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Article

Spatial Distribution and Quality of Urban Public Spaces in the Attica Region (Greece) during the COVID-19 Pandemic: A Survey-Based Analysis

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Abstract: This study investigates the spatial distribution and quality of urban public spaces in the Attica region during the COVID-19 pandemic. A questionnaire survey was conducted to gather data on the availability, accessibility, and quality of open urban public spaces. The findings indicate that, although several respondents reported the presence of outdoor public spaces in their respective areas, these spaces often did not meet the desired quality standards. Notably, a clear preference was expressed for open public spaces located within a convenient walking distance, typically within a 15-min walk. Quality assessments varied across different sectors of Attica, with the central Athens and central Piraeus sectors receiving lower ratings in terms of availability, quality, and safety. Compared to the rest of Attica, the residential suburbs of Athens's Northern Sector appear to have more accessible, safe, and well-maintained public areas. The research underscores the critical importance of quality public spaces, particularly during times of crisis. This study emphasizes the need for a re-evaluation of urban planning strategies to ensure that public spaces remain functional and accessible to citizens.

Keywords: urban public space availability; availability; accessibility; spatial justice; socio-economic inequalities; social and spatial cohesion

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1. Introduction

Public spaces in cities are critical to the operation of metropolitan areas because they provide people with a variety of social, economic, and environmental advantages and experiences. These public areas serve as a meeting place for the community, as well as a place for cultural exchange and social cohesion [1]. These areas—parks, squares, playgrounds, and pedestrian pathways—not only provide chances for leisure, exercise, and relaxation, but they also have a direct impact on city people's everyday lives and their mental and physical health [2–4]. In addition to having a significant influence on a city's overall quality of life, public space quality has an impact on local economies and real estate values. [5,6]. Due to disparities in residents' equitable access, particularly during times of crisis like the pandemic when migration in these places has grown, questions of accessibility as well as spatial and environmental justice develop [7,8].

Although numerous studies have highlighted the benefits of urban public spaces and especially green spaces for the health and well-being of citizens, nevertheless, the precise effects of the unequal geographical distribution of these spaces, both at the local and regional levels, have not yet been thoroughly studied. Our research objectives are twofold. First, we would like to draw attention to the quality, accessibility, and availability of urban public places in the Attica region as reported by the people who visited them during the pandemic. Second, we aim to evaluate these statistics in order to derive valuable insights

for future discussions about environmental and spatial justice, particularly concerning how various social groups are impacted by Attica's housing patterns.

Urban public places in cities are critical to their economic well-being because they allow for commercial activities, such as street vending, outdoor markets, and festivals [9–11]. According to pertinent literature, well-landscaped outdoor spaces may increase the neighboring property value up to 2.6–11.3% [12]. The environmental dimension of urban public spaces is also noteworthy. Green areas in public spaces absorb pollutants, regulate temperature, and lower the urban heat island effect, contributing to the city's environmental health [13–15]. Moreover, well-connected outdoor green spaces sustain urban flora and fauna, contributing to urban ecosystem preservation [16].

However, simply having public spaces in a city is not enough. It is critical to guarantee that all residents, regardless of their socio-economic status, gender, age, or ability, have access to public spaces. The term accessibility refers to whether a public space is physically and psychologically accessible, which means it must satisfy certain criteria, such as wheelchair accessibility, sufficient lighting, and safety features [17,18]. The availability of a public place refers to whether it is open for use, meaning that it is not closed off or reserved for exclusive use [19]. The data derived from relatively recent publications demonstrate that the Attica region lacks appropriate public spaces. To be more specific, the Organisation for Economic Co-operation and Development (OECD) recently released the study "OECD Factbook 2014: Economic, Environmental, and Social Statistics", which also comments on the case of Attica. In the sub-report, "Environmental Sustainability on Metropolitan Areas," one of the problems examined was the percentage of green areas per person in metropolitan areas around the globe. Concerning the World Health Organization claiming that the minimum percentage of green areas in cities is not less than 9.0 m^2 per person, Athens is ranked fourth from the bottom with only 0.96 m^2 of green per person [20,21]. In European Mediterranean cities, the proportion of people who are satisfied with recreational and green areas is only 66% in Spain, 64% in Malta, 61% in Italy, 59% in Cyprus, and 50% in Greece [22]. This "dissatisfaction" is a factor that has to be highlighted in order to encourage procedures aimed at improving the current situation, using measures that might be based on regional efforts and the efforts of the European Union.

The existing body of evidence indicates that in times of crisis, such as the COVID-19 pandemic, citizens prefer to visit public places that are within walking distance. Surveys carried out in Greece during the time of the pandemic have already published findings confirming citizens' preference for nearby public spaces (walking time less than 15 min) [7]. This argument is also compatible with the concept of a compact city and the 20-min neighborhood; a desired outcome of efficient post-COVID city planning (20MNs) [23].

To achieve a better understanding of the significance of public spaces within the urban fabric in an actual context, it is essential to examine the issue of unequal spatial distribution in addition to the environmental perspective. According to studies, certain populations, such as people with low income and people of color, may have less access to public spaces as a result of systemic and historical inequalities in municipal planning and development [24]. This can result in a lack of access to the numerous social, economic, and environmental benefits provided by public places.

Focusing on the selected case study, within the Attica region, certain neighborhoods may have fewer public spaces and green enclaves than others. Residents in those areas may have less access to the physical and mental health benefits that public spaces provide, such as improved air quality and chances for physical activity. Furthermore, communities with fewer public spaces may have fewer opportunities for social interaction and community engagement, which can exacerbate social inequalities [25,26]. To address this problem, urban planning and development should emphasize the equitable distribution of public places throughout a city, with an emphasis on providing access to underserved communities. Initiatives such as community-led design and development, cooperation with local groups, and zoning policies that emphasize public space development in socio-economically disadvantaged areas may have a positive impact. Cities can enhance their residents' health,

well-being, and social cohesion while also supporting environmental sustainability by promoting equitable access to public spaces [27,28].

From this point of view, the purpose of this paper is to provide a thorough examination of the spatial distribution and quality of urban public places in Attica, Greece. This study includes a thorough literature review that identifies key factors that influence the distribution and quality of urban public places in the region. Authors have also collected data through surveys, offering insights into the current condition of Attica's public spaces. The methodological framework of this study has been built upon certain research questions. The first research question focuses on comprehending the current condition of Attica's urban public spaces, including their spatial distribution and quality. The second research question seeks to identify factors such as socio-economic factors, urban design, and planning policies that contribute to the distribution and quality of public places in the region. The third research question attempts to investigate the spatial justice implications of the distribution and quality of public places in Attica. The authors will investigate how the distribution of public places impacts the region's various social groups and whether there are any spatial inequalities.

Finally, the authors explore how urban planners and policymakers can achieve equal access to urban public spaces, regarding the case of Attica. This could include suggesting changes to urban planning policies or new approaches to designing and managing public places that promote greater spatial justice. Overall, the purpose of this paper is to contribute to a better understanding of the connection between public spaces and spatial equity, as well as to provide practical suggestions for improving the distribution and quality of public spaces in Attica, Greece.

Literature Review

According to studies, a lack of urban public places, especially parks, is associated with a lack of all urban ecosystem services, which can have a negative effect on residents' health and well-being [29]. Factors relevant to park design may have a greater impact on the quality of outdoor space and ecosystem services. From this point of view, fencing may discourage residents from using a park for recreation and exercise. Planning for friendly and sustainable communities should include provision for accessible and available public places that provide residents of metropolitan centers with a variety of social, economic, and environmental benefits.

