



Proceedings

Accessibility to urban green spaces in the city of Cartagena (Spain)

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Abstract: This research investigates urban parks accessibility in Cartagena, Spain. With an expanding urban population, urban green spaces are essential for physical and mental health. Using Geographic Information Systems, the study assesses proximity and travel time to 24 urban parks, revealing that only 40% of Cartagena's residents live within 300 metres of a park and 58% within a 5-minute walk. The city falls short of WHO's recommended 9m² of green space per inhabitant, offering only 3.3m². These findings are vital for urban planning, aiding the city in better meeting WHO's green space guidelines and improving the well-being of its population.

Keywords: urban parks; spatial justice; environmental justice; Cartagena

1. Introduction

In recent decades, the urban population has grown significantly and it is envisaged that it will continue to do so in the next few years [1]. Urbanisation has exerted significant pressure on the environment, with increasingly more congested and polluted cities, a lack of parks and serious problems with environmental or green gentrification [2]. Consequently, on the one hand, there are more and more people living in cities, most of which are either completely or almost completely “artificialised”, and on the other hand, the residents pay more attention to their living environment [3].

In view of this situation, it is important that city inhabitants have access to urban parks a short distance from their home, as these are an indicator of urban quality life [4,5]. Parks are public places that provide citizens with areas that are beneficial to both physical and mental health [6], since contact with nature helps to alleviate illnesses related to lifestyle by providing areas with vegetation, health assets and promoting socialisation [7]. Also, they fulfil significant environmental functions such as improving the air quality [8], mitigating the urban heat island effect [8–10] and reducing noise pollution, *inter alia* [8].

In this respect, the World Health Organisation (WHO) [11] recommends that all inhabitants have an accessible green area less than 300 metres or less than 5 minutes' walk from their home. Also, the same organisation establishes a minimum EVU (green area per inhabitant) of 9 m², with the ideal value being 50 m² [12].

The aim of this research is to ascertain the accessibility that residents in the central area of the town of Cartagena (Spain) have to urban parks in the study area, in terms of distance (m), time (min.) and available surface area (m²/inhabitant.). To this end, (1) parks are selected, using SIG tools (Geographic Information Systems), according to criteria of size, facilities and presence of vegetation; (2) the town population register and access points to the 24 identified park areas are georeferenced; and, using routing analysis, (3) the resident population is identified inside and outside the indicated limits of distance and time, in relation to the urban parks in the area of study.

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2. Area of study: Cartagena

The city of Cartagena, located in the Region of Murcia (Spain) and situated in the southeast of the Iberian Peninsula, is a significant industrial, tourist, and culturally rich centre due to its history. With a population of approximately 220,000 inhabitants, Cartagena stretches along a 30-kilometer coastline and is surrounded by small hills. It boasts one of the most important ports in the Mediterranean Sea, serving both commercial and military purposes. Additionally, Cartagena has a robust petrochemical industry that plays a crucial role in the city's economy.

The study area encompasses the city's central area, including its historic district and the Ensanche. This area is home to 159,852 residents and features twenty-four urban parks, primarily concentrated in the southern part of the city (Figure 1).

