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How did the COVID-19 pandemic impact urban green spaces? A multi-scale assessment of Jeddah megacity (Saudi Arabia)

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**ABSTRACT**

The outbreak of the COVID-19 pandemic emerged as a global public health threat. In this crisis period, urban parks provided multiple ecosystem services and direct/indirect benefits to mental and physical health. However, the use patterns, attitudes, and perceptions of urban park visitors remained unexplored in Saudi cities. This study aimed to find out the use patterns, attitudes, and perceptions of people regarding urban parks during the COVID-19 pandemic, and the findings were compared with non-pandemic periods. Two urban parks (Al Masarah Garden and Al Jamaa Garden) in Jeddah megacity (Saudi Arabia) were assessed, and 215 respondents were surveyed to fulfill the objectives of the study. The study applied a questionnaire survey and field observations to understand the impact of the COVID-19 pandemic on the use patterns, attitudes, and perceptions of urban park visitors. Non-parametric tests (Kruskal–Wallis and Mann–Whitney tests) were performed to find out the impact of sociodemographic factors (such as age, gender, and education). From the results, it was found that the COVID-19 pandemic had a substantial impact on the use, attitudes, and perceptions of urban parks in comparison with non-pandemic periods. The number of park visitors decreased during the COVID-19 pandemic, but urban parks were crucial to people’s mental and physical well-being. The findings of this study may help to understand the importance of urban parks as green spaces and to implement measures to enhance the quality and quantity of urban green spaces in Saudi cities.

1. Introduction

Urban green spaces are very important, as they provide multiple ecosystem services (Enssle and Kabisch, 2020; Chang et al., 2017). Ecosystem services are the direct and indirect benefits (such as regulating, supporting, provisioning, and cultural ecosystem services) that people derive from ecosystems (Chen et al., 2020; Das and Das, 2019; Costanza et al., 2017). In an urban environment, ecosystems are highly valued for what they provide in people’s lives, particularly cultural uses (Egoh et al., 2012; D’ouza and Nagendra, 2011). Thus, urban parks as green spaces also provide various benefits to people and collectively enhance the quality of life and urban sustainability (Lee and Kim, 2015; Mensah et al., 2016). The importance of urban parks as green spaces largely varies across cities and is highly influenced by the sociocultural background of the visitors (Priego et al., 2008). The recent COVID-19 pandemic has brought many changes to people’s lives (Naryanan et al., 2020; Van der Werf et al., 2021; Hu et al., 2020). Common changes that were reported included changes to human mobility and working environments (Venter et al., 2020). The emergence of the COVID-19 pandemic not only was a global public health emergency but also had an immense impact on social cohesion and restrictions around the world (Burga and Pavel, 2020). In addition, the pandemic brought unprecedented alterations to economic activities and environmental footprints (Muhammad et al., 2020; Venter et al., 2020). In a few recent studies, it was reported that strict restrictions were imposed on the use of and accessibility to urban green spaces around the world after the emergence of the pandemic (Erdönmez and Atmiş, 2021; Liu and Wang, 2021; Ugolini et al., 2020). These restrictions had an impact on people’s mental and physical health (Liu and Wang, 2021). Thus, accessibility to urban parks emerged as one of the big issues in cities due to the pandemic (Honey-Rosés et al., 2020; Patino and Poon, 2021; El Kenawy et al., 2021). Therefore, it is essential to examine the impact of the COVID-19 pandemic on the use of and attitudes toward urban parks.