This necessitates a comprehensive approach to urban planning that considers the requirements and preferences of all residents, while also promoting inclusivity and equity. Current studies have shown that the availability and quality of urban public places can have an impact on city dwellers' physical and mental health and well-being [30,31]. These results emphasize the importance of urban public spaces in promoting the health and well-being of urban residents. At an overall scale, the availability and quality of public urban spaces have a multilayered influence on city people's health, well-being, and quality of life.

Proper urban planning can help guarantee the quality of public places by ensuring their accessibility, functioning, and safety. For example, the design of sidewalks, bike paths, and public transportation systems can improve citizens' accessibility, mobility, and security; enhancing green space can also help mitigate challenging climates and relaxation; and improving the quality of urban equipment and lighting improves citizens' comfort. Furthermore, inclusive urban planning can actively support diversity and inclusion in public spaces by investigating the needs and preferences of various groups of people (gender, age, ethnicity, disability, etc.). This can include designing accessible spaces for people with disabilities, providing seating areas for older people, and incorporating cultural or historical aspects that represent a community's identity [32]. However, urban planning alone cannot guarantee the availability and quality of public spaces. Governance, local authorities, and decision-makers all play a part in shaping the quality of public spaces [33]. To establish and sustain public spaces, consistent and adequate funding is required. Only

intensive and efficient governance structures can guarantee that public spaces are managed in ways that benefit the entire community [34].

Even though European cities show a growing concern for public space environment and improvement, Greek cities are among the least competitive in Europe in this field [35–37]. It has been established since the late 1970s that the deterioration of the urban environment in the central regions of Attica, particularly in Athens and Piraeus, is characterized by several parameters, including lack of free and green spaces, heavy traffic, various forms of pollution, inadequate maintenance of public and private infrastructure, high residential density, and a lack of basic social infrastructure for housing [38,39]. Indeed, Greece's urban environments are not considered welcoming for residents and visitors today, particularly in Attica, and frequently present serious functional problems, such as insufficient levels of comfort and high pollution, accessibility and safety issues, extensive lack of greenery and open spaces, traffic congestion and lack of parking, lack of efficient amenities and urban infrastructure, and degradation of national cultural heritage. All these deficiencies are owed to a large extent to historical incidents that defined the type of urban growth in the area during the early 20th century. To be more specific, the Asia Minor Refugee inflow, following the Laussane Treaty in 1923, led to a rapid population change in urban and rural areas of the country. Based on historical sources, more than 1,500,000 refugees settled in Greece. Thus, the urbanization process of this period was strongly connected to the Asia Minor Refugee Rehabilitation, leading to urban forms designed under the pressure of providing affordable housing for a large number of beneficiaries. Adding to that, the post-war urbanization process in the 1950s and 1960s was associated with sprawling procedures on the west side of Attica, expanding the limits of the city without proper planning and provision. Further urban sprawl was observed in Attica during the early 2000s in the eastern part of Attica (Figure 1). On account of all these events, the evaluation of the quality of planning and design in the Attica region should acknowledge the above-mentioned issues. It is also important to mention that the old city cores of Athens and Piraeus have higher population density (Table 1 and Figure 2) compared to suburban areas (Southern and Northern Sector of Athens) and peri-urban areas in West and East Attica. In light of this observation, there are disparities regarding the quality of outdoor public spaces.

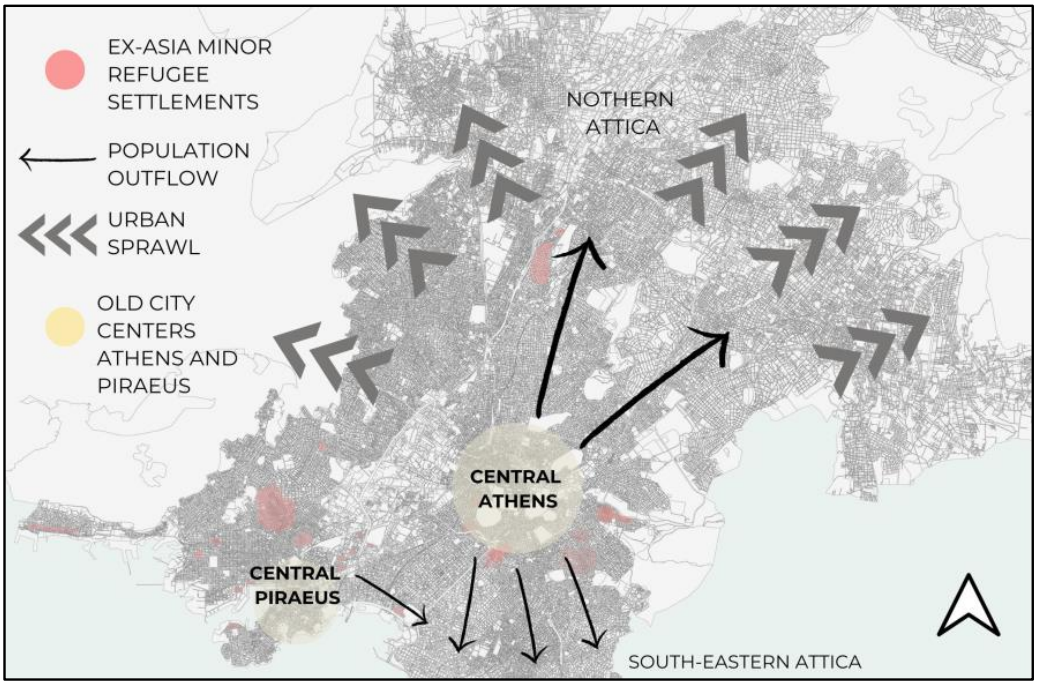


Figure 1. Urban sprawl was observed in Attica during the early 2000s (authors' work).

Table 1. Population density (residents per Km^2) with detailed population data (census 2021) and area by sector.

	AREA in Km^2	Population Based on the 2021 Census	Population Density Residents per Km^2
East Attica	1517	516,549	332.02
West Attica	1002	164,864	160.28
Piraeus Prefecture	51	443,196	8905.67
Central Sector of Athens	87.27	1,002,212	11,796.14
Western Sector of Athens	66.8	475,809	7126.08
Northern Sector of Athens	138.78	601,163	4315.08
Southern Sector of Athens	70	529,455	7692.46

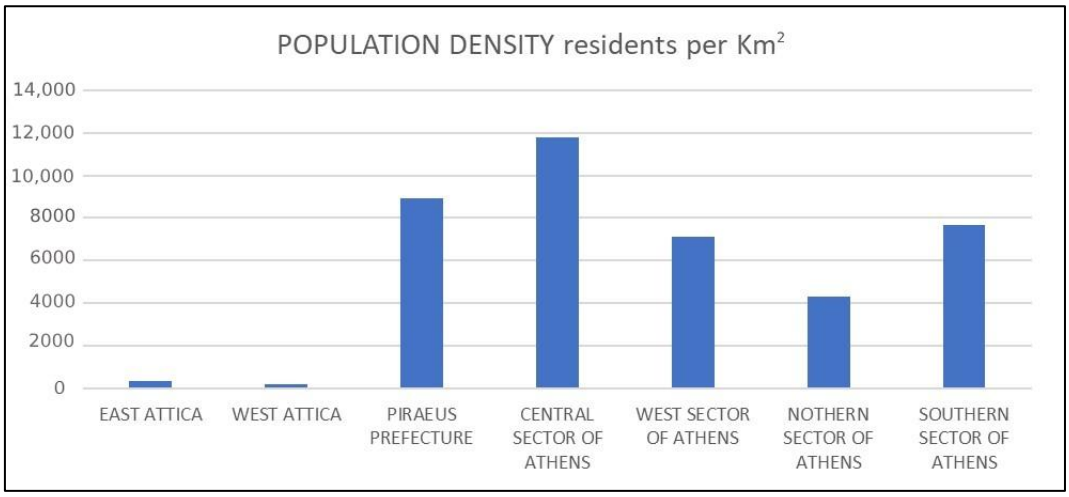


Figure 2. Bar chart related to the population density (residents per Km^2) (authors' work).