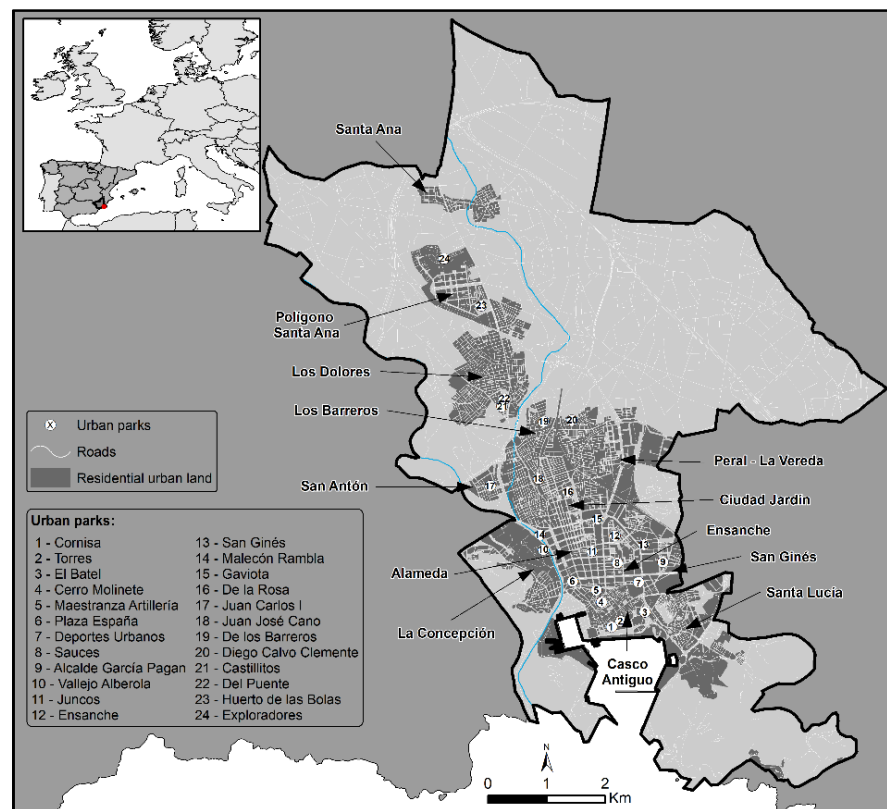


Figure 1. Study area and urban parks.

3. Methodology

First of all, using the town population register provided by the Cartagena City Council as of 1/1/2022, all residents have been geolocated. Subsequently, park entrances were digitised to establish the x, y coordinates of their respective entry points. Following this, a routing analysis was conducted, resulting in two layers: one containing the measured distance in minutes and the other in metres for each resident to the designated study parks. In the fourth step, aiming to determine if the available surface aligns with WHO standards, the area in m² of each park was calculated. All analyses were performed using QGIS 3.28 software and the *Open Route Service* extension.

4. Results: accessibility to green parks

The greatest accessibility to urban parks in terms of distance travelled in metres (<300m) is observed predominantly in the neighbourhoods of Casco Antiguo, Alameda, Ensanche, and San Ginés (Figure 2a). Only 40% of Cartagena's residents have an urban

park within less than 300 metres from their homes, as recommended by the WHO (Table 1).

