URBAN GREEN SPACE FOR ENVIRONMENTAL HEALTH IN RELATION TO PANDEMIC CRISES

BY

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ABSTRACT

Urban green spaces are a significant element in making cities more sustainable, greener, and healthier places to live in a world with an expanding population and urbanization. The growing importance of urban green space is evident as it is now becoming one of the venues for recreation quests in agreement with the fast lane of urban lifestyles. Urban green space can be related to environmental health because it reduces environmental and health inequities. It became an essential medium for preventing pandemic spread, especially in the current context of global urbanization and helped enhance public health. The research aim is to investigate the roles of urban green space for environmental health in relation to pandemics crises. The exploratory research employs mixed methods, using qualitative and quantitative methods to elicit the data consisting of questionnaire surveys and semi-structured interviews. For questionnaire surveys, there are 421 respondents, which use random sampling to ensure equal probability chances are given to everyone through an online questionnaire survey. For the semi-structured interview, a total of 17 participants were involved in the semi-structured interviews. The data from the quantitative method were analyzed by using SPSS software (Version 27). Content analytic techniques were used to analyze data from the semi-structured interview. The findings revealed that two factors influenced the roles of urban green space during the pandemic, which are social and environmental. For the social factor, the findings revealed that the roles of urban green space are improved immune system functioning, improved social capital and cohesion, reduced mortality and increased life span, potential adverse health effects, improved mental health and stress reduction, and improved physical health. For the environmental factor, the roles of urban green space are beautifying and making a healthier environment, promoting biodiversity, creating valuable, usable space for people, and reducing the risk of disease transmission. The formation of the framework of urban green space for environmental health concerning pandemic crises becomes the overall findings of the research. The framework emphasizes the seven indicators of urban green space as environmental health such as demographic, knowledge and understanding; urban green space visitation; activities in urban green space, the effectiveness of urban green space elements; urban green space for mental health treatment and urban green space for physical health lifestyles. The framework will help government agencies and policymakers to enhance urban green space usage during the pandemic. The concept of Ad-Deen, which brings the meaning of a whole way of life in reducing pandemic crises, is produced after three stages in the framework. The Ad-Deen concept that highlights three aspects which are physical well-being, mental well-being and spiritual well-being, in reducing pandemic spread, will become the fundamental framework of the function and role of urban green space in reducing the pandemics crises.

ملخص البحث

تعد المساحات الخضراء الحضرية عنصرًا مهمًا في جعل المدن أكثر استدامة وخضرة وصحة للعيش في عالم يتزايد فيه عدد السكان والتوسع الحضري. إن الأهمية المتزايدة للمساحات الخضراء الحضرية واضحة لأنها أصبحت الآن واحدة من أماكن المهام الترفيهية بما يتوافق مع المسار السريع لأنماط الحياة الحضرية. يمكن ربط المساحات الخضراء الحضرية بالصحة البيئية لأنها تقلل من عدم المساواة البيئية والصحية. وأصبحت وسيلة أساسية لمنع انتشار الأوبئة، وخاصة في السياق الحالي للتوسع الحضري العالمي وساعدت في تعزيز الصحة العامة. هدف البحث هو دراسة أدوار المساحات الخضراء الحضرية للصحة البيئية فيما يتعلق بأزمات الأوبئة. يستخدم البحث الاستكشافي أساليب مختلطة، باستخدام الأساليب النوعية والكمية للحصول على البيانات التي تتكون من مسوحات الاستبيان والمقابلات شبه المنظمة. بالنسبة لاستقصاءات الاستبيان، هناك 421 مشاركًا، يستخدمون أخذ العينات العشوائية لضمان منح فرص احتمالية متساوية للجميع من خلال استبيان استبيان عبر الإنترنت. بالنسبة للمقابلة شبه المنظمة، شارك ما مجموعه 17 مشاركًا في المقابلات شبه المنظمة. تم تحليل البيانات من الطريقة الكمية باستخدام برنامج SPSS (الإصدار 27). تم استخدام تقنيات تحليل المحتوى لتحليل البيانات من المقابلة شبه المنظمة.وكشفت النتائج أن هناك عاملين أثرا على أدوار المساحات الخضراء الحضرية أثناء الوباء، وهما الاجتماعي والبيئي. بالنسبة للعامل الاجتماعي، كشفت النتائج أن أدوار المساحات الخضراء الحضرية هي تحسين أداء الجهاز المناعي، وتحسين رأس المال الاجتماعي والتماسك، وانخفاض معدل الوفيات وزيادة متوسط العمر، والآثار الصحية الضارة المحتملة، وتحسين الصحة العقلية والحد من التوتر، وتحسين الصحة البدنية. . بالنسبة للعامل البيئي، فإن أدوار المساحات الخضراء الحضرية هي تجميل البيئة الصحية وجعلها

أكثر صحة، وتعزيز التنوع البيولوجي، وخلق مساحة قيمة وقابلة للاستخدام للناس، والحد من مخاطر انتقال الأمراض. إن تشكيل إطار المساحة الخضراء الحضرية للصحة البيئية فيما يتعلق بالأزمات الوبائية يصبح النتائج الإجمالية للبحث. ويؤكد الإطار على المؤشرات السبعة للمساحات الخضراء الحضرية مثل الصحة البيئية مثل الديموغرافية والمعرفة والفهم؛ زيارة المساحات الخضراء الحضرية؛ الأنشطة في الفضاء الأخضر الحضري، وفعالية عناصر الفضاء الأخضر الحضري؛ مساحة خضراء حضرية لعلاج الصحة العقلية ومساحة خضراء حضرية لأنماط الحياة المتعلقة بالصحة البدنية. وسيساعد الإطار الوكالات الحكومية وواضعي السياسات على تعزيز استخدام المساحات الخضراء الحضرية أثناء الوباء. إن مفهوم الدين، الذي يحمل معنى أسلوب حياة كامل في الحد من الأزمات الوبائية، يتم إنتاجه بعد ثلاث مراحل في الإطار. إن مفهوم الدين الذي يسلط الضوء على ثلاثة جوانب هي السلامة الجسدية، والصحة العقلية، والسلامة الروحية، في الحد من انتشار الجائحة، سيصبح الإطار الأساسي لوظيفة ودور المساحات الخضراء الحضرية في الحد من أزمات الأوبئة.