Various historical and cultural variables have shaped the idea of public space in the Greek urban context. This study identifies essential aspects, theories, and empirical evidence linked to the availability and quality of urban public space in Greece in this context. The idea of public space is central to urban planning discussions. Public spaces are described as areas that are accessible to all and intended for social interaction, relaxation, and interaction with the environment. Public spaces in Greece are affected by the historical and cultural heritage of the ancient Greek "agora" and the Roman forum [40]. In Greece, public spaces are intended to encourage community and social interactions, and they frequently include culturally significant elements, such as historical monuments and works of art. Several theories that analyze human interactions with public spaces provide a framework for understanding the role and function of public spaces in urban environments. The social interaction theory, for example, proposes that public spaces facilitate social cohesion and interaction, as well as the formation of a sense of community [34], whereas the ecological theory emphasizes the importance of access to natural environments in public spaces for health and wellbeing [41,42]. The political theory emphasizes the importance of public spaces in promoting democratic and civic participation [43].

Historically, the evolution of Athens's urban development has combined expansion with the intensification of land exploitation. Capital flow from bank financing and establishment of contractual consideration (land-for-apartment exchange system or flats-for-land system) facilitated housing real estate growth in the late 1990s and early 2000s, just before and after Greece's entrance into the eurozone [44,45]. In terms of urban development, this signaled an increase in the population of Athenian suburbs, particularly in areas

near recently constructed major transportation infrastructure (highways). This sprawling procedure widened the boundaries of "traditional" metropolitan Athens, being strongly connected to the infrastructures developed before the Olympic Games of 2004 [46]. The steady relocation of the Greek middle and higher social classes from built-up areas in the city center and surrounding areas, which began in the 1970s, was the other side of this urban growth trajectory [47]. Negative effects on the quality of life in Athens, especially in the decaying city center, have been a source of public concern since at least the 1980s. However, until the 1990s, the main focus of strategic planning was on managing growth and promoting a more decentralized metropolis.

The 1985 Athens Master Plan increased the attention on these issues [48]. Although the city's population had stopped growing by that time, the effort to promote a more decentralized urban structure was also a key issue in the revision of this plan in 1992, but this did not stop the continued growth of the urban fabric outwards [47]. Many inner-city neighborhoods, whose populations, rents, and prices had declined, provided relatively affordable housing options to successive waves of economic migrants who entered the country in the early 1990s after the fall of the Soviet Union, and then from African and Asian countries in the decade of 2000 [38]. These groups had access to housing as tenants first, and then as owners of houses and stores primarily on the lower levels of apartment buildings in central areas [49]. It is important to mention that socio-spatial inequalities in Attica have been thoroughly documented by various studies, providing cartographic depictions that reveal evident socio-economic discrepancies [45]. These socio-economic discrepancies are often related to unequal access to efficiently designed public spaces. From this point of view, this study offers insights by collecting new data in the Attica region during the COVID-19 pandemic. These data cover a gap in the existing knowledge since there are only a few recent relevant studies in this field.

2. Materials and Methods

To conduct the cross-sectional survey, the researchers selected Athens, Greece, during the second wave of restriction measures, from 27 April to 27 June 2021. To collect data for this survey, the researchers created a questionnaire that included questions frequently requested in the scientific field during the pandemic, such as those in studies by [50]. The sample consisted of 745 residents of Attica, Greece, aged over 18 years old, who voluntarily and consensually participated in the survey. Based on the most recent census data of 2021, the total population of the Attica region comprises 3,792,469 citizens. To have an approximate guide of how to calculate sample size, Saunders et al. [51] state that for a population of 10,000,000 people, a sample of 384 observations is necessary to achieve a 5% margin of error and 95% confidence level. To accurately estimate the required sample size for Attica, the authors have used an online application and selected a 99% confidence level, 5% margin of error, and 50% population portion. The required sample was estimated at 666 observations. The total number of participants was 745, which exceeds the estimated required sample. Authors have calculated the margin of error for the 745 responses at 4.73%. This means that there is a 99% chance that the real value is within $\pm$4.73% of the measured/surveyed value.

The participants' responses were self-reported, and the researchers provided detailed information about the nature and scope of the research before collecting the responses. The researchers used convenient and snowball sampling techniques to recruit the participants. The participants were invited via personal e-mails and social media posts on Facebook and Instagram. Each participant received a separate questionnaire, and some participants forwarded the questionnaire to their friends and family. The questionnaire collected sociodemographic information, including gender, ethnicity, age, place of residence, marital status, having children, house size, educational status, occupation, and annual income. The questionnaire also included questions about the characteristics of public spaces, such as quantity, quality, safety during the day and night, maintenance, and mobility information. The participants answered the questions either through a Likert-type scale ranging from 1

(strongly disagree) to 5 (strongly agree) or from close-ended questions comprising multiple-choice answers [7].

Statistical Analysis

SPSS, particularly PASW Statistics 18, was used for the statistical analysis. Both descriptive and inferential statistics were used in this study. The quantitative factors were described using descriptive statistics, such as relative and absolute frequencies. Moreover, cross-tabulation analysis, also known as contingency table analysis, was used to explore the interrelation among different variables. The associations between the frequency of visits to free public spaces and their availability, quality, accessibility, maintenance, safety during the day, safety during the night, and feeling of relaxation, as well as age, gender, education level, employment status, and having children, were investigated using multivariable logistic regression. In the context of the data analysis, the link between geographic data (different sections of the Attica region) and public space quality characteristics was calculated. Initially, all variables were included in each model, and then they were gradually removed until the model's predictive adequacy was achieved. The statistical significance level was set at $p < 0.05$, which means that a result was deemed statistically significant if the chance of obtaining it was less than 5%.

3. Results

Survey participants are citizens of the regional administrative area of Attica, the capital of Greece. The sample includes 201 male participants, 550 female participants, and 1 non-binary participant (Figure 3). The sample includes citizens of all the administrative areas of Attica, as presented in Table 2. The administrative division within the Attica region is depicted in Scheme 1. Survey participants' socio-economic background is defined by their educational level and average income, as shown in Table 3 and Figure 4. To comment on the limitations of this survey, the educational levels of the participants are higher than the average recorded educational level. Based on the published analysis of statistical data referring to the Attica region by Maloutas and Spyrellis (2019), there are discrepancies among different sectors of Attica in terms of educational levels. In particular, the southeast and northern parts of Attica seem to have residents with a tertiary degree at a higher percentage compared to other districts of Attica, a fact that is strongly associated with differences in housing and employment positions. However, the snowball method used for this survey led to the identification of participants with higher educational qualifications in all sectors of Attica.

