

## Research Paper

# Adjustment of Optimal Sports Site Selection Criteria for Elderly Using Analytical Hierarchy Process and Geographic Information System



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## ABSTRACT

**Objectives** Aging and its associated problems are one of the challenges in the country. This necessitates the need for proper planning during this period. In this regard, the present study was conducted with the aim of fitting the indicators for choosing optimal sports location for the elderly.

**Methods & Materials** The present study is a descriptive-analytic research that determined the weights of research criteria using a structured interview with eight experts in Analytical Hierarchy Process. In addition, the pools of Karaj (27 cases) were selected as the study population and the elderly people referred to these pools were selected as the research community. A total of 127 elderly were examined using stratified sampling. After weighing the sub-criteria of each research criterion, AutoCAD, Excel, ArcGIS, and Google Earth software were used to create a spatial database.

**Results** Of the total 127 elder participants, 66% were male, 48% were aged 60-65 years, and 54% spent more than 6 hours a week on sports. According to experts' opinions, three indicators of accessibility, proximity to other land uses, and safety ranked higher in the field of influencing the selection of sports places. Among the sub-criteria, subway lines and highways for access index; proximity to parks and green spaces and proximity to cultural centers for proximity index; and proper position to health centers and fire centers for safety index had relative importance compared to other sub-criteria.

**Conclusion** Proximity to other land uses and safety was recognized as important criteria influencing the selection of sports places. By using the results of this research and by correctly locating the sports venues, it is possible to prevent the mistakes in choosing the location of sports facilities.

### Key words:

Adjustment, Sports Facilities, Elderly

## Extended Abstract

### 1. Objectives

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ging is a critical period of life and considering the issues and needs of this stage is a social necessity. It should be noted that lack of attention to health and neglecting the behaviors promot-

ing quality of life have resulted in health issues in the elderly [1]. Aging is a natural phenomenon associated with reduced physical, psychological, and psychological activities. The physiological changes are similar in different people, although the speed of changes can be different. Lack of attention to body and mind during this period accelerates the aging process and ultimately leads to premature death [2]. This highlights the importance of proper planning in the aging period. An

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ideal urban space is a space where citizenship justice is respected, and it can be used by all citizens, including vulnerable people [3]. In this regard, the present study was conducted with the aim of fitting optimal sports site selection criteria for the elderly.

## 2. Methods & Materials

The descriptive-analytic research method was employed in this applied research work, which was approved by the Research Ethics Committee of Mazandaran University. This field study was conducted in three phases. In the first phase, six important criteria for optimal sports site selection of older adults were determined by studying library resources. The indices extracted by a structured interview tool were used by eight experts in the field of sports and sports facilities for pair-wise comparison.

The Expert Choice Software was used to analyze the data collected in this study. Since each type of sports facility has its own characteristics, they cannot be all together in the same place. In the second phase, 27 swimming pools of Karaj were selected, and the elderly referred to these sites were identified as the statistical population for this study. In this stage, a questionnaire designed using the indices determined in the first phase along with the four sub-criteria for each indicator was used. After collecting the data using the Analytical Hierarchy Process, the sub-criteria of each index were prioritized, and two sub-criteria with higher relative weights were determined for each of the indicators. Moreover, AutoCAD maps were prepared using AutoCAD 2015, Excel 2013, ArcGIS 9.3, Google Earth

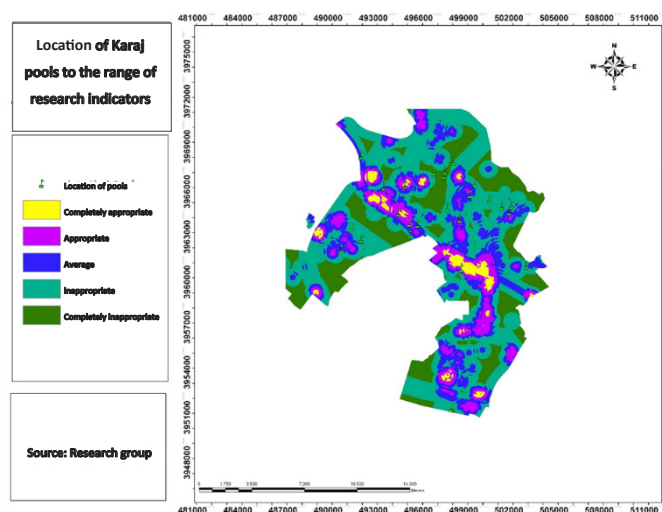
7.1.8 or GPS device. In the third phase, we collected information for each of the prioritized sub-criteria to create a spatial research database. After exporting the layers used in the GIS environment and creating the topology, the information table was also completed and prepared for final analysis. Then, the location of each pool was determined according to the indicators.

## 3. Results

In the descriptive part of the research, the elderly are considered to be over 60 years old. According to the sampling method, 135 questionnaires were distributed, and finally, 127 completed questionnaires were collected. The majority of the sample size was male (66%).

About 48% of the samples were aged between 60 and 65 years, 31% were aged between 65 and 70 years, and 21% were aged over 70 years. Regarding the employment situation, 41% of the samples were employed, and the remaining 59% were retired. Regarding the rate of sports activities per week, 46% of the respondents spent less than 6 hours a week while the remaining 54% spent more than 6 hours a week on sports activities. According to the data obtained from the pair-wise comparison matrix, the most effective criteria are accessibility, closeness to other urban utilities, safety, density of sports facilities, topographical features, and privacy.

The three factors of accessibility, closeness to other urban utilities, and safety had the highest relative weights and were identified as important indicators. These factors, along with the sub-criteria for each criterion, were provided to some older adults attending sports facili-



**Figure 1.** The location of the pools in Karaj concerning the range of indicators

ties. The results showed that among the sub-criteria, access to metro lines and highways, closeness to parks and green spaces as well as cultural centers and appropriate location relative to medical and fire-fighting centers had achieved higher relative weights. The maps of each sub-criterion were obtained from the relevant organizations, and the geographic locations of the pools in Karaj were determined (Figure 1). The areas with distance 0 to 200 meters, 200 to 400 meters, and 400 to 600 meters of the desired feature range were identified. Finally, the locations of different pools in Karaj were shown based on the research indicators in a five-item scale (completely appropriate, appropriate, medium, inappropriate, and completely inappropriate).

## 4. Conclusion

The findings of this study showed that the most important factors affecting the optimal sports site selection for the elderly are accessibility, closeness to other urban utilities, safety, density of sports facilities, topographical features, and privacy. This finding is consistent with the studies by Zohrevandian et al. (2015) [18] and Hosseini et al. (2013) [6]. Access to metro lines and highways was found to be an important factor in accessing sports pools in Karaj. These studies had limitations such as the unavailability of an integrated research sample, a survey of a group of sports facilities (pools), and the difference in the types of customers. Certainly, sports activity in the elderly, in addition to maintaining mobility and reducing diseases, brings about excitement and rejuvenation, resulting in a healthy life.

## Acknowledgments

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## Conflict of Interest

The authors declared no conflicts of interest.