APPROVAL PAGE

The dissertation of Ali Saifuddin bin Nor Azhar has been approved by the following:

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DECLARATION

I hereby declare that this dissertation is the result of my own investigations, except where otherwise stated. I also declare that it has not been previously or concurrently submitted as a whole for any other degrees at IIUM or other institutions.

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LIST OF ABBREVATIONS

CDC	Centers for Disease Control and Prevention
IIUM	International Islamic University Malaysia
OECD	Organization for Economic Co-operation and Development
SDG	Sustainable Development Goal
SPSS	Statistical Package for the Social Sciences
UGS	Urban Green Space
UGSI	Urban Green Space Indicator
WHO	World Health Organisation

CHAPTER ONE

INTRODUCTION

1.1 INTRODUCTION

The chapter presents the introduction of research topic which elaborate on research background in which explain about urban green space, sustainable environmental health and pandemic crises. The chapter focuses on the research issues and problems highlighting environmental changes and social changes related to pandemic spread. Moreover, the chapter introduces research aim, research questions and research objectives. The chapter also introduces the gap of research as well as the thesis structure to give overall research ideas.

1.2 RESEARCH BACKGROUND

Urban green space is any “green space”, “public open space”, or “park” in an urban setting (Lee et al., 2015). Green space in cities is one of the most essential aspects of environmental preservation in cities. It refers to any green areas as well as places with permeable hard surfaces that are primarily composed of "soft surfaces" like soil, grass, bushes, and trees (Dunnett et al., 2002; Lee et al., 2015). They add that the examples of urban green spaces such as parks and gardens, housing green spaces, city farms, grassland, private green areas, sports grounds, and agricultural districts.

According to Revi et al. (2014), 70% of the world's population is anticipated to stay in cities by 2050.Urban green spaces are significant for community in term of quality of life, health, and general wellbeing. Urban green spaces use for preserving wildlife, water catchments, grasslands, flora, filtering air in the cities, and a place for recreational activities (José et al., 2018). Urban green space is a part of "green infrastructure," (World Health Organization, 2020). Urban green space is a significant part of promoting environmental health among urban communities in public open spaces and common services provided by a local city authority (World Health Organization, 2020). It is essential to make sure that green spaces are accessible without difficulty accessible to all population groups and distributed equitably within the city. Green spaces are the area that is filled with trees, grass, elements of water, shrubs. The green spaces typologies defined based on size, distance and facilities (Guedes et al., 2019).

Urban green spaces are a significant element for making cities more sustainable, greener, and healthier places to live in a world with an expanding population and urbanisation (World Health Organization - WHO, 2017). According to Naomi (2021) and Braubach et al. (2017), explain urban green space give negative consequences such as pollen allergies, illnesses, or injuries. He adds the majority of negative consequences are often linked with poorly maintained and designed of green space. According to Braubach et al. (2017); Naomi (2021), emphasize that the appropriate planning, design, and maintenance of urban green space can lessen or prevent these effects for example planting non-allergenic vegetation species, monitoring disease vectors and enlightening safety.

Green space has the potential to alleviate environmental and health inequities through giving all community equivalent chances to interact in and benefit from natural settings, as well as equal ecosystem services like pollution and noise control (Braubach et al., 2017). In addition, urban green spaces also tend to have reduced health-care costs due to it provides healthier environment and more productive community. Urban green space can be related to sustainable environmental health due to it contributes to reducing environmental and health inequities. For example, urban green space provides communities with equal chances to engage in and beneficial from natural surroundings, as well as equal ecosystem services such as provides fresh air for recreational activities (Braubach et al., 2017). According to Kruize et al. (2019) and Naomi (2021), the element of urban green space which is vegetations is important to provide shade and to control the temperature. Thus, vegetation in urban green space provides shade and the process of evapotranspiration able to aid in the generation of airflows and the dispersal of pollution concentrations. The factors such as the gender, environment, type of contacts, life course, age, social groups, and level of physical activity appear to have an impact on the health and urban green space visitation (Kruize et al., 2019).

A well-designed, attractive, accessible, and well-maintained urban green space able to boost environmental sustainability. It may encourage people to engage in more sustainable and healthful behaviors by making it more appealing to cycle or walk (Kruize et al., 2019). The provision of a number of ecosystem services by urban green space benefits individuals by enhancing their quality of life and ability to fight off various diseases (Xie et al., 2020; Naomi, 2021).

Urban green spaces offer a variety of ecosystem services that can help people cope with a variety of ailments, enhance quality of life, and improve mental and physical health. Stress has a detrimental effect on psycho-physiological health, and outdoor leisure in urban green spaces such parks in which assist to lessen these depressive mood conditions (World Health Organization, 2017). According to Xie et al. (2020), stress has a negative impact on psycho-physiological health. She adds that by performing recreational activities in urban green space able to reduce stress among community in the city. Urban green space has been shown to be helpful in enhancing public health against the backdrop of current global urbanisation (Liu, 2019). Exposure to green space is also beneficial to a community's physical and mental wellness (Sandy et al, 2020). She adds regular physical activity such as exercise is important for both physical and mental health and may be useful in maintaining the body and reducing the harm brought on by the pandemic.