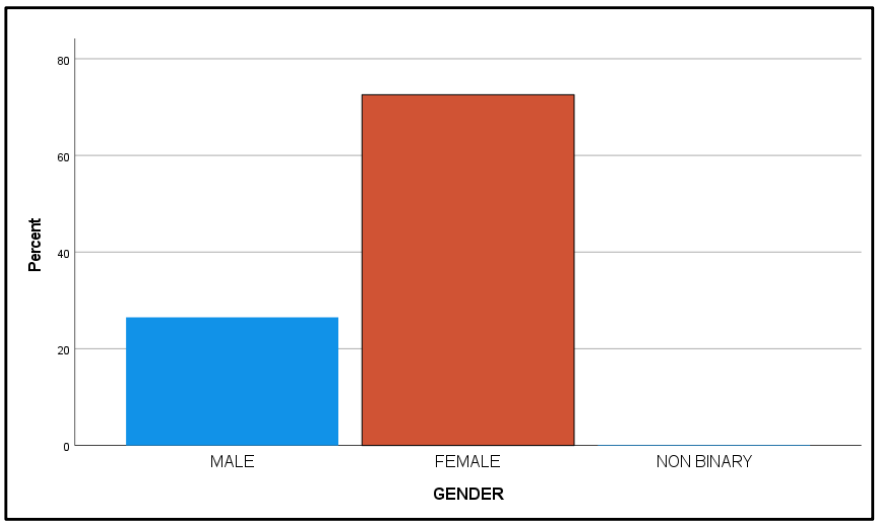
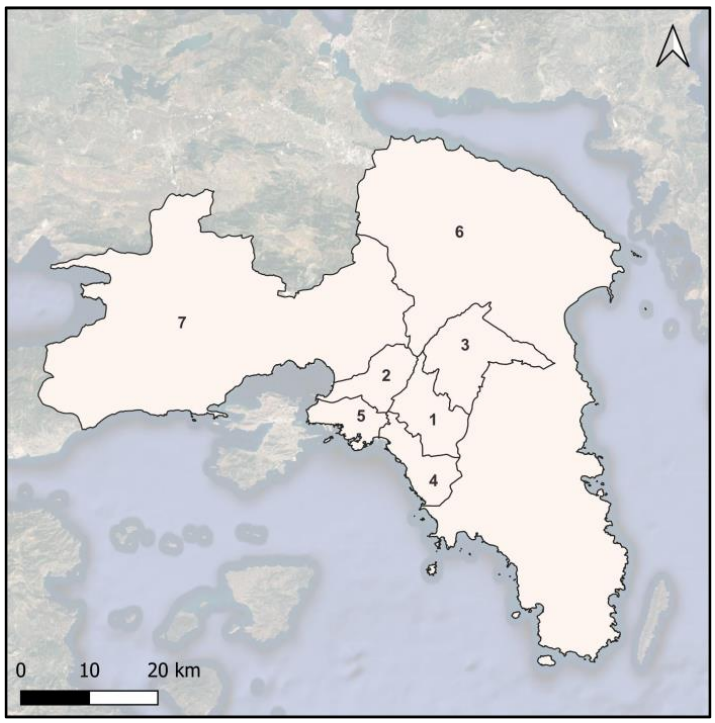


Figure 3. Participants' gender; SPSS; descriptive analysis (authors' work).

Table 2. Participants' place of permanent residence; SPSS; descriptive analysis (authors' work).

Place of Permanent Residence	N	%
East Attica	52	6%
West Attica	49	5.7%
Piraeus Prefecture	76	8.8%
Central Sector of Athens	292	33.7%
Western Sector of Athens	104	12.0%
Northern Sector of Athens	123	14.2%
Southern Sector of Athens	139	16.1%
Don't know/don't answer	3	0.3%
Missing	28	3.2%



Scheme 1. Administrative regions of Attica used as key identifiers for interpreting survey results (authors' work); background map available at https://www.patt.gov.gr/perifereia (accessed on 5 October 2023): 1. Central Sector of Athens, 2. Western Sector tor of Athens, 3. Northern Sector of Athens, 4. Southern Sector of Athens, 5. Piraeus Prefecture, 6. East Attica, and 7. West Attica.

Table 3. Participants' educational level; SPSS; descriptive analysis (authors' work).

Education	N	%
Msc/PhD	229	26.4%
University/College	443	51.2%
High School	79	9.1%
Junior High School	5	0.6%
University/College Student	2	0.2%
Missing	108	12.5%

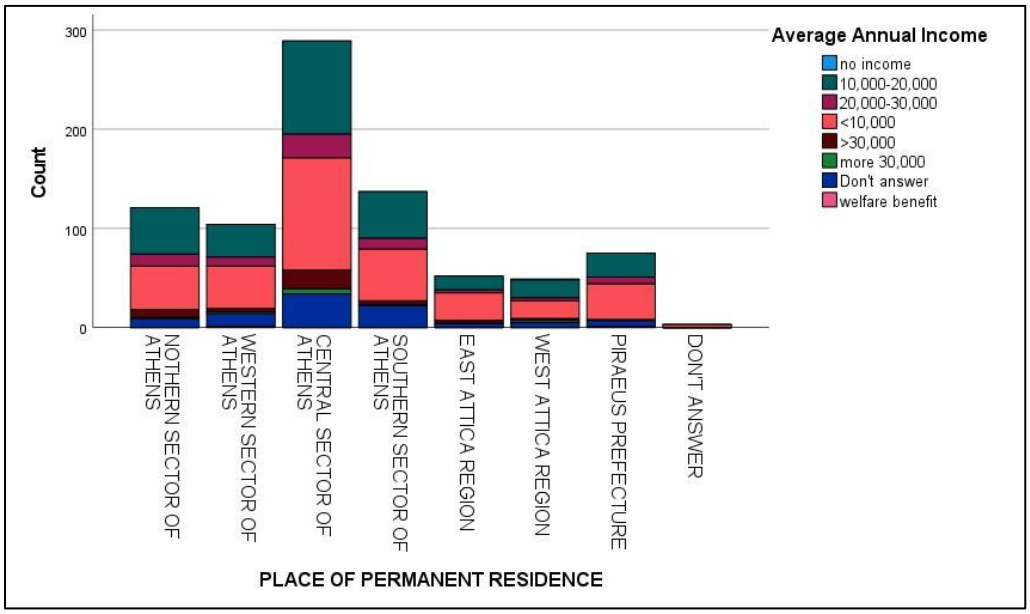


Figure 4. Participants' income (authors' work).

In terms of availability, a medium percentage of 37.25% of the respondents in all administrative sectors of Attica stated that their neighborhood provides adequate public outdoor spaces; however, an average of 18.7% in all sectors appears dissatisfied with the number of outdoor public spaces (Figure 5).

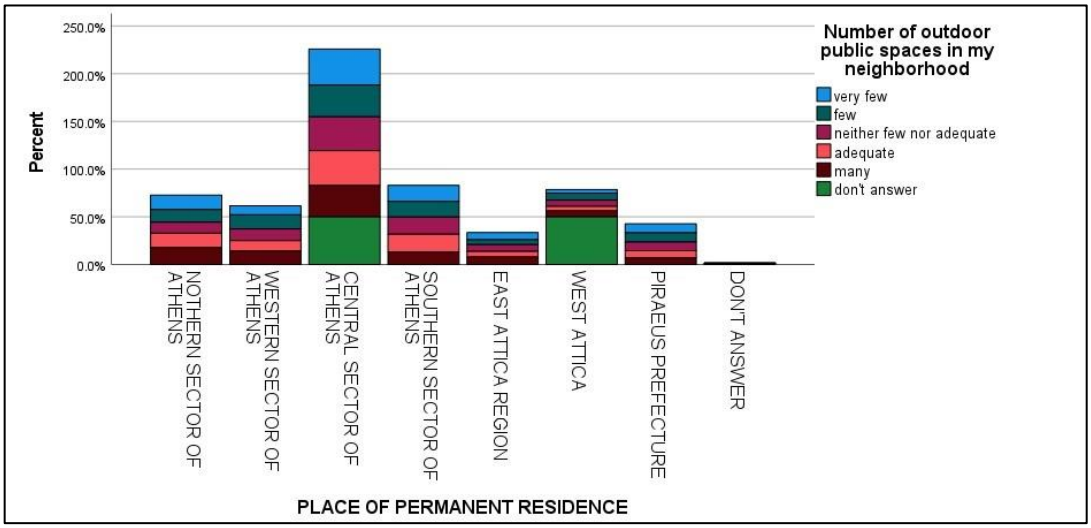


Figure 5. The responses regarding the amount of public open spaces in the area of residence (authors' work).