The population living in urban areas is increasing rapidly, and this has become a serious threat to urban green spaces due to land-use and land-cover transformation (Lee et al., 2015). Urban green spaces and parks play crucial roles in maintaining microclimates, improving soil fertility, supporting mental and physical health, building resilience to...
natural disasters, maintaining social relations and interactions, and improving social inclusion (Finaneva, 2017; Jayakody et al., 2018; Setälä et al., 2017; Sturm and Cohen, 2014; Kabisch et al., 2015; Peters et al., 2010; Lahoti et al., 2019). In many research studies in cities such as Tokyo, Japan (Kohsaka and Okumura, 2014); New York, USA (Sutton and Anderson, 2016); and Singapore (Henderson, 2013), it was well documented that urban green spaces play a crucial role in enhancing health, biodiversity, and livelihoods. Urban green spaces directly and indirectly improve people’s quality of life, health, and well-being (Gianico et al., 2021; Jabbar et al., 2021). Thus, in the literature, it is well recognized that urban green spaces play a significant role in overall sustainability. However, urban green spaces have recently been under serious threat due to accelerated urbanization (Basu and Nagesh, 2021).

In Saudi Arabia, several measures were imposed to reduce the transmission of SARS-CoV-2 since the outbreak of the virus. There were strict restrictions on the seasonal minor Umrah pilgrimage and a partial curfew was imposed to reduce the transmission of the virus. In addition, shopping malls, parks, restaurants, and cafes were strictly closed. Public gatherings were also restricted by government agencies. In the government sector, attendance at workplaces (except for healthcare, military, and security) was suspended for 16 days. In commercial areas, markets and malls were closed (except supermarkets and hypermarkets). The government of Saudi Arabia also encouraged reducing the number of employees at workplaces. Furthermore, strict preventive measures were imposed on flights from China on 25 January 2020, and concerned committees were formed to establish precautions to curb COVID-19 transmission in the country on 2 February 2020. In March 2020, attendance in all government sectors was suspended, shopping malls and complexes were closed, and public gatherings were strictly banned. From March 2020, stricter restrictions were imposed to curb SARS-CoV-2 transmission, such as the suspension of prayer in mosques (14 March) and domestic flights and transportation (such as buses, trains, and taxis) (21 March), with a partial curfew imposed from 7 PM to 6 AM for 21 days (23 March). On 21 June 2020, the government decided to get back to normal life in the country and imposed restrictions to aid with health and maintaining social distancing. Thus, in Saudi Arabia, the government adopted several initiatives to reduce SARS-CoV-2 transmission. Regarding the use of urban parks, there were also restrictions: the number of park visitors decreased during the pandemic in comparison to before the lockdown. Thus, it is essential to find out the impact of the COVID-19 lockdown on the use patterns and accessibility of urban parks.

In a few recent studies, it was well documented that the use of and accessibility to urban green spaces were significantly affected due to strict restrictions (Venter et al., 2020; Ugolini et al., 2020) (Supplementary Table 1). During the early phase of the COVID-19 pandemic, various measures were adopted, such as social distancing and restrictions on economic activities, and a lockdown was imposed in many countries, including the USA, France, Spain, Canada, and Italy (Geng et al., 2021; Rogers et al., 2020; Yip and Chau, 2020). Therefore, public spaces, parks, and facilities were shut down to curb SARS-CoV-2 transmission (Liu and Wang, 2021). The closure of public parks and green spaces posed a challenge in urban environments in terms of staying mentally and physically active and healthy during the pandemic (Slater et al., 2020; Ugolini et al., 2020; Geng et al., 2021). As reported by Ugolini et al. (2020) and Rice and Pan (2020), the number of park visitors during the pandemic was dramatically reduced to avoid health risks. Multiple studies reported that the closure of green spaces and urban parks due to the pandemic revealed their importance for outdoor activities (Ugolini et al., 2020; Xie et al., 2020; Geng et al., 2021). People’s psychological burden was largely affected by the pandemic (Geng et al., 2021; Slater et al., 2020). Thus, from the previous literature, it is clear that the COVID-19 pandemic had a significant impact on the uses and perceptions of urban parks. However, limited studies were performed to examine the impact of COVID-19 on the uses and perceptions of urban parks in the Saudi context. Therefore, considering this research gap, this study aimed to assess the impact of the COVID-19 pandemic on the use of and accessibility to urban parks in Jeddah city, Saudi Arabia, from diverse perspectives. The main objectives of this study were (i) to explore the patterns regarding urban parks (such as use and accessibility) during pandemic and non-pandemic periods, (ii) to find out the reasons for visiting urban parks during pandemic and non-pandemic periods, (iii) to examine the attitudes toward urban parks during pandemic and non-pandemic periods, and (iv) to assess the impact of sociodemographic factors on the use patterns, attitudes, and perceptions of urban park visitors (Table 1).

