

**THE IMPACT OF COVID-19 ON THE IMPORTANCE AND USE OF
PUBLIC PARKS IN SAUDI ARABIA (DAMMAM CITY AS A CASE STUDY)**

BY

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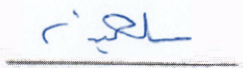
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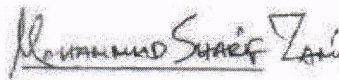
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|To my mother, whose love and support over the years had made me where I am today. |

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ABSTRACT

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Pandemics through the history have had a significant impact on human society. This includes COVID-19's pandemic, which significantly affected people's interaction with their urban environments. This includes both indoor and outdoor spaces on the individual and collective levels. This study aims to examine the impact of COVID-19's pandemic on people's experience in using public urban spaces. The study focused on the public urban green spaces in this regard considering the pandemic's impact on people's awareness of the importance of these spaces and their use rate and patterns. The study considered Dammam city in Saudi Arabia as a case study in this regard, where improving the provision and utilization of public urban green spaces is at the top of the urban development agenda. The study used a mixed qualitative and quantitative approach in this regard using participatory observation and questionnaire surveys. The study found that people have become more aware about the importance of public urban green spaces in their daily life, which has been reflected on their visit rate and duration of these spaces. The study also observed some change in people's use pattern of these spaces, where more preference was given to the physical activities in the post-pandemic time compared to the pre-pandemic one. The study concluded some recommendations related to the future planning of public urban green spaces including the provision of public urban green spaces that are well-integrated into their urban context. This fragmentation strategy is essential to improve people's accessibility to those spaces, especially in the case of mobility restrictions associated with pandemics. More attention should also be given to accommodate more active functions within these spaces including walking and sport activities. The use of smart technologies to enhance individual and collective outdoor physical activities is recommended in this regard

ملخص الرسالة

الاسم الكامل: سند الخواجة

عنوان الرسالة: تأثير جائحة كورونا على أهمية واستخدام المساحات الخضراء الحضرية العامة في المملكة العربية السعودية مع الإشارة إلى مدينة الدمام

التخصص: ماجستير في علوم العمارة: الاستدامة والمباني الخضراء

تاريخ الدرجة العلمية: ديسمبر، 2022

الكلمات المفتاحية: جائحة كورونا، المساحات الخضراء الحضرية العامة ، المملكة العربية السعودية ، التخطيط بعد الجائحة ، التصميم الحضري |

كان للأوبئة عبر التاريخ تأثير كبير على المجتمع البشري. ويشمل ذلك جائحة كورونا، الذي أثر بشكل كبير على تفاعل الناس مع بيئاتهم الحضرية. يشمل ذلك المساحات الداخلية والخارجية على المستويين الفردي والجماعي. تهدف هذه الدراسة إلى دراسة تأثير جائحة كورونا على تجربة الناس في استخدام الأماكن الحضرية العامة. ركزت الدراسة على المساحات الخضراء الحضرية العامة في هذا الصدد مع الأخذ في الاعتبار تأثير الوباء على وعي الناس بأهمية هذه المساحات ومعدل استخدامها وأنماطها. واعتبرت الدراسة مدينة الدمام في المملكة العربية السعودية دراسة حالة في هذا الصدد ، حيث يأتي تحسين توفير واستخدام المساحات الخضراء الحضرية العامة على رأس أجندة التنمية الحضرية. استخدمت الدراسة منهجاً كمياً ونوعياً مختلطاً في هذا الصدد باستخدام الملاحظة التشاركية واستطلاعات الاستبيان. ووجدت الدراسة أن الناس أصبحوا أكثر وعياً بأهمية المساحات الخضراء الحضرية العامة في حياتهم اليومية ، الأمر الذي انعكس على معدل زيارتهم ومدة هذه المساحات. لاحظت الدراسة أيضاً بعض التغيير في نمط استخدام الأشخاص لهذه المساحات ، حيث تم إعطاء المزيد من الأفضلية للأنشطة البدنية في وقت ما بعد الجائحة مقارنةً بالوباء. خلصت الدراسة إلى بعض التوصيات المتعلقة بالتخطيط المستقبلي للمساحات الخضراء الحضرية العامة بما في ذلك توفير المساحات الخضراء الحضرية العامة التي يتم دمجها جيداً في سياقها الحضري. تعتبر استراتيجية التجزئة هذه ضرورية لتحسين وصول الأشخاص إلى تلك المساحات ، لا سيما في حالة قيود التنقل المرتبطة بالأوبئة. يجب أيضاً إيلاء المزيد من الاهتمام لاستيعاب المزيد من الوظائف النشطة داخل هذه المساحات بما في ذلك أنشطة المشي والرياضة. يوصى باستخدام التقنيات الذكية لتعزيز الأنشطة البدنية الخارجية الفردية والجماعية في هذا الصدد

CHAPTER 1

INTRODUCTION

1.1 General Overview

The coronavirus disease caused by SARS-CoV-2 virus has emerged from the Chinese province of Wuhan in December 2019. Due to the virus's high spreading ratio, the World health Organization declared an international high level of emergency on the 11th of March 2020 (WHO, 2020). The virus global spread since has caused numerous amounts of deaths since then, that has been rapidly increasing since the emergence of the virus (Angiello, 2020). Due to the arising concerns about COVID-19 rapid spread, casualties and death cases, global quarantine policies have been declared in most cities resulting in restricting people's major activities including mainly socially interacting among each other (Kavan, 2021). Various social restrictions have been implemented in order to resist the virus's rapid spread rate, common restrictions were implemented globally including to switching to online learning for schools, universities and colleges, social distancing and lockdowns procedures which minimized people's mobility to the lowest rate possible (Karnon, 2020). The extreme procedures of preventing social interactions led to noticeable physical and mainly mental issues, public areas especially urban green spaces were completely shut down by the authorities causing the major part of the physical, social and health consequences that made tremendous impact on the people's well-being during pandemic (Mofijr and Fattah, 2021).

The COVID-19 rapid spread is influenced by various and multiple factors including population density, society's life style and traditions and the activities associated with the society's general background, religion and culture. Saudi Arabia has a low population

density when compared to other countries, Japan for instance, has a 92% of urban population from its 126.6 million population and Iran that has population of 83.9 million with a 76% urban population. COVID-19 virus had a higher spread ratio in Saudi Arabia's despite its low population of 38.8 million population with its 84% urban population when compared to the mentioned countries (Alrashed et al, 2020). Saudi Arabia reported on the 2nd of March 2020 the first confirmed case of COVID-19 virus, by the 5th of April 2020 the virus had infected 2400 individuals, however, the infection rate was much slower in Japan and Iran while similarities in the Iranian population's culture, traditions and religion and the Saudi's are noticed (Worldometer, 2022). The number of death cases due to the infection of the COVID-19 virus started to arise and due to the unavailability of any type of vaccination in the time, Saudi Arabia along with the whole world started extreme measures of lockdowns to slow down and hopefully try to prevent any further death and infection cases (Alrashed et al, 2020).

Saudi Arabia had imposed several measures to prevent the COVID-19 spread, as the host of the most important destination for all Muslims around the globe, Umrah were restricted to be performed for the individuals inside Saudi Arabia and from the whole world, along with, Al-Hajj which is a must be performed ritual in the Islamic religion, prayers in mosques were as well banned to be performed. Furthermore, all commercial related activities were prevented including shopping malls, cafes and restaurants shutdown. Gatherings in general were prevented which associated with the shutdown of parks, private chalets and wedding halls, attending governmental entities was restricted as well. Moreover, flights were restricted specially from multiple countries around the world specially China which the first COVID-19 case was confirmed in and the virus started to spread from. The restrictions of flights continued after the vaccination process, specific countries with high COVID-19 confirmed cases were banned to land on Saudi Arabia lands (Addas and Maghrabi, 2022). The main aim of Saudi Arabia's plan to get back to normal life was to prevent the virus's spread as much as possible, multiple restrictions were put on social distancing and gathering, penalties on face masks, smart phone apps usage and high rate of vaccinations prevented the virus to rapidly spread (Alrashed et al, 2020).

Urban green spaces are threatened due to the rapidly increasing urbanization, it is expected that by the year 2050 most of the world's population will be living in cities (UN, department of population affairs, 2019). Humans by nature needs to connect with nature, connecting with nature is an essential need for humans due to its physical and physiological benefits including a place that accommodates physical activities such as walking and cycling, a place for relaxation and a place where stress can be reduced (Lee, 2015). Moreover, enhancing social relations, inclusion and improving social interactions are crucial roles played by urban green spaces, along with, enhancing the community's well-being and improving cities livability (Jabbar, 2021). Thus, despite the great threat on urban green spaces due to the urbanization, it is well known that they play a crucial role is enhancing multiple and various aspects in cities and providing the essential needs for humans (Basu and Nagendra, 2021).

The changes on the lifestyle were heavily effected due to the pandemic's restriction measure, many studies have documented mental, physical and socio-psychological problems that are related to the prevention of accessing the urban green spaces (Jia, 2021). Researches have proven that human's health and well-being are improved tremendously when associated to urban green spaces, both physical and mental health improvements are as well associated with access to urban green spaces (Europe, 2016). Multiple pandemics have previously occurred and affected mankind in various and multiple aspects, previous researches and studies focused on inequity and vulnerability of particular sections of the community to pandemics (Wade, 2020). Yet, the restrictions of accessing the urban green spaces and the people's avoidance in accessing them due to fear of COVID-19 have redefined its role on the health, well-being and multiple socio-physiological related aspects (Geary, 2021).

Thus, due to COVID-19 pandemic's tremendous impacts on physical and mental health of people that is associated with the restriction measures implemented on accessing urban public green spaces despite its potential benefits to decrease COVID-19 cases through boosting people's immune system and enhancing the general health and well-being of people. Therefore, this study aims to assess the impacts of COVID-19 on people's perception of the importance and use preferences of public urban green spaces through

measuring and evaluating several indicators in this regard such as visiting rates, duration of visits and their associated activities. This study adopts multiple methods in assessing COVID-19's impacts which includes an on-site questionnaire and an urban analysis on the urban public parks selected in this study. The study considers Dammam city in Saudi Arabia a case study in this regard.

1.2 Problem Statement

The importance of urban green spaces as an essential urban component for human's needs is well established in multiple and various studies. Connection to urban green spaces is crucial for both mental and physical health especially in challenging times as COVID-19 pandemic through providing multiple and various benefits including increasement of health performance, enhancing social interaction, stress relief, promoting social relations, enhancing people's immune system and boosting the general well-being. During the COVID-19 lockdown these benefits and needs were not met, causing multiple issues related mainly to physical and social performances. COVID-19 pandemic affected the mentioned aspects and the perception of the urban green space due to fear of infecting with the virus especially before the vaccination availability.

1.3 Research Aim and Objectives

The aim of this study is to determine the impact of COVID-19 on the importance and use of urban public green spaces in post-pandemic period through determining the following:

1. To discuss people's perception of the importance of urban public green spaces, especially, in post-pandemic period due to the impacts of COVID-19 pandemic.
2. To investigate people's post-pandemic demand of urban public green spaces in terms of their design aspects.
3. To propose urban related recommendations for the post-pandemic era.

1.4. Significance of the Study

The significance of this study is determined through the study's contribution to the international contexts since urban public parks are essential needs to human beings and their societies. Moreover, inspiring decision makers policies and planning decisions

through determining the pandemic's restriction huge impacts on human's needs related to health, well-being and socio-physiological aspects.

Thus, this study will contribute in the highlighting the importance of urban public green spaces in terms of meeting and satisfying people's needs, especially due to the impact of COVID-19 pandemic which prevented people to meet these needs despite the abundance of urban public green spaces in Dammam city, Saudi Arabia.

1.5. Scope and Limitation of the Research

The main aim of this study is to identify the impacts of COVID-19 pandemic on people's perception of the importance of public urban green spaces and their use preferences of these spaces after the COVID-19 pandemic. However, the scope and limitations of this study are the following:

- This study will examine the impact of COVID-19 pandemic that is only associated to urban public park's importance, use rate and use preferences in post-pandemic period. The study will select two urban public parks in Dammam city. The study will use a mixed qualitative and quantitative approach in this regard using participatory observation and questionnaire surveys.
- The study will focus on respondents who have visit history to the selected public parks and which Saudi Arabia is their country of residence since pre pandemic periods.
- This study will include urban related recommendations for the post-pandemic period. Therefore, determining people's post-pandemic demand of urban public parks.
- This study will not address the importance of urban public green spaces during the pandemic period.

1.6. Thesis Organization

The proposed thesis as shown in Figure 1 is organized into five main chapters, chapter 1 which includes 1. an overview introduction, 2. problem statement, 3. research objective, 4. significance of the study and 5. scope and limitation of the study. Chapter 2 offers a literature review that includes an overview of COVID-19 pandemic, how Saudi Arabia dealt with the pandemic, vaccination rates in Saudi Arabia, the significance of urban green spaces to the public and the role of public urban green spaces during the pandemic. Chapter 3 presents the research's methodology which illustrates the selected study area, selected urban parks, questionnaire structure, urban analysis, data collection method and data analysis process. Chapter 4 illustrates the findings of the study through the data analysis. Chapter 5 summarizes the analyzed data, draws conclusions based on the conducted questionnaire, and outlines the recommendations for post-pandemic era.

Thus, this study aims to assess people's post-pandemic perception of the importance of public urban green spaces, along with, its use rate and use preferences through comparing it with the pre-pandemic period. Two urban public parks in Dammam city will be selected in this regard. An on-site questionnaire survey will be applied in order to compare the pre and post-pandemic periods in terms of people's perception of urban public parks importance, use rate, duration of visits and their use preferences. As well as, determining user's level of satisfaction regarding the selected urban public park's design aspects in order to conclude urban related recommendations for the post-pandemic era.

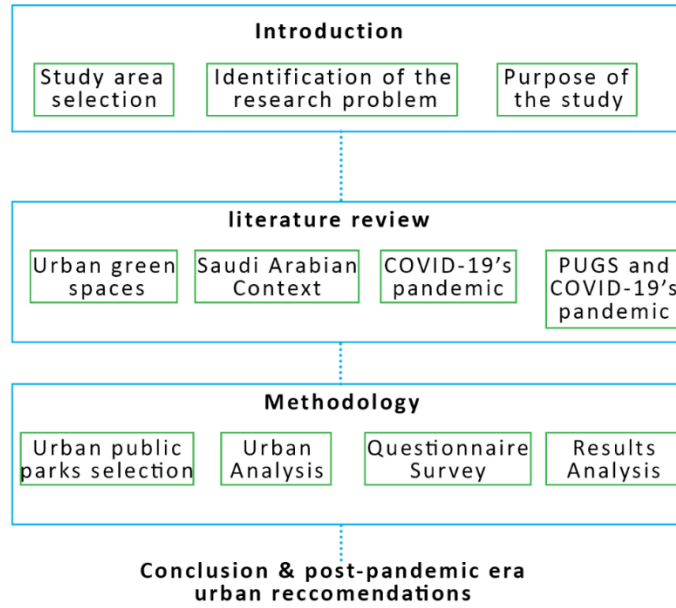


Figure 1 The Diagram of The Study

Chapter 2

Literature Review

2.1. Urban Green Spaces

2.1.1. Urbanization and Urban Green Spaces

Urban areas worldwide are increasingly congested and populated. The increasing demand on urban lands and the rapidly increasing urban population concentration in urban areas has risen over time and will continue to rise resulting in huge changes in the natural outlook causing loss of diverse natural resources. The urban expansion hugely influences the conversion of natural lands into urban lands (He, Zhang, Huang, & Zhao, 2016). By 2050, it is expected that more than Two Third of the world's population to live in urban areas, while more than half of the world's population lives in urban areas nowadays (UN, United Nations, 2022).

Natural covers including forests covers, crop lands, water bodies and different types of natural covers are hugely affected by the rapid urbanization. The loss of natural covers affects the ecosystem's function resulting in loss of ecosystem services (Delphin, Escobedo, Abd-Elrahman & Cropper, 2016). Multiple aspects are associated when addressing ecosystems including water quality, land quality, biodiversity, habitats, GHG emissions and various environmental related aspects. Developing countries in particular such as China, India and African countries natural land covers were replaced by urban land due to the rapidly increasing urbanization which resulted in declination of ecosystems services especially those ecosystems located within the urban areas (Bohnet & Pert, 2010). Nearly 50% of the world's population is resided nowadays in urban areas while 60% is assumed to reside by the year 2023 (Avelar, Zah, & Tavares-Corrêa, 2009). The land cover changing whether documented as man-made or natural-made affected the ecosystem's functions, processes and services (Chase, Pielke Sr, Kittel, Nemani, & Running, 2000). Urbanization nowadays is seen through a developmental perspective resulting in increasing the rate of residing the rural population to the urban areas. Despite the associated benefits

of urbanization related mainly to socio-economic and cultural aspects, multiple environmental impacts associated the land conversion. Urbanization is the major cause of the environmental and the ecological changes worldwide (Qu & Lu, 2015). Therefore, efficient environmental management is required in order to maintain and balance the urbanization rates and the ecosystems services of the urban life. The adoption of ecosystems services as an efficient and important tool to quantify the environment's ecological quality (Ahern, Cilliers and Niemla, 2014). Thus, assessing the urbanization impacts on ecosystems services in order to identify the declined ecosystems services due to the urban expansion. Resulting in proper understanding of the relationship between the urbanization and its associated impacts on the ecosystems services (Alam, Dupras and Messier, 2016).

Saudi Arabia in the previous years had experienced an extremely rapid urbanization resulting in high rates of land use and land cover (LULC) changes. The LULC high rates in Saudi Arabia affected mainly the cities thermal environment resulting in extreme levels of heat island increasement which was obviously noticed due to the high temperatures of Saudi Arabia's context (Detommaso, 2021). Temperature in Saudi cities has risen by 4° C in the last five decades. Coastal cities such as Al-Khobar, Dammam and Jeddah are the most vulnerable to the temperature increasement which is likely to increase by 2 – 2.75° C. During summer season the temperature reaches for 52° C while in the year 2040 the temperature levels is predicted to increase by 2.2 – 2.7 ° C. Therefore, the climate change issue in Saudi Arabia is obviously highly impacting the Saudi context (Al-Maamary, 2017). Therefore, urban planners are facing an extremely difficult challenge due to the climate change which policy makers are participating in as well. Nature-based urban environmental solutions are the key to face the mentioned challenges, through efficient management and restoration. Urban green spaces including urban gardens and parks plays an essential role in facing the climate change, heat island and the general thermal environment of urban areas, as well as, enhancing the overall urban resident's quality of life (Addas and Maghrabi, 2021).

2.1.2 Urban Ecosystems Services

Urban ecosystems are described as the direct benefits gained from within the urban areas located ecosystems. Ecosystem benefits humans through their well-being, health and human's social related activities, as well as, the environment in multiple and various ways. Ecosystems services are defined as the indirectly and directly services of ecosystems, meanwhile, urban ecosystems are urban ecological related services including parks, water bodies, urban green spaces, green spaces and their associated components (Gómez and Barton, 2013). In general, ecosystems services refer to the benefits derived from user's experiences associated with ecosystems functions, moreover, ecosystems services as well refers to the dependence rate of the urban population on ecosystem's services and the usage of its related components (Elmqvist, Fragkias and Goodness, 2013). Urban ecosystem services however, is defined as the ecosystem services provided through the ecological landscape of the urban area, moreover, urban ecosystems refer to the infrastructure which people lives within in high density (Jansson, 2013). Therefore, urban ecosystems simply refer to the provided services by the ecological infrastructure within the physical boundaries of an urban area. Thus, urban ecosystem's services are the provided through urban green spaces and the provided through ecosystem's products by the urban population.

Multiple ecosystem services are provided through urban green spaces, illness reduction through pollution prevention, physical activities, accommodating social activities which enhances social inclusion and interaction, along with, enhancing the general well-being of residents are the essential benefits of urban green spaces (Blanco et al., 2009). Public green spaces include parks, sports fields, water features, green trails and trails, community gardens, green walls along with conventional spaces and cemeteries. Private green spaces however include private yards, private sport fields and corporative campuses (Roy, Byrne, & Pickering, 2012).

The provided ecosystem services of urban green spaces contribute in enhancing and assuring resident's health. Green spaces in general filters air, prevent pollution, manage storm and rain waters and mitigates high temperature, moreover, providing food, ensure

habitat's durability and enhances biodiversity (Nowak, Crane, & Stevens, 2006). Despite that most researches regarding urban green spaces were linked to health, lack of parks and other green spaces were linked to mortality (Coutts, Horner and Chapin, 2010). Moreover, parks mainly accommodate and encourage physical activities which is related to multiple health benefits including illness prevention, mortality rates reduction and enhancing the general health of individuals. (Barton and Pretty, 2010). Obesity rates related to children in particular is addressed in multiple researches related urban green spaces, along with adult obesity it was found that accessibility rates to urban green spaces highly influenced obesity rates. Children with accessibility rates to urban green spaces were as well found to be more active in general (Diez Roux et al., 2007). Moreover, researchers have found that parks which encourages physical activities had higher visiting rates than parks which do not address the mentioned aspect, nevertheless, the highest visiting rates parks had more pleasant esthetically appearance (Veitch, Ball, Crawford, Abbott and Salmon, 2012).