The urban green space able to improve mental and physical health and improving the body's immune system (Braubach et al., 2017). At the same time, increased exposure to allergens (pollen) and the danger of infectious infections, as well as skin cancer from excessive UV exposure, could have negative health consequences (Kruize et al., 2019). Many of these negative consequences can be avoided with attention, good practice, appropriate design. In practice, balancing the positive effects of more and greater green space against the negative consequences could be hard. It is believed that knowledge of benefits and risks is not always broadly available especially among experts working in fields such as urban design.

Furthermore, some of the health impacts linked to stress could be the result of a combination of stress and physical activity. Physical activity able to reduce stress levels in which mental and physical health (Bell et al., 2020). Urban green space able to lower health-care expenditures in which may attract the attention of health-insurance firms (World Health Organization, 2016). Many healthcare professionals are already promoting the use of green space through "therapeutic" activities in green space as well as collaborating with doctors to prescribe the activities (Kruize et al., 2019). These efforts are still in their early stages, but there is a lot of room for them to grow and be evaluated.

Urban green space is significant for healthy environment as well as heathy city. There is still a lot of confusion about the existing of urban green space and epidemics (World Health Organization, 2017). Moreover, it is crucial to comprehend the various roles that different kinds of green spaces play in promoting public health because green space has been defined as a combination of urban green space, agricultural space, and natural green. Parks may greatly increase physical activity, which has a bigger favourable effect on the health of community. It has been demonstrated that having green space in the neighbourhood, as part of overall green space coverage, has positive effects on the local community. Green spaces vary in terms of vegetation cover, ecological dimension, and environmental quality.

This research emphasizes the effectiveness of urban green space for sustainable environmental health in relation to pandemic crises. According to history of pandemics like Ebola, SARS, and SARS-CoV-2 in which all these pandemics are enormously infectious viruses have led to global pandemics from 2002 and all these three transmissions to people by animals that come from the jungle (Vidal, 2020). Since the 1918 flu pandemic, the novel human coronavirus Covid-19 has emerged as the fifth known pandemic (Liu et al., 2020). The pandemic Covid-19 originated in Wuhan, China and spread over the entire world (Liu et al., 2020).

The International Committee on Taxonomy of Viruses through phylogenetic analysis stated that this virus was known to have severe acute respiratory syndrome coronavirus 2 SARS-CoV-2 believed to originate from animals and spread among them then adapted the ability of people-to-people virus transmission (Liu et al., 2020). The Corona virus is highly contagious, and it rapidly spreads among humans on the earth. The rising pandemic reflects the profound changes in society and in behavioral patterns of communities especially in the environment of urban green space (Liu et al., 2020). Urban green space like open space, playgrounds, pocket space, and park able to lesser morbidity and mortality, enhance mental and physical health in urban city by stimulating social cohesion, psychological relaxation, stress alleviation, enhance physical activity, and control contact to air pollutants, excessive heat and noise (World Health Organization, 2016).

The relationship of urban green space with potential health regularly being discussed through approaches to reduce the risks with the sustainable maintenance and

design of green spaces for healthy urban areas. Nowadays, health care systems have been broadly well recognized to play a great role and importance in determining the modern society's quality of life and social welfare in urban areas (Braubach et al., 2017).

1.3 ISSUES AND PROBLEM STATEMENT

Nowadays, the impact of urbanisation destroys many green areas due to limited spaces for the purposes of housing, retail and commercial developments as well as transport infrastructure. Global deforestation, zoonotic and vector-borne disease outbreaks, as well as evidence that reforestation and plantations may lead to infectious disease or epidemics (Morand and Lajaunie, 2021). It is anticipated that these levels of urbanisation will lead to social and health inequities in which lead to a negative effect on people's mental and physical health as well as social cohesion (Corti et al., 2016).

Human activities and wildlife trade continue in tropical forests in which lead humans exposed to wild animals and the diseases that they may transmit (Vidal, 2020). Animals are forced into different or smaller regions through human activities such as logging and mining lead to degrade or destroy natural habitats, and they are more prone to get sick and stressed. This animal is more likely to come into touch with humans and domestic animals, which increases the risk of disease transfer from wildlife to humans. Animal species that are in risk of extinction due to overexploitation or habitat loss are more likely to get diseases.

World Health Organization (2017), indicated that green spaces and innovative strategies can improve urban communities' well-being and health by strengthening local resilience, enhancing the quality of the urban environment, and promoting sustainable lifestyles. These strategies able to make sure that communities have appropriate opportunities for exposure to nature, that urban biodiversity is maintained and protected, that environmental hazards like noise and air pollution are reduced, and that the effects of extreme weather events like flooding and heatwaves are minimised. Urban green space for example gardens and parks consists of vegetation in private and public spaces in which act as an element of these strategies (World Health Organization WHO, 2017).

Nowadays, the issues on Covid-19 pandemics are frequently in the media. It has become a widespread chronic pandemic throughout the world. Recently, the awareness of urban green space is rise and it has the potential to make a large contribution to global environmental sustainability, health, and health equity at the same time (Kruize et al., 2019). The environment conditions these days are related with pandemics and further factors for example chronic stress, insufficient recreational activity and become close to anthropogenic environmental risks (Ayesha, 2021). Green space is an important medium for preventing pandemics spread especially in the current context of global urbanisation in which urban green space has been shown to be useful in enhancing public health (Slater et al., 2020).

