Chapter 4
Data Analytics and Decision Making in Healthcare Using Spatial Data Infrastructure:
The Case of Pakistan

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ABSTRACT

Pakistan's healthcare system grapples with numerous challenges, including limited access to quality healthcare, a shortage of healthcare workers, and poor coordination among stakeholders. However, amidst these challenges lies a transformative solution—the integration of spatial data infrastructure (SDI). SDI serves as a central hub for geospatial data, encompassing population statistics, healthcare facility locations, and disease prevalence. By leveraging SDI, planners can address these challenges effectively. Through spatial mapping and analysis, SDI enables targeted resource allocation, strategic workforce planning, and evidence-based decision-making. Moreover, SDI promotes transparency and accountability by

providing stakeholders with access to reliable and up-to-date information. This chapter highlighted the pivotal role of SDI in overcoming specific challenges faced by Pakistan's healthcare system, offering a pathway towards a more resilient and adaptive healthcare infrastructure.

INTRODUCTION

Pakistan's urban regions are growing quickly, which is consistent with a world-wide trend. Nevertheless, Pakistan's current urban planning techniques are failing miserably. Since 83% of Pakistan's urban settlements lack a spatial plan and urgently need intervention, it is imperative to incorporate scenario planning with conventional methodologies (ul Hussnain et al., 2020). In Pakistani cities, the absence of public transport networks has had a negative impact on equity, mobility, and environmental sustainability. This highlights the need for efficient governance, capacity building, and urban planning (Imran, 2009). Kalwar et al. (2019) emphasized that insufficient planning policies for small and medium-sized agricultural enterprises, financial dependency on the central government, and reliance on foreign help are impeding the five-year plans for agriculture-based industrial growth in Pakistan's secondary towns.

Pakistan's healthcare system is undergoing a period of transformation, as evidenced by the challenges faced by diverse populations. Studies by Memon et al. (2024). highlighted the difficulties foreigners in Pakistan encounter when it comes to healthcare, including difficulties accessing quality care, navigating cultural differences in health beliefs, facing disparities in the healthcare system, and experiencing increased risk of complications from existing health conditions. Similarly, Habib et al. (2021) noted that cultural norms and limited resources conspire to limit access to TB care for rural Pakistani women. They lack control over finances, face restrictions on traveling alone, and endure long journeys to clinics. Additionally, healthcare spending often prioritizes men, and there's a shortage of female providers, creating further obstacles.

To address these issues and optimize healthcare delivery, data analysis and decision-making techniques are crucial. Chakraborty et al. (2023) argued that Multi-Criteria Decision Making (MCDM) applications in healthcare are growing rapidly, with a focus on areas like waste management, supply chain management, and disease diagnosis. Additionally, Pradhan et al. (2022) showcased the importance of data-driven approaches in district health systems' ability to respond the issues like a shortage of female medical staff, inadequate disaster response training, inconsistent reporting mechanisms across provinces, and a lack of gender-sensitive approaches, during the floods. By embracing data analysis and evidence-based decision-making,

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