Physical activities in green spaces as well were found crucial for mental health. Barton and Pretty (2010) conducted a study based in the UK proving that tremendous impacts were found on self-esteem and mood improvements when linked to urban green spaces related physical activities. In addition, Van den Berg, Maas, Verheij and Groenewegen (2010) conducted a comprehensive study in the Danish context, finding that individuals living near green surfaces and urban green spaces had less stress rates than individuals living in a normal urban context, concluding that living near green surfaces results in less stress rates through buffering the stress.

Despite the fact that urban areas are human's creation. Humans in their nature have a special connection with nature, connection with nature results as stated in various benefits related to the physiological, health and well-being of humans, along with boosting the immune system and the cognitive functions (Menzel et al., 2020). Moreover, connecting with nature provide an enhanced emotional state. The difference in individual's rates of recovery and perceptual intake is mostly due to exposure to natural when compared to man-made settings. For instance, in stressful times connecting with natural elements within the urban area is noticed to highly decrease stress levels even if the connected with urban green spaces were hard to be reached. Therefore, exposure to nature is highly recommended when

facing hard times such as loved one's death, divorce cases and multiple negative emotional states that could be mitigated through connecting with nature. Therefore, achieving balance between the urban infrastructure and the natural infrastructure is crucial for an efficiently health environment within urban areas (Russo and Cirella, 2018).

The integrated urban green spaces within the urban areas were found to promote a healthier community, people are often found happy, mentally and physically healthier, as well as, enjoying spending longer times in natural spaces including urban green spaces. Moreover, urban green spaces are often perceived as shelter due to the social activity's accommodation provided through them (Cox et al., 2017). WHO defined urban green spaces as "all urban land covered by vegetation of any type, including vegetation on private and public grounds, regardless of size and function, and can also include small water bodies such as ponds, lakes or streams (Blue Spaces)" (World Health Organization - Europe, 2017). Multiple studies have found that urban green spaces are directly linked to general health and well-being. Mental stress, anxiety and depression are associated with short life spans and low productivity, meanwhile, urban planners through providing natural infrastructure achieved health related long return investment (Beyer et al., 2014). People living near green infrastructure are found healthier than people who live in a radius of 1 KM, found that those living in the mentioned radius have higher stress, anxiety and depression levels, noticing that all people are vulnerable to the mentioned mental states but people with increasing connection to natural infrastructure are less affected by the negative mental states. However, attention should be paid to low-income sections of the community as they suffer harsh environmental conditions and less accessible to green spaces due to mobility difficulties (van den Berg et al., 2016).

Urban green spaces as the places that promote health becomes un-accessible when new viruses emerge, confining people in their indoor environments resulting in increasing of stress levels and abruptly halting normal and casual habits. Being confined in urban places and limiting accessibility to natural infrastructures results in a negative impact on people's health and well-being (Brooks et al., 2020). The urban green spaces availability in Dammam was reported as 5.4 m², recording the highest among other megacities including Riyadh which recorded a per capita availability of urban green spaces of 1.18 m² and 0.5

m² in the city of Jeddah. However, Dammam city requires to add to its 5.52 m² of green spaces by 40% in order to meet the WHO's standard (Addas and Maghrabi, 2020). However, COVID – 19 pandemic has limited people's access to urban green spaces through the restrictions conducted in order to mitigate the rapidly spreading virus resulting in multiple impact as this study will highlight.

2.1.3. Urban Green Spaces Contribution to the Urban Context

Urban green spaces contribute in various aspects in the urban context including its effects on climate change through mitigating heat island levels, booting ecosystems services through providing food supplies, wood, fuel and controlling water's pollution levels. Therefore, urban green spaces have a highly noticeable impacts on urban environment's overall sustainability (Brantley, Hagler and Baldauf, 2014).

Sustainable Development Goals (SDG) founded by the United Nations launched its New Urban Agenda in 2016 in order to create more sustainable and resilient urban settlements. Multiple aspects are included when addressing urban sustainability including urban planning, urban context management, ecological amenities and the urban green spaces quality, all the mentioned aspects level of enhancement depends however on the implementation efforts (Madureira, Nunes and Oliveria, 2018). Urban public green spaces within the urban context are considered as crucial components to the urban context due to its efficient contribution to the social, health, well-being and environmental dimensions. Therefore, urban green spaces including public green spaces became a necessary urban element in many countries due to its effective benefits to the residents and the urban context. However, few studies were performed to assess the urban green space's importance in Saudi Arabia and in the Middle Eastern context in general (Addas, 2015).

User's well-being and health are highly impacted by urban green spaces especially when located within the urban context. Relaxation, stress reduction and restoration are associated with urban green spaces user's experiences, stimulating and restoring positive mental effects including fear reduction, anger reduction and aggression states reduction are all proven to rapidly mitigate through frequently visiting natural settings (Ulrich, 1991). The physical activities accommodated in the urban green spaces are what mostly improve the

mental well-being of the residents. The relationship between the urban green space's provision and the public health is investigated in many studies. Therefore, it was found that the urban green spaces percentage within the overall urban context reflects and could measure the general health and well-being of the residents, influencing in a direct and indirect ways to resident's mental, social and physical well-being (Grazuleviciene, Andrusaitytė and Dedel, 2020). Thus, due to the significant role of urban green spaces in various sustainability related areas, the need of urban green spaces integration in the urban context has risen, including it in many urban related decisions by urban and city planners and by the policy makers (Leichenko, 2011). Applying innovative strategies and developing various new tools is crucial for managing and planning cities growth. Urban green spaces enhancement, along with, multiple strategies including buildings with low energy consumption and innovative urban structures are all addressed through climate change adaptation strategies and decisions (Reyes et al., 2019).

Urban green spaces in particular, is considered an essential strategic solution especially in new and growing cities that addresses sustainability, promotes resilient communities and resident's health and well-being. USA for instance have prioritized urban green spaces in its decisions making processes, New York, Washington D.C and Philadelphia cities prioritized urban green spaces the most (Nowak, 2006). While considering urban green spaces as an integral component of multiple European cities such as Milan, Turin and Catania (Baycan and Nijkamp, 2009).

2.1.4. Urban Public Parks Planning

Urban parks planning considers multiple aspects including the demographic structure, population, social needs and city's density. Comprehensive understanding of urban parks planning models is essential in order to adequately provide the wide range of benefits of the urban parks, therefore, determining the planning criteria is crucial. Urban park's size and shape associates with multiple benefits through accommodating different social, community and physical activities, larger urban parks could provide a variety of activities to all the community's sections including children, women, adults and elderly. Moreover,

larger the urban parks the more it contributes in heat island reduction, biodiversity and ecological preservation (Addas, Goldblatt and Rubinyi, 2020).

Three urban parks planning models were identified by Maruani and Cohen (2007). Firstly, the space standards model that has been criticized for its neglect to environmental and social aspects. This model links the size and quantity of urban parks to the population, area and density through quantitative measurements. The opportunistic model however, reuses demolition lands, leftover spaces, construction land and recycles and renew existing lands. Despite the opportunistic model sustainable approach, it is considered unrelated to planning due to its chance dependence. Thirdly, the park system model, depending on proximity, user diversity and user needs. This model encourages the interrelationship between different urban parks and provides a continuous movement within the urban parks structure existed within the urban context (Maruani and Cohen, 2007).

Urban park's accessibility is the most debatable topic in urban and city planning due to the relationship with environmental justice and general health. Urban parks accessibility is the key indicator in assessing cities quality of life (Thompson, 2011). Accessibility is defined as "ease with which a resident can reach a given destination" (Talen, 2003). Many misleading often occurs when addressing accessibility with mobility. However, mobility refers to the ability to move through spaces, meanwhile accessibility refers to reaching the destination easily. Urban parks and accessibility relate positively when parks are accessible through walking especially when related to user's homes. Therefore, accessibility to urban parks through vehicles is not even considered in assessing urban park's accessibility (Krenichyn, 2006).

In addition, proximity is another vital factor to be considered, achieving sustainable urban form through considering proximity to urban parks in early stages of neighborhood's design. Moreover, considering proximity tremendously reduces urban sprawl through providing adequate access to services, furthermore, tackling the economic aspect through adding more value to existing properties, reduction of infrastructure services and reducing vehicles usage (Brown, 2008). Accessibility measurement often relates to proximity regardless other related factors including entry method whether by fees or not, and access

method whether through gates or paths (WHO, 2017). Various approaches are existed when addressing urban parks planning. England for instance, relates to urban parks through accessibility, every individual should be able to access within a 5-minutes walking radius. However, the European indicator for urban parks recommends accessibility within a 15-minutes walking. Meanwhile, USA defines urban parks through provided area per resident, 500 m walkable radius and paths existence (Pickard et al., 2015).

Moreover, diversity indicator is considered a crucial factor through considering in particular social diversity through the urban park's locations. Although addressing urban park's locations is essential, quality of life is not measured by diversity. Furthermore, diversity is measured through the activities rates including place's aesthetic. Urban parks accommodate multiple and various activities ranging from physical, social and seasonal events, therefore, providing various choices in order to enhance users experience (Harun and Mansor, 2013).

Global literature has tackled the accessibility aspect of urban green spaces the most in order to asses and measure quality of life within urban areas. Meanwhile, Barrera (2016) define the urban parks area per capita as the basic measurement tool in defining city's quality of life (Barrera, Reyes and Banzhaf, 2016). Despite the abundance of literature addressing urban park's accessibility, design and planning, developing countries including Saudi Arabia that is witnessing a rapid growth rate have not yet shed light on the addressed matter.

2.2. Saudi Arabian Context

2.2.1. Saudi Arabian Policies, Context and Characteristics

Vision 2030 was launched mainly to diversify income and economic sources. However, multiple aspects were addressed through the Kingdom's ambitious plan, improving the urban green context of Saudi cities through diverse projects and initiatives. The quality of life was one of the projects launched through Vision 2030 aiming to enhance resident's lives, creating a sustainable environment and accommodating multiple and diverse cultural, recreational and sporting events (Addas, 2018).

The Ministry of Municipal and Rural Affairs (MOMRA) launched in 1975 for the various related infrastructural development in Saudi Arabia is the responsible entity of public open spaces in the Kingdom including urban parks and urban green paces in general. MOMRA through controlling the municipalities of the Kingdom supervises, directs and advises the development. Through setting guidelines and regulations, MOMRA provide the support for urban development. The regulation, standards and guidelines of MOMRA are derived from international, yet, they address the Saudi context in particular due to the differences in culture, religion and tradition of Saudi Arabia (Addas, 2018).

MOMRA guidelines emphasize the need of urban green spaces especially in residential areas including green walkways, urban parks and developing the existing potentials. For instance, MOMRA promote providing a playground of a minimum 400 m² for every 20 combined neighborhoods. Moreover, 5 m² of urban green spaces should be provided in reference to neighborhoods scale with a minimum of 5000 m². However, MOMRA does not yet have a comprehensive strategy which is noticed through the neglect of the quality dimension when addressing the mentioned guidelines and regulations (Addas, 2020).

Thus, Vision 2030 is clear. Vision 2030 addresses the importance of enhancing the quality of life through its National Transformation Program (NTP), acting as the key indicator, NTP program emphasizes enhancing the existing green infrastructure, providing sufficient urban green spaces and increasing resident's accessibility to urban green spaces. The NTP program launched multiple supporting programs including Quality of Life program (Addas, 2020).

A. Population

Saudi Arabia located in the Middle East is considered the third largest Arab country related to land's area. Saudi Arabia is witnessing a rapid growth especially nowadays through its Vision 2030 agenda. Due to vision 2030's rapid economic growth, 40% of the 35,112,587 Saudi population are non-Saudi seeking for job opportunities in its rapidly growing context. Meanwhile, it is worth mentioning that the urban population in Saudi Arabia reached to

84.1% in 2019, while 48.8% in the year 1970 mainly because the oil discovery which led the Saudi economy to tremendously grow (General Authority of Statistics, 2022)

B. Urbanization and social activities

Due to the huge economic growth related to oil's discovery, urbanization rates had extremely risen resulting in huge urban growth, therefore, noticeable changes in the Saudi centered in villages lifestyle was obviously missing in the urban growth due to the community's fragmentations and the separation of families. The rapid urbanization affected the Saudi context through social and planning aspects, the rapid growth did not associate with efficient regulations and planning strategies. Major resulted issues were found especially in Saudi megacities including Jeddah, Riyadh and Dammam. Therefore, the context could not improve without fixing the resulted due to urbanization consequences (Mandeli, 2011).

The planning approaches and strategies in the past four decades related to reshaping the society's structure through providing its needs resulted in a noticed deviation from the traditional urban context's environment. It is assumed that the social transition could not be met without gradually changing the urban environment through providing and creating a context that address the ranging modern activities (Mandeli, 2011). As a Muslim and Eastern community, urban parks are crucial in order to provide and address their needs. As places that accommodates social activities, gatherings and events which is one of the Islamic and Eastern social attitudes, derived mainly form religious, traditional and cultural factors. However, urban parks are presently facing serious developmental challenges due to the inadequate planned cities, resulted from the rapid urbanization. Therefore, low visiting rates are noticed despite the cultural and religious factors that highly encourages their usage, resulting in switching to the indoor private environment (Alfahad, 2008).

2.2.2. Urban Green Spaces in Dammam City, Saudi Arabia

Dammam city contains a total of 367 green spaces located in its urban boundary with a total area of 5,526,933 m², these urban green spaces vary from parks to gardens as shown in Figure 2. The urban green spaces per capita in Dammam city is 5.4 m² that is close to

meet WHO's standard. However, 40% is yet needed to be added in order to meet WHO's standard that recommend to provide a 9 m² as minimum for each person. In addition, it is important to mention that Dammam's urban green spaces per capita is the highest among the Saudi megacities including Riyadh and Jeddah, however, it is assumed to be highest due to the population of Dammam in comparison to Riyadh and Jeddah (Addas and Maghrabi, 2020).



Figure 2 GIS Of Urban Green Spaces in Dammam, Saudi Arabia

Source: (Addas and Maghrabi, 2020)

2.3. COVID-19 Pandemic

2.3.1. COVID-19 Emergence and Spread

Pandemics through human history have showed a pattern of reaching a peak point then gradually vanishing over time with few exceptions. However, COVID-19 could not be compared with previous pandemics as earth's population have been at least doubled over the last 5 decades, people's mobility options and ability resulting in increased international and regional communication and the dense urban areas which most world's population lives in making them the most vulnerable to diseases spread (Wang and Dong, 2020). Furthermore, an early peak levels of disease contamination spread would be noticed in most of the urban environments, especially denser contexts resulting in early failure in the infrastructure. Therefore, smart infrastructures are required in the future in order to detect, analyze and report any disease related symptoms resulting in early containing the spread of any virus, thus, controlling future pandemics (AlRashed, 2020).

In December 2019, the coronavirus disease caused by SARS-CoV-2 virus firstly emerged from the Chinese province of Wuhan. The World Health Organization (WHO) issued an international high level of emergency on March 11, 2020, because of the virus's extremely rapid spread rates (WHO, 2020). However, the virus's global rapid spread has resulted in a large number of deaths, a number that has gradually increasing since the virus's emergence. Global quarantine policies have been announced in most places as a consequence of the growing concern of COVID-19 rapid spread resulting in tremendous of casualties, and death cases. Therefore, resulted in numerous restrictions on people's main activities, including mostly social interaction among each other (Wu and McGoogan, 2020). Various social restrictions have been implemented in order to mitigate the virus's rapid spread rate, common restrictions were implemented globally including switching to online learning for schools, universities and colleges, social distancing and lockdowns procedures which minimized people's mobility ability to the lowest rate possible. Therefore, extreme restriction measures during the pandemic were taken by the authorities that included preventing social interactions which resulted in noticeable levels of physical and primarily

mental issues. Public areas, particularly urban green spaces, were completely closed down by the authorities, resulting in the majority of the physical, social, and health consequences that had a significant impact on the people's well-being (Mofijr and Fattah, 2021).

Multiple and various factors influence and determines the virus's spread along with its rate, urban density, society's life style and customs, and activities linked with the society's general background, religion, and culture have a role in determining the development of COVID-19 spread rate. COVID-19 had a higher spread ratio in Saudi Arabia's context that accommodates 38.8 million population with 84% urban population when compared to other countries such as Japan, which has a 92% urban population of its 126.6 million population and Iran, which has 83.9 million population with a 76% urban population. Despite Saudi Arabia's low population density when compared to other countries such as Japan and Iran, Saudi Arabia had the highest COVID-19 spread ratio when compared with Japan and Iran despite the major differences in population and density (Min-Allah and Saxena, 2020).

2.3.2. Saudi Arabia's Measures During COVID-19 Pandemic

Multiple restrictions were made in all countries all around the world in order to contain COVID – 19's extremely rapid spread in order to mitigate the amounts of infections and casualties, worldwide flights restrictions, working from home, switching to online education, social distancing, limited mobility and implementing comprehensive lock downs measures that resulted in shutting down city's commercial infrastructure, work places and urban green public spaces were all worldwide implemented measures to curb the spread of COVID-19 (Min-Allah and Saxena, 2020).

On the 2nd of March 2020, Saudi Arabia had confirmed its first COVID-19 infection case, by the 5th of April 2020 the virus had infected 2,400 individuals, taking in notice the spread ratio when compared to the mentioned above countries of Japan and Iran. The virus's spread in Japan was much slower, reaching the number of 2400 infections during 71 days. However, in Iran the same number of infections were documented in 14 days. Thus, COVID-19 was extremely spread in the Saudi context (Min-Allah and Saxena, 2020).

Therefore, several measures were imposed in the Saudi context including restrictions on accessing Mecca, the most visited destination by Muslims all around the world. Umrah rituals were strictly restricted, along with, Al-Hajj which only was accessible to residents within Saudi Arabia, however, the allowed number of Hajj performers were tremendously decreased in order to contain the virus's spread. Moreover, commercial infrastructure including shopping malls, restaurants and parks were shut down in order to guaranty social distancing, hypermarkets, supermarkets and pharmacies were not included in the shutdown measures. Public gatherings were as well restricted on the 14th of March 2020 including daily gatherings in mosques for the daily prayers, along with, Friday prayers which got prevented to perform. Attendance to workplaces were prevented in the early phases of the pandemic, however, in later stages of the pandemic regarding working place's attendance, the government emphasized only reducing the number of employees. Furthermore, flights from and for China were prevented on the 25th of January, following with totally restricting flights to Saudi Arabia from particular countries with high COVID-19 infection rates. The flights restrictions continued all over the pandemic period restricting specially flights to Saudi Arabia which established a comity to evaluate the risks in allowing particular countries residents to enter Saudi Arabia, meanwhile, allowing outside Saudi nationality holder to enter Saudi Arabia with a condition of a 2 weeks quarantine. The flights restrictions were implemented until the 15th of August 2021. Meanwhile, cautiously getting back to normal life were decided by the Saudi government on the 21st of June 2020 while encouraging and emphasizing the use of the digital apps imposed during the earliest phases of the pandemic in order to maintain and contain the virus's spread. However, COVID-19 pandemic had resulted in many infection cases and death cases, during 2020 the infection cases averaged from 4000 – 5000 daily cases, peaking in July 2020. The total documented COVID-19 infection cases (until April 13, 2022) have reached 752,078, along with, 14,330 death cases. The absence of effective vaccinations was the most vital component in the mentioned infections and death cases (Addas and Maghrabi, 2020).

Saudi Arabia during COVID-19 pandemic has been extremely proactive in containing the virus's rapid spread, the measures implemented in a short notice were extremely effective and met the various demands and needs of people. In the era of internet, smart phones and technological advancement more than 89% of the Kingdom's population uses the internet

through their smartphones, therefore, Saudi Arabia have launched a digital services provision which tremendously aided the virus's spread. Furthermore, as shown in Figure 2, the digital services were mainly digital-mobile apps that performed multiple functions including digital services, surveillance, contacting and following up. Thus, Saudi Arabia through its digital services that mitigated the virus's spread met people's needs, contained the virus spread and established an extremely efficient provision that would be useful in further pandemics to occur (Hassounah, 2020).