This research consists of two main issues which are environmental changes and social issues that lead to occurrence of various diseases infection in humans and exposure to the pandemic and virus from wild animals and the diseases they may transmit in related to green spaces due to human activity. Below is the explanation about the issues:

a) Environmental Changes

The first issue is environmental changes. According to the World Health Organization (2003), there are five environmental changes effects the occurrence of numerous diseases infection in human related to green space such as:

i. The construction of dams, canals, and irrigation
ii. Agricultural intensification
iii. Urbanisation, urban crowding
iv. Deforestation and new habitation
v. Reforestation

Table 1.1 below is the environmental changes that affect the occurrence of various diseases and infection in humans.

Table 1.1 The environmental changes affect the occurrence of various diseases infection in human

Environmental changes	Example diseases	Pathway of effect
Dams, canals, irrigation	-Schistosomiasis -Malaria -Helminthiasies -River blindness	▲Snail host habitat, human contact ▲Breeding sites for mosquitoes ▲ Larval contact due to moist soil ▼Blackfly breeding,▼ disease
Agricultural intensification	-Malaria -Venezuelan haemorraghic fever	▲Crop insecticides and ▲vector resistance ▲ rodent abundance, contact
Urbanization, urban crowding	-Cholera -Dengue -Cutaneous leishmaniasis	▼ Sanitation, hygiene;▲ water contamination ▲Water-collecting trash,▲ Aedes egypti mosquito breeding sites proximity, sandfly vectors Malaria
Deforestation and new habitation	-Malaria -Oropouche -Visceral leishmaniasis	▲ Breeding sites and vectors, immigration of susceptible people ▲ contact, breeding of vectors ▲ contact with sandfly vectors
Reforestation	-Lyme disease	▲ tick hosts, outdoor exposure

▲Increase ▼Reduction

Source: (World Health Organization, 2003)

Based on Table 1.1 the environmental changes of human activity such as the construction of canal, dam, irrigation leads to snail host habitat, breeding sites for mosquitoes, larval contact due to moist soil and build blackfly breeding in which give human contact and directly can cause disease such as Schistosomiasis, Malaria, Helminthiasis and river blindness (World Health Organization, 2003). Human activity such as agricultural intensification can cause Malaria, Venezuelan hemorrhagic fever from crop insecticides and vector resistance rodent abundance, contact (World Health Organization, 2003). According to the Organization for Economic Co-operation and Development OECD (2020), the diseases such as Nipah virus, Lyme disease, Malaria, Schistosomiasis, and West Nile come from wildlife which are reservoirs for pathogens

like the novel coronavirus into closer proximity with each other and humans. In short, environmental changes lead to diseases to humans.

According to Alves (2021), larger groups of people living in one place because of increasing displacement due to environmental disasters makes it more difficult to provide all necessary conditions for an adequate life, which may result in diseases linked to poor water quality, low food quality or intake, and other factors. There is also the issue of ongoing human population increase, which is putting strain on urban regions and causing people to feel compelled to expand urban frontiers, which leads to an invasion of wild territory contact (World Health Organization, 2003). This shortened the barrier between people and wild animals carrying infections unknown to humans, disrupting the body's natural defensive system and perhaps allowing infectious diseases to spread beyond the control of sanitary agencies. The World Health Organization (2003) stated that urbanisation cause urban crowding my lead to Cholera (sanitation, hygiene; water contamination), Dengue (water-collecting trash, Aedes aegypti mosquito breeding sites) and Cutaneous leishmaniasis (proximity, sandfly vectors Malaria). According to Alves (2021), the urbanisation process for housing and commercial development had destroyed many green spaces on the earth.

Moreover, the environmental changes such as deforestation and new habitation can cause to breeding sites and vectors, immigration of susceptible people contact, breeding of vectors contact with sandfly vectors and lead to diseases such as Malaria, Oropouche and Visceral leishmaniasis contact (World Health Organization, 2003). The deforestation, zoonotic and vector-borne disease outbreaks, as well as evidence that reforestation and plantations may lead to infectious disease or epidemics (Alves, 2021). Reforestation causes Lyme disease in which tick hosts and outdoor exposure will give negative consequences (World Health Organization, 2003).

Other environmental changes such as ocean warming cause red tide and produce toxic algal blooms to the environment (World Health Organization, 2003). Elevated precipitation causes rift valley fever and Hantavirus pulmonary syndrome in which it provides a pool for mosquito breeding and rodent food, habitat, and abundance. Overexploitation of natural resources for capitalist agendas and for the benefit of humanity has created an imbalance in nature, and the effect it has on nature will eventually give negative impact (Alves, 2021). Alves (2021), stated that the damages

that mankind has inflicted on nature, whether through over-exploitation of resources, the burning of fossil fuels, deforestation, or an increase in industrial activity, have resulted in an environmental imbalance in which greenhouse gas concentrations in the atmosphere have risen well above the natural level on the planet, causing global warming, which is the primary driver of climate change.

Climate change is a significant factor in determining one's health (World Health Organization, 2003). The climate limits the range of infectious diseases, whereas the weather affects the frequency and severity of epidemics. Epstein (2001), in his book/article titled, "*Climate change and emerging infectious diseases. Microbes and Infection, Volume 3*", p. 747, states that "long-term warming is promoting the geographic spread of several major illnesses, while extreme weather events are producing a "cluster" of disease outbreaks and causing a series of "surprises."