2. Material and methods

2.1. Selected parks

Jeddah is one of the largest megacities in Saudi Arabia, with a total population of 4 million; the population density is 5400 persons/km². It is located on the western coast of the Red Sea. This city is characterized by a dry and hot desert climate with an average rainfall of 45 mm and an average temperature of >40 °C in summer and around 28 °C in winter. In this study, two urban parks in Jeddah megacity, which are located nearly at the centre of the city, were taken into consideration (Fig. 1). Al Masarah Garden and Al Jamaa Garden are public parks with areas of approximately 44,250 and 55,380 m² and were established in 2008 and 2017, respectively. These two parks provide various benefits for people, such as enjoying physical activity, spending time with relatives and friends, picnicking, and playing sports. The details of the parks are presented in Table 2. These two urban parks were selected because they are located at the center of the city and are easily accessible. This is why many people visit these parks and spend a lot of time with friends and family there. In addition, these parks provide various recreational services and good opportunities for other cultural services. To the best of our knowledge, this is the first study to explore the impact of the COVID-19 pandemic on the use patterns, attitudes, and perceptions of urban park visitors in Jeddah megacity. Thus, this study revealed significant findings on the importance of urban parks during crisis periods for people’s well-being (Fig. 2).

2.2. Methods

2.2.1. Data collection and questionnaire survey

In this study, both online and on-site questionnaire surveys were used to examine the impact of the COVID-19 pandemic on the use patterns and perceptions of urban park visitors. The questionnaire survey was performed from June to mid-August 2021. A total of 215 respondents were surveyed at two urban parks, among which, 154 were face-to-face surveys and 61 were online surveys. For the on-site surveys, visitors were selected randomly and surveyed in different parts of the park. They were given a pre-test questionnaire to find out their impression of the park. For a better understanding of the impact of

| Name of Park     | Expected Visitors (per day) | Approximate Area (m²) | Type of Park (Public/Private) | Foundation Year | Number of Sampled Respondents |
|------------------|-----------------------------|-----------------------|-------------------------------|-----------------|-----------------------------|
| Al Masarah Garden| More than 101               | 44,250                | Public                        | 2008            | 104                         |
| Al Jamaa Garden  | More than 200               | 55,380                | Public                        | 2017            | 111                         |
COVID-19 on the use and perception of urban park services, the survey was performed during public holidays and weekends. The questionnaire was initially developed in English, and later it was translated into Arabic to better understand the research objectives. The survey was performed separately in the two parks. The closed-ended questionnaire was divided into four main sections. The first section mainly covered general information about the park visitors, such as age, gender, educational status, and occupational status. The second section mainly covered the frequency of the use of urban parks during pandemic and non-pandemic periods. The third section covered the duration of time spent in urban parks. The fourth section covered the motivations to visit urban parks during pandemic and non-pandemic periods (Table 3).

