

# Chapter 12

## From Data to Insights Harnessing GeoAI for Informed Decision–Making in Healthcare

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### ABSTRACT

*This chapter examined the utilization of GeoAI for healthcare issues like patient demographics, socio-economic factors, health insurance coverage, and environmental conditions to enhance healthcare delivery. By analyzing population density and socio-economic data, GeoAI can optimize the placement of healthcare facilities and resources, ensuring equitable access. Environmental data, such as air and water quality, can identify regions at risk for specific health issues, guiding targeted interventions. GeoAI can address healthcare disparities by considering social determinants of health and enabling personalized treatment plans. Integrating high-quality, timely, and relevant geospatial data can allow GeoAI to facilitate accurate decision-making and resource allocation, improving patient outcomes and public health strategies. However, challenges include ensuring data privacy and security, managing technical and operational integration complexities, and requiring specialized expertise, which can be overcome with robust data governance*

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*and interdisciplinary collaboration.*

## **INTRODUCTION**

The advent of big geospatial data in terms of demographics, environment, and distribution of the basic amenities of healthcare has given birth to many possibilities in healthcare (Hu et al., 2023; Jing et al., 2023; Yudono et al., 2023). Taken together, these data can be utilized to effectively monitor population health status, disease occurrence, and their spread and utilization of medical resources for ultimately wiser choices in planning and practice. The quantitative methods linked with traditional spatial analysis are complex in constructing features and statistical modeling, which is time and resource-consuming and often inadequate in capturing the complex, multidimensional relationships inherent in geospatial data. Since such approaches do not have predetermined analysis factors, they could potentially miss out on some important sub-relationships between the elements under study. Furthermore, most healthcare decisions consider very few sources of information and personal opinions, which can result in significant inefficiencies and disparities in access to quality care (Sanders Thompson, 2013; Viviani & Pasi, 2017). They may also fail to incorporate the broader climatic and societal determinants of health, leading to deficiencies in healthcare delivery and consumers' demands. With the help of advanced methods used in geographic information analysis and by using necessary data sources, it is possible for healthcare systems to properly solve the mentioned challenges, raise the probabilities of making the right resource allocations, and set up a better and more functional distribution of the health care facilities for all the profiles of populations (Guhlincozzi, 2024; Siddik et al., 2023).

Geospatial Artificial Intelligence (GeoAI) has emerged as a game changer towards achieving the maximum potential of geospatial information for supporting healthcare decisions geographically (Kang et al., 2024; S. Wang et al., 2024). This is made possible by GeoAI, which re-imagines the analysis of large geospatial datasets along with the existing clinical datasets. For this, integrated planning makes it possible for healthcare authorities to approach the determination of needs and provisions for the resource requirements of the different regions systematically. Therefore, using GeoAI they can find new patterns or trends that were not visible earlier, use the resources properly, address the needs of a certain number of communities, enhance the efficiency of the care offered, and also improve equitable access to quality and efficiencies of the care being offered (Kamel Boulos et al., 2019; Sahana et al., 2023).

While there is an emergent literature in GeoAI and healthcare, the available literature provides either a general overview of GeoAI or discusses the technology in particular contexts of the wider sphere of healthcare, such as disease prediction

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