The degradation of green spaces puts wildlife that serves as reservoirs for viruses like the new coronavirus closer to people (Andersen, 2020). He states that the Covid-19 outbreak in which failure to care for the planet implies failing to care for ourselves with the message "Nature is sending us a message with the coronavirus pandemic,". Kuo (2015), explained the importance of urban green space in the connections between nature and health for improved immune function. According to Rook (2013) the long-term benefit of exposure to the green space is one of many impacts covered by the hygiene hypothesis or the biodiversity hypothesis. He described the immune system's evolved necessity to absorb inputs from microbial biodiversity, particularly species that must be tolerated, and hence have coevolved functions as immunoregulatory pathway inducers. These immunoregulatory mechanisms help to prevent chronic inflammation and the disorders that come with it, such as cardiovascular disease and depression (Rook, 2013). Urban green space should be protected and safeguarded because it helps the immune system work more effectively through the natural health-nature linkages.

b) Social Issues

The second issue is social issues. In this research social issues are divided into two factors which are the recreational issue and physical contact issues. According to the Ministry of Health Malaysia (2022), there were 4.94 million total cases of Covid-19 cases with 36,522 total deaths as of 10 November 2022. Volenec et al. (2021) and

Korpilo et al. (2021), described that the pandemic led to the closure of the recreational areas to reducing pandemic cases in Malaysia and other countries. Indirectly, the implication of the closure of urban green space will cause communities to have no place for recreational activities to improve health.

Previous research has shown that the greater effect on mental health through showing complex levels of evading behavior and anger with long duration of the quarantine period (Brooks et al,.2020; Xie et al., 2020). Moreover, facilities like the gymnasiums also not able to be used because of the risk of infection during quarantine, which leads to further deterioration of health (World health Organization, 2020). A change in human behavioral patterns such as no physical contact with other people gives depression and isolated community. According to Xie et al. (2020), previous research only emphasizes the importance of urban green space to improve human health without considering the pandemic crises.

The additional issues for the research are lack of knowledge and information about the significance of urban green space for sustainable environmental health in related to pandemic crises (Noszczyk et al., 2022). According to Mora et al. (2022); Xie et al. (2020), the discussions regarding urban green spaces' role under extremely stressful circumstances (such as during a pandemic) are still limited. Therefore, this research focus on roles and contribution of urban green space during pandemic crises.

Table 1.2 below are the previous research that highlighted about social and environmental issues of green space and roles and benefits of urban green space related to pandemic:

Table 1.2 The previous research that highlighted ab out social, environmental issues of green space and roles and benefits of urban green space related to pandemic

Author	**Keywords**	**Social Issues**	**Environment issues**	**Roles and benefit of green space related to pandemic crises**
World Health Organization (2021) Green and New Evidence and Perspectives for Action Blue Spaces and Mental Health	Mental health – the public health challenge; The main WHO policy frames relevant for the work on green and blue spaces and health; The health benefits of urban green and blue spaces; The green space types and characteristics are most beneficial; The blue space types and characteristics are most beneficial	The concentration of the virus threat and the physical limitations put in place as a result of it and the function of such spaces as substitute areas for physical activity and social interaction	Not available	Only focusing green space's benefit on mental health
Alizadehtazi (2021) Urban Park usage during pandemic	Comparison of park usage and Covid-19 cases between parks; Comparison between vulnerability and density categories; Correlation between the number of park users and Covid-19 cases	No significant correlation between Covid cases and park usage	Parks may spread Covid-19 more widely	Not available
Larson (2021) Urban Park Use During the Covid-19 Pandemic: Are Socially Vulnerable Communities Disproportionately Impacted?	Declines in urban park visitation since the start of Covid-19; Declines in park visitation during the pandemic was more pronounced in socially vulnerable communities	Inequitable access to and use of parks and greenspace may make socially vulnerable populations worse	Not available	Using green spaces encourages healthy lifestyle, which lowers the risk of cardiovascular disease and other chronic health disorders

Herman (2021). Green Infrastructure in the Time of Social Distancing: Urban Policy and the Tactical Pandemic Urbanism	Urban Parks; Low-Budget Strategies Green Infrastructure; Tactical Urbanism	Pandemic urban ethnography	'Tactical pandemic urbanism' in design management method	Not available
Forsyth (2020) What role do planning and design play in a pandemic?	Role of planning and design on pandemic on the future urban life	Planning, design and public health have focused less on infectious diseases	The environment needs to focus on all population group. The current pandemic asks to provide effective design for infectious diseases.	Not available
Xie (2020) Urban Parks as Green Buffers During the Covid-19 Pandemic Sustainability	Pandemic; quarantine; health; urban parks; green buffer	Decline in residents' physical and mental health as a result of a lack of social connection	Urban parks have a special role in pandemics, offering areas for socialising and safe outdoor activities, resolving residents' health issues on a budget, and lowering potential health hazards	Provide people access to a variety of ecosystem services that can help them better manage their health and a variety of ailments.
Bratman (2019) Nature and mental health: An ecosystem service perspective	Value of nature experience for mental health; consensus across the natural, social, and health sciences on the impacts of nature experience on cognitive functioning, emotional well-being, and other dimensions of mental health; ecosystem service assessments can be expanded to include mental health	Rapid urbanisation and declines in human contact with nature	Human well-being is linked to the natural environment and actionable understanding of these links is deepening in diverse disciplines	Not available too general on nature
Kabisch (2017) Urban Green Spaces and the Potential for Health Improvement and Environmental Justice in a Changing Climate	Health and urban green space through climate change affect; urban green area may be linked to an insufficient provision of ecosystem services and the related positive health outcome effect	Not available	Urbanisation and climate change have an impact on people's health and wellbeing	Reduced mortality, reduced cardiovascular morbidity, lower blood pressure and decreased depressive symptoms