### 2.2.2. Questionnaire design for visitors’ attitudes toward urban parks

In this study, to assess place attachment or attitudes toward urban parks, 15 items were developed. These 15 items were assessed under 4 domains: place dependence (4 items), place identity (3 items), affective or emotional attachment (4 items), and social attachment (4 items). The details of the domains and items are presented in Table 4 and Fig. 3. Place dependence refers to the functional and goal-oriented connectivity between a place and people (Ujang, 2012; Raymond et al., 2010) and the functional attachment of people with a place (Halpenny, 2010). Place identity refers to the symbolic attachment of people to a place (Anton and Lawrence, 2014; Brown et al., 2015; Yuksel et al., 2010) and it expresses specific human meaning (Tsar et al., 2014). Affective or emotional attachment is considered a significant pillar that represents the attachment between people and places and reflects people’s deep feelings about specific places (Lin and Lockwood, 2014). In other words, affective or emotional attachment refers to positive and negative perceptions about specific places (Halpenny, 2010). Lastly, social attachment refers to the social character of a specific place (Shaykh-Baygloo, 2020). In general, social attachment refers to people’s emotional bonding and feelings related to a place (Song and Soopramanien, 2019; Raymond et al., 2010).

A five-point Likert scale was used, indicating agreement or disagreement with the items that were selected for place attachment to urban parks. The scale was as follows: 5 = “strongly agree” (SA), 4 = “agree” (A), 3 = “neutral” (N), 2 = “disagree” (DA), and 1 = “strongly disagree” (SD) (Fig. 3). Statements from park visitors were assessed in
terms of percentages for each option. This Likert scale was previously used in many research studies to assess place attachment toward forest conservation and pro-environmental behaviour (Cheung and Hui, 2018; Shaykh-Baygloo, 2020).

2.2.3. Questions regarding specific measures that were used by the urban park visitors

In this study, 10 questions were developed to understand the impact of COVID-19 on the use patterns, attitudes, and perceptions of the urban park visitors. These questions clearly asked for the perception of visitors about urban parks. All responses were expressed as percentages from the two urban parks. The details of the questions are presented in Table 5.

2.2.4. Statistical analysis

A number of statistical analyses was performed to find out the impact of COVID-19 pandemic on urban parks use, attitudes, and perception from diversified perspectives. Firstly, the non-parametric Mann–Whitney U test was performed to find out significant differences in the perceptions of and attitudes between urban parks. Kruskal–Wallis test (K-W test) was performed to find differences in socio-demographic attributes regarding the perception of urban parks. The correlation coefficient was performed to find out the relationship of variables measured for visitors’ attitudes toward urban parks. Median regression was also used to find out the influence of socio-demographic attributes on the perceived importance of activities performed in parks. All statistical analyses were performed in SPSS software (version 22).

Table 3
Attitudes of visitors toward urban parks during the COVID-19 pandemic.

| Domain          | Variable ID | Items                                                                 |
|-----------------|-------------|----------------------------------------------------------------------|
| Place dependence (PD) | PD1         | This park meets my needs                                           |
|                  | PD2         | No other places can be compared with parks                         |
|                  | PD3         | In parks, I can do whatever I like to do                           |
|                  | PD4         | Parks meet my demands related to leisure and entertainment         |
| Place identity (PI) | PI1         | I am well-grounded with the parks in the city                      |
|                  | PI2         | I feel that this park is a part of my daily life                   |
|                  | PI3         | This park has a unique environment                                 |
| Affective attachment (AA) | AA1     | I really miss the parks when moving out of the city                |
|                  | AA2         | I really like these city parks                                     |
|                  | AA3         | I am happy with the services provided by the parks                 |
|                  | AA4         | I am emotionally attached to the parks                             |
| Social attachment (SA) | SA1       | Parks provide opportunities for socializing with neighbors         |
|                  | SA2         | I have a friendship network in the park                            |
|                  | SA3         | I feel loyal to the people in these places                         |
|                  | SA4         | My friends and family like these parks                            |
3. Results

3.1. Sociodemographic characteristics of the park visitors

In this study, 215 park visitors were surveyed in two urban parks in Jeddah city, among which, about 60 % were male and about 40 % were female (61 % male and 39 % female at Al Masarah Garden and 55 % male and 45 % female at Al Jamaa Garden). Most of the visitors to the two parks were Saudi (more than 95 %). The largest percentage of park visitors were 30–40 years old (>35 %), followed by 20–30 years old (about 25 %), 40–50 years old (more than 20 %), and older than 50 (>15 %). Other details of the respondents are presented in Table 6.