However, at the present (April 13, 2022), the number of confirmed COVID-19 cases have dropped to its lowest, with a record of an average COVID – 19 cases of 150 per day. The vaccination process was the most driving factor resulting in this drop, along with, maintaining the amount of the low reported cases. Saudi Arabia was one of the first countries encouraging the vaccination process, the vaccination process included first dose, second dose and a booster dose. In addition, the vaccination rates in Saudi Arabia were rapid, vaccinating 26 million with the first dose, 24 million with the second dose and 12 million with the booster dose. The Saudi government prioritized firstly the elderly whom their ages range from 60 years and above and the medical staff, students and governmental staff then. The vaccination covered all human beings from different nationality (*Covid19.Moh. Gov.Sa*, 2022).

2.3.3 Health and “New normal” in Post-Pandemic Urban Environments

COVID-19 had various impacts on cities and societies all around the world. Due to COVID-19 high spread, infection cases and death cases, health aspect and other related aspects impacts formed crucial and essential factors to be considered in cities future development. COVID-19 world-wide restriction measures had set key factors that will contribute to the future education, research and practice of architectural and urban design sciences. These factors will be considered as base factors for the developmental contribution of the architectural, urban design and urban planning disciplines due to COVID-19 high impact on every urban level ranging from individual's homes, work places, commercial infrastructure and urban public spaces including urban green spaces (Salama, 2020).

Forsyth (2020) stated that “the current pandemic brings the question of designing for infectious diseases back to the forefront and raises important questions for future research and practice.” Therefore, developing, designing and providing healthy urban environments is crucial to be considered through architectural and urban design disciplines. However, health consideration in urban environments is not absent and clearly noticed through architecture, urban design and urban planning education and profession. Therefore, it is essential to highlight the impact of COVID-19 pandemic in shedding more light on health aspect within the urban environments. Forsyth (2020) stated as well that “For the past decades, those looking at the intersections of planning, design, and public health have focused less on infectious diseases and more on chronic disease, hazards and disasters, and the vulnerable.” Therefore, the necessity of providing pandemic resilient urban environments is essential to be considered in future developmental efforts. Thus, since health is a central factor in both architectural and urban design discipline, increased synergy between both the disciplines is required in order to deliver healthier environments which is more demanded by people after COVID-19 pandemic (Rice, 2019).

COVID-19 pandemic due to its measures including social distancing, lockdowns and precautionary measure such as wearing masks, imposed a condition referred to “New normal”, particularly derived from isolation, people detachment, working from home, online education and the increased engagement in virtual worlds due to the occurred international lockdown. However, the perception of the importance of new normal activities that is related to health due to the virus’s health threats resulted in modifying the actual or existing normal to be the new normal. Thus, new normal conditions and activities emerged during COVID-19 pandemic became the actual normal of nowadays (Salama, 2020). Therefore, people’s needs and standards had raised which is reflected to the urban environments as people will demand and value health considering urban environments more and reevaluating their existing environments mainly if not providing the necessary functions that accommodates people’s new normal activities.

Castells (2000) foretold the new normal to become the actual normal through his book “The Rise of the Network Society: Economy, Society, and Culture” through a theory of the society related to the huge impacts of the technological advancement in contemporary world, stating that “the global city is not necessarily a place but a process seems to manifest in the future stable conditions”. Therefore, concluding that actual normal reflects societies and cities prospects.

2.4. Urban Green Spaces with Reference to COVID-19 Pandemic

2.4.1. Urban Green Spaces During the Pandemic

The COVID-19 pandemic during its early phase have limited people’s regular daily activities to its lowest through the social distancing measurements imposed by governments all over the world including Saudi Arabia’s government that had set multiple restricting measures in order to mitigate COVID-19 high rate of death and infections cases. The total city’s infrastructure shut down measure including flights, open spaces, commercial places and urban green spaces imposed world-wide had affected people’s daily activities including public events, work, social gatherings and people’s ability to move around freely. Therefore, most of the urban green spaces were shut down in order to limit COVID-19 spread (Yip and Chau, 2020). Meanwhile, during the restrictions implemented for COVID-19, all urban green spaces were not accessible as they were shut down due to the social distancing restrictions in Saudi Arabia. Thus, preventing people from meeting their physical and mental needs especially those activities that normally included accessing urban green spaces such as social gatherings, stress relief, physical activities and events (Yip and Chau, 2020).

The restrictions on people’s accessibility to urban green spaces during COVID-19 pandemic has highlighted the needs of people’s more than before. The need for outdoor activities including the most performing physical exercises, relaxing and connecting with nature was emphasized in multiple studies as the main need people could not meet during the pandemic (Geng et al., 2020). Therefore, addressing the reduction in outdoor physical activities during pandemic’s lockdown in multiple studies, highlighting in particular community’s sections whom are vulnerable to health issues such as the elderly section of

the community that need to maintain a routinely level of physical activity in order to stay healthy, avoid health issues and boosting their immune system (Rogers et al., 2020,). Moreover, addressing urban green space's effective role in psychological burdens reduction such as low mental health, stress and post-traumatic symptoms which individuals affected with the mentioned issues were not able deal with as they did normally before the pandemic, other studies however, addressed that the absence of urban green spaces during the pandemic's lock down have resulted in the mentioned issues, shedding more light on the importance of urban green spaces (Geng et al., 2020). In addition, urban green spaces provide multiple and various social benefits such as providing a place for social events, accommodating social gatherings and activities (Geng et al., 2020). Saudi Arabians as a Middle-eastern and Muslim community relates to the mentioned social activities, therefore, valuing urban green spaces as places that provides and accommodates the essential activities related to their cultural, traditional and religious background. Thus, Saudis were highly affected through the pandemic's restrictions and measures that resulted in shutting down urban green spaces due to its importance in accommodating multiple normal, weekly and annual activities used to be performed and accommodated in

In addition, despite the total shutdown of urban green spaces in order to contain COVID-19 rapid spread during the earliest phase of the pandemic such as national parks in USA and the Corniche in Dammam that hosts and accommodates thousands of people whom might daily use and visit for all sort of reasons and needs. However, the following phases of restriction measures limited people's mobility through allowing moving in certain hours of the day and on foot, resulting in opening closed urban green spaces but limiting its access only to people living within a walking radius to urban green spaces. Moreover, the shutdown of public transport in order to implement social distancing as well caused in preventing people to meet their related to urban green spaces needs (Asgaard et al., 2021). According to a study conducted to measure urban green spaces during COVID-19 pandemic, (Geng et al (2020) stated that "the restrictions on public transport is the second most significant factor, behind the factor of "stay at home" restrictions", addressing restrictions on public transport as an essential factor resulting in decreasing urban green space's visiting rates.

Geary et al., (2021) stated that the demand, importance and value of urban green spaces has significantly increased during COVID-19 pandemic. Despite the virus's noticed high spread ratio in the outdoor environment when compared to the indoor environment, during the pandemic's first phase the necessity of urban green spaces has risen to its maximum through relating to its importance in maintaining and enhancing physical, mental health and its ability to provide and accommodate people's other needs that are related to urban green space's social, physical and mental benefits. Therefore, multiple countries such as USA have opened particular urban parks during restrictions with pandemic precaution policies and rules such as wearing masks and keeping social distancing. Overcrowd scenes were noticed and documented by the media and multiple studies addressing COVID – 19's pandemic and urban green spaces usage rates (Geary et al., 2021). The global number of urban green spaces visitors according to Google COVID-19 Community Mobility Reports (2020) started increasing in April 2020. Particular urban green spaces are more preferable to people than other due to multiple reasons including its linkage to public transport, location, sense of place, landscape and functions. However, the overcrowd in the particular opened urban green spaces documented in many cities worldwide have shed the light on the lack of urban green spaces in certain urban environments resulting in people increased awareness related to the importance of urban green spaces (Reynolds and Forgione, 2020).

COVID-19 pandemic made people more aware to aspects related to urban green space's abundance and accessibility especially those accessible through walking or cycling resulting in noticing the surrounding amenities along with its proximity throughout people's evaluation of their urban environments. Therefore, light was shed on inaccessible urban green spaces during pandemic's lockdown, noticed mostly through the urge and crowdedness in the opened urban green spaces despite the fear of infection, high infections and death rates and the lack of vaccinations. Therefore, concluding the importance of easily accessible urban green spaces in normal circumstances, however, emphasizing its importance as an important necessity in pandemics and other challenging times. As a result, planners, designers and policy makers should rethink urban green space's importance, abundance and accessibility. Saudi Arabia through its Vision 2030 have launched programs that addresses the quality of life in the Saudi context through prioritizing urban green spaces considering its existing, accessibility and quality.

2.4.2. Post-Pandemic Urbanism

The notion of cities reshaping due to diseases related pandemics and other pandemics is well acknowledged through numerous studies, highlighting planners and urban designer's developmental solutions that addressed pandemics including COVID-19 pandemic and other pandemics. Multiple disease related had occurred including the cholera in the 19th century in UK London, the Spanish flue in New York in 1918, 2003 the SARS which occurred in Mexico City and the most recently Ebola in West Africa in 2014. However, COVID-19 pandemic is often referred to be an unprecedented pandemic that affected urban environments, global cities and the international population. However, COVID-19 differs from the mentioned above disease in its extremely high spread and contagious rates which made it globally, regionally and locally challenging (Salama, 2020).

Urban development and highly contagious diseases have a direct relationship, COVID19 pandemic would significantly impact urbanism understandings (Salama, 2020). According to Hang (2020), the rapid COVID-19 spread occurred to dense cities through generating adequate settings for its spread, therefore, through comparing SARS-CoV occurred in 2003 and SARS-CoV-2 occurred in 2020. In a period of Eight months in China, more than 300 individuals died and more than 5000 individuals were infected during SARS-CoV. Meanwhile, more than 4000 individuals were infected by SARS-CoV-2 in a period of Seven weeks during 2019/2020 in China. This comparison however, relates to the extremely dense context of China.

Badger (2020) however, have an opposite view addressing high density as not a public health issue. Relating to the dense contexts of Singapore and Hong Kong through comparing them to the less dense context of New Your city, highlighting how Singapore and Hong Kong denser contexts were able to rapidly develop pandemic related solutions and strategies such as earlier COVID-19 cases tests and comprehensively tracing COVID-19 cases which decreased the spread rate more efficiently than extensive isolation. Badger (2020) relates to the contribution of dense contexts to cities richness, public health and the overall quality of life. Therefore, taking into account the various strategies and aspects that results and contributes to city's quality of life, therefore, including aspects that in parallel

mitigates COVID-19 pandemic along with other pandemics such as enhancing and creating public transport provisions, providing sufficient and walkable accessible urban green spaces, prioritizing pedestrianization through providing adequate walkable urban environments and supporting the public safety and health. In addition, Shenker (2020) states that compact, dense and sustainable cities will adopt in the future several architectural and urban solutions that would efficiently results in enabling people to live and socialize in dense contexts without the feeling of living in an extremely crowded and packed urban environment.

The relationship between urban development and re-emerging infectious diseases is tight. Transportation methods, urban sprawl and the connection between urban and natural environments contributes in diseases spread from cities borders to the urban centers. Therefore, the relationship of urban developments and diseases spread requires more detailed and in-depth investigations through clear understanding of the diseases spread patterns within urban environments, in particular dense urban contexts due to the sustainable approach of planning denser contexts (Keil et al., 2020).

COVID-19 had various impacts on cities and societies all around the world. Due to COVID-19 high spread, infection cases and death cases, health aspect and other related aspects impacts formed crucial and essential factors to be considered in cities future development.

2.4.3. Post-Pandemic Urban Green Spaces

Urban green space's importance and value had significantly increased since COVID-19 pandemic including planned such as parks and gardens and natural such as forests. People in particular those residing in urban environments flocked to urban green spaces instantly since the restriction measures were waved. Despite the lack of vaccination in the early phases of COVID-19 pandemic, people rushed to urban green spaces due to the mental, health and well-being benefits urban green spaces provide despite the fear of catching the extremely contagious virus (Day, 2020).

Therefore, planners, urban designers and policy makers have reconsidered the importance of urban green spaces, considering the health aspect in their post-pandemic decisions through providing urban green spaces that consider social distancing as crucial to the existing COVID-19 situation, further pandemics and new normal imposed by the pandemic. Moreover, wider pedestrian paths that includes running and cycling paths are as well considered in post-pandemic urban green spaces, in order to provide an infrastructure which accommodates physical activities through encouraging health in dense urban environments. Due to post-pandemic increased health importance, active transportation is reconsidered by designers including reaching work on foot and on cycles, meanwhile, linking active transportation strategies to urban green spaces through providing walkable accessible urban green spaces and green walkable ways across cities, connecting residents to urban centers acting as greenways through proper and sufficient landscape (Pucher and Buehler, 2010). Multiple cities around the world provides sufficient urban green spaces to resident's, however, these cities noticed an extreme overcrowd during COVID-19 pandemic despite the abundance of urban green spaces in their context. Therefore, these cities highlight the tremendous increase in urban green space's importance. For instance, the generous city of Oslo, Norway, provides 60 m² of urban green spaces per inhabitant which is more than sufficient according to WHO, however, the city witnessed an intensive crowd in urban green spaces and a noticed increasement in the visiting rates post COVID-19 pandemic. Furthermore, along with the city of Oslo, multiple European countries including Austria, France and Germany have as well sufficient green spaces in their urban context, Europe provide twice the amount of urban green spaces recommended by WHO that is 18 m² per urban resident. Yet, these cities as the city of Oslo observed overcrowd of urban green spaces visitors during the pandemic and an increasement of visiting rates post the pandemic (Badger, 2020).

Furthermore, due to the importance of urban green spaces especially in challenging times as COVID-19 pandemic, some cities as the city of Oakland reused parts of its urban environment in order to accommodate activities provided by urban green spaces. The city of Oakland shut down streets through preventing vehicles in certain hours of the day in order to provide a place where people could perform physical activities. Moreover, Oakland city during the pandemic repurposed certain urban green spaces into recreational

purpose places (Swan, 2020). Therefore, Oakland city nowadays promoted active transport post the pandemic through promoting implementation of traffic slow strategies and enhancing the existing pedestrian routes including upgrading lighting fixtures, hardscapes and adding adequate landscape. In addition, to improving the accessibility to urban green spaces and prioritizing them in each health relating aspect in the city's policies (Hegarty, 2020).

Therefore, urban public green spaces importance had increased post the pandemic to residents, urban designers and policy makers. Thus, increasing the amount of urban green spaces along with their accessibility is prioritized the most nowadays in many cities. Saudi Vision 2030 however, prioritize urban green spaces with emphasize to provide sufficient amount for each resident, despite the lack in addressing quality and accessibility aspects in Vision 2030's related program to urban green spaces.

Thus, from the previous literature, it is clear that COVID-19 pandemic had significantly affected people's mental and physical health during the pandemic's challenging time due to the imposed restriction measures. However, limited studies were conducted in order to assess the impact of COVID-19 pandemic on people's health and well-being related to the perception and use of urban green spaces in the context of Saudi Arabia.

Therefore, considering the mentioned research gap, this study aims to assess the impacts of COVID-19 pandemic through measuring and evaluating people post-pandemic's perception of the importance and use preferences of public urban green spaces in Dammam, Saudi Arabia. In this study, an urban observation and analysis of the selected urban public green spaces will be performed. Along with, a questionnaire survey which is developed in order to measure people's post-pandemic value and importance of public urban green spaces. The main aim of the questionnaire is to compare people's post and pre-pandemic use rate, frequency of visits, reasons of visits and their associated activities. In addition, the questionnaire survey aims to measure the user's level of satisfaction with the selected urban public parks in this study in order to conclude urban recommendations for the post-pandemic era.

Chapter 3

Research Methodology

3.1. Chapter Overview

This chapter is devoted to provide a comprehensive description of the research methodology. The conceptual framework for measuring people's perception of the importance and use preferences of public urban green spaces in the post pandemic era. The methodological framework's development was based on the extensive review of the previous literature on the importance and benefits of urban green spaces, along with, the impacts of COVID – 19's pandemic in this context. The study's methodological framework is shown in Figure 3 which includes: 1.study area selection, 2.urban parks selection, 3.questionnaire survey and urban analysis, 4.analysis of the results, 5.conclusions, 6.urban related recommendations for the post pandemic era.

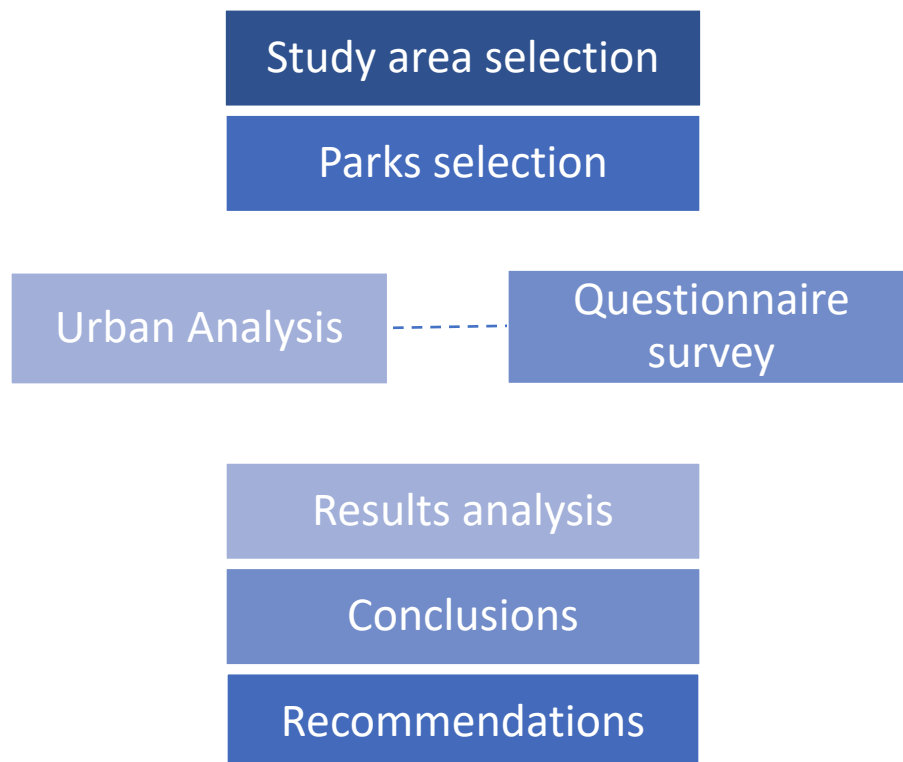
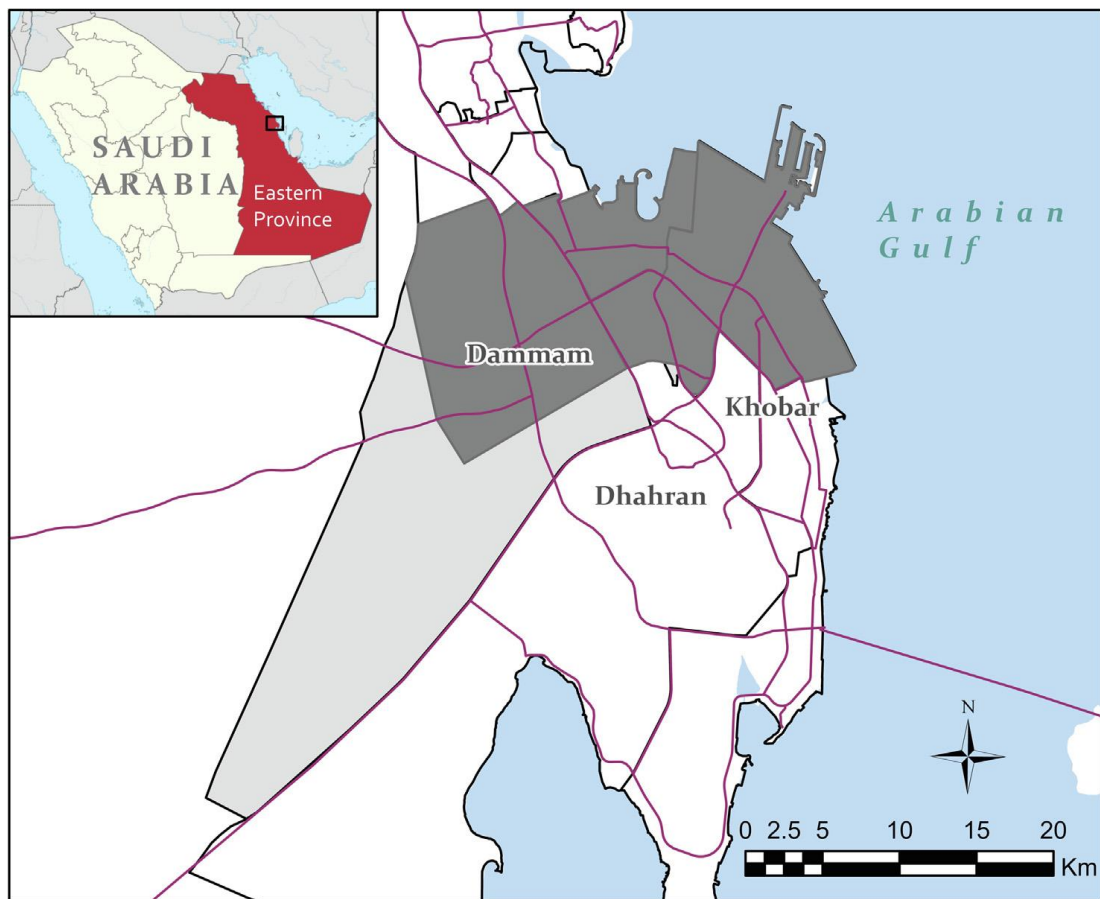


Figure 3 Methodological Framework's Flowchart for Measuring People's Perception of the Importance of Public Urban Green Spaces in The Post-Pandemic Era

3.2. Study Area

The city of Dammam is in the Eastern Province of Saudi Arabia, is located 360 km from away Riyadh the capital of Saud Arabia. The Eastern Province includes multiple cities, Dammam city is adjacent to Two major cities of Khobar and Dhahran as shown in Figure 4 (Aboukorin and Al-Shihri, 2015). Dammam is considered the capital of the Eastern Province and hosts the majority of the regional administrative institutions. According to 2022 census, Dammam city has a population of 1,305,000 with an increase of 2% from the year of 2021 (General Authority of Statistics, 2022).