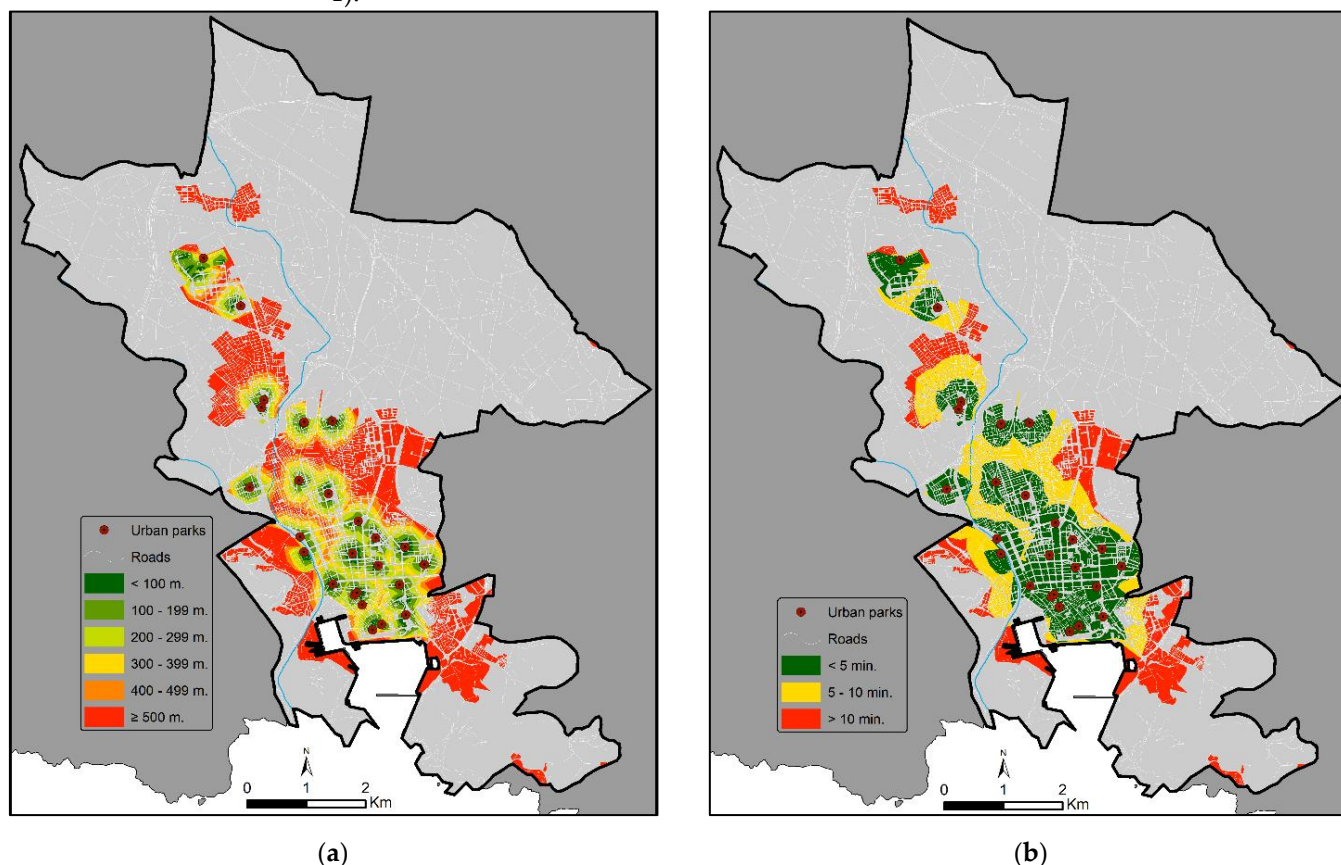


Figure 2. (a) Distance in metres between homes and urban parks; (b) Walking distance between homes and urban parks.

Table 1. Accessibility of the population to urban parks. In distance travelled in metres.

Distance	Population	% Population
< 100 m.	9,070	5.7 %
100 – 199 m.	26,728	16.7 %
200 – 299 m.	29,129	18.2 %
300 – 399 m.	25,466	15.9 %
400 – 499 m.	15,416	9.7 %
≥ 500 m.	54,043	33.8 %
TOTAL	159,852	100.0%

As for the time walked, in minutes, (Figure 2b), the inhabitants with the greatest availability of parks at less than 5 minutes from their homes are in the central-southern part of the city (Casco Antiguo, San Ginés, Alameda, Ensanche and Ciudad Jardín). Table 2 shows the percentage values of the population that is inside and outside the values recommended by the WHO. In this case, almost 60% of the inhabitants have access to urban parks within less than a 5-minute walk from their homes.

Table 2. Accessibility of the population to urban parks. In distance travelled in minutes.

Time	Population	% Population
< 5 min.	93,043	58.2%
5 – 10 min.	39,317	24.6%
> 10 min.	27,492	17.2%
TOTAL	159,852	100.0%

The 24 urban parks in Cartagena have highly varying sizes, ranging from the largest, Exploradores Park, with 248,094 m², to the smallest, Juan José Cano Park, with 3,524.7 m². In total, the combined area of all urban parks in the city totals 527,369.2 m². The average available park space is 3.3 m² per inhabitant.

5. Conclusions

The city of Cartagena has a large surface area of urban parks, nevertheless due to its large population, it falls short of the minimum values established by WHO (9 m²/inhabitant.), as it only has 3.3 m²/inhabitant. As for accessibility, in terms of walking distance in metres, only 40% of the population has a park within the 300 metres recommended by the WHO. In terms of accessibility calculated in minutes, the city shows better results, with nearly 60% of the population in Cartagena having a park within less than a 5-minute walk.

To conclude, various authors [13,14] affirm that people who live less than 100 m from an urban park engage in sporting activities more regularly than those who live further away. In Cartagena, only 5.7 % of the population meet this criterion.

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