Only an average of 15.2% in all administrative sectors claim that there are abundant outdoor public spaces in the neighborhoods they live in. At this point, it is important to mention that there are no stark differences in accessibility and availability of outdoor public spaces among the different administrative sectors of Attica (Figure 6). Only a slight differentiation between the northeast part of Attica and the rest of the Attica prefecture indicates that residents in the northeast part of Attica seem more satisfied with the availability of the existing outdoor public spaces in these areas. This could be justified by the suburban character of these areas and the subsequent differences in city planning and design. However, in terms of accessibility, newly established suburban areas in the eastern part of Attica seem less efficient compared to metropolitan Athens and Piraeus. Thus,

traditional city centers in Attica may have fewer outdoor public spaces yet are easy to reach, while suburban areas have more outdoor public spaces yet are inefficiently connected to the neighborhoods. This could be owed to a large extent to the fact that the urban fabric in these suburban areas is not as compact as in city centers, offering outdoor public spaces that require longer walking distances.

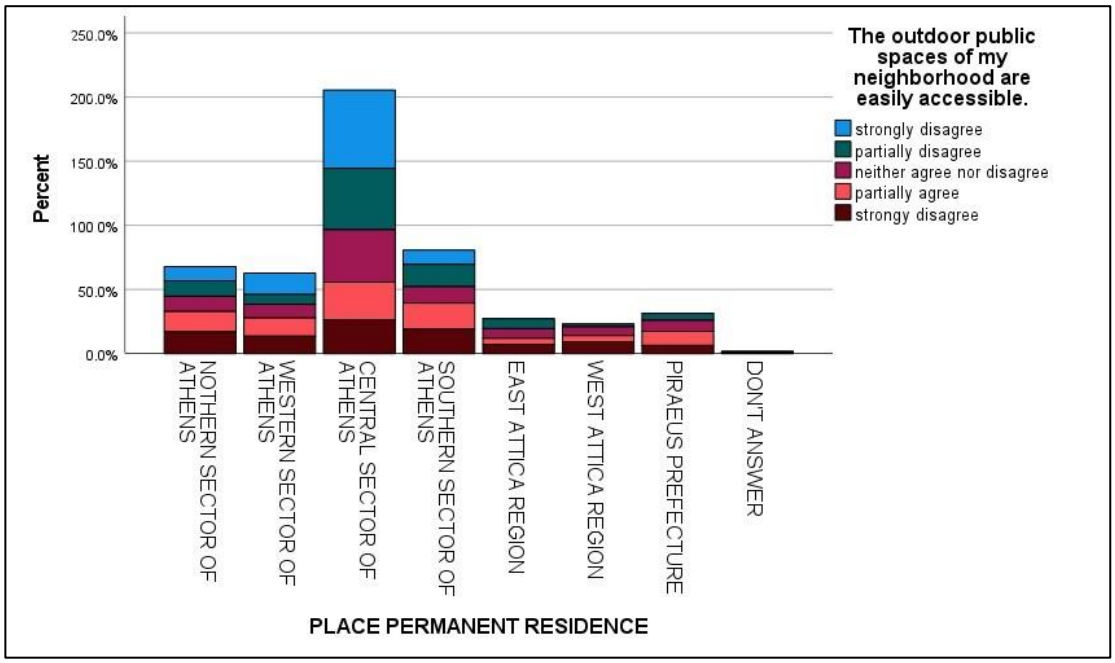


Figure 6. Graph depicting the responses regarding the accessibility of public open spaces in areas of residence (authors' work).

By responding to the question, "How accessible is the public space in your area?", participants were asked to assess the accessibility of public places in their areas. Respondents were asked to rank accessibility on a 5-point Likert scale, with 1 denoting limited accessibility and 5 denoting good accessibility. Also, an average of 50% of the respondents in all administrative sectors of Attica prefer outdoor spaces within a 5 to 15-min walking distance. A noteworthy finding is the fact that a significant average of 17.67% in all administrative sectors puts forward the idea of establishing outdoor spaces within less than a 5-min walking distance from residential areas, implying the necessity for small scattered green outdoor spaces in every neighborhood. Less popular but still preferable are outdoor spaces within a 15 to 25-min walking distance. However, outdoor spaces that require a walking distance of more than 25 min appear less appealing. A general assessment in terms of accessibility reveals that an average of 36.7% of the respondents in all sectors are partially satisfied with the existing situation. At this point, it is important to mention that other studies conducted in the era of COVID-19 indicate that there is a tendency for car-dependent leisure travel during weekends to reach medium- to large-scale urban parks in Attica. This tendency seems to be stronger among citizens of highly populated neighborhoods within Attica [52].

Significant discrepancies among different administrative sectors of Attica have been revealed through questions relevant to quality. Participants were asked to assess the general quality of public spaces in their communities by answering the question, "How would you rate the overall quality?", with ratings ranging from 1 (very poor) to 5 (excellent). Specifically, the residents of the Central Sector of Athens describe the state of preservation of the existing outdoor spaces as less satisfactory (71.7%), while the residents of the Northern Sector of Athens seem satisfied (38.9%). However, there is a noteworthy percentage of 34.3% of participants in the Northern Sector of Athens, suggesting that there is room for

further improvement despite the upgraded urban environment. A similar situation to central Athens is present in central Piraeus: only a small percentage of participants (15.6%) seem to be satisfied with the quality of preservation of the existing public outdoor spaces in the area. As for the south suburbs of Athens, the outdoor spaces seem to be under better maintenance, based on the research findings. In particular, 46% of the participants who live in South Attica regard the existing state of preservation as efficient and satisfactory (Figure 7).

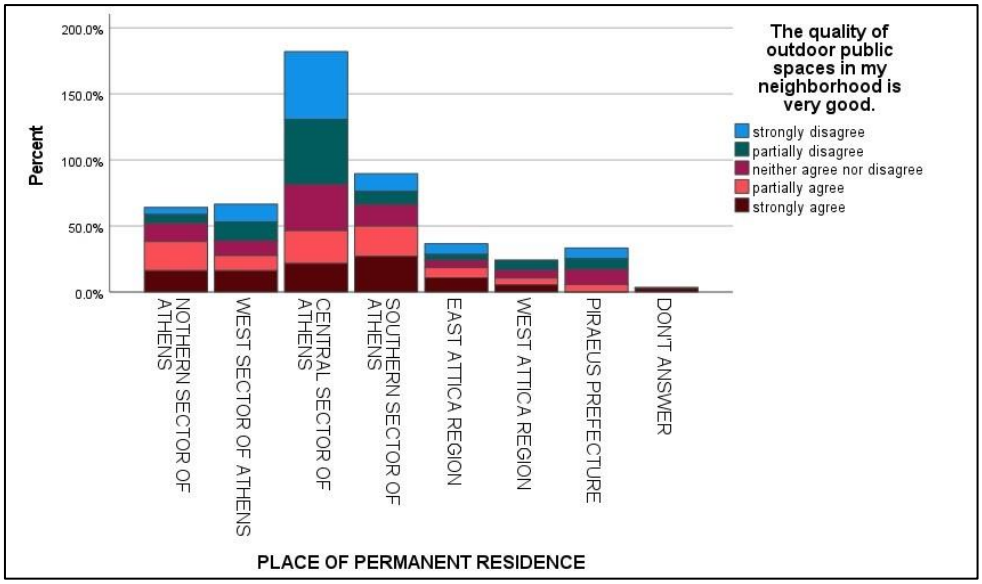


Figure 7. Graph depicting the responses regarding the quality of public open spaces in the area of residence (authors' work).