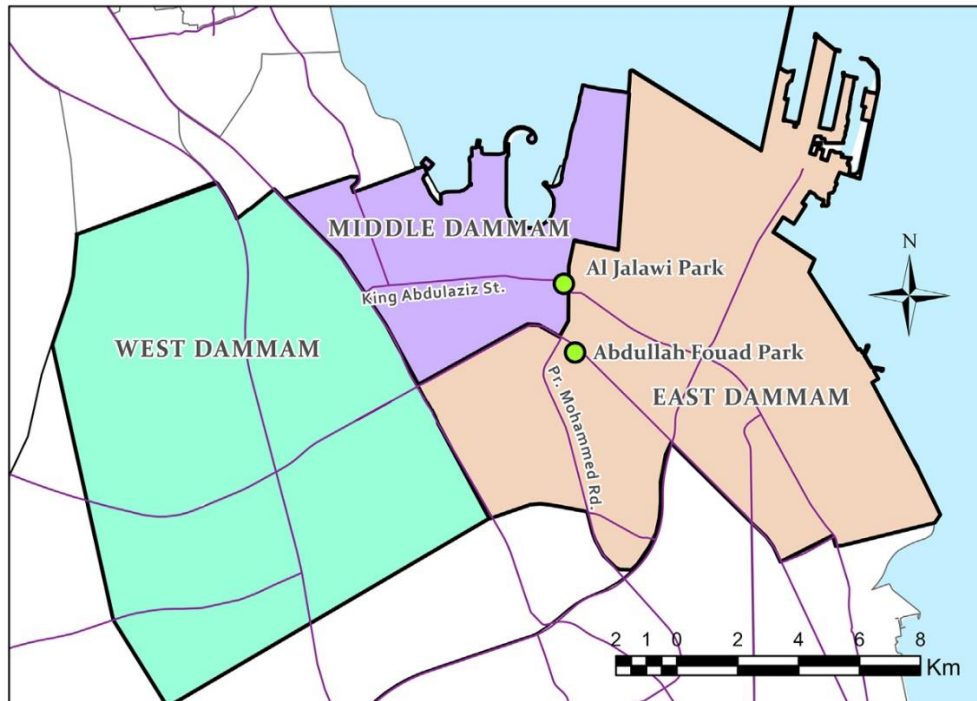
*Figure 4 Location of Dammam, Saudi Arabia City
Source (Maniruzzaman Et Al., 2020).*

3.3. Urban Public Parks Selection

Dammam city is divided into Three main geographical sectors: East sector, Middle sector, and the West sector. The sectors each have their own municipality, which operates under the supervision of a single superior municipal authority (Amanah) (Mohanna and Alqahtany, 2019). In this study, two major urban parks in Dammam city are selected, both of the urban parks are located in the East sector of Dammam and in the middle as shown in Figure 5.

The Abdullah Fouad park shown in Figure 6 is located in Eastern Dammam is reachable through the major arterial road of King Fahad, the park is considered a landmark in Dammam with an area of 186,000 m². In addition, the park is near to Dammam's Housing Complex residential project. Prince Abdullah Bin Jalawi park is considered the most important park in the middle of Dammam's city. The park is characterized with high number of visitors with an area of 18,880 m² and located on the cross of important arterial roads of King Abdelaziz Street and Prince Mohammed bin Fahd Road. Figure 7 shows a view of the urban park.

The mentioned above parks provide various benefits to the residents of Dammam and accommodates multiple physical, mental and social activities including physical exercises, walking, picnicking, social gatherings and a place to mentally relief. The selection of the mentioned urban public parks was based on their central location, ease of accessibility and because they are well known for Dammam's residents. Thus, this study aims to measure and examine the impact of COVID – 19's pandemic on individual's experiences during the pandemic due to restrictions on accessing the urban green spaces through measuring how they perceive and often visit urban green spaces in post-pandemic period.



*Figure 5 Locations of The Selected Urban Parks
Source (Maniruzzaman Et Al., 2020).*



Figure 6 Image of Abdullah Fouad's Urban Public Park



Figure 7 Image of Prince Abdullah Bin Jalawi Urban Public Park

3.4. Selected Park's Urban Analysis and Observation

As previously mentioned in the literature, Dammam city is rich with public urban green spaces within its context, ranking the highest in Saudi Arabia with a per capita of 5.4 m², which is close to meet the WHO's standard of 9 m². However, the value and importance of public urban green spaces had significantly increased due to COVID-19 pandemic, resulting in reconsidering its importance by planners, designers and policy makers. Thus, in order to highlight people's post-pandemic demand of urban public parks, this study aims to analyze the selected public urban green spaces through the following:

- Accessibility
- Attractiveness
- Social benefits
- Services
- Pedestrian circulation
- Urban furniture
- Safety
- Views
- Shading
- Quietness

3.5. Questionnaire Survey Structure

In this study, an on-site questionnaire will be used to measure people's perception of the importance of public urban green spaces, and their use preferences in this regard considering their pre- and post-pandemic experience. The on-site questionnaire survey was adopted in this study in order to make sure that the respondents were residents of Saudi Arabia since pre-pandemic periods and have a visit history in regard to the selected urban public parks. Meanwhile, a one-sample t-test was used to ascertain whether there was any significant difference between the means of one variable and the mid-value of the agreement five-point scale, that is, 3.0, while a two-sample t-test was also used to determine whether there was a significant difference between the means of two groups. The respondents will be selected randomly from different parts of the parks with neglect to gender, age and nationality. Moreover, the surveys will be performed during weekends and public holidays due to the high rate of visitors. Furthermore, the questionnaire will be developed in English but will get translated to Arabic in order for people to clearly understand it.

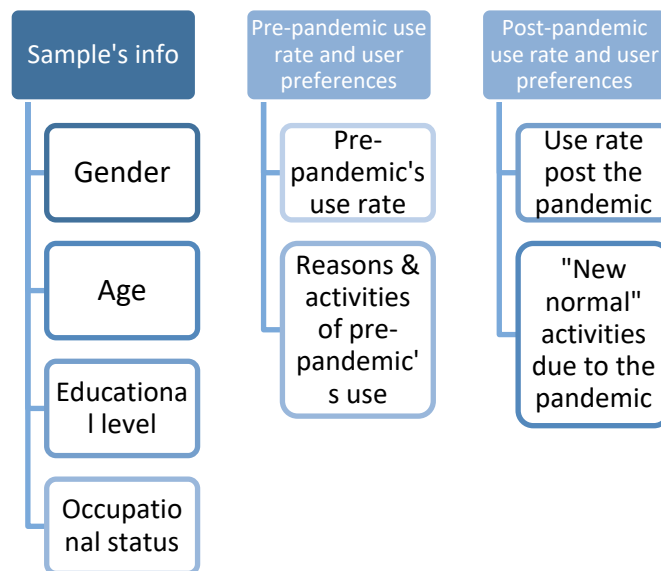


Figure 8 Dimensions Used in The Study

The questionnaire survey will include three sections. The first section will include general info about the sample such as gender, age, educational level, occupational status and visit

history. The second section will include pre- and post-pandemic importance, use rate and user's preferences. The third section will include user's level of satisfaction with the selected urban public parks design aspects.

3.6. Questionnaire Survey Design and Implementation

In order to assess people's post-pandemic perception and importance of public urban green spaces and use preferences the questionnaire survey in this study will include three major dimensions including: 1.pre-pandemic's use rate and user preferences, 2.post-pandemic use and user preferences, 3.user's level of satisfaction with the selected urban public parks

In this study, assess the design aspects of the selected urban public parks, five-point Likert scale indicating disagreement or agreement is adopted as follows: 1 = "strongly disagree" (SD), 2 = "disagree" (DA), 3 = "neutral", 4 = "agree" (A), and 5 = "strongly agree" are adopted.

Moreover, as shown in Table 1, the questionnaire survey in this study consists of 15 questions which were developed in order to measure people's post pandemic's value and importance of public urban green spaces, along with, user's level of satisfaction with the selected urban public parks. However, the first part of the questionnaire will include necessary demographic data including age, educational background and occupational status. The responses of the survey from both the selected urban parks will be expressed in percentages.

3.7. Sample Size Determination

As it is well known, in order to conduct a questionnaire survey, it is highly important to determine an appropriate sample size. Therefore, as shown below, this study has adopted the equation developed by Park and Jung (2009) which is specifically developed for Likert-scale data:

$$n = \frac{Z_{\alpha/2}^2 C^2}{KD^2 [1 + (K - 1)\rho]}$$

The n stands for the sample size, while the $Z_{x/2}^2$ is the percentage of the standard distribution, calculated through $100(1 - x/2)$ in order to get a percentage. The C stands for the coefficient of the population's variation, the Likert scale items selected in the questionnaire is expressed by K , D stands for the relative tolerable error, while the ρ expresses the pairwise correlation coefficient.

In this study, the $K = 10$ due to the Likert-scale based items shown in the questionnaire. The significance level expressed as x holds the value of 0.05. Meanwhile, C holds a value of 0.5 as Park and Jung (2009) suggests. The D is set at 10%, however, as suggested by Park and Jung (2009) the ρ should hold a value of between 0.2 and 0.5, therefore, this study assumed the value of 0.4.

Therefore, through the equation that included given and assumed values, the sample size in this study is set on a minimum of ≈ 52 questionnaire surveys for each urban public green space. However, due to the vast areas of the selected urban public green spaces, 100 on-site questionnaire surveys will be performed in each of the selected urban public green spaces. The questionnaire surveys will be distributed equally in both the selected urban public green spaces.

3.8. Pilot Testing and Face Validity

In this study, the questionnaire survey would be pilot tested through a paper questionnaire which will be distributed for the selected urban public parks users. In addition, various experts in engineering, architecture and environmental sciences will be included in the pilot testing of the questionnaire survey.

The pilot testing is intended for respondents to comment on and evaluate the questionnaire survey's instructions which may be hard to follow, the questions level of complexity and the difficulty level of answering. Moreover, the respondents will be asked to comment on the questionnaire's overall ease, comprehensiveness and format using a 1-5 scale which 1 represents the lowest and 5 represents the highest, along with, an open-ended question that will be added in order to add any comments in this regard. The time needed to complete the questionnaire which will be noted as well. Thus, 10 pilot surveys will be distributed in

this matter, which will include randomly selected users of the selected urban public parks and experts in the disciplines mentioned above.

3.9. Data Collection and Analysis

The data collected is intended to provide the sufficient amount of information through the minimum needed questions that will take a maximum of Five minutes in order to fill the questionnaire survey. The questions will tackle the following:

1. The pre-pandemic use rate and user preferences.
2. The post-pandemic use rate and user preferences.
3. The reasons and activities of respondent's post-pandemic use.
4. The "new normal" activities emerged due to the pandemic.
5. The pandemic's impact on people's health value of urban green spaces.

Therefore, this study aims to assess whether the COVID-19 pandemic had improved people's perception of the importance of public urban green spaces and whether it has altered people's use preferences of public urban green spaces. The data analysis in this study will include a five-point Likert scale in order to measure the agreement level of the frequencies and weighted means.

Therefore, as shown in Figure 9, the people's post-pandemic importance of urban green spaces will be determined through comparing people's post-pandemic use rate of public urban green spaces and people's pre-pandemic use rate of public urban green spaces, along with, people's pre and post pandemic's user preferences. In addition, highlighting people's "new normal" activities that had emerged due to the COVID-19 pandemic as well as, offering recommendations related to public urban green space's utilization in challenging time such as COVID-19 pandemic.

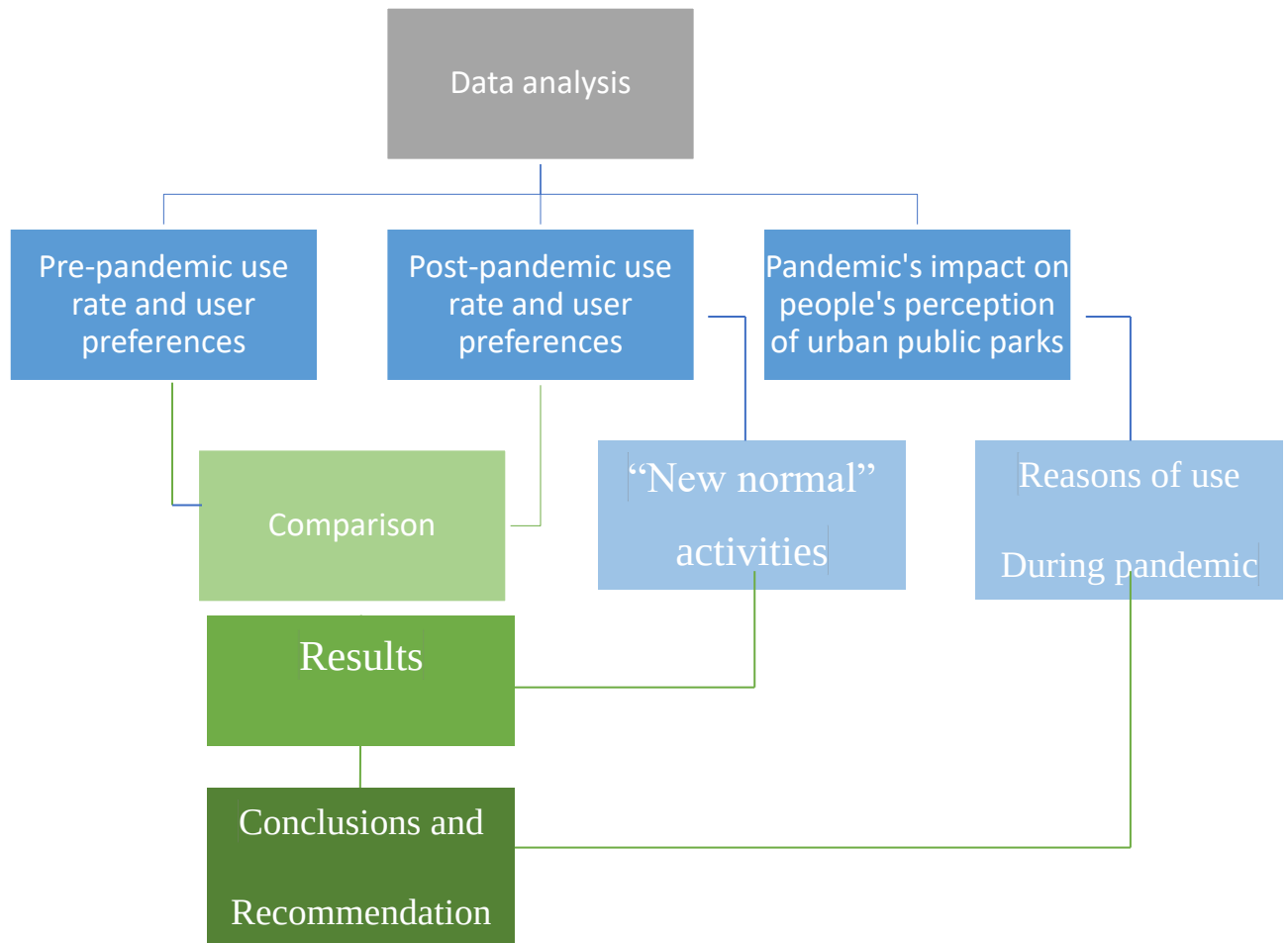


Figure 9 Data Analysis Flowchart

Thus, this study aims to measure people’s post-pandemic perception and importance of public urban green spaces and use preferences through comparing the pre-pandemic use and user preferences with post the pandemic use and user preferences. In addition, “new normal” activities emerged during the pandemic and the reasons of public urban green spaces use during the pandemic will be highlighted in this study in order to conclude urban planning related recommendations for the post-pandemic era. The urban parks of “Abdullah Fouad’s park” and “Prince Abdullah Bin Jalawi’s park” in Dammam, Saudi Arabia will be assessed in this study. An on-site questionnaire will be performed in order to determine the pre and post pandemic use of urban green and use preferences, along with, the reasons and activities of pre and post pandemic use.

Chapter 4

Results & Discussion

4.1. Urban Analysis and Observation

As previously mentioned, Dammam city is divided into three geographical sectors which are the East, West and Middle. Each sector operates and functions under the highest municipal authority of Dammam called “Amana”, however, each geographical sector has its municipality “Al Baladiyah”. Abdullah Fouad’s park located in the Eastern sector of Dammam is perceived as a landmark to Dammam’s residents due to its proximity to Dammam Housing Complex that is well known in the context. Moreover, the park’s area of 186,000 m² and its location on the major arterial road of King Fahd adds to its value for the residents.

In addition, the urban public park of Prince Abdullah Bin Jalawi is considered as the most significant one located in the heart of Dammam city. With an area of 18,880 m², the park is characterized by a significant number of visitors and is located at the intersection of King Abdelaziz Street and Prince Mohammed bin Fahd Road, two important arterial highways. Moreover, the selected urban public park serves numerous residents whose living in various typologies within the urban public park’s radius including residential complexes, single-family houses and apartments building. Along with, the vast and dense commercial strip due to the intersection of the mentioned above major arterial roads.

Thus, due to the increased post-pandemic importance of urban public green spaces this study will analyze the selected urban public parks. The analyzed aspects will be categorized in five group of items including: accessibility, convenience, aesthetics, quality and services and social benefits.

4.1.1. Accessibility

As shown in Figure 10, the urban park of Abdullah Fouad is easily accessible through two major arterial roads connected to multiple local roads that leads directly to the urban park.

However, the urban park lacks planned and adequate parking that should have been considered earlier especially for disabled individuals. Moreover, the lack of a drop off area and traffic calming strategies for pedestrians crossing are highly noticed.

In addition, as of the park's previous mentioned unique location in the center of a dense housing complex, the walkability radius of 500 m covers most of the residential units, along with, the governmental and commercial buildings that will be illustrated further in this study.

However, despite the huge area that is not covered in the 500 m radius, multiple surrounding urban public parks contribute in this matter, resulting in an accessible and rich of urban public parks environment. Yet, despite the abundance of other urban public parks in the context, Abdullah Fouad's public park is considered the most famous compared to its surrounding public parks, in addition, considered well known in Dammam city.

