



Spatial Analysis of Neighborhood Centers' Accessibility to Urban Services (Case Study: Tazeh Shahr Neighborhood, Ardabil)

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Abstract

Background and Objective: The spatial distribution of services, facilities, land uses, and activities in cities, as well as their accessibility, is a key issue in urban studies. In this regard, the location of neighborhoods in relation to access to land uses and urban services requires special attention. This study focuses on analyzing the position of the Tazeh Shahr neighborhood to examine its accessibility to various land uses within the spatial context of the neighborhood and at different distance intervals.

Methodology: This research is applied in nature and employs a descriptive-analytical approach. Data on land uses and the street network were extracted from the detailed plan of Ardabil city and processed in ArcGIS. For each land-use category, the allocated area was calculated at the neighborhood zoning level and within distance rings (0–200, 200–500, 500–1000, 1000–2000 meters, etc.). Frequency tables and spatial indices were then generated, and the Hot Spot Analysis (Getis-Ord Gi) was applied to identify clusters of service concentration or shortage. The results were presented and analyzed through thematic maps.

Findings and Conclusion According to the research findings based on the structural model, the T-Value statistic for all variables is greater. The results revealed the accessibility status of Tazeh Shahr to a wide range of land uses, both within the neighborhood itself and across various distance rings. Findings indicate that while the neighborhood enjoys favorable accessibility to certain services, it faces limitations and shortages in others. Overall, the accessibility level of Tazeh Shahr to urban services and land uses varies depending on the type of land use and spatial scale, highlighting the need for optimized urban planning.

Keywords: Urban services, Accessibility, Spatial statistics, Land use, Tazeh Shahr neighborhood, Ardabil city.

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EXTENDED ABSTRACT

Introduction:

The spatial distribution of urban services, facilities, land uses, and activities, as well as their accessibility, is one of the critical issues in urban studies and planning (Koochi Haris et al., 2025: 369). Ensuring equitable access to services at the neighborhood level plays a fundamental role in promoting spatial justice and improving the quality of urban life. Urban planners are expected to adhere to principles of fairness and inclusivity when planning and allocating services across urban areas (Kiani & Kazemi, 2015: 3). These principles are essential to guarantee equal opportunities for all residents in terms of health, education, commerce, and recreational facilities. In many cities in Iran, however, the distribution of services often deviates from these principles, leading to spatial inequality, increased transportation costs, and reduced satisfaction among citizens. The concentration of services in specific urban zones and the lack of adequate facilities in other areas create urban polarization and pressure on transportation networks, resulting in environmental and social challenges (Saberi et al., 2024: 194). Ardabil city is no exception; rapid population growth and unbalanced urban expansion have intensified these challenges. This imbalance can lead to longer travel times for daily needs, reduced access to essential services, and a decline in urban sustainability. Among the city's neighborhoods, Tazeh Shahr stands out due to its high residential density and diverse population, making it essential to assess its accessibility to urban services and land uses. A comprehensive analysis of accessibility at the neighborhood level is necessary to identify disparities and to provide recommendations for improving service distribution and urban equity. Accordingly, the main research question is: What is the accessibility status of Tazeh Shahr neighborhood to urban land uses and services within the neighborhood and across different distance ranges?

To answer this question, the study employs spatial analysis techniques in a GIS environment, considering various service categories and distance buffers. The findings are expected to help urban planners design strategies for equitable service distribution, reducing spatial inequalities, and improving the overall quality of life in urban neighborhoods.

Methodology:

This research is applied in nature and employs a descriptive–analytical approach. Spatial data on land uses and the street network were obtained from the detailed urban plan of Ardabil city. After preprocessing and editing, the data were analyzed in ArcGIS. For each land-use category, the allocated area was calculated at the neighborhood level and within multiple distance rings (0–200 m, 200–500 m, 500–1,000 m, and 1,000–2,000 m). Subsequently, frequency tables and spatial indices were generated. To identify clusters indicating either concentration or shortage of services, the Hot Spot Analysis (Getis-Ord G_i^*) method was applied. The results were presented and interpreted through thematic maps and classification schemes.

Results and Discussion:

The analysis revealed significant variations in the accessibility of Tazeh Shahr neighborhood to different land uses. Some services, such as educational and commercial facilities, show a relatively balanced distribution, providing adequate coverage for most residents. In contrast, other essential services, particularly healthcare and recreational facilities, exhibit uneven distribution and concentration in limited areas, resulting in accessibility challenges for certain parts of the neighborhood. The hot spot analysis highlighted areas with service surpluses as well as zones suffering from service shortages. These spatial inequalities create unnecessary trips across the city and increase dependency on distant zones, ultimately affecting urban

sustainability and residents' quality of life. Comparing these findings with previous studies reveals similar patterns of imbalance in other Iranian cities, confirming that unequal service distribution is a structural issue linked to centralized planning and lack of neighborhood-scale considerations.

Conclusion

The findings of this study reveal that the accessibility of Tazeh Shahr neighborhood to urban land uses and services is uneven and varies significantly depending on the type of service and spatial scale. While some services, such as local commercial and educational facilities, are relatively well-distributed and meet a large share of residents' daily needs, other essential services—particularly healthcare, cultural amenities, and green spaces—are either scarce or concentrated in distant zones. This imbalance forces residents to travel longer distances, creating additional time and financial costs, traffic congestion, and environmental pressures on other parts of the city.

From a spatial justice perspective, these inequalities reflect a lack of balanced urban planning at the neighborhood level. The dominance of residential land use in Tazeh Shahr, combined with limited allocation for complementary services, exacerbates the challenge. Furthermore, the *hot spot analysis (Getis-Ord Gi)** demonstrated that high-value clusters for certain services are located far from the study area, highlighting the need for rethinking service allocation patterns in future plans.

To address these shortcomings, urban planners should adopt integrated and equitable development strategies, which include:

- Prioritizing service provision in underserved neighborhoods to reduce spatial disparities.
- Designing mixed-use development models that ensure proximity of essential services to residential areas.
- Applying GIS-based monitoring systems for continuous evaluation of service accessibility and to prevent spatial inequality in future urban expansions.
- Encouraging community participation in identifying local service needs to improve satisfaction and quality of life.

Ultimately, improving accessibility at the neighborhood level is crucial not only for enhancing the quality of life of residents but also for achieving broader goals of sustainable urban development and social equity. The results of this research can serve as a practical guideline for planners, policymakers, and local authorities to design more inclusive urban environments.

Declarations

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Authors' Contribution

Authors contributed equally to the conceptualization and writing of the article. All of the authors approved the content of the manuscript and agreed on all aspects of the work declaration of competing interest none.

Conflict of Interest

The authors declare no conflict of interest.

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