In addition to issues of maintenance, the participants evaluated the outdoor spaces regarding the efficiency of their design and quality. From this standpoint, central Athens and central Piraeus have the lower percentages; around 18% of the participants residing in these areas described the quality of the existing outdoor public spaces as efficient, while the rest of the participants appeared ambivalent or unsatisfied.

Being relevant to well-preserved outdoor public spaces, questions about safety reveal discrepancies not only among different administrative regions but also at different times of the day. To be more specific, participants at high percentages in all administrative regions of Attica consider the existing outdoor spaces during night hours as unsafe (Figure 8). Research findings, as depicted below, underscore the critical situation in terms of safety in the central area of Athens; 41.8% of the respondents describe the existing outdoor spaces during night hours as totally unsafe, and 30.5% as partially unsafe. These results are rather alarming, indicating the need for an intervention. The situation is better during morning hours, with an average of 36.9% in all administrative sectors declaring that outdoor spaces feel quite safe during morning hours.

Another significant finding is associated with the increase in the frequency of visits during the COVID-19 pandemic. An average of 57.4% in all administrative sectors of Attica stated that the frequency of visits has increased during the pandemic. Concerning the utilization of public spaces for athletic activities, the Northern Sector of Athens exhibited a higher rate of positive responses, with 42.3% expressing partial or complete agreement. Similarly, the East Attica region showed significant support, garnering a combined 37.5% approval. In contrast, the Southern Sector of Athens displayed the lowest enthusiasm, with only 24.2% expressing agreement, closely followed by the Central Sector of Athens at 27.6% (Figure 9). Moreover, the majority of participants in all administrative sectors highlighted the contribution of outdoor spaces to physical and mental health, as presented in Figures 10 and 11 below. Based on this study's findings, these percentages are higher for

residents of the dense urban fabric of Athens and Piraeus, compared to the suburban areas of Attica.

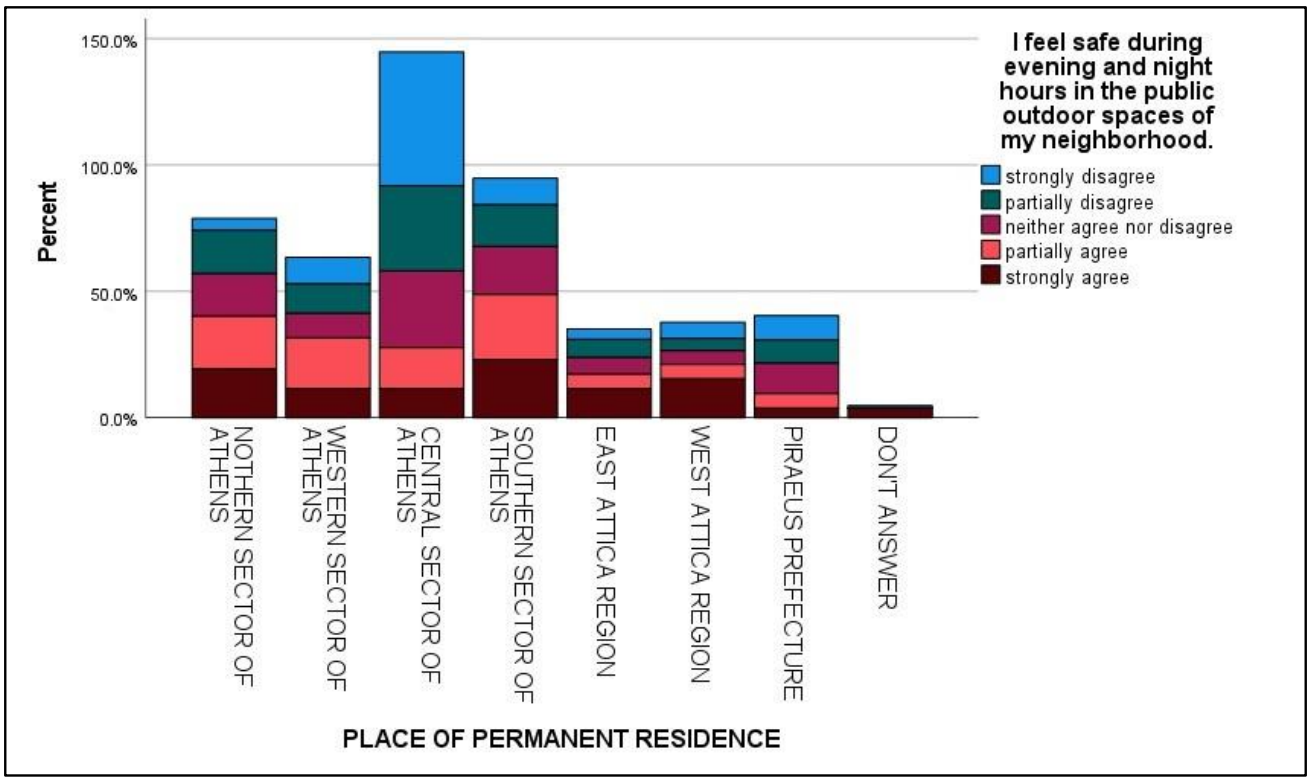


Figure 8. Results regarding safety during the night in urban public spaces by sector (authors' works).

