected with this app can be utilized by the government to finalize the upcoming hospital's location and bed capacity as shown in Figure1.

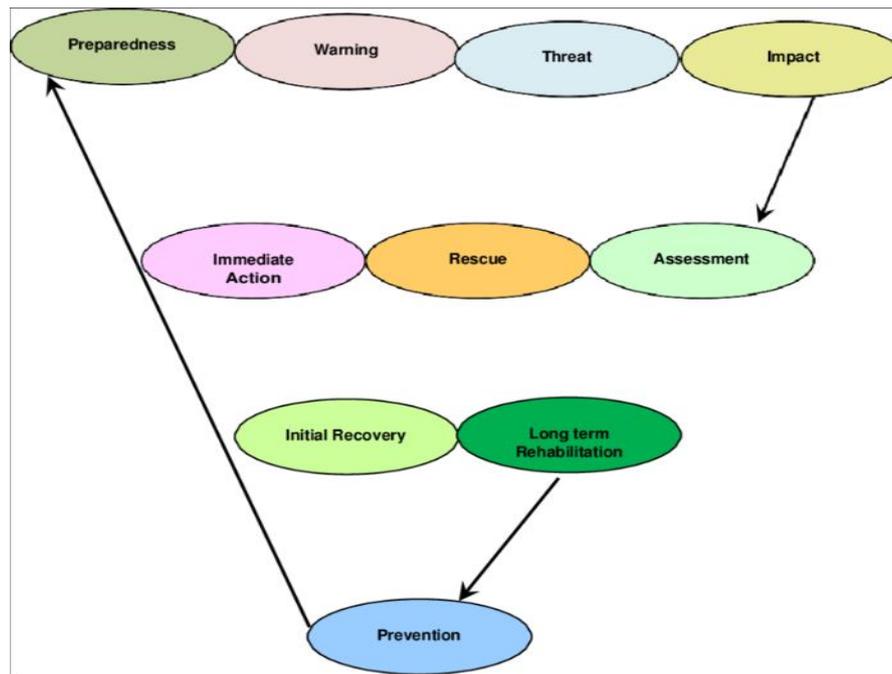


Figure1: Using GIS in medical Emergency

### Conclusion

GIS has been widely utilized in public health studies, but as a tool for creating an emergency referral transportation system, it has not yet taken off in underdeveloped countries. As a result, this study offers helpful guidelines for creating a GIS-based transportation system in a rural environment with limited resources, which may be used to any nation in a situation like this. The death rate can be greatly decreased with this use. It will be very beneficial in offering remedies right away. For many rural residents, this concept may be life-saving.

### References

1. Chowdhury AI, Haider R, Abdullah AYM, et al. Using geospatial techniques to develop an emergency referral transport system for suspected sepsis patients in Bangladesh. *PLoS One*. 2018;13(1):e0191054. Published 2018 Jan 16. doi:10.1371/journal.pone.0191054
2. Tanser F, Gijsbertsen B, Herbst K (2006) Modelling and understanding primary health care accessibility and utilization in rural South Africa: an exploration using a geographical information system. *Social Science & Medicine* 63: 691–705.
3. Noor AM, Zurovac D, Hay S, Ochola S, Snow RW (2003) Defining equity in physical access to clinical services using geographical information systems as part of malaria planning and monitoring in Kenya. *Tropical Medicine & International Health* 8: 917–926.
4. Zinszer K, Charland K, Kigozi R, Dorsey G, Kanya MR, et al. (2014) Determining health-care facility catchment areas in Uganda using data on malaria-related visits. *Bulletin of the World Health Organization* 92: 178–186. doi: [10.2471/BLT.13.125260](https://doi.org/10.2471/BLT.13.125260)
5. Schuurman N, Fiedler RS, Grzybowski SC, Grund D (2006) Defining rational hospital catchments for non-urban areas based on travel-time. *International Journal of Health Geographics* 5: 43 doi: [10.1186/1476-072X-5-43](https://doi.org/10.1186/1476-072X-5-43)
6. Abdullah AYM, Dewan A, Shogib MRI, Rahman MM, Hossain MF (2017) Environmental factors associated with the distribution of visceral leishmaniasis in endemic areas of Bangladesh: modeling the ecological niche. *Tropical medicine and health* 45: 13 doi: [10.1186/s41182-017-0054-9](https://doi.org/10.1186/s41182-017-0054-9) [

7. Abdullah AYM, Dewan A, Rahman MM, Shogib MRI, Karim R (2017) Exploring spatial and temporal patterns of visceral leishmaniasis in endemic areas of Bangladesh. *Tropical Medicine and Health* 45: 29  
doi: [10.1186/s41182-017-0069-2](https://doi.org/10.1186/s41182-017-0069-2)
8. Bailey PE, Keyes EB, Parker C, Abdullah M, Kebede H, et al. (2011) Using a GIS to model interventions to strengthen the emergency referral system for maternal and newborn health in Ethiopia. *International Journal of Gynecology & Obstetrics* 115: 300–309.
9. Kim D, Sarker M, Vyas P (2016) Role of spatial tools in public health policymaking of Bangladesh: opportunities and challenges. *Journal of Health, Population and Nutrition* 35: 8.
- 10 “Emergency Healthcare in Rural Areas” This case was written by B Mahadevan, Professor, Indian Institute of Management, Bannerghatta Road, Bangalore 560 076, INDIA.  
<https://www.iimb.ac.in/sites/default/files/inline-files/Emergency%20Healthcare%20v3%20May%202013.pdf>
11. <https://www.ruralhealthinfo.org/topics/emergency-preparedness-and-response>
12. <https://health.economictimes.indiatimes.com/news/industry/need-for-emergency-medical-services-in-rural-india-manish-sacheti/63021716> By **Manish Sacheti** CFO, Ziqitza Healthcare Limited, Mumbai<br ..
13. [https://www.researchgate.net/publication/327284279\\_Emergency\\_care\\_in\\_rural\\_settings\\_no\\_easy\\_solutions](https://www.researchgate.net/publication/327284279_Emergency_care_in_rural_settings_no_easy_solutions)