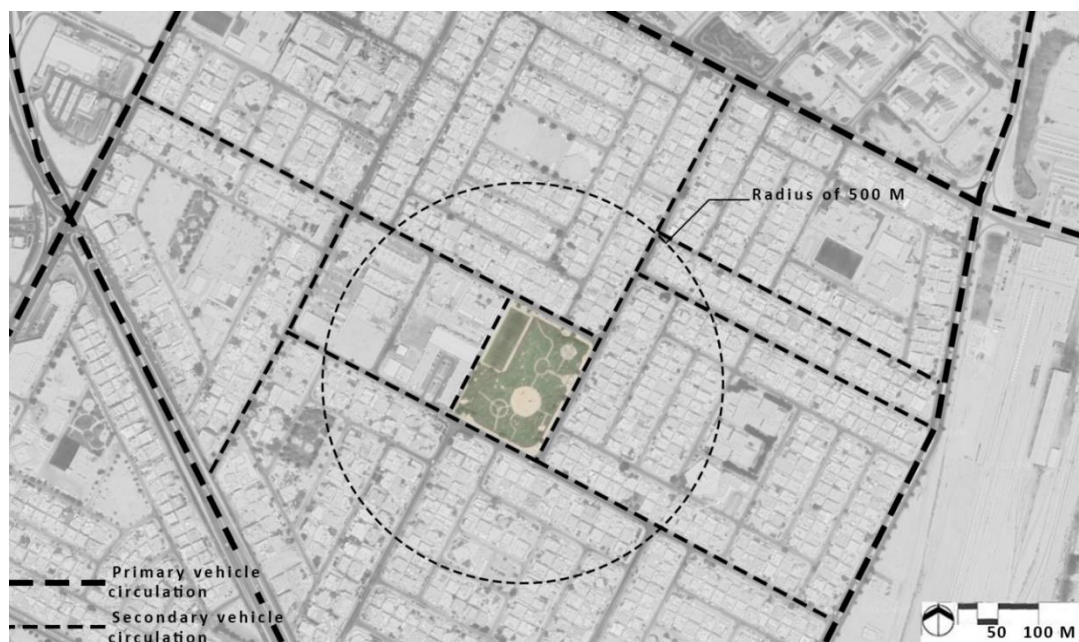


Figure 10 Abdullah Fouad's Urban Public Park Accessibility Analysis

As seen in Figure 11, there are limited minor roads that are connected to the two major arterial highways, nevertheless, the urban public park of Bin Jalawi is easily accessible through the arterial roads. However, the urban public park lacks planned and sufficient parking that should have been taken into account earlier, especially for people with

disabilities. In addition, the absence of a drop-off zone and traffic calming measures for pedestrian crossings is noticed.

Furthermore, due to the urban public park's location in the middle of a dense mixed-use area that includes commercial and residential components as earlier mentioned, the walkability radius of 500 m includes the majority of the residential units as well as the commercial components that will be presented further in this study.

The abundance of other urban public parks in the dense context made the selected urban public of Bin Jalawi highly recognized within the residents and the employees whose working near the park.

Moreover, the selected urban public is considered as a landmark for its unique design, location and accessibility and its users whom ranges between employees, residents and cross byers. It is noticed by the design team that certain users are found in different times including employees in their break times at noon times, residents after the hot sun of Dammam breaks down and families during the weekends. Ramps for handicaps are considered in Bin Jalawi's urban public park.



Figure 11 Prince Abdullah Bin Jalawi's Urban Public Park Accessibility Analysis

4.1.2. Convenience

To ensure a well functioned and adequate urban public park the convenience aspect is crucial to be considered in this matter including urban furniture, safety, quietness and shading which this study has highlighted in the analysis shown in Figure 12.

As shown in the bellow Figure, in order to ensure safety, Abdullah Fouad's urban park is surrounded with steel fence and entered through a gate, therefore, children movement could be monitored when playing all around the park, in addition, to preventing any possible cars run over through the fenced park. In addition, the gated entrance adds a sense of closure and security to the park through closing the gates after midnight to prevent any vandalism of public property. Moreover, the urban park is well lighted with its own lighting fixtures, the soccer pitch's and the municipality lighting fixtures on the park's sidewalks.

The urban furniture in Abdullah Fouad's park as shown in the bellow Figure shows adequate number of benches and lighting fixtures, however, the shaded area is limited only above the water fountain while neglecting the children playing area and the rest of the park. Furthermore, the noise generated from the surrounding streets and the soccer pitches were not addressed through the planning through not providing a green wall of vegetation to block them or by any other strategies.

With regard to Bin Jalawi's urban public park, as shown in the Figure below, the urban public park is gated and surrounded by a steel fence to provide safety. This allows for the monitoring of children's movements while they play around the park and the prevention of any traffic accidents. By locking the gates after midnight to stop any destruction of public property, the gated entrances also give the park a sense of closure and security. The urban park also has its own lighting fixtures, as well as, the municipal lighting fixtures on the sidewalks around the urban public park. As shown in Figure 13, Bin Jalawi's urban public park includes well distributed benches, lighting fixtures and sufficient artificial and natural shading. However, no shading was considered for the childrens playing area. Bin Jalawi's urban public park is not considered as quite due to the crowded at all times arterial roads surrounding the park which was not addressed in the design stage nor through the operation



Figure 12 Abdullah Fouad Urban Public Park Convenience Analysis



Figure 13 Prince Abdullah Bin Jalawi's Urban Public Park Convenience Analysis

4.1.3. Views and Aesthetics

As for the aesthetic aspect, the urban park contain two main features shown in Figure 14, the features includes a sheltered water fountain and memorial monument for Abdullah Foad which is the individual the park is didicated. The water fountain is functioned through out the year and maintained on regular phases, in addition, several benches surrounds the water fountain and it is the only sheltered area in the park.

Most of the park's views are un blocked especillay from the angles were non of the agins trees exists, however, most of the views are extremely poor resulting in lack of attraction as the West view to the park facing the soccer pitch and the East view which faces the gate, along with, the Southern view to the park which faces the toilets. However, the Northern view to the park faces the water fountain feature which may attracts inviduals to.



Figure 14 Abdullah Fouad Urban Public Park Views and Aesthetics Analysis

With regard to the views and aesthetics, two main features are included which are shown in Figure 15. Firstly, a to scale vernacular architecture mock-up of Dammam's city coastal architecture which the urban public park is considered a landmark for and the best view to

Bin Jalawi's urban public park as well. Secondly, an art work model of the first oil ships which the Eastern Province including Dammam city is rich with. The views to the park are poor and it was not even considered through the design and operation phases despite that the major renovation of the urban public park which was done by the municipality five years ago.



Figure 15 Prince Abdullah Bin Jalawi's Urban Public Park Views and Aesthetics Analysis

4.1.4. Quality and Services

Pedestrians entering to Abdullah Fouad's park enters from one entrance shown in Figure 16. Pedestrians however, circulates through primary routes that leads to the main functions as the children playing area, soccer pitches, toilets and the shaded area containing the water fountain.

Moreover, the parks contain the essential services which serves the community's diverse sections as the children playing area, toilets and two five-a-side soccer pitches which are

functioned till midnight during the whole week. Along with, a recently added running track of 665 m which women, youth and elderly use frequently.

The water fountain and the pitch's light stop operating on midnight, along with, the gate which is shut and reopened after morning prayers. The cleaning of the toilets and the park are done by the municipality's cleaners, as the refilling of the toilet's soap and tissues and the regular maintenance for the park's multiple components.



Figure 16 Abdullah Fouad Urban Public Park Quality and Services Analysis

The selected urban public park includes two main gated entrances shown in Figure 17, the entrances of the park considered ramps for handicaps. The primary wide routes of the pedestrians lead to the main services as children's playing area and the WCs.

The major services as the separated males and female WCs and children playing are included and are adequately functioned, operated and maintained. However, the urban public park lacks a running track, soccer pitches and outdoor exercises instruments that nowadays are available in most of Dammam's city urban public green spaces.

Bin Jalawi's urban public park closes after midnight, the personnel responsible for the public park lives within the park and has his private kitchenette, room and bathroom, the responsible personnel are assigned from Dammam's municipality and is responsible for the daily irrigation, security and operation. Daily cleaning is performed by a team assigned from the municipality between 4:00 to 6:00 AM, as well as, the routinely maintenance that is performed every three months.



Figure 17 Prince Abdullah Bin Jalawi's Urban Public Park Quality and Services Analysis

4.1.5. Social Benefits

Abdullah Fouad's urban public park is located within a dense residential neighborhood as previously mentioned in the study, however, Figure 18 shows the existing surrounding of the park in order to reflect its significance to the context, the city of Dammam and its residents. The park as shown in the bellow figure is located in the heart of dense single-family residents which most of them are 2-3 stories height. However, the park is adjacent to an important commercial mall that include a huge supermarket, restaurants, cafes and

other functions as banks and tailor shops. Along with, multiple governmental facilities that serves the Eastern sector of Dammam city as a police station, postal office, fire station and multiple charities that occasionally uses the urban park for events such as Ramadan's iftar and multiple gatherings that takes place in the selected park in this study.



Figure 18 Abdullah Fouad Urban Public Park Quality and Social Benefits Analysis

Thus, Abdullah Fouad's urban park selected in this study significantly contributes to Dammam city and to its surrounding context and residents which the park's location, area and functions plays a crucial role in achieving. Moreover, the urban park includes the main essential services such as toilets and children playing area and running track, along with, the two soccer pitches that are well lighted, managed and implemented. Therefore, due to the regular maintenance of the park's components it accomplished being known in its rich of urban public parks context. Furthermore, considering the park's easily accessible location by automobiles including private cars, public transport and by walking due to the 500 m radius wide that include vast residential areas.

Due to the mentioned unique location of Bin Jalawi's urban public park centered in the heart of Dammam's city, the urban public park of Bin Jalawi is socially beneficial and highly contributes to its context. As shown in Figure 19, Bin Jalawi park serves a range of various residential typologies including single-family houses, residential complexes and apartment buildings. Along with, the ranging commercial infrastructure that ranges from offices, restaurants, retail stores and galleries which most of them functions from early morning to after midnight and serves various sections of the community in all times of the day and week. Some employees were observed to use the public park for gatherings, breaks and relaxing. Moreover, multiple residents were observed to eat, picnic and socialize while in the urban public park while shopping, eating and visiting the mixed-use commercial infrastructure.



Figure 19 Prince Abdullah Bin Jalawi's Urban Public Park Quality and Social Benefits Analysis

4.2. Questionnaire Survey

As mentioned earlier in this study, the questionnaire survey mainly aims to measure people's post pandemic importance and perception of urban public green spaces through comparing their pre and post pandemic use rate, use preferences, frequency of visits, reasons of visits and the associated activities with their visits. The survey shown in table 1, consists of three parts including: 1.pre-pandemic importance, user rate, frequency of visits, reasons of visits and their associated activities 2.post-pandemic importance, user rate, frequency of visits, reasons of visits and their associated activities 3.user's level of satisfaction with regard to accessibility, urban furniture, attractiveness, safety, social benefits, views and services, along with, shading, pedestrian circulation and quietness.

In this study, 20 of the selected urban public green spaces of "Prince Abdullah Bin Jalawi" and "Abdullah Fouad" in the city of Dammam, Saudi Arabia visitors were on-site surveyed between the 27th of October and the 10th of November where the weather is relatively appropriate for people to perform outdoor activities in general due to the extremely humid weather of Dammam city. In addition, the survey was performed in weekdays and weekends during noon hours when the sun's heat breaks down which is the time people start to visit the park because of Dammam's hot and humid weather. The study team made sure that all of the surveyed individuals were users of the selected urban public green spaces since a while in order to ensure that the individuals were affected by Saudi Arabia's COVID-19 restriction measures, therefore, the survey that was mainly developed in English was translated into Arabic. The respondents were selected randomly with neglecting to nationality, gender and age.

In addition, respondents were not asked for their names and the study team made sure that all of the gathered data are collected anonymously and will be used for research purposes by explaining it for the respondents through the brief given when performing the survey and through mentioning it in bold letters in the distributed survey samples.

The data in this study were analyzed by using IBM SPSS Statistics software and MS Excel.

4.2.1. Sociodemographic Characteristics of the Respondents

In regard to Abdullah Fouad's urban public green space 100 visitors were surveyed as shown in Table 1, among those, 26 females and 74 males were surveyed. Most of the respondents were young, including 46 respondents between 15 – less than 30 years old, 44 respondents between 30 – less than 45 years old and only 10 respondents between 45 – less than 60 years old, meanwhile, none of the respondents were above 60 years old.

Furthermore, more than half of the respondents holds bachelor's degree with a total of 54 while 8 of the respondents holds masters and above and 38 of the respondents holds high school degrees. In regard of the respondent's employment rate, more than half of the respondents were employees with a total of 66 respondent, 34 of the respondents however were unemployed who mostly included the young youth who frequently uses the soccer pitches shown in Figure 13.

Moreover, with regard to the question "since when do you visit this urban public green space?", 76 of the respondent's visits Abdullah Fouad's urban public park from more than one year mostly including residents from the dense residential context as shown above in Figure 14. Meanwhile, only 6 of the respondents used to visit Abdullah Fouad's urban public park for one year and 18 of the respondents used to visit from less than one year arguing that they appreciated various and multiple characteristics of this particular urban public park resulting in visiting despite having more accessible alternatives.

The 100 respondents of "Prince Abdullah Bin Jalawi" urban public park shown in Table 1 however, included more male respondents than Abdullah Fouad's respondents with a total of 80 males against only 20 females. As well as the previous urban public park, most of the respondents were young, however, the respondents ages are distributed on all age categories which includes the majority of 15 – less than 30 years old category with a total of 40 respondents, 36 respondents from the age of 30 – less than 45, 18 respondents from the age of 45 – less than 60 and 6 elderly respondents of 60 and above years old. The elderly respondents stated that Prince Bin Jalawi urban public park's design considered ramps for handicaps and elderly which made it extremely appropriate for daily visits.

Furthermore, 70 of the respondents are employees and a huge proportion of them works near the park stating that their appreciation for public urban green spaces has increased post COVID-19 pandemic resulting in spending more time within before heading to their houses, meanwhile, only 30 of respondents were unemployed including mostly undergraduate youth.

Moreover, the survey showed that 66 of the respondents used to visit the urban public park of Bin Jalawi since more than one year. In addition, 18 of the respondents visit since less than one year and 20 of the respondents for one year.

However, most of the recent visitors stated that their visits and perception of urban public green spaces in general and the Bin Jalawi urban public park in particular are highly influenced of COVID-19 pandemic.

Table 1 Sample Characteristics in The Investigated Cases

Aspect	Category	Responses (%)	
		Case 1	Case 2
Gender	Male	74	80
	Female	26	20
Age	15 – less than 30	46	40
	30 – less than 45	44	36
	45 – less than 60	10	18
	60 and above	0	6
Educational level	High school	38	34
	Bachelors	54	56
	Masters and above	8	10
Occupational status	Employee	66	70
	Unemployed	34	30
Visit history	Less than one year	18	18
	One year	6	20
	More than one year	76	62

4.2.2. PART 1: Importance, Use Rate and User's Preferences

A. Urban Public Green Space's Importance Comparison Between Pre and Post COVID-19 Pandemic Periods

The questionnaire survey's respondents showed that most of the selected urban public parks visitors considered urban public green spaces highly important post and pre the pandemic. However, as shown in Figure 20, the 100 respondents of the questionnaire survey performed in Abdullah Fouad's urban public green spaces showed that urban public green space's importance had increased post the COVID-19, 78 of the respondents considered urban public green spaces highly important pre the pandemic, while, 20 considered it as normally important and 2 respondents considered it as not important at. Meanwhile, when comparing the pre-pandemic to the post-pandemic as Figure 20 shows, 90 of the 100 respondents considered urban public green spaces highly importance, while, only 10 considered them normally important.

In addition, multiple respondents argued that despite the fact that Abdullah Fouad's urban public green spaces is easily accessible by foot for them, the necessity, importance and value of accessing and the existence the urban public park emerged after COVID-19 pandemic despite living adjacent to the urban public park for years and occasionally accessing it. Meanwhile, some of the respondents that considered urban public green space's highly important pre and post the pandemic, stated that more time is spent in urban public green spaces post COVID-19 pandemic.

As of Prince Bin Jalawi urban public park, most of the respondents showed that urban public green spaces are highly important pre and post COVID-19 pandemic. However, as shown in Figure 20, a considerable amount of the respondents considered urban public green spaces normally important pre the pandemic, accounting for 28 of the 100 respondents, meanwhile, 72 of the respondents considered urban public green spaces highly important pre the pandemic which is considered high enough. However, the pre and post pandemic comparison showed in Figure 20, shows that urban public green spaces had significantly risen post the pandemic, 88 of the respondents consider it as highly important and only 12 respondents stated that it is normally important.

However, as in Abdullah Fouad's urban park, multiple respondents emphasized that their perception of urban public green space's importance had significantly increased in the post COVID-19 pandemic period. A handicapped respondent living adjacent to the urban public park stated that people visiting and using the park had noticeably increased, moreover, the post-pandemic importance and value of this particular urban public green space had significantly increased for the handicapped respondent arguing that it is blessing to live adjacent to an easily accessible urban public park especially post COVID-19 pandemic.

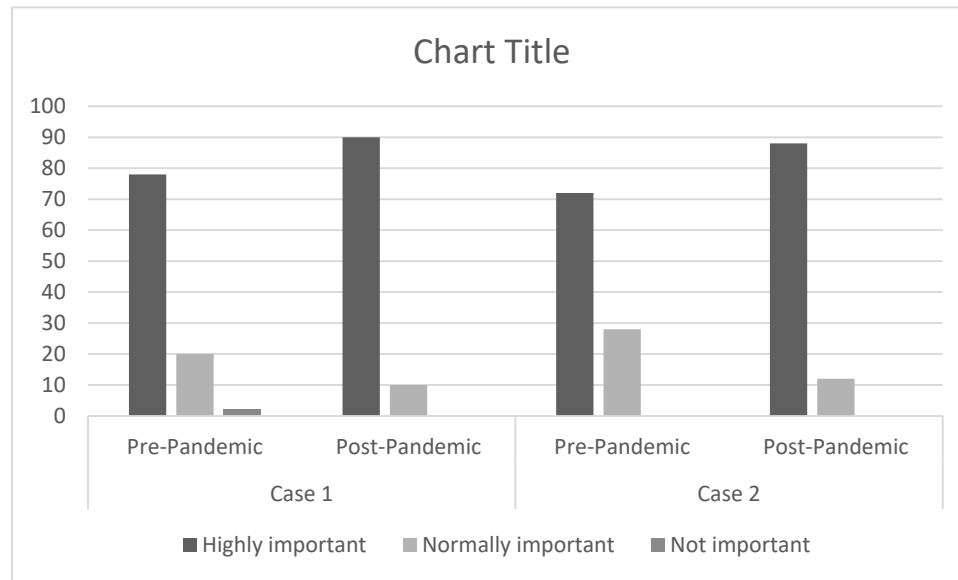


Figure 20 The Importance of The Investigated Urban Public Parks in The Pre And Post-Pandemic Periods

As mentioned earlier, the data in this study is analyzed through IBM SPSS Statistics software. The data was coded and entered properly in the software. Several tests were used in the study to analyze the data. Using the Paired Sample T-test, the pre and post pandemic importance of public urban green spaces to the residents, was 2.65 and 2.92 out of 3, respectively, and (sig. value was 0.0 which is lower than the assumed significance level of 0.05). Therefore, there is a statistically significant difference between the importance of urban public green spaces to the respondents in the pre and post-pandemic periods in favor of post pandemic period.

Thus, concluding that most the respondents perceive and believe that urban public green space are extremely important and that the importance of urban public green spaces had risen in the post the COVID-19 pandemic period.

B. Urban Public Green Space's Frequency of Visits and Usage Comparison Between Pre and Post COVID-19 Pandemic Periods

In regard to Abdullah Fouad's urban public green space, survey results shown in Figure 21 shows that pre-pandemic visits and usage of the urban public park was much lower than post-pandemic's visits and usage. However, in pre and post the pandemic periods, most visitors visited the urban public more than once a week. In the pre-pandemic periods, 50% of the visitors used to visit more than once a week, meanwhile, 32% (accounting for 32 respondents out of 100) of the visitors used to visit once a week and only 18% used to visit less than once a week as shown in Figure 21 bellow. In the post-pandemic periods, most of the visitors visits the urban public park more than once a week, accounting for 70% of the respondents and 18% visit once a week, while, only 12% visits less than once a week.

The survey results of Prince Abdullah Bin Jalawi's urban public park however are completely different form Abdullah Fouad's results. As shown in Figure 21, most of the pre-pandemic periods visitors visited the urban public park of Bin Jalawi once a week, accounting for 46% of the 100 surveyed respondents. In addition, only 18% of visitors used to visit less than once a week and 36% visited more than once a week. However, in post-pandemic periods the frequency of visits significantly increased, 64% of the 100 surveyed respondents visits more than once a week accounting for the majority, meanwhile, once a week visits significantly dropped to 20% and less than once a week visits slightly dropped to 16%.