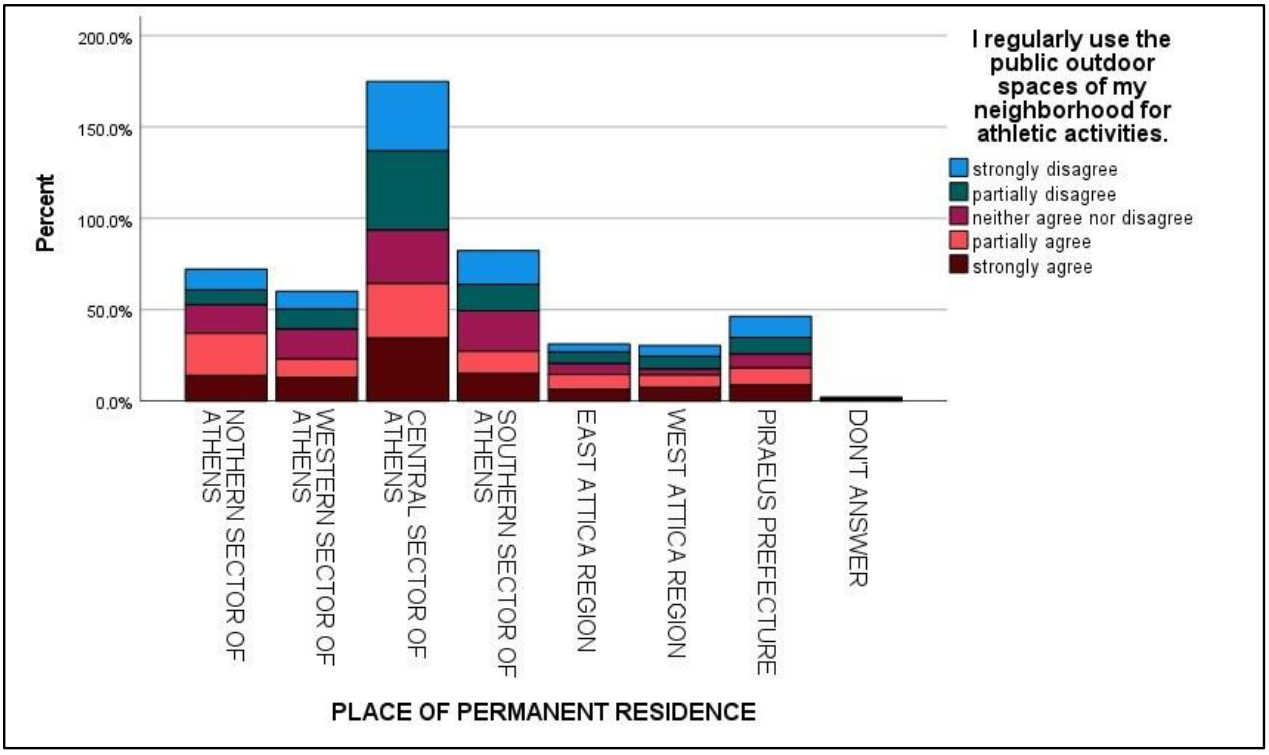


Figure 9. Results regarding the use of public spaces for athletic activities (authors' work).

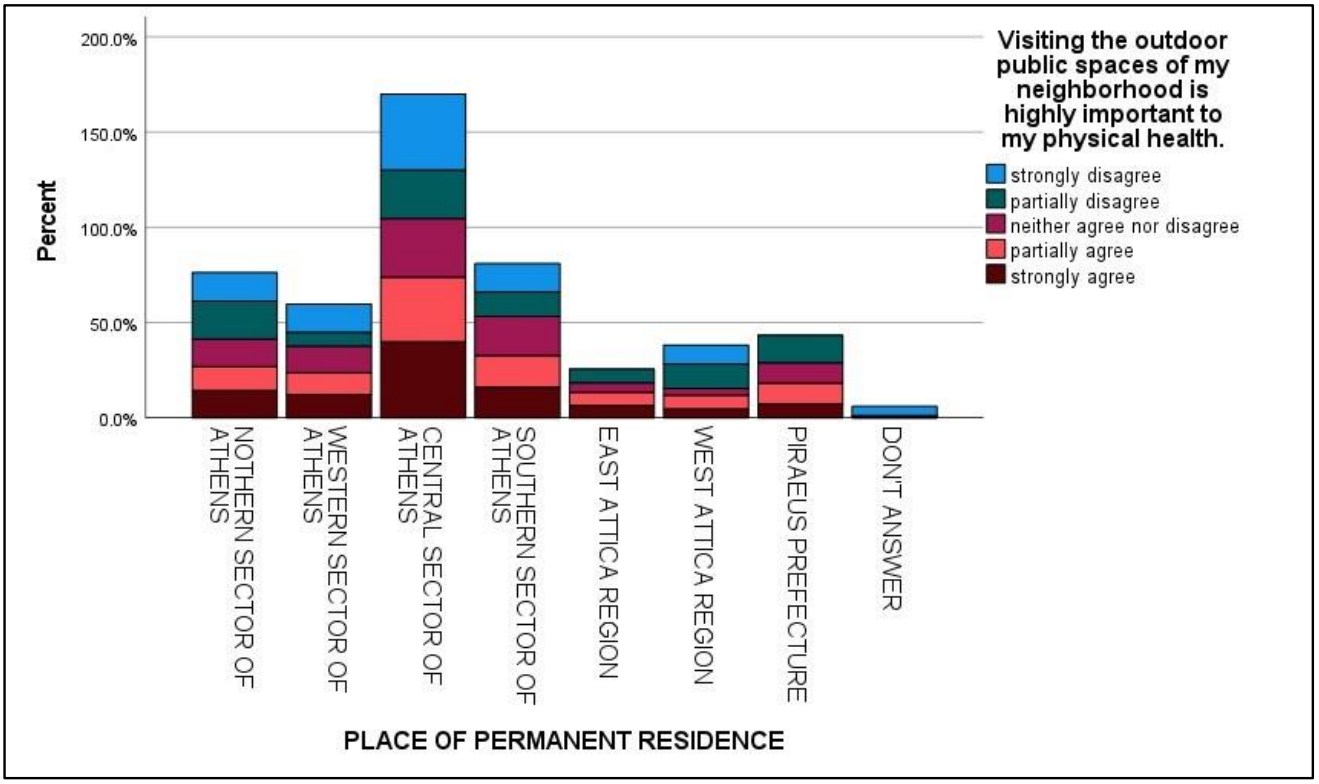


Figure 10. Results regarding how important respondents consider visits to public space for their physical health (authors' work).

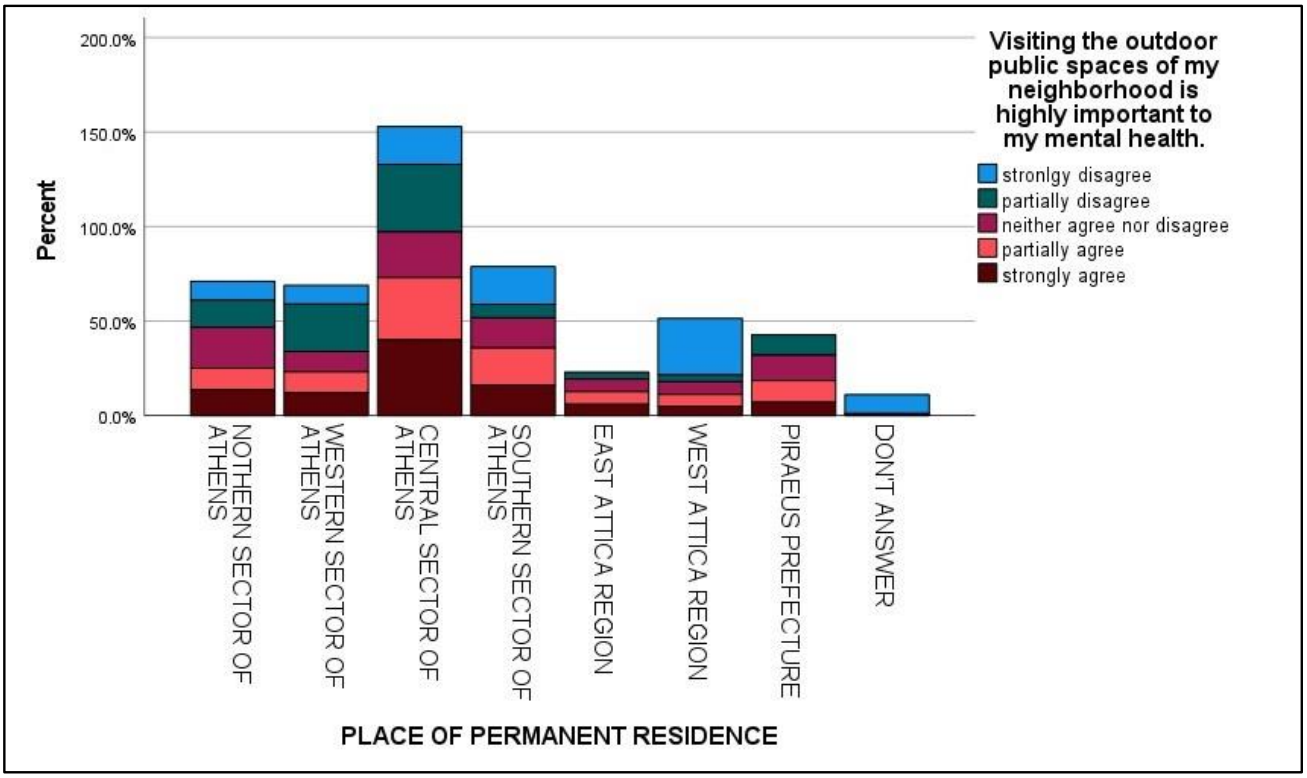


Figure 11. Results regarding how important respondents consider visits to public space for their mental health (authors' work).