3.2. Comparison of the use of urban parks during pandemic and non-pandemic periods

The results documented that the number of park visitors was much lower during the COVID-19 pandemic compared to non-pandemic periods. In non-pandemic periods, the highest percentage of visitors (about 35 %) visited a park once a week, followed by 1–4 times a month and 2–4 times a week (25 %). In Al Jamaa Garden, the majority of visitors visited a park once a week (41 %), followed by 2–4 times a week (19 %), 1–4 times a month (18 %), and daily (12 %). In contrast, during the pandemic, the use of urban parks substantially decreased. The results showed that more than 65 % of survey respondents never visited parks during the pandemic (68 % in Al Jamaa Garden and 66 % in Al Masarah Garden). About 20 % of visitors visited parks less than once a month. Thus, the overall result showed that during the pandemic, visits to urban parks dramatically reduced (Figs. 4 and 5).
3.3. Comparison of the duration spent in parks during pandemic and non-pandemic periods

The results showed that the amount of time spent on each park visit was dramatically reduced during the pandemic in comparison to non-pandemic periods. During non-pandemic periods, the largest percentage of visitors spent 1–2 h (32%), followed by 2–3 h (27%) and 3–4 h (18%). In contrast, during the pandemic, the largest percentage of visitors spent up to 1 h (about 70%), with a higher percentage of visitors to Al Jamaa Garden (71%) than Al Masarah Garden (66%) spending up to 1 h.

Table 5
Sociodemographic profile of urban park visitors (%).

| Dimension         | Urban Parks | Al Masarah Garden (n = 104) | Al Jamaa Garden (n = 111) |
|-------------------|-------------|----------------------------|---------------------------|
| Gender            | Male        | 61                         | 55                        |
|                   | Female      | 39                         | 45                        |
| Nationality       | Saudi       | 96                         | 97                        |
|                   | Non-Saudi   | 4                          | 3                         |
| Age (years)       | 20–30       | 29                         | 24                        |
|                   | 30–40       | 33                         | 38                        |
|                   | 40–50       | 23                         | 22                        |
|                   | >50         | 15                         | 16                        |
| Educational level | Bachelor    | 46                         | 41                        |
|                   | Master’s or above | 23 | 30 |
|                   | Students    | 16                         | 14                        |
|                   | Government employee | 32 | 33 |
|                   | Businessman | 22                         | 34                        |
|                   | Housewife   | 30                         | 19                        |

Source: Field survey, 2021.

Fig. 4. Frequency of park visits during pandemic and non-pandemic periods (Al Masarah Garden survey).

Fig. 5. Frequency of park visits during pandemic and non-pandemic periods (Al Jamaa Garden survey).
to 1 h at the park. More than 30% of visitors spent 1–2 h (29% in Al Jamaa Garden and 34% in Al Masarah Garden). Thus, along with the frequency of park visits, the duration spent in parks for each visit also dramatically decreased during the pandemic compared with the non-pandemic period (Figs. 6 and 7).

3.4. Reasons for visiting urban parks during pandemic and non-pandemic periods

In this section, the reasons that were given for visiting parks during pandemic and non-pandemic periods are presented. The results showed that the largest percentage of park visits were for spending time with relatives and friends (25.65%), followed by mental refreshment (12%), spending time with kids (playing, travelling) (11%), physical activities (9%), and social relations (6.6%) during the pandemic. During non-pandemic periods, park visits were mostly for mental refreshment (44%), followed by experiencing loneliness (21%), physical activities (12%), and the fresh environment (6%). During pandemic periods, very limited use of urban parks was reported for experiencing nature and its beauty, spending time with relatives and friends, reading, picnicking, playing sports, and socializing (Figs. 8 and 9).