World Health Organization (2016) Urban green spaces and health	Urban green spaces, roles for human; evidence of health benefits, discusses pathways to health and evaluates health-relevant indicators of urban green space	Not available	Not available	By promoting psychological relaxation and stress reduction, fostering social cohesiveness, encouraging physical exercise, and minimising exposure to air pollutants, noise, and extreme heat, urban dwellers' physical and mental health will improve, and morbidity and mortality will decrease
Daniella (2010) Green Space, Blue Space and Mental Health in An Urban Setting: A Phenomenological Research	Physical and Mental health of urban green spaces roles.	Not available	Not available	Green spaces improve mental and physical health.
Maas (2006) Physical activity as a possible mechanism behind the relationship between green space and health: A multilevel analysis.	Green space, urbanity, and health; the amount of green space in the living environment is related to the level of physical activity	The relation between the amount of green space in people's living environment and their perceived general health	More people may have to live in residential areas with less green resources due to growing urbanisation and a densification policy in spatial planning.	Not available

1.4 RESEARCH GAPS

The urban green space (UGS) becomes increasingly important as populations become more urbanised. A city's public open spaces and common services must include urban green space since it can foster a healthy environment for all community (World Health Organization, 2017). It is critical to guarantee that public green areas are easily accessible to all communities and that they are spread equally around the city.

Various works have been done on urban green space including the roles and benefits related to the public (World Health Organization, 2017). Therefore, from the above Table 1.2, it summarizes that from the previous research from 2006 until 2021 there is a limited studies about social and environmental issues of green space together with the roles and benefits of urban green spaces related to pandemic crises. The research needs to be conducted to investigate the roles and benefits of urban green space for sustainable environmental health in relation to pandemic crises by highlighting the social and environmental issue of green spaces. Therefore, the research focuses on the roles of urban green space for sustainable environmental health in relation to pandemics crises because of the main issues of the research which is environmental changes and social issues of green space.

Thus, the research focuses on the roles and benefits of urban green space for sustainable environmental health in relation to pandemic crises. The research strives to evaluate the roles of the urban green space to reduce pandemics spread for a healthy environment and investigate the benefits of the urban green space in relation to pandemics crises. The gap of this research was to highlight the importance of urban green space among communities during pandemic crises. Moreover, this research proposes the urban green space framework for sustainable environmental health in relation to pandemic crises.

Developing urban green space by considering pandemic crises helps to understand the effectiveness of urban green space for sustainable environmental health and thus contributing to the increase the awareness of community about the benefit of urban green space during pandemic. The result of this work is useful for policy makers as a foundation for the higher officials in formulating plans that can assist in planning and designing urban green space development in relation to pandemic crises. Moreover,

this research provides on developing and expanding theory or knowledge in urban green space related to pandemic crises which is limited in Malaysia and to the world.

1.5 RESEARCH AIM

The research aim is to investigate the roles of urban green space for the environmental health in relation to pandemics crises.

1.6 RESEARCH QUESTIONS

i. What are the roles of urban green space for environmental health?

ii. How does urban green space contribute to health crises in relation to pandemic spread?

iii. How urban green space became the framework for environmental health?

1.7 RESEARCH OBJECTIVES

i. To identify the roles of the urban green space for environmental health.

ii. To evaluate the contribution of the urban green space in relation to pandemics spread.

iii. To propose the urban green space framework for environmental health.

1.8 THESIS STRUCTURE

There are five chapters in the thesis. All chapter content focuses on research aim and objectives. The titles of the five chapters are (1) Introduction, (2) Literature review, (3) Research methodology, (4) Research results and findings, and (5) Interpretation and conclusion.

Chapter One (Introduction) introduces the topic of research which together with research background, issues, aim, research question and objectives of the research. Moreover, the chapter explains the research gaps together with the thesis structure.

Chapter Two (Literature review) review of literature where the sources are from journals, articles, thesis, report, magazine, and newspaper. This chapter discusses and highlights major topics which are related to the research title. Early explanation of definitions of urban green space and the explanation of healthy cities in relation to pandemics. Besides that, this research describes the relationships between community

and urban green space. The history of pandemics is explained, and it is followed by explanations of symptoms, causes, risk factors, complication, and prevention of pandemics. The consequences of pandemics also being highlighted and followed by the explanation of green space and health. After that, the roles and benefits of urban green space are highlighted. Additionally, the explanation on the best criteria of an urban green space in relation to pandemic crises is also being focused. The research depends on research in many disciplines that evaluate urban green spaces, sustainable environmental health and pandemic crises.

Chapter Three (Research methodology): introduces and explains the methods that are employed in the research. It defines research design, survey and data collection. The chapter includes explanation of case research of the selected sites. Moreover, the chapter introduces the research method such as questionnaire survey and semi structured interview.

Chapter Four (Research results and findings): explains the research findings. This chapter presents the core of the research aims. This chapter explains the main findings and results of the research from questionnaire survey and semi structured interview.

Chapter Five (Interpretation and conclusion): this chapter introduces the research conclusion. It also contains a summary, ideas and recommendations for more research in the future. It also presents interpretation of findings, context of findings and implications of findings.

1.9 CONCLUSION

The chapter acts as an outline or the basis for the research so that it may be easier for the researcher to determine the objectives and the measures need to be taken to achieve the designated aim for that matter. The next chapter discusses on the literature review to get a deeper understanding in regard to this subject. The chapter on the literature review exhibits in-depth subject knowledge and offers justifications for the research topic.