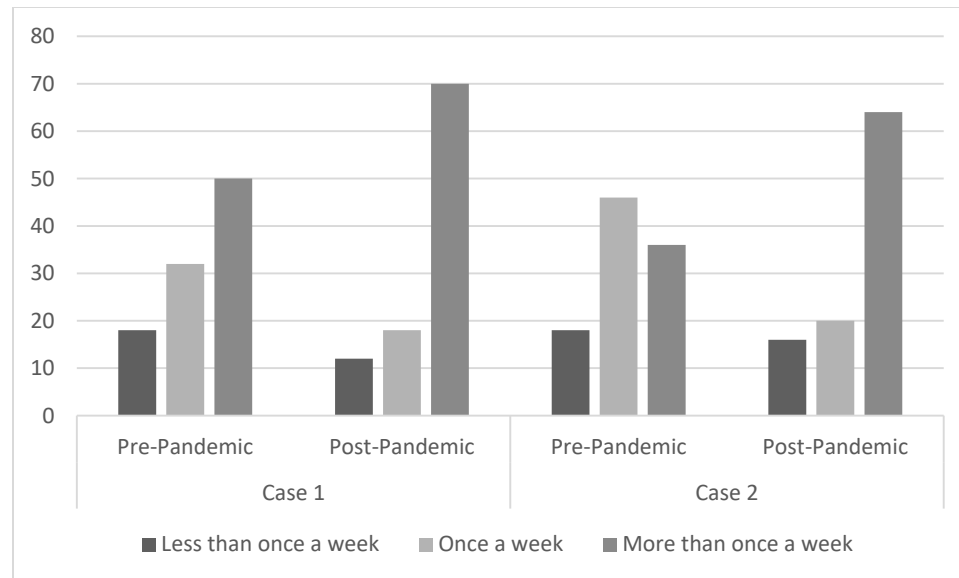


Figure 21 Visit Frequency of The Investigated Urban Public Parks in The Pre And Post-Pandemic Periods

A Paired Sample T-test was performed using IBM-SPSS software, the mean of the related aspects which included the respondent's pre and post pandemic frequency of visits of public urban green spaces, observed to be 2.21 and 2.63 out of 3 (sig. = 0.0 < 0.05). Therefore, there is a statistically significant difference between the frequency of visiting urban public green spaces in the pre and post-pandemic periods in favor of post pandemic period.

Thus, as shown in Figures 17 and 18, the frequency of visits of public urban green spaces has significantly increased. As seen in Bin Jalawi's urban public park, most people in pre-pandemic periods used to visit once a week, mostly arguing that it was due to having only one day off from work. However, when comparing pre-pandemic periods to the post-pandemic period, visiting urban public green spaces became not affected in having only one day off due to people's increased perception of urban public green spaces importance after COVID-19 pandemic's harsh period.

C. Urban Public Green Space's Duration of Visits Comparison Between Pre and Post COVID-19 Pandemic Periods

The survey results of Abdullah Fouad's urban public park shown in Figure 22 shows tremendous increase in the duration spent in the post-pandemic period. As shown in Figure 19, most of the visitors spent 1-2 hours per visit, accounting for the majority of 36%. However, 32% visitors spent less than one year per visit, same as 32% of the visitors who used to spend more than 2 hours. Due to the relatively high durations spent in pre-pandemic periods which reflects the benefits and importance of urban public green spaces to the respondents, duration spent in post-pandemic period has significantly risen. The majority of the respondents in post-pandemic periods spends more than 2 hours per visit, accounting for 48% nearly half of the 100 surveyed respondents, while, respondents who spend less than one hour decreased by half which accounts for 16%. However, the percentage of respondents who spend 1-2 hours in post-pandemic periods accounted for 32% as same as the percentage of respondents in pre-pandemic periods.

The respondents during the survey argued that the reasons, activities and durations associated with their urban public parks visits was not affected by COVID-19 pandemic due to multiple reasons including living adjacent to the urban public park resulting in routinely daily, weekly and occasionally visits, limited daily and weekly free time and Damman's city weather which certain activities could not be performed for longer durations. However, most of the respondents emphasized that their perception, appreciation and need of accessible urban public green spaces had significantly risen since COVID-19 pandemic due to the harsh measures that was associated with the pandemic that includes mainly the lockdown.

With regard to Prince Abdullah Bin Jalawi's urban public park, Figure 22 shows that most of the respondents as well used to spent 1-2 hours per visit in pre-pandemic periods. However, despite the low duration of visits in pre-pandemic periods that accounted for 46% who used to spend 1-2 hours, 26% used to spend less than one hour and only 28% who used to spend more than 2 hours, the duration of time spent per visit had significantly risen in the post-pandemic period. Most of the respondents spend more than 2 hours per

visit in the post-pandemic period, accounting for 52% which is more than half, meanwhile, respondents who spend 1-2 hours significantly dropped to 30%, as well as, respondents who used to spend less than one hour which dropped to 18%.

The visitors and users of Bin Jalawi urban public park differentiates from Fouad's urban public park visitors and users. Bin Jalawi's users and visitors are mostly single employee individuals who works and live near the park, therefore, stating that post COVID-19 pandemic their perception of activities, relaxation and socializing had changed due to the lockdown measures of the pandemic. Thus, spending more time performing activities, mentally relaxing and socializing outdoor in urban public green spaces rather than indoors.

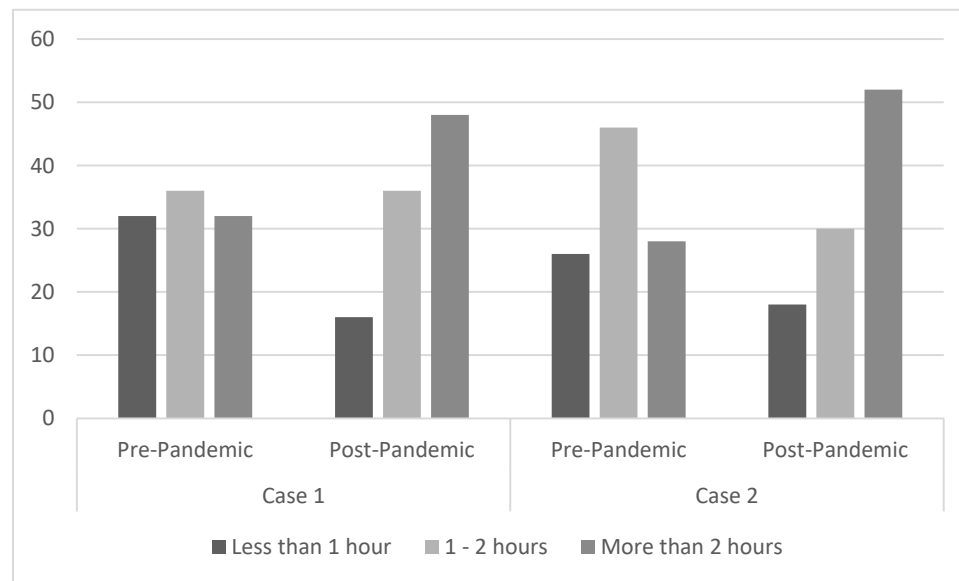


Figure 22 Visiting Duration of The Investigated Urban Public Parks in The Pre And Post-Pandemic Periods

The Paired Sample T-test performed showed that the mean of the related aspects which included the respondent's pre and post pandemic duration of visits of public urban green spaces results in 1.97 and 2.49 out of 3 (sig. = 0.0 < 0.05). Therefore, there is a statistically significant difference between the duration of urban public green spaces visit in the pre and post-pandemic periods in favor of post pandemic period.

Thus, as shown in the above Figures, respondents from both the selected urban public parks spends significantly more time per visit in urban public green spaces than pre-

pandemic periods. The pandemic changed people's perception, importance and value of urban public green spaces, as stated by the respondents, less indoor time is spent especially for the existence of an accessible urban public park. Respondents stated that spending more time reflected on multiple aspects as mental health, physical health and their general welfare, a handicapped individual who was noticed by the study team daily visiting the urban public park of Bin Jalawi stated that whenever the weather is appropriate to visit and use the park, none of his time is spent indoor.

D. Comparison of The Reasons and The Associated Activities of Visiting Urban Public Green Spaces Between Pre and Post COVID-19 Pandemic Periods

In this section, the reasons of visiting urban public green spaces in pre and post-pandemic periods are presented in Figure 23. The results show that most of the surveyed respondents in Abdullah Fouad's urban public park used to visit for physical activities in pre-pandemic periods, accounting for 52% of the 100 surveyed respondents, followed by social gatherings accounting for 46% and mental relaxation which accounted for 42%. However, physical activities in post-pandemic periods is shown to significantly increased in post-pandemic periods, representing the number one reason visitors visit urban public green spaces in pre and post-pandemic periods, physical activities in post-pandemic periods accounted for 64%, while social gatherings decreased in post-pandemic periods by 10% accounting for 36%, meanwhile, mental relaxation in post-pandemic periods is shown to slightly increase accounting for 48%.

In regard to the visit's associated activities, as shown in Figure 24, relaxing was the most activity associated with the pre-pandemic visits which accounted for 64%, followed by socializing accounting for 52% and physical activities that accounted for only 28%. However, in comparison to post-pandemic periods, relaxing formed the majority as well significantly increasing to 80%, as well as, physical activities which significantly increased in post-pandemic periods, as shown in the bellow figure, physical activities accounted for 48% in post-pandemic periods which is merely doubled from pre-pandemic periods, socializing however, is shown to slightly decreased post the pandemic and accounted for only 46%.

With regard to Prince Abdullah Bin Jalawi urban public park, the results presented in Figure 23 shows that most of the visitors used to visit for mental relaxation in pre-pandemic periods which accounts for 70% of the 100 surveyed respondents, followed by physical activities which accounted for 48% and social gatherings as the least reasons for visiting the urban public park of Bin Jalawi which accounted for 40%. Moreover, mental relaxation in post-pandemic periods stayed at the top of reasons visitors visit Bin Jalawi's urban public park which accounting 64% a slight decreased is noticed however. Despite visitor's low interest in physical activities in pre-pandemic periods, visiting for physical activities had slightly increased post the pandemic which accounted for 58%, meanwhile, respondent's interest of visiting for social gatherings stayed in post=pandemic as it was pre the pandemic which accounted for 40% as shown in Figure 23.

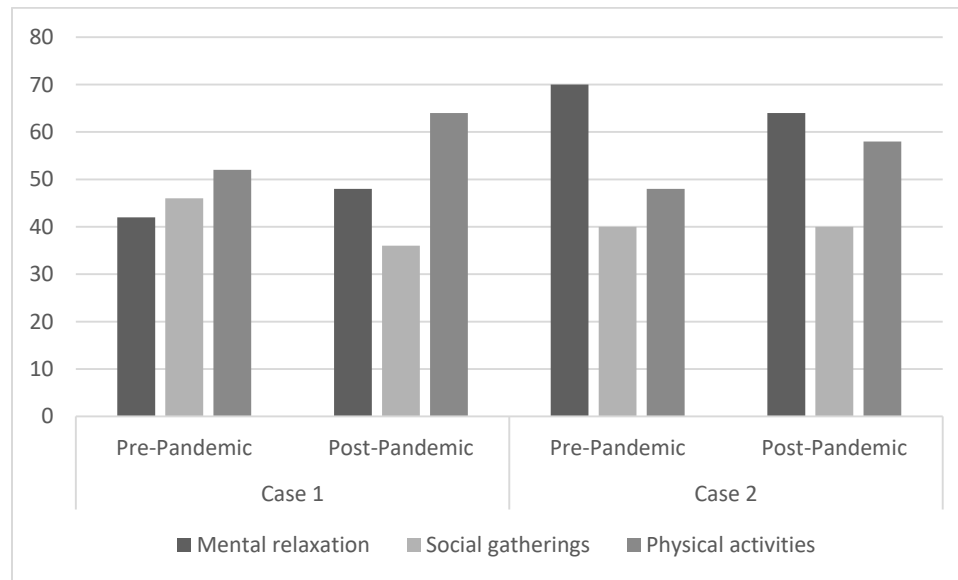


Figure 23 Reasons of Visiting the Investigated Urban Public Parks in The Pre And Post-Pandemic Periods

The associated activities of visiting Bin Jalawi's urban public park presented in Figure 24 shows that the majority of the visitors performed relaxing in pre-pandemic periods which accounted for 66%, followed by physical activities that accounted for 48%, while socializing only accounted for 42%. However, in comparison with post the pandemic period, relaxing decreased to 54% and physical activities increased to 56%, meanwhile, socializing stayed at 40%.

As stated earlier, high percentage of Bin Jalawi's urban public park are single employees who used to spend their free time indoors in pre-pandemic periods, however, post the pandemic most of their time is spent outdoor particularly in Bin Jalawi's since it is easily accessible by foot. Multiple argued and stated that Bin Jalawi's accessible urban public park is perceived as a blessing post the pandemic.

One respondent stated that “despite my need to move for a more appropriate house, the existence of an accessible urban public park totally changed the idea of moving to elsewhere.”. Adding however “My appreciation to urban public parks emerged due to COVID-19 pandemic, I now use it nearly daily for multiple reasons and activities. Moreover, my wife and kids started visiting the urban public park only post COVID-19 pandemic”.

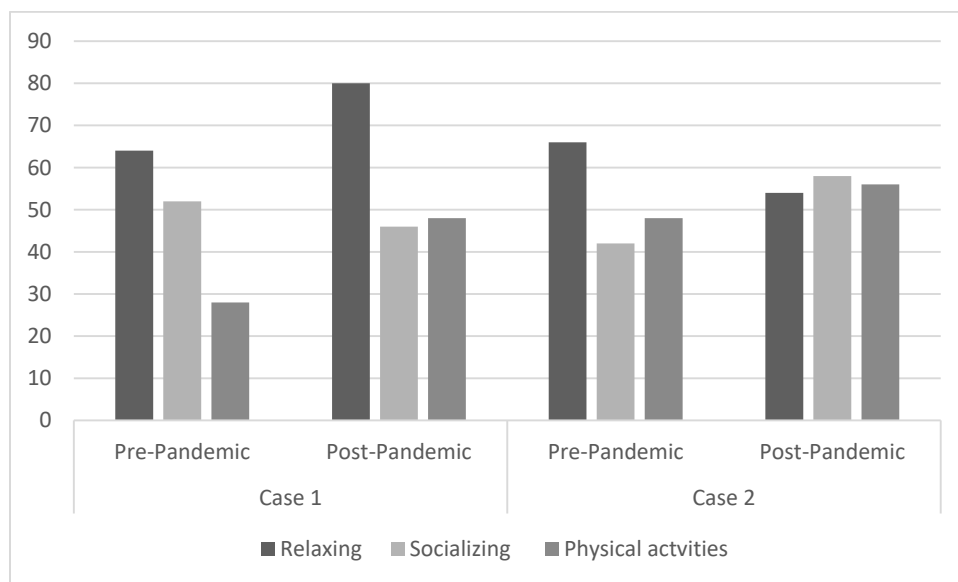


Figure 24 The Associated Activities of Visiting the Investigated Urban Public Parks in The Pre And Post-Pandemic Periods

Thus, due to the pandemic's significant effects on people's physical and mental health, along with, people's general health and well-being, the importance of urban public green spaces had significantly increased post COVID-19 pandemic. As shown in Figures 20 and 21, despite people pre-pandemic's high importance of urban public green spaces its importance had significantly increased post the pandemic in which none of the 200 surveyed respondents considered it as not important post the pandemic, although it was

found that few respondents considered urban public green space not relatively important in pre-pandemic periods.

In addition, the frequency of visiting urban public green spaces had significantly increased in post-pandemic periods, in which the majority of the respondents in both the selected urban public parks visits more than once. Despite the high frequency of visits in pre-pandemic periods, respondents who used to visit urban public green spaces once a week and less than once a week had significantly decreased in post-pandemic periods, stating that our perception, value and importance of urban public green had noticeably increased since COVID-19 pandemic.

Moreover, visit's duration in post-pandemic periods had significantly increased in comparison to the pre-pandemic periods. As shown in Figures 24 and 25, most of the surveyed respondents in both of the selected urban public parks used to spend for 1-2 hours per visit, in addition, the percentage of respondents who used to spend less than 1 hour per visit in pre-pandemic periods was noticed to be high as well. However, the majority of visitors in post-pandemic periods spends more than 2 hours per visit, which significantly increased in comparison with the pre-pandemic pandemics and visitors who used to spend less than hour had significantly decreased. Meanwhile, visitors who used to spend 1-2 hours in pre-pandemic periods slightly decreased in the post-pandemic periods.

Furthermore, with regard to Abdullah Fouad's urban public, the reasons and the associated activities of visiting urban public green spaces in pre-pandemic periods was mixed between mental relaxation, socializing and physical activities and merely close to each other. Noticed that each of the selected urban public park's design supports certain activities by providing the services and amenities needed for the visitors. As of Abdullah Fouad's urban public park, most respondents used to visit to perform physical activities in pre-pandemic periods and much of their visit's associated activities included relaxing, following with socializing. However, in post-pandemic periods the reasons of visiting for physical activities and mental relaxation had significantly increased while reasons of visiting for social gathering had slightly decreased, meanwhile, most of the activities associated with the respondent's post-pandemic visits included mainly relaxation which increased in post-

pandemic periods. As shown in Figure 13 of the urban analysis and observation performed on Abdullah Fouad's urban public park, soccer pitches and a running track is provided, therefore, accommodating visitors who visits for physical activities purposes.

On the other hand, most of Prince Abdullah Bin Jalawi's urban public park's respondents used to visit for mental relaxation reasons in pre-pandemic periods and the activities associated with their visits included mainly relaxing. However, despite that most of the visitors still visits of mental relaxation reasons in post-pandemic periods it however had slightly decreased in post-pandemic periods, on the other hand, reasons of physical activities had slightly increased, as well as, respondent's associated activities. Despite the increasement in visiting for physical activities, Figure 18 of the urban analysis and observation conducted on Bin Jalawi's urban public park shows no running track nor soccer pitches or tennis courts are provided in the urban public park.

4.2.3. PART 2: User's Level of Satisfaction on The Selected Urban Public Parks

Due to the increased post-pandemic value and importance of urban public green spaces various and multiple aspects and attributes are reconsidered and prioritized by planners, designers, policy makers, users and residents. Therefore, this study aims to analyze the selected urban public green spaces through the urban observation and analysis, in order to measure the user's level of satisfaction of the selected urban public parks.

Thus, in order to measure user's satisfaction level on the selected urban public green spaces, 10 questions were developed in this regard using five-point Likert. These questions included various attributes as accessibility, safety, quietness, urban furniture, attractiveness and social benefits, along with, services, pedestrian's circulation, shading and views.

A five-point Likert is adopted in this matter, as it is considered an interval scale, the average is very significant. The following calibration of (Pimentel, 2010) is adopted in order to measure the degree of satisfaction:

- If the mean ranges between 1 to 1.80, then the respondents "Strongly Disagree".
- If the mean ranges between 1.81 to 2.60, then the respondents "Disagree".

- If the mean ranges between 2.61 to 3.40, then the respondents are “Neutral”.
- If the mean ranges between 3.41 to 4.20, then the respondents “Agree”.
- If the mean ranges between 4.21 to 5.00, then the respondents “Strongly Agree”.

E. User’s Level of Satisfaction in Terms of Accessibility, Safety and Amenities

With regard to Abdullah Fouad’s urban public green space, as shown in the analysis and observation, the urban public park’s walkability radius includes a dense residential context, which the urban public park of Abdullah Fouad is located within. In addition, it is extremely accessible through the two major arterial roads as shown in the analysis and observation in Figure 10.

Therefore, as shown in Table 2, most of the surveyed respondents accounting for 66 of the 100 surveyed respondents strongly agrees that Abdullah Fouad’s urban public is easily accessible and 28 only agrees. Meanwhile, only 4 of the respondents are neutral, following with only 2 who disagrees, however, none of the respondents strongly disagrees. Nonetheless, multiple respondents stated that the urban public park is not considered accessible for handicaps due to the lack of proper crossovers and ramps.

The second question presented in Table 2 highlighted safety which included various aspects as crimes, lighting, fencing, vehicle circulation and pedestrian circulation which are shown in Figure 11. As presented in the table, the majority of the respondents accounting for 68 strongly agrees that Abdullah Fouad’s urban public is safe, followed by 28 who only agrees about the urban public park’s safety and only 4 are neutral regarding the safety, meanwhile, none disagree nor strongly disagrees the park’s safety.

Thirdly, regarding amenities which scored the least mean between safety and accessibility, the majority of the respondents agrees that the park’s amenities are sufficient, which accounted for 48 of the 100 surveyed respondents, meanwhile, 34 strongly agrees that the amenities are sufficient, following with 16 who are neutral and only who disagrees.

As shown in Figure 11, benches according to the urban park’s vast area of 186,000 m² are considered few. Moreover, all the surveyed respondents stated that no shelters exist in the

urban public park either artificial or natural by the trees. According to noises, most of the respondents stated that the urban park is extremely quite due to multiple reasons which includes mainly low traffic and the surrounding residential quiet context, however, as stated by the respondent's soccer pitches do not generate any noises.

As shown in Figure 15 of the observation and analysis, Prince Abdullah Bin Jalawi urban public park is located within a dense a mixed-use commercial and residential which are included in its walkability radius, as well as, the urban public park is located exactly on a conjunction of two major arterial roads.