3.5. Attitudes of park visitors toward urban parks during pandemic periods

The questionnaire included 15 items to examine the degree of place attachment to urban parks in Jeddah city. The results showed that most of the items were given scores ranging from 3 (neutral) to 5 (strongly agree), indicating a strong place attachment of visitors to services provided by the parks (Fig. 10). Five items that were given high scores were SA4, “My friends and family like these parks” (69%), followed by AA1, “I really miss the parks during the pandemic” (65%); PD1, “This park meets my needs” (62%); SA3, “I feel loyal to the people in these places” (61%), and AA4, “I am emotionally attached to the parks” (56%). The largest percentage of park visitors (16%) disagreed with item PI2, “I feel that this park is a part of my daily life,” followed by PI1, “I am well grounded with the parks in the city” (8%); AA3, “I am happy with the services provided by the parks” (7%), and SA2, “I have a friendship network in these parks” (6%) (Fig. 10).

Fig. 11 shows the results of the question-specific assessments of the impact of COVID-19 on the perception of urban parks. The park visitors answered 10 questions in two urban parks regarding their perceptions of the parks. The results showed that most of the park visitors went to urban parks mainly for mental refreshment (44%), followed by escaping from loneliness (21%) and experiencing nature (16%). The respondents really missed gathering with relatives and friends (51%), physical
activities (24%), and the natural environment (12%) during pandemic periods due to restrictions on the use of urban parks. Most of the respondents visited urban parks near their homes (73%) to avoid mass gatherings. More than 80% of respondents stated that urban parks were essential to meet their needs, to eliminate their psychological stress, and to enhance their mental health. Thus, the overall results showed that there was a significant impact of the COVID-19 pandemic on the behaviour patterns of the park visitors.

![Fig. 8. Reasons for visiting urban parks during pandemic and non-pandemic periods (Al Masarah Garden sample).](image)

![Fig. 9. Reasons for visiting urban parks during pandemic and non-pandemic periods (Al Jamaa Garden sample).](image)

![Fig. 10. Level of agreement with place attachment items as perceived by the park visitors (Table 3).](image)
3.6. Influence of socio-demographic factors on the use patterns, attitudes, and perceptions of the urban park visitors

The results showed that there was a substantial impact from socio-demographic factors on the use patterns, attitudes, and perceptions of the urban park visitors. The field survey found that female respondents (4.76) assigned more importance (based on the five-point Likert scale) than male respondents (4.26) during the pandemic. This may be due to the limited accessibility of women to urban parks during the pandemic. In terms of age, people belonging to age above relatively high

Fig. 11. Question-specific assessments of the impacts of COVID-19 on the perception of urban parks.
importance (4.53) to urban parks compared to other age groups. The KW test showed that there was no significant difference between the socio-demographic factors (such as age, education, and occupation) regarding the use patterns, attitudes, and perceptions of urban park visitors ($p$-value >0.05). Thus, this clearly indicated that during the pandemic, urban parks were mostly used for enhancing mental and physical health; visitors were closely linked with urban parks (attitudes) and perceived the value of urban parks as more or less the same.

From the statistical results (Mann–Whitney U test), it was found that although the number of park visitors decreased during the pandemic, there were no significant differences between pandemic and non-pandemic periods in terms of the frequency of use and duration spent in parks for respondents in both parks. The results were tested at the 95% confidence level, showing $p$-values <0.05 (0.522 and 0.575 for frequency of visits and 0.528 and 0.674 for duration spent in parks). Thus, there was no significant influence of socio-demographic factors on the use patterns, attitudes, and perceptions of the urban park visitors. The median regression model showed that there was a significant impact on the activities performed in urban parks based on socio-demographic attributes (Supplementary Table 3). As per the results, significant differences were reported from gender age and education towards different activities performed in the urban parks. For example, walking ($\beta = 0.32$), fresh environment ($\beta = 0.21$), experience nature and its aesthetic beauty ($\beta = 0.25$) are largely influenced by gender. Walking ($\beta = 0.46$), experience nature and its aesthetic beauty ($\beta = 0.25$), mental refreshment and relaxing ($\beta = 0.33$) are influenced by age. Particularly, experience nature and its aesthetic beauty ($\beta = 0.26$), spend time with kids ($\beta = 0.33$) are influenced by education respectively. The results indicated that perception of urban parks was large.