CHAPTER TWO

LITERATURE REVIEW: URBAN GREEN SPACE AS SUSTAINABLE ENVIRONMENTAL HEALTH

2.1 INTRODUCTION

The chapter explains about the theoretical framework of the research. It started with the definition of the urban green spaces and how it became the framework for sustainable environmental health in relation to pandemic crises. The chapter further describes the relationship of sustainable environmental health and urban green spaces; and explains the role of urban green spaces for sustainable environmental health. The chapter includes the Islamic perspectives to firm the theory of the research.

2.2 THEORY OF URBAN GREEN SPACE

Charles (1991), stated that the earliest definition of urban green zones was created by Frederick Law Olmsted who is an American Landscape Architect who was influenced by the public-open-space movement in England and the Boston Park System in which was established in the nineteenth century. Francis et al., (1984), stated that the strategy to introduce nature that begins with central and prospect parks in New York City is referred to Olmsted as the "lungs of the city". Nature has a beneficial effect on human behavior, according to Frederick Law Olmsted, and well-planned parks and settings can help improve a community's sense of well-being (Francis et al., 1984).

According to Eisenman et al. (2013), Fredrick Law Olmstead is the responsible person to introduce contemporary green infrastructure theory and practice such as ecosystem services and human well-being; environmental restoration; and comprehensive planning. This indicates that the understanding and consideration of sustainable environmental planning and design was a holistic approach in any environmental development.

Francis (1983), in his book titled, " Frames on the Land: Early Landscape Painting in New Zealand", highlighted that Frederick Law Olmsted had widely publicized ideas through his park planning and design about the advantages for community's mental health that urban green space could offer. He supported urban planning that concern about the planting of for large and mature vegetation to grow at

city park and alongside city streets and green space that were accessible to everyone together allowed them to come and enjoy the environments in urban area.

According to Johnson et al. (1991), in 1870, Fredrick Law Olmstead wrote about the urbanite's need for "receptive recreation", which he described as "getting pleasure from one's surroundings without exerting oneself". According Eisenman et al. (2013), the urban environment is describing as the sensory foundations of mental life that solved the tensions occurred between individuals and the collective (i.e., the city), emotions and critical thinking, and interpersonal relationships and transactions of urban community. Eisenman et al. (2013), describes that Simmel (1969), explains urban life as taking its cue 4 from the economic transactions that form the basis of a city leading to a life dominated by logic and money and devoid of emotions and humanity.

Furthermore, in 1969 Simmel explains that the constantly shifting stimuli in the urban environment were stressful on residents' nerves, and through overstimulation urban community had established a "blasé" attitude (Eisenman et al., 2013). These connections between mental health and urban parks are still significant today, particularly in light of the rising prevalence and disease burden of mental health problems.

The relevance of 'urban green' has long been acknowledged in urban architecture (McHarg, 1971). According to Steiner (2017), McHarg emphasises that the best way to change the earth is to plan and design accordingly for both ecology and landscape character. These will be able to avert severe natural disasters and become truly regenerative. Thus, McHarg thought and his works ensured that urban communities would have a better sense of place and identity through effective landscape and ecology.

In addition, the cities account for such a large share of global production, consumption, and waste output in which highlight the important of the concept of sustainability in urban area. A worldwide concern for quality of life and sustainability particular focus on cities is increasing. Society has been concerned with the built or man-made environment, as well as with protecting or preserving the nature elements in urban areas in which led to the development of green space and landscape such as

gardens and parks in the urban area (McHarg, 1971; Roelofs, 1999; Turner et al., 1999). Table 2.1 presents the summary of the theory of urban green space.

Table 2.1 The summaries of theory of urban green space

Author /Year	**Founder of theory**	**Theory**
Charles (1991). The Papers of Frederick Law Olmsted	Frederick Law Olmsted (1870)	The earliest definition of urban green zones was influenced by the public-open-space movement in England and the Boston Park System, which was established in the nineteenth century.
Francis et al., (1983). Frames on the land: Early landscape painting in New Zealand	Frederick Law Olmsted (1870)	Strategy to introduce nature that begins with central and prospect parks in New York City is referred to by Olmsted as the "lungs of the city".
Eisenman et al., (2013). Frederick Law Olmsted, Green Infrastructure, and the Evolving City. Journal of Planning History.	Fredrick Law Olmstead (1870)	Theory and practise of modern green infrastructure include ecological services and human well-being, environmental restoration, and thorough planning.
Eisenman et al., (2013). Frederick Law Olmsted, Green Infrastructure, and the Evolving City. Journal of Planning History.	Simmel (1969)	Benefits for city communities' mental health that urban green space may offer. Urban development that permitted tall, mature trees to flourish alongside city streets and public parks that were accessible to all people and offered a haven from the noise, congestion, and sights of the city.
Steiner, F. (2017). Healing the Earth: The Relevance of Ian McHarg's Work for the Future. Human Ecology Review	McHarg, (1971)	The best way to inhabit and transform the earth is to plan and design it with careful consideration for both ecology and landscape character.
Steiner, F. (2017). Healing the Earth: The Relevance of Ian McHarg's Work for the Future. Human Ecology Review	McHarg (1971); Roelofs (1999); Turner et al., (1999)	Society has been concerned with the built or man-made environment, as well as with protecting or molding nature in urban areas, resulting in specific landscape patterns in the countryside and the establishment of parks and gardens in cities.
Thomas (2019). McHarg's theory and practice of regional ecological planning: retrospect and prospect. Socio-Ecological Practice Research.	McHarg (1971)	Regional ecological planning theory represents a watershed moment in planning and socio-ecological practice. The application of science to determine optimal development locations geology, physiography, soils, hydrology, and vegetation marked a significant divergence from planning based on economic growth.