As shown in Table 2, more than half of the surveyed respondents strongly agrees that Prince Abdullah Bin Jalawi urban public is accessible which accounted for 56 of the 100 interviewed respondents, following 26 who agrees, 14 who are neutral and 4 who disagrees, meanwhile, none of the respondents strongly disagrees that the urban public park is accessible. In addition, all interviewed respondents stated that drop off areas are included, as well as, the consideration of handicaps in the public park design. Moreover, an interviewed handicapped who daily visits stated that he really appreciated considering his condition through the implemented proper ramps.

As shown in Table 2, regarding safety which included fencing, crimes, lighting, vehicle circulation and pedestrian circulation which presented in Figure 16 through the urban observation and analysis conducted in the study. However, the majority of the surveyed respondents which accounted for 52 strongly agrees that Bin Jalawi's urban public park is considered safe, meanwhile, 38 only agrees on the public park's safety, following up, 6 who are neutral and only 4 who disagrees, however, none of the respondents strongly disagrees that the park is safe.

In regard to the public park's amenities, as shown in Table 2, only 18 of the respondents strongly agreed that the amenities are sufficient, meanwhile, the majority which accounted for 44 agreed that the amenities are sufficient to meet their needs. However, 24 of the respondents are neutral in this matter, 10 disagrees that the amenities are sufficient and 4 strongly disagrees. The urban analysis and observation conducted on the amenities is shown in Figure 16.

As shown in Figure 16 of the urban observation and analysis, benches are well distributed, as well as, the lighting fixtures. Shelters however, are implemented artificially through the urban public park's vast area, the trees in Bin Jalawi spreads horizontally and provide and planted specifically to provide the needed shading. However, as shown in Figure 16, noises effecting the public park's visitors are extreme due to the high traffic in the arterial roads surrounding the park, multiple visitors stated through the questionnaire survey that they get highly affected by the noise generated from vehicles.

Table 2 User's Level of Satisfaction in Terms of Accessibility, Safety and Sufficiency of Amenities of The Examined Urban Public Parks

No	Design Aspect	Case Study 1				Case Study 2			
		N	Mean	Achieved	Rank	N	Mean	Achieved	Rank
2.1	Accessibility	100	4.67	SA	3	100	4.41	SA	3
2.2	Safety	100	4.73	SA	1	100	4.46	SA	1
2.3	Sufficiency of recreational amenities	100	4.32	A	5	100	3.69	A	8

F. User's Level of Satisfaction in Terms of Shading, Urban Furniture and Quietness

As shown in Figure 11 of the urban analysis and observation, artificial shelters in Abdullah Fouad's urban public park is only implemented in one small area despite the vast area of the public park. Moreover, the vegetation in the public urban is limited only to palms in order to create an identity to the public park, however, palms does not produce the needed shading for visitors.

As shown in Table 3, only 14 respondents strongly agree that the urban public park of Abdullah Fouad is well shaded, meanwhile, the majority which accounted to 40 respondents only agrees, following 28 who are neutral, 12 who disagrees and 6 who strongly disagrees.

However, the respondents during the survey stated that their visits are limited to multiple factors which includes mainly, visiting in certain times of the year when the weather is acceptable to perform various outdoors activities, noon times where the sun's heat

breakdown and times when rain is not expected. Therefore, shading is not much needed in this regard.

With regard to the urban furniture, as shown in Table 3, most respondents who accounted to 36 agrees that the urban public park is well furnished, while 34 are neutral in this regard and only 14 respondents strongly agrees that it is well furnished, however, 12 disagrees and 4 strongly disagrees.

As mentioned earlier, most surveyed respondents stated that more benches are required especially due to the vast area of the urban public park. However, most respondents stated that the urban furniture is considered good or in other terms not bad or old in terms of quality.

The quietness aspect shown in Figure 11 indicates that the pitches might cause noises to the visitors, especially due to the pitches huge area of land. However, a large number of the surveyed respondents strongly agrees that the urban public park is considered quiet, whom accounted to 40, as shown in Table 3. In addition, the majority which accounted 46 agrees that it is considered quiet, 10 are neutral in this regard, 2 disagrees and 2 strongly disagrees.

Respondents stated that they are affected by the noises due to multiple reasons, which includes mainly the depth of the urban public park, the cornered pitches with their own entrances and local low traffic streets that surrounds the park. In addition, stating that most visitors especially during weekdays visits for physical activities purposes as jogging, walking and playing soccer, therefore, few kids are found playing around.

Shading in Prince Abdullah Bin Jalawi's urban public park scored higher mean than Abdullah Fouad's public parks. As shown in Figure 16, high percentage of the urban public park's area is artificially shaded. Moreover, trees planted in the urban public park generates the needed shading, as they spread horizontally.

As shown in Table 3, 22 of the respondents strongly agrees that the urban public park is well shaded artificially and naturally, following the majority of 48 which agrees that it is

well shaded, 18 who are neutral and 12 who disagrees, meanwhile, none of the surveyed respondents strongly disagreed.

Regarding Prince Abdullah Bin Jalawi's urban public park, as shown in Table 3, most respondents agrees that the urban public park is well furnished which accounted for the majority of 46, on the other hand, large number of respondents as well strongly agrees which accounted 20 of the 100 surveyed respondents, following with 24 who are neutral, 10 who disagrees and none who strongly disagrees.

As shown in Figure 16, shelters, benches and lighting fixtures are well distributed in the urban public park. In addition, surveyed respondents stated that the urban furniture is in a very good quality and ergonomic to use. An elderly interviewed in the survey process, stated that since the last renovation of Bin Jalawi's urban public park, semi-annually checkups are conducted by the municipality which results in changing damaged furniture, fixing needed to fix and upgrading the urban furniture in certain conditions.

In regard to the public park's quietness, Figure 16 shows that the surrounding arterial roads generates lots of noises, especially, due to its high traffic. However, despite the observation and analysis performed, Table 3 shows none of the respondents strongly disagrees that the urban public is considered quiet and only 19 disagrees. On the other hand, the majority which accounted for 40 agrees that the urban public park is quiet, 26 are neutral and 24 strongly agrees that the urban public park is considered quiet.

Table 3 User's Level of Satisfaction in Terms of Shading, Urban Furniture and Quietness of The Examined Urban Public Parks

No	Design Aspect	Case Study 1				Case Study 2			
		N	Mean	Achieved	Rank	N	Mean	Achieved	Rank
2.4	Shading	100	3.59	A	8	100	3.80	A	5
2.5	Sufficiency of urban furniture	100	3.57	A	9	100	3.75	A	7
2.6	Quietness	100	4.27	SA	6	100	3.80	A	6

G. User's Level of Satisfaction in Terms of Services, Pedestrian Circulation, Attractiveness and Social Benefits

As shown in the urban analysis and observation, Figure 13 shows that Abdullah Fouad's urban public park includes various services along with the essential services, including running track, children play area and soccer pitches.

However, as shown in Table 4, most of the respondents which accounting to 28 are neutral regarding the sufficiency of the services, along with, their quality, maintenance and efficiency. Moreover, only strongly agrees that the services are sufficient to meet their needs and 24 agrees. On the other hand, 18 of the respondents disagrees and 18 strongly disagrees that the services are sufficient.

Multiple respondents argued that WCs are not maintained at all and water is found running as should be rarely, WCs conditions, maintenance and quality is what most of the respondents are upset for. However, in regard to the soccer pitches, all respondents were extremely satisfied of, stating that they used to use since decades, especially individuals who live within the urban public park's walkability radius.

With regard to the pedestrian circulation, as shown in Table 4, more than half of the respondents agrees that they walk comfortably in the urban public park which accounted to 54 of the 100 respondents, along with, the 42 respondents who strongly agrees and only 4 who are neutral in this matter.

The conducted pedestrian circulation analysis and observation is shown in Figure 13. In addition, all the respondents stated that they walk comfortably and none showed disagreement in this matter. However, the study team did not notice any handicapped individual, who might have added his experience in this regard.

The attractiveness of the urban public park shown in Figure 12, highlights the aesthetic elements which included mainly a water fountain and memorial monument of Abdullah Fouad, the individual who created the urban public park and was named after him.

Therefore, as shown in Table 4, most of the respondents accounting for 54 agrees that Abdullah Fouad's urban public park is considered attractive and 28 strongly agrees in this matter. Meanwhile, 20 respondents are neutral, stating that it could have been more attractive due to the private care, maintenance and attention it gets daily by Abdullah Fouad's staff. However, none of the respondents disagreed or strongly disagreed that the urban public park is considered attractive.

Moreover, more than half of the respondents believe that socially beneficial and achieves social interaction which accounted for 60 of the respondents strongly agrees in this regard, while 32 agrees and only 8 who neutral in this regard.

The users of Abdullah Fouad's urban public park are mostly residents living within the dense residential context. Figure 14 of the observation and analysis shows that all the surrounding context is residential, along with, few governmental facilities and major commercial complex.

With regards to Prince Abdullah Bin Jalawi's urban public park's sufficiency of services, most of the respondents whom accounted for 38 disagrees that the services are sufficient to meet their needs and 22 strongly disagrees, as shown Table 8. On the other hand, 16 of the respondents are neutral, meanwhile, 16 agrees and 8 strongly agrees that the services are sufficient.

Figure 18 shows that the services in Bin Jalawi's urban public park are the essentials including the WCs and the children playing area, however, soccer pitches and running track are not available.

Pedestrian circulation however, as shown in Figure 18, consists from a primary route and a secondary route. Moreover, Table 4 shows that half of the respondents agrees that they walk comfortably in the urban public park which accounted for 50, along with, 36 of the respondents who strongly agrees in this matter. However, 8 are neutral in this matter and only 6 disagrees that they walk comfortably in the urban public park. However, a surveyed handicapped individual stated that he strongly agrees that he circulate comfortably in the urban public park.

However, 12 of the respondents disagreed that Bin Jalawi's urban public park is considered attractive and 2 strongly disagrees in this matter. Meanwhile, 32 are neutral, 12 strongly agrees and the majority of 42 respondents agrees that Bin Jalawi's urban public park is considered attractive. Moreover, as shown in Figure 17, despite that Bin Jalawi's includes aesthetics which are considered as a landmark, the unintegrated aesthetics with the urban public park added no value to the public park, despite adding to Dammam's city.

Regarding the urban public park's social benefits, as shown in Figure 19, Bin Jalawi's urban public park serves a dense mixed-use commercial and residential context in the heart of Dammam's city. Therefore, as shown in Table 4, more than half of the respondents which accounted for 52 agrees that Bin Jalawi's public park is socially beneficial and achieves social interaction, meanwhile, 38 agrees and only 10 are neutral in this matter.

Table 4 User's Level of Satisfaction in Terms of Services, Pedestrian Circulation, Attractiveness and Social Benefits of The Examined Urban Public Parks

No	Design Aspect	Case Study 1				Case Study 2			
		N	Mean	Achieved	Rank	N	Mean	Achieved?	Rank
2.7	Sufficiency of public services such as toilets	100	2.91	N	10	100	2.55	D	10
2.8	Comfortable pedestrian movement	100	4.54	SA	4	100	4.27	SA	4
2.9	Attractive views	100	4.13	A	7	100	3.64	A	9
2.10	Social benefit	100	4.69	SA	2	100	4.45	SA	2

H. User's Overall Satisfaction on The Selected Urban Public Parks

The average overall satisfaction level, considering the above-mentioned 10 aspects of satisfaction, in Abdullah Fouad and Prince Abdullah Bin Jalawi's Urban Public Green Space was 4.14 and 3.88 out of 5, respectively. These two values were compared to the mid of the Likert scale using One-sample T-Test in both cases, Sig value was 0.0, which is lower than the assumed significance level of 0.05. This indicates that the average overall satisfaction is significantly higher than the neutrality level, which generally places it in the agreement zone.

In details, with regards to Abdullah Fouad's urban public park, the average response of most aspects was 4 which indicates that most respondents neither strongly agrees nor

neutral with the surveyed aspects. Thus, as shown in Table 6, most of the respondents regarding the services were neutral which scored an average of 3. However, with regard to the amenities, shading, quietness and attractiveness, the majority agreed on the aspect's sufficiency, efficiency and considered the selected urban park to be quiet and attractive, therefore, scoring an average of 4. Meanwhile, the average response of accessibility, safety, pedestrian circulation and social interaction was 5, therefore, indicating that most of the respondents consider the selected urban public park of Abdullah Fouad as accessible, safe and socially beneficial, along with, their agreement on the way they circulate within it.

However, most of the average responses regarding Prince Abdullah Bin Jalawi's urban public park shown in Table 6 was 4, indicating that most respondents agree that the amenities are sufficient, the urban public park is well shaded, well furnished, quiet, along with, walking comfortably within it and considering it as an attractive urban public green space. In addition, strongly agreeing that they easily accessible the urban public park, on its social benefits and considering it as a safe urban public green space. However, most respondents disagreed that the services including WCs, prayer areas and soccer pitches are sufficient to meet their needs, arguing during the survey that multiple crucial services especially post the pandemic are missing and not provided, which as well been observed during the analysis performed shown in Figure 18.

4.3. Discussion

Due to COVID-19's rapid spread rate, the World Health Organization (WHO) had declared an international high level of emergency on the 11th of March 2020 (WHO, 2020). The rising concerns about COVID-19 rapid spread, causalities and deaths had led to a global policies and measures which were implied all over the world, mainly including quarantine policies and lockdowns measures in order to minimum further causalities and deaths (Kavan, 2021). The measures implied due to COVID-19 pandemic mainly aimed to prevent people from socially interacting among each other in order to resist the virus's high spread rate, therefore, common measures were implied globally which included switching to online education in schools, colleges and universities, cessation of international and local flights and lockdown procedures in order to minimum people's mobility to the lowest rate possible (Karnon, 2020). However, the pandemic's measures and procedures had

noticeable effects on people's general health and well-being specially physically and mentally. The shutdown of urban public green spaces is the major cause of the physical, mental and social setback that resulted in tremendous impacts on people's health and well-being (Mofijr and Fattah, 2021).

Moreover, the virus's spread is influenced by various and multiple factors including population density, society's life style and traditions and the activities associated with the society's general background, religion and culture. For instance, despite Saudi Arabia's low population density, COVID-19's spread was higher in Saudi Arabia when compared to countries with higher population densities as Iran and Japan (Alrashed et al, 2020). Saudi Arabia had reported the first confirmed case of COVID-19 on the 2nd of March 2020 and on the 5th of April 2020 the virus had infected 2400 individuals (Worldometer, 2022). Therefore, due to the rising numbers of death and infection cases due to the infection of the COVID-19 virus, especially, due to the unavailability of any vaccination at the time, countries all over the world including Saudi Arabia started extreme measures of lockdowns to slowdown and hopefully prevent any further infection and death cases (Alrashed et al, 2020).

Saudi Arabia is the most important destination for billions of Muslims around the globe because of the Islamic annually rituals hosted in the city of Mecca, Saudi Arabia, therefore, various measures were implied in this regard, Al-Hajj which is a must be performed ritual in the Islamic religion was restricted due to the millions of Muslims that are predicted to perform multiple times annually. In addition, Umrah was restricted as well for people outside and inside Saudi Arabia due to the thousands of people who is predicted to perform it daily. Furthermore, all commercial related activities were prevented including shopping malls, cafes and restaurants shutdown. Gatherings in general were prevented which associated with the shutdown of parks, private chalets and wedding halls, attending governmental entities was restricted as well. Moreover, flights were restricted specially from multiple countries around the world specially China which the first COVID-19 case was confirmed in and the virus started to spread from. The restrictions of flights continued after the vaccination process, specific countries with high COVID-19 confirmed cases were banned to land on Saudi Arabia lands (Addas and Maghrabi, 2022). In addition, penalties

on face masks were implied which resisted the virus's spread, along with, the high rate of vaccinations and the use of smart phones apps that tracked infected individuals and allowed only the vaccinated individuals to enter various governmental, commercial and educational facilities (Alrashed et al, 2020).

It is well known that urban public green spaces play a crucial role in enhancing multiple and various aspects in cities and providing the essential needs for humans (Basu and Nagendra, 2021). Therefore, the changes on the lifestyle were heavily effected due to the pandemic's restriction measure, many studies have documented mental, physical and socio-psychological problems that are related to the prevention of accessing the urban green spaces (Jia, 2021). Researches have proven that human's health and well-being are improved significantly when associated to urban green spaces, both physical and mental health improvements are as well associated with access to urban green spaces (Europe, 2016). Multiple pandemics have previously occurred and affected mankind in various and multiple aspects, previous researches and studies focused on inequity and vulnerability of particular sections of the community to pandemics (Wade, 2020). Yet, the restrictions of accessing the urban green spaces and the people's avoidance in accessing them due to fear of COVID-19 have redefined its role on the health, well-being and multiple socio-physiological related aspects (Geary, 2021).

Furthermore, few recent studies had well documented that the accessibility and usage rate of urban green space was significantly affected due to COVID-19 pandemic's restrictions that has been imposed in order to mitigate the rapid spread of the highly contagious virus. The restriction measures were imposed since the earliest phases of the pandemic and included many countries as France, Iran, Turkey, USA, Germany and Saudi Arabia, the measures included mainly social distancing, flights prevention and switching to online education and working from home, therefore, resulting in a total lockdown world-wide. The restriction measures included the commercial infrastructure, governmental and the urban green spaces including urban parks and natural settings due to restrictions on mobility (Venter et al., 2020). The urban green spaces closure significantly affected people in terms of staying mentally and physically healthy during the challenging time of the pandemic. Therefore, the post-pandemic's urban green spaces importance had significantly

increased, as documented in multiple studies. However, people's psychological aspect was the most affected due to urban green spaces closure (Ugolini et al., 2020).

Thus, from the previous literature, it is clear that COVID-19 pandemic had significantly affected people's mental and physical health during the pandemic's challenging time due to the imposed restriction measures. However, limited studies were conducted in order to assess the impact of COVID-19 pandemic on people's health and well-being related to the perception and use of urban green spaces in the context of Saudi Arabia.

Thus, this study aimed to assess the impacts of COVID-19 pandemic through measuring and evaluating people post-pandemic's perception of the importance and use preferences of public urban green spaces in Dammam, Saudi Arabia. In this study, an urban observation and analysis of the selected urban public green spaces has been performed. Along with, a questionnaire survey which is developed in order to measure people's post-pandemic value and importance of public urban green spaces. The main aim of the questionnaire is to compare people's post and pre-pandemic use rate, frequency of visits, reasons of visits and their associated activities. In addition, the questionnaire survey aims to measure the user's level of satisfaction with the selected urban public parks in this study in order to conclude urban recommendations for the post-pandemic era.

The city of Dammam, Saudi Arabia is rich with urban public green spaces within its context, ranking the highest in Saudi Arabia with a 5.4 m² per capita. The selected urban public parks in this study are located East and in the middle of Dammam city. Abdullah Fouad's urban public park is located in Eastern Dammam with an area of 186,000m² and is located in a dense residential context. On the other hand, Prince Abdullah Bin Jalawi's urban public have an area of 18,880 m² and is located in the heart of Dammam's city within a dense commercial and residential context.

The urban analysis and observation conducted on the selected urban public parks included multiple and various aspects as accessibility, urban furniture, attractiveness, safety, social benefits and views, along with, services, shading, pedestrian circulation and quietness. The results showed that both of the selected urban park's walkability diameter includes a dense residential context, however, Prince Abdullah Bin Jalawi's urban public is accessible for a dense mixed-used context of commercial and residential context. In addition, both the

selected urban public parks are easily accessible through the surrounding street network. Moreover, the results showed that both of the selected urban public parks are convenient, both are considered safe and quiet, despite the noisy arterial main arterial roads adjacent to Bin Jalawi's urban public park. With regard to the urban furniture, the results showed that Bin Jalawi's urban public park contains sufficient benches and lighting fixtures which are well distributed all over the urban public park, as well as, artificial or natural shading. On the other hand, Abdullah Fouad's urban public parks contains fewer benches in comparison to its vast area and limited artificial shelters are provided and the palms trees generates no natural shading as needed.

With regard to the views and aesthetics, the results show that Bin Jalawi's urban public park's aesthetics are considered as a landmark in the city of Dammam, the public park contains a vernacular human scale architectural mockup of the coastal architecture of Dammam's city, however, despite the attractiveness of the public park from the city's perspective, the aesthetics are not integrated with the urban public park. On the other hand, Abdullah Fouad's urban public park contains no views to the park, however, the softscape is distributed and designed in a way that adds value to the urban public park.

Furthermore, regarding the quality and services, the results showed that Abdullah Fouad's urban public park contains multiple services including mainly the children playing area and the WCs, as well as, a running track and two soccer pitches which are used frequently by the visitors. On the other hand, Bin Jalawi's urban public park contains only children playing area along with the WCs. However, sufficient pedestrian routes are included in Bin Jalawi's and handicaps are considered in terms of the entrances and the pedestrian routes, unlike Abdullah Fouad's urban public park. However, both of the selected urban public parks serve hundreds of the users, especially due to their well fitted location in dense residential and mixed-used contexts, therefore, considered to be socially beneficial and achieves social interaction.