4. Discussion

This study aimed to examine the impact of the COVID-19 pandemic on the use and perception of urban parks in Jeddah megacity, Saudi Arabia. The survey began in June 2021 and continued until mid-August 2021, where 215 respondents were surveyed at two urban parks, namely, Al Masarah Garden and Al Jamaa Garden. The results showed that the frequency and duration of park visits decreased due to restrictions on the use of public spaces, which is a similar result to other studies (e.g., Grima et al., 2020). Regarding the place attachment to urban parks, it was shown that heightened importance was given to urban parks, and such findings were also reported in recent studies (e.g., Da Schio et al., 2021). Regarding attitudes about place attachment, it was shown that the value of urban green spaces and parks significantly increased, clearly indicating that these were crucial for enhancing the quality of life (Lin et al., 2019; Schipperijn et al., 2010).

In previous studies, it was reported that there was a substantial impact from the COVID-19 pandemic on people’s overall well-being (Table 7). The results of this study showed that the frequency and duration of park visits significantly decreased; these findings are contrary to other studies (Derks et al., 2020; Venter et al., 2020). According to Derks et al.’s (2020) study in a peri-urban forest (Kottenforst near Bonn) and Venter et al.’s (2020) study in Oslo (Norway), the number of park visitors significantly increased during the COVID-19 pandemic. On the other hand, a study that was performed by Xie et al. (2020) in Changdu, China, reported that the number of park visitors substantially decreased during the pandemic due to strict restrictions on movement in public and private green spaces. An international experiment was performed by Ugolini et al. (2020) in Europe, and their findings showed that the number of park visitors decreased during the pandemic. Based on interactions with park visitors, it was reported that the number of park visitors increased post pandemic. Decreased visits during COVID-19 pandemic periods and increased visits to urban parks were also reported in many previous studies (Lopez et al., 2020; Beria and Lunkar, 2021) (Fig. 12).

The results of the study also showed that although the number of park visitors decreased during the COVID-19 pandemic, few activities or services were more dominant during that time. During the pandemic, parks were mostly used for mental refreshment, physical activities, and escaping from loneliness. Thus, from this finding, it was clear that the park visitors valued green spaces for their mental and physical health, and this finding was similar to other research studies (Jay et al., 2016; Xie et al., 2020; Beckmann-Wibbelt et al., 2021). Studies performed by Lopez et al. (2020) in New York (USA) and Berdejo-Espinola et al. (2021) in Brisbane (Australia) highlighted the importance of mental health during the COVID-19 pandemic.

The results of the study showed that the use of and accessibility to urban parks were largely determined by the socio-demographic factors of the visitors. Female respondents gave more importance to urban parks than male respondents, and visitors aged 20 and older also gave them more importance. In previous studies, it was well recognized that socio-demographic factors determine the use patterns of urban green spaces (Kabisch, 2019; Lee and Lee, 2019; Pinto et al., 2021). Recently, Adlas and Maghrabi (2021) performed a study to find out the social evaluation of public open spaces and showed that socio-demographic attributes, such as age, gender, and education, influence the use of such spaces; similar findings were also reported by Pinto et al. (2021). This study also found that female respondents gave more importance to urban parks than male respondents and visitors aged 20–40 years gave them more importance than other age groups. This clearly indicated that socio-demographic attributes had a role in the use of urban parks.