4. Discussion

Studies conducted in the era of COVID-19 highlight the importance of outdoor public spaces for the general well-being of city dwellers [53]. Regardless of the specificities of time and place, studies converge on the fact that the presence of outdoor (especially green) public spaces adds to the urban experience, also being beneficial to physical and mental health [54]. However, studies have proved that limited social interactions in outdoor spaces during the pandemic have changed the experience of the visitors, and a decrease in the number of visits was recorded in some cases [54].

The main body of the existing evidence indicates that socio-economic attributes, such as income, age, and gender, are critical to the frequency of visits [55]. Moreover, scholars underscore the fact that even before the pandemic, socio-economic factors played an important role in the cities of Europe (ibid). Adding to the previous argument, there is an associative link between high socio-economic status and access to green spaces in North America (ibid). Our study verifies that there are associations between socio-economic strata and public spaces; the upper-class residential suburbs of the Northern Sector of Athens seem to have well-maintained, accessible, and safer public spaces compared to the rest of Attica. Cartographic depictions in the previous chapter illustrate the discrepancies among the different sectors of Attica, each with its urban history. These inequalities also have a strong environmental dimension; green outdoor spaces offer better air quality improving urban microclimate conditions [53]. Well-designed outdoor spaces are bound to counterbalance the ramifications of the poor housing facilities, especially in areas with degraded housing reserves suffering from energy poverty. Therefore, suburban regions have more outdoor public spaces but are inefficiently connected to neighborhoods, while historic city cores in Attica may have fewer outdoor public spaces but are still more accessible.

The presence of such spaces combined with safe and convenient access may function as key components of sustainable and inclusive urban design. Deriving elements from a study conducted in the U.K., discrepancies regarding urban green spaces have been not only sustained but also worsened during the pandemic [54]. Given this fact, this study reveals issues such as maintenance, preservation, and safety as critical factors for further consideration [7]. Although this study adds valuable information to a mostly unexplored subject for this specific region, there are a few noteworthy constraints to take into account. Firstly, it is based only on survey data, which might include biases such as self-selection, response bias, and self-reporting mistakes. Due to the type of method used to gather the data, the sample—while sizable—did not contain a representative sample of immigrants or the elderly. Additionally, there is no qualitative data available because the district-level quantitative survey would be very time-consuming and challenging to analyze, especially during the pandemic phase, given the large resources and infrastructure required. As a result, the quality and accessibility assessments are based solely on subjective perceptions.

In light of the vast literature on cities and the COVID-19 pandemic, our research makes significant contributions to understanding the spatial distribution and quality of urban public spaces in the Attica region during this critical period. Through this examination, our study addresses a crucial gap by shedding light on the availability, accessibility, and quality of open urban public spaces. Furthermore, our research goes beyond the mere identification of existing public spaces, delving into the quality assessments across different sectors of Attica. Notably, we reveal disparities, with central Athens and central Piraeus sectors receiving lower ratings in terms of availability, quality, and safety compared to residential suburbs, particularly in the Northern Sector. This nuanced analysis of spatial disparities contributes to our understanding of environmental and spatial justice, emphasizing the need for an equitable distribution of public spaces to address socioeconomic inequalities. This study's significance extends to its emphasis on the critical importance of quality public spaces, especially during times of crisis like the COVID-19 pandemic.

Although this research provides valuable data in an area that has never been examined in this light, there may be some limitations. This research is primarily based on self-reported survey data from a specific region during the COVID-19 pandemic, which may limit the

objectivity of the results. The limitations related to the data gathering as well as the sample collection can be an inspiration for further and more targeted research, with a combination of data collection methods. Future research in this field could delve into a micro-geographic level to investigate different types of outdoor spaces in the era of COVID-19 to compare and contrast different scales and different locations within a given city fabric. Moreover, vulnerable population groups could be a focus for examining the weaknesses of current design and planning strategies [17,56–58]. On account of all these factors, future research on this topic should explore small pieces of the urban fabric to evaluate the quality of public spaces and test whether planning and design strategies follow the basic principles of inclusiveness.

5. Conclusions

The COVID-19 epidemic has accentuated the critical role that urban public spaces play in promoting people's general well-being. To address the void in the literature about the disparate distribution of open public spaces in the Attica region, our study focused on the availability, distribution, quality, safety, and accessibility of the regions of Attica, Greece. According to our research, on average, 37.25% of the respondents from all administrative sectors in Attica stated that there were several outdoor public spaces in their neighborhood, and 18.7% of the respondents expressed dissatisfaction with the quantity of these places. Merely 15.2% of the respondents claimed that their communities had an abundance of open public areas. This reveals a large disconnect between the supply and demand for public places, urging for a reconsideration of planning approaches to address this disparity. With an average of 50% of the respondents indicating a preference for outdoor places within a 5 to 15-min walk, the survey also emphasized the need for accessibility. It is noteworthy, nevertheless, that outdoor areas that required a longer walk than 25 min were less well-liked. The safety and quality of outdoor public places vary throughout administrative areas according to our results. For instance, people in Athens's Northern Sector showed more satisfaction with the status of conservation than those in the city's Central Sector and Central Pireaus. Overnight, safety concerns were especially noticeable in Athens's core district, highlighting how urgently this issue has to be addressed. When compared to the other sectors of Attica, the upper residential suburbs in the Northern Sector of Athens seemed to have safer, easier-to-access public places. By highlighting the deficiencies in the current distribution and quality of public spaces in the Attica region, we advocate for a re-evaluation of urban planning strategies. Our work not only contributes to the academic discourse on this topic but also provides practical suggestions for policymakers and urban planners to enhance the distribution and quality of public spaces. Ultimately, our research aims to improve the overall well-being, health, and social cohesion of residents in the Attica region by promoting equitable access to high-quality urban public spaces. The results emphasize the need for continuous conservation measures to guarantee the maintenance, safety, and functionality of public areas in neighborhoods. These areas are essential components of inclusive and sustainable urban planning and can mitigate the negative impacts of poor housing conditions, particularly in neighborhoods with high-density populations. Micro-geographic level analysis should be considered in future studies in this field to examine various forms of outdoor spaces in the context of the COVID-19 period. By concentrating on disadvantaged populations, we may secure their participation in urban planning while also pointing out the shortcomings in the present planning and design methods. Municipalities and urban planners may enhance the standards of living for their residents and guarantee that outdoor public areas continue to be lively and essential elements of cities by addressing the issues that were identified. The goal of this research is to support the continuous initiatives in the Attica region to develop thriving, sustainable cities.

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