As to the urban analysis and observation conducted, an on-site questionnaire survey was conducted in this study as well. The questionnaire survey in this study was performed in order to determine pre and post pandemic importance, use rate and the use preferences, as well as, the reasons and activities associated with the pre and post pandemic use of urban

public green spaces. The survey was developed in English and translated to Arabic and consisted of three parts including: 1.pre-pandemic importance, user rate, frequency of visits, reasons of visits and their associated activities 2.post-pandemic importance, user rate, frequency of visits, reasons of visits and their associated activities 3.user's level of satisfaction with regard to accessibility, urban furniture, attractiveness, safety, social benefits, views and services, along with, shading, pedestrian circulation and quietness. The respondents were selected randomly with neglection to age, gender and nationality. The survey was conducted on the 27th of October till the 10th of November, 200 were surveyed in both the selected urban public green spaces (100 in each urban public park). Most of the surveyed respondents were men which accounted for 80 out of 100 in Bin Jalawi's urban public park and 74 in Abdullha Fouad's urban public park. In addition, most of the surveyed respondents used to visit the selected urban public parks since more than one year which accounted for 62 out of 100 in Bin Jalawi and 76 in Abdullah Fouad.

The results showed that despite the high importance of urban public green spaces in pre-pandemic periods, the importance of urban public green spaces had significantly increased post the COVID-19 pandemic. Moreover, the frequency of visits was found to significantly increase in post-pandemic, as most of the respondents who used to visit once a week or once in less than one week in pre-pandemic periods started to visit more in post-pandemic periods, therefore, the results showed that respondents who used to visit once a week had significantly decreased in post-pandemic periods and people who visits more than once a week significantly increased post the pandemic.

Furthermore, the visits duration had increased significantly in post-pandemic periods in comparison to pre-pandemic periods, most of the surveyed respondents in both of the selected urban public parks used to spend for 1-2 hours per visit, in addition, the percentage of respondents who used to spend less than 1 hour per visit in pre-pandemic periods was noticed to be high as well. However, the majority of visitors in post-pandemic periods spends more than 2 hours per visit.

With regard to the reasons and the associated activities of visiting urban public green spaces, it was noticed that each of the selected urban public park's design supports certain activities by providing the services and amenities needed for the visitors. Therefore, As of

Abdullah Fouad's urban public park, the results showed, that most of the respondents used to visit to perform physical activities in pre-pandemic periods and much of their visit's associated activities included relaxing, following with socializing. However, in post-pandemic periods the reasons of visiting for physical activities and mental relaxation had significantly increased while reasons of visiting for social gathering had slightly decreased, meanwhile, most of the activities associated with the respondent's post-pandemic visits included mainly relaxation which increased in post-pandemic periods. On the other hand, most of Prince Abdullah Bin Jalawi's urban public park's respondents used to visit for mental relaxation reasons in pre-pandemic periods and the activities associated with their visits included mainly relaxing. However, despite that most of the visitors still visits of mental relaxation reasons in post-pandemic periods it however had slightly decreased in post-pandemic periods, on the other hand, reasons of physical activities had slightly increased, as well as, respondent's associated activities. Despite the increasement in visiting for physical activities, Figure 18 of the urban analysis and observation conducted on Bin Jalawi's urban public park shows no running track nor soccer pitches or tennis courts are provided in the urban public park.

With regards to user's level of satisfaction on the selected urban public parks, the of each of the selected urban public parks are different. In regard to Abdullah Fouad's urban public park, the results showed that the average response of most the surveyed aspects was 4 which indicates that most respondents neither strongly agrees nor neutral with the surveyed aspects. Thus, most of the respondents regarding the services were neutral which scored an average of 3. However, with regard to the amenities, shading, quietness and attractiveness, the majority agreed on the aspect's sufficiency, efficiency and considered the selected urban park to be quiet and attractive, therefore, scoring an average of 4. Meanwhile, the average response of accessibility, safety, pedestrian circulation and social interaction was 5, therefore, indicating that most of the respondents consider the selected urban public park of Abdullah Fouad as accessible, safe and socially beneficial, along with, their agreement on the way they circulate within it.

However, the results show that most of the average responses regarding Prince Abdullah Bin Jalawi's urban public park was 4, indicating that most respondents agree that the

amenities are sufficient, the urban public park is well shaded, well furnished, quiet, along with, walking comfortably within it and considering it as an attractive urban public green space. In addition, strongly agreeing that they easily accessible the urban public park, on its social benefits and considering it as a safe urban public green space. However, most respondents disagreed that the services including WCs, prayer areas and soccer pitches are sufficient to meet their needs, arguing during the survey that multiple crucial services especially post the pandemic are missing and not provided, which as well been observed during the performed analysis.

Thus, the results of this study showed that urban public green spaces in general are highly important to people, however, its importance increases during pandemics as seen in the comparison between pre and post-pandemic periods conducted in this study, due to the social and health benefits provided by it. The results showed that the frequency and duration of visiting urban public green spaces had significantly increased post the pandemic in comparison with pre-pandemic periods. Moreover, health and well-being related visits had increased in post-pandemic due to people's post-pandemic perception of urban public green space's benefits, especially due the COVID-19 pandemic's restriction measures that associated with lockdowns that led to minimizing people's mobility to its lowest and minimizing people's ability to socially interact.

Furthermore, as seen in the results, people's perception, standards and requirements in regard to urban public green spaces had been modified post the pandemic. People's satisfaction level on urban public parks differs post the pandemic in comparison to pre-pandemic periods, especially, in terms of accessibility, services, quietness, urban furniture and amenities that provides the needed to accommodate their needs. For instance, people in post-pandemic periods prioritize physical activities in comparison to pre-pandemic periods, along with, mental relaxation which was shown to significantly increase in the post-pandemic period in comparison to the pre-pandemic periods. Therefore, various modifications and on the existing urban public green spaces are required, as well as, being considered when providing sufficient urban public green spaces for the post-pandemic era in order to meet people's post-pandemic perception.

Chapter 5

Conclusion

This study mainly investigated people's post-pandemic perception, importance, use rate and user's preferences of urban public green spaces through comparing people's pre-pandemic's use and user's preferences with post the pandemic use and user's preferences. A questionnaire survey and an urban analysis and observation on two urban public parks in Dammam city, Saudi Arabia was performed. Through the results of the study multiple notable findings are reported.

Firstly, the importance of urban public green spaces to the public had increased in comparison to the pre-pandemic's period. As the results showed, most of the respondents in both pre and post-pandemic periods considers urban public green spaces, however, a noticeable number of respondents used to consider urban public green spaces normally important and a few used to consider it not important in pre-pandemic periods. However, the number of respondents who used to consider urban public green spaces normally and not important in pre-pandemic periods had significantly decreased in favor to the post-pandemic periods. The results show that nearly all the respondents perceive urban public green spaces as highly important post the pandemic, accounting for 90 of the 100 surveyed respondents in Abdullah Fouad's urban public park and 88 in Prince Bin Jalawi's urban public park. Therefore, urban public green spaces are considered highly important to the majority of people in post-pandemic periods and none consider it as not important, despite the few respondents who considered it as normally important and even not important in pre-pandemic periods.

Secondly, people's frequency of visiting urban public green spaces had significantly in post-pandemic periods in comparison to pre-pandemic's periods. The results showed that majority of the respondents used to visit urban public green spaces once in less than a week and once a week in pre-pandemic periods. However, in comparison to post the pandemic, the number of visitors who used to visit once and less than once a week significantly decreased in post-pandemic periods in favor to visiting more than once a week. As in

Abdullah Fouad's urban public park, despite that half of the respondents used to visit more than once a week in pre-pandemic periods, 70 of the 100 surveyed respondents visit more than once a week in post-pandemic. However, the results of Prince Abdullah Bin Jalawi's urban public park as well showed a tremendous decrease of less than once a week and once a week visits in post the pandemic periods, the 63 respondents who used to visit once and less than once a week in pre-pandemic periods dropped to nearly half which accounted for 37 in post-pandemic periods. Moreover, the results showed that the visitor's duration of visits in post-pandemic periods had increased in comparison to pre-pandemic periods. As shown in the results, most of the respondents in both the selected urban public parks used to spend 1-2 hours per visit in pre-pandemic periods and visitors who used to spend less than one hour per visit was close to visitors who used to spend more than 2 hours per visit. However, in post-pandemic periods, visitors who spend more than 2 hours per visit forms the majority which accounted to more than half of the surveyed respondents in both the selected urban public parks and visitors who used to spend less than one hour per visit had significantly decreased, meanwhile, a slight decrease in the 1-2 hours visit durations was found in post-pandemic periods. Thus, due to the increased post-pandemic importance of urban public green spaces, the frequency of visits had increased significantly and visitor's duration of visits had slightly increased post the pandemic in comparison to pre-pandemic periods.

Thirdly, the results showed that urban public green spaces were mostly visited for mental relaxation, followed by physical activities and social gatherings in pre-pandemic periods and the associated activities with the pre-pandemic visits mainly included relaxing, followed by socializing and physical activities in both the selected urban public parks. On the other hand, the results show that urban public green spaces in post-pandemic periods is mostly visited for physical activities which slightly increased in comparison to pre-pandemic periods and the associated activities with the post-pandemic visits are mostly relaxing which was found to slightly decreased despite forming the majority. However, it was found that the reasons of visits and their associated activities are defined by each urban public park amenities, services and context, therefore, the responses differ from one urban public park to another. For instance, with regard to Abdullah Fouad's urban public park, most of the visits in both pre and post-pandemic periods is for performing physical

activities and the associated activities with their visits in both pre and post-pandemic periods were for relaxing, followed by physical activities. As the conducted urban analysis and observation showed, the urban public park of Abdullah Fouad's includes a running track and two soccer pitches, as well, considered as a quite urban public park due to its location, surroundings and vast area. Meanwhile, the results of Prince Abdullah Bin Jalawi's urban public park showed, that the urban public park is mostly visited for mental relaxation in pre and post pandemic periods due to the lack of a proper running track and a proper designed space to accommodate certain physical activity as tennis, soccer or basketball. Nonetheless, despite the lack of physical activities amenities, respondents visiting Bin Jalawi's urban public park for performing physical activities had increased post the pandemic which indicates respondent's post-pandemic perception of urban public green spaces. However, the majority of the respondents visiting of mental relaxation still forms them majority in post-pandemic periods. Therefore, the survey conducted on both the selected urban public parks indicated that people's perception of urban public green spaces is altered post the pandemic due to COVID-19 pandemic's effects on people's physical and mental health, as well as, the general health and well-being of people.

Moreover, due to the increased post-pandemic importance, frequency of visits and the duration spent in urban public green spaces, the questionnaire survey included a user's level of satisfaction part on the selected urban public parks. Along with, the first part which included the comparison of people's pre and post-pandemic perception, importance, use rate and user's preferences of urban public green spaces, in order to conclude urban planning related recommendations for the post-pandemic era.

Despite the differences in the selected urban public parks in terms of their location, area, amenities and services shown in the conducted urban analysis and observation, it was found that the respondent's satisfaction did not vary in regard to the surveyed urban public park. Therefore, assuming that the related surveyed aspects are more systematic and less specific to the selected urban public parks.

The results showed that the aspect which most the surveyed respondents strongly agrees that both the selected urban public parks are considered safe, as it scored the highest

average of 4.73 out of 5.00 in Abdullah Fouad's urban public park and average of 4.54 out of 5.00 in Bin Jalawi's urban public park. On the other hand, the aspect that the most of the surveyed respondents disagreed on its sufficiency and quality was the services, especially WCs which all stated that its not sufficient nor well maintained and the praying areas which most stated that it does not exist.

Furthermore, in terms of accessibility and amenities, the results showed that most of the respondents strongly agrees that the selected urban public parks are easily accessible by foot, in which scored the second highest average in both the selected urban public parks after the safety aspect. However, it is worth mentioning that the accessibility of handicaps issue was raised by most the respondents during the survey, especially in Abdullah Fouad's urban public park which lacks the needed ramps and crossways for handicaps. With regards to amenities, the results showed that the respondents only agree that the amenities are sufficient to meet their needs, nonetheless, despite the respondent's agreement, multiple stated that more regular maintenance is required.

With regard to the shading, urban furniture and the quietness of the selected urban public parks, the results showed that most of the respondents agreed that the selected urban public parks are well shaded, considered quiet and well furnished. However, despite that the urban analysis and observation conducted on the selected urban public parks should that Abdullah Fouad's urban public park is not well shaded nor furnished and that Prince Abdullah Bin Jalawi's is considered noisy due to its location, yet, most of the respondents agreed on the surveyed aspects of shading, urban furniture and quietness.

In terms of the pedestrian circulation and the attractiveness of the selected urban public parks, most of the respondents agreed on that they walk comfortably and they agreed that they consider them as attractive urban public parks. However, it is worth mentioning that the handicaps surveyed in Bin Jalawi's urban public park stated that they circulate comfortably, as well as, they are able to enter the WC easily as well. On the other hand, regarding the social benefits of the selected urban public parks, the results showed that most of the respondents strongly agreed that the urban public parks are socially beneficial and achieves social interaction. In addition, the respondents stated that due to the

pandemic's mental and physical health consequences and their increased post-pandemic value of urban public green spaces, the availability of an accessible urban public green space means that more time should be spent and social gatherings should be hosted within.

Therefore, as the results showed, most of the surveyed respondents in both the selected urban public parks agreed and strongly agreed that the selected urban public parks are easily accessible by foot, considered safe, the amenities are sufficient, well shaded and well furnished, as well as, considered quiet, attractive and achieves social interaction. However, most of the respondents disagreed that the services are sufficient to meet their needs.

Thus, from the overall study, it can be stated that there was substantial impact on the importance, user and user's preferences of urban public green spaces due to COVID-19 pandemic. As seen in the pre and post-pandemic comparison conducted in this study, the importance, frequency and duration of visits of urban public green spaces had significantly increased in post-pandemic periods compared to pre-pandemic periods. Moreover, the reasons of visiting and their associated activities had altered due to the pandemic. As the results showed, visiting for performing physical activities had significantly increased post the pandemic, despite the absence of the necessary amenities and services required in one of the selected urban public parks as seen in the conducted urban analysis and observation, yet, visiting urban public green spaces for performing physical activities had increased. Furthermore, as the importance, frequency and duration of visits had increased post the pandemic, people would likely demand the post-pandemic necessary requirements of urban public green spaces, along with, further improvements in their quality, in which the responsible authorities would need to respond those demands in order to meet people's post-pandemic satisfaction level on urban public green spaces.

Therefore, due to the increased post-pandemic importance of urban public green spaces, multiple urban public green spaces related recommendations for the post-pandemic are offered in this regard:

1. *Provide sufficient and accessible urban public green space:* The WHO standard of 9 m² per capita should be met and urban public green space within walkable radiuses should be provided.

2. *Keep urban public green spaces open during pandemics:* By rescheduling and defining visitor's capacity and implementing precaution measures as masks wearing to prevent and resist COVID-19's spread or other diseases, despite the lack of the required vaccination.
3. *Incorporate public transportation with urban public green spaces:* The public transport should be fully incorporated with urban public green spaces in order to achieve maximum accessibility, especially in the peak of any disease spread in further pandemics.
4. *Prioritize handicaps:* Urban public green spaces should consider handicaps in terms of entering the urban public green space through including ramps and crossovers, considering handicaps circulation within the urban public green space and considering handicap's in terms of accessing WCs.
5. *Provide amenities and services needed to perform physical activities in urban public green spaces:* Due to the pandemic's effects on people's physical and mental health, people's awareness of the benefits of performing physical activities had risen, therefore, each urban public green space should include a running track, along with, the needed amenities for performing physical activities such as soccer pitches and tennis courts.
6. *Raising and maintaining urban public green spaces quality:* As people would likely to demand more of urban public green spaces, the quality should be maintained and risen through adding to the urban public green space, precaution and regular maintenance and developing the urban public green space's components.
7. *Provide high quality urban public green space:* As the importance of urban public green spaces had increased, the post-pandemic satisfaction level should be met.

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Appendix A: Questionnaire Survey

Table 5 Questionnaire Survey

Sample Characteristics							
Gender:	☐ Male		☐ Female				
Age:	☐ 15 – less than 30		☐ 30 – less than 45		☐ 45 -less than 60		☐ 60 and above
Educational level:	☐ High school		☐ Bachelors		☐ Masters or above		
Employment Status:	☐ Employee		☐ Unemployed				
PART 1: Importance, Use Rate and User's Preferences							
No	Question	Pre-pandemic			Post-pandemic		
Q1.1	How important are urban public green spaces to you?	☐ Highly important	☐ Normal	☐ Not important	☐ Highly important	☐ Normal	☐ Not important
Q1.2	How often do you visit urban public urban green spaces?	☐ Less than once a week	☐ Once a week	☐ More than once a week	☐ Less than once a week	☐ Once a week	☐ More than once a week
Q1.3	What is the duration of your visits to urban public green spaces?	☐ Less than 1 hour	☐ 1 - 2 hours	☐ More than 2 hours	☐ Less than 1 hour	☐ 1 - 2 hours	☐ More than 2 hours
Q1.4	What are the reasons of your visits to urban public green spaces? (You may choose more than one)	☐ Mental relaxation	☐ Social gatherings	☐ Physical activities	☐ Mental relaxation	☐ Social gatherings	☐ Physical activities
Q1.5	What are the activities associated with your visits to urban public green spaces? (You may choose more than one)	☐ Physical activities (e.g. walking and exercising)	☐ Socializing (e.g. Spending time with family and friends	☐ Relaxing (e.g. connecting with nature)	☐ Physical activities (e.g. walking and exercising)	☐ Socializing (e.g. Spending time with family and friends	☐ Relaxing (e.g. connecting with nature)
PART 2: User's Level of Satisfaction with The Selected Urban Public Parks							
Q2.1	Do you consider this urban park to be easily accessible?	☐ Strongly agree	☐ Agree	☐ Neutral	☐ Disagree	☐ Strongly disagree	

Q2.2	Do you think this urban park is safe?	☐ Strongly agree	☐ Agree	☐ Neutral	☐ Disagree	☐ Strongly disagree
Q2.3	Do you agree that amenities in this urban park are sufficient to meet your needs?	☐ Strongly agree	☐ Agree	☐ Neutral	☐ Disagree	☐ Strongly disagree
Q2.4	Do you agree this urban park is well shaded?	☐ Strongly agree	☐ Agree	☐ Neutral	☐ Disagree	☐ Strongly disagree
Q2.5	Do you agree that this urban park is well furnished in terms of benches, lighting and shelters?	☐ Strongly agree	☐ Agree	☐ Neutral	☐ Disagree	☐ Strongly disagree
Q2.6	Do you agree that this urban park is quiet?	☐ Strongly agree	☐ Agree	☐ Neutral	☐ Disagree	☐ Strongly disagree
Q2.7	Do you agree that the services in this urban park are sufficient?	☐ Strongly agree	☐ Agree	☐ Neutral	☐ Disagree	☐ Strongly disagree
Q2.8	Do you walk comfortably inside the park?	☐ Strongly agree	☐ Agree	☐ Neutral	☐ Disagree	☐ Strongly disagree
Q2.9	Do you agree that this urban park includes attractive views and is considered as an attractive urban park?	☐ Strongly agree	☐ Agree	☐ Neutral	☐ Disagree	☐ Strongly disagree
Q2.10	Do you think this urban park is socially beneficial?	☐ Strongly agree	☐ Agree	☐ Neutral	☐ Disagree	☐ Strongly disagree

Appendix B: User's Overall Level of Satisfaction with The Different Design Aspects of The Examined Urban Public Parks.

Table 6 User's Overall Level of Satisfaction with The Different Design Aspects of The Examined Urban Public Parks

No	Design Aspect	Case Study 1				Case Study 2			
		N	Mean	Achieved	Rank	N	Mean	Achieved	Rank
2.1	Accessibility	100	4.67	SA	3	100	4.41	SA	3
2.2	Safety	100	4.73	SA	1	100	4.46	SA	1
2.3	Sufficiency of recreational amenities	100	4.32	SA	5	100	3.69	A	8
2.4	Shading	100	3.59	A	8	100	3.80	A	5
2.5	Sufficiency of urban furniture	100	3.57	A	9	100	3.75	A	7
2.6	Quietness	100	4.27	SA	6	100	3.80	A	6
2.7	Sufficiency of public services such as toilets	100	2.91	N	10	100	2.55	D	10
2.8	Comfortable pedestrian movement	100	4.54	SA	4	100	4.27	SA	4
2.9	Attractive views	100	4.13	A	7	100	3.64	A	9
2.10	Social benefit	100	4.69	SA	2	100	4.45	SA	2

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