4.1. Policy implications

From the results of the study, it was recognized that the citizens of Jeddah megacity who went to parks did so because they were highly dependent on urban parks for their physical and mental well-being. This clearly indicates that urban parks need to be managed properly to enhance people’s well-being and meet their needs. COVID-19-induced lockdowns had an immense impact on people’s mental and physical health. Particularly in cities, people remained isolated at home, which has had a dramatic impact on their mental and physical health. In urban areas, parks are among the major sources of ecosystem services (such as regulating, supporting, and cultural ecosystem services). Urban parks also provide cultural ecosystem services (such as recreation, socializing, educational, and aesthetic value), which are also important for people’s well-being. Thus, in urban areas, parks must be managed and infrastructure facilities must be promoted. The results of this study showed...
that urban parks had a significant impact on physical health (such as walking, physical activities, and sports) and mental health (such as mental refreshment and relaxation). Thus, this study has immense potential for helping to understand the role of urban parks as green spaces to cope with many diseases and enhance the quality of life and health (Wolch et al., 2014). Mental health stress negatively impacts psychological health, and green spaces, such as urban parks, improve negative states through the experience of leisure (Orsega-Smith et al., 2004).

Apart from mental and physical health, urban parks also facilitate the development of social relations in neighborhoods (Hayward and Weitzer, 1984; Lloyd et al., 2008). Previous studies observed that urban parks play a significant role in enhancing mental and physical health. Particularly during crisis periods (such as the COVID-19 pandemic), the contribution of urban parks is considered significant for improving mental and physical health. Due to lockdowns during the COVID-19 pandemic, the opportunities to visit urban parks and green spaces were limited to reduce virus transmission. People, particularly in cities, remained isolated at home due to the closure of public spaces and strict restrictions. These closures and restrictions had an immense negative impact on human health during the lockdown periods (Fofana et al., 2020; Mazza et al., 2020). Thus, alongside the findings of the study, the aforementioned further suggest that urban green spaces, such as parks, need to be managed and the cultural ecosystem services they provide must be enhanced to improve people’s quality of life and well-being.

4.2. Limitations

Although this study is important for understanding the role of urban parks as green spaces, it also had a few limitations. First, there was an unequal number of participants from the two urban parks and an uneven distribution of socio-demographic factors (for example, the sample was 61 % male and 39 % female). Thus, the samples that were collected for the study may not be representative. This issue was also addressed by Boll et al. (2014) and KrjajlerOstoic et al. (2020). Apart from this, very small numbers of samples were collected due to COVID19 pandemic following the guidelines of the government. Secondly, the questionnaire survey was performed during a post-pandemic period and visitors were asked for their perception during and before the pandemic; therefore, a recall bias may be present. No post-pandemic empirical analysis was performed. Third, we considered two urban parks in Jeddah city; no more parks were selected due to time and resource limitations. Despite these limitations, these findings of the study will help to understand the role of urban green spaces in people’s well-being to improve public health.

5. Conclusion

This study mainly investigated the use patterns, attitudes, and perceptions of urban park visitors during the COVID-19 pandemic and compared pandemic and non-pandemic periods in two urban parks in Jeddah city, Saudi Arabia, using a questionnaire survey and field observations. From the results of the study, few notable findings were reported. Firstly, there was a substantial impact during the pandemic in comparison with non-pandemic periods in the use of urban parks. Secondly, the number of park visitors and frequency of park use decreased during the pandemic in comparison to non-pandemic periods. Thirdly, the urban parks were mostly used for spending time with relatives and friends followed by mental refreshment, spending time with kids (playing, travelling), physical activities. On the other hands, during non-pandemic periods, the urban parks were mostly used for mental refreshment, followed by experience loneliness, physical activities, and fresh environment respectively. The socio-demographic attributes had substantial impact on the use, attitudes and perception towards urban parks use. Thus, from the overall study, it can be stated that there were substantial impact on the use, attitudes and perception towards urban parks during pandemic and non-pandemic periods.