Thomas (2019). McHarg's theory and practice of regional ecological planning: retrospect and prospect. Socio-Ecological Practice Research.	Simmel (1969)	-The sensory underpinnings of mental life, the conflict between the individual and the communal (the city), emotions and critical thought, as well as interpersonal connections and community transactions, are all present in the urban environment. -Urban life is said to take its cues from the economic transactions that underpin a city, resulting in an existence that is ruled by logic and money and devoid of feelings and compassion. -City dwellers have become "blasé" in their attitudes as a result of the overstimulation caused by the continuously changing stimuli in the urban environment.

Moreover, according to WHO Regional Office for Europe (2017), urban green space intervention is a change that significantly modify green space features and availability through.

- creating new green space;
- improving or changing green space use, characteristics, and functions; or
- removing/replacing green space.

WHO Regional Office for Europe (2017), says that urban green space interventions can be used in places like private parks, school yards, and other public green spaces. In regional and urban planning, terminology like "green corridors," "green infrastructure," and "public open space" is frequently used and should not be seen as competing with the term "urban green spaces" (WHO Regional Office for Europe, 2017). Some of these larger green space systems, like green belts, green corridors, and urban woods, may cover a large area and offer environmental, social, and recreational benefits to many people living in cities.

The treatments can be used in school yards, private parks, and other similar green spaces that are open to the public. Urban green spaces shouldn't be used in contrast to other regularly used terms and definitions in urban and regional planning,

such as green infrastructure, green corridors, or public open space (WHO Regional Office for Europe, 2017).

2.3 DEFINITION OF URBAN GREEN SPACE

Urban green spaces are defined in a variety of ways. According to Burkhard et al., (2021), urban green spaces are surfaces such as alluvial zones, street trees, blue areas like ponds, lakes, and rivers, private gardens, and beaches. Urban green spaces are categorized into two main classes which are leisure and recreation (Burkhard et al., 2021). Burkhard et al. (2021), categorised leisure green spaces as locations with infrastructure such as barbeque areas, restrooms, playgrounds, or benches that encourage gatherings of family and friends. Recreational green spaces are characterised as areas of wilderness, unadulterated nature, and solitude that are devoid of infrastructure (Burkhard et al., 2021).

Green spaces are the area that is filled with trees, grass, elements of water, shrubs. The green spaces typologies defined based on size, distance and facilities. According to Choi (2020), the classification of urban green space in different countries as shown in Table 2.2 below:

Table 2.2 The classification of urban green space in different countries

Country	**Source**	**Type**	**Size Criteria**
United State	National Recreation and Park Association (Mertes and Hall,1995)	Mini Park, Neighbourhood park, Community park, National resource area, etc.	0.4-2ha (1-5 acres) 2-4 ha (5-10 acres) 8-20 ha (20-50 acres) variable
United Kingdom	Greater London Authority (2016)	Pocket parks, Small open spaces, Local parks and open spaces, District parks, Metropolitan parks, Regional parks.	under 0.4 ha (1 acre) under 2ha (1-5 acres) 2ha (5 acres) 20ha (50 acres) 60 ha (150 acres) 400 ha (1000 acres)
Canada	City of Toronto (2013)	Parkettes, Neighbourhood park, Community parks, District park, City parks.	under 0.5 ha (1.2 acres) over 0.5 ha (1.2 acres) over 3 ha (7.4 acres) over 5 ha (12.4 acres) over 15 ha (37.1 acres)

Feltynowski and Kronenberg (2020), defined that urban green spaces comprises of are all vegetated areas within urban bounds, whether public or private. All these vegetated, impermeable areas provide ecosystem services and the advantages that go along with them to city dwellers. According to the WHO Regional Office for Europe (2016), urban green space is defined as any area of a city that is covered by vegetation of any kind. WHO Regional Office for Europe (2017), explained that urban green spaces are considered as urban space covered by vegetation of any kind and this include:

- smaller green space features (such as street trees and roadside vegetation);
- green spaces not available for public access or recreational use (such as green roofs and facades, or green space on private grounds); and
- larger green spaces that provide various social and recreational functions (such as parks, playgrounds or greenways).

According to Derkzen (2017), urban green space includes vegetation and water in cities like a street tree or combined like a park with lawns, trees, and ponds in nature. He adds urban green space also can be like a wetland or seminatural like a canalised river and green wall. Urban green space is an outdoor area and green area where we may spend our leisure time engaging in a variety of active and passive activities (World Health Organization, 2017).

Urban green space's expanding significance is evident because it is currently one of the locations for recreational activities in line with the fast-paced of urban lives (Yong, 2005). Being exposed to green spaces and natural habitats is highly advised especially for those residing in urban areas that are still expanding. The green space such as green belts, urban woods, or green corridors, may be regional in scale and are thought to offer social, ecological, and recreational benefits to a variety of urban communities (WHO Regional Office for Europe, 2017).

According to Sangwan (2022), urban green space is defined as public and private open spaces in urban and rural areas that are mostly covered by vegetation and are accessible to a range of users and communities directly (for active or passive

enjoyment) or indirectly (for other purposes) and it may give positive impact on the urban environment.

Contiguous vegetated areas and spaces, such as artificially constructed municipal parks, wild plant stands, and land areas, such as botanical gardens, as well as solitary street trees, street medians, and private gardens, are referred to as green spaces (Cilliers, 2015). Other examples of green spaces which may be divided into formal and informal green spaces, include sports fields and school grounds (Matthew, 2010). He explains the term open space, open areas and public space are some of the most often used to refer to urban green spaces.

The definition of urban green spaces varies and depends on the local and cultural context as well as the objective of the green space (Kulinkina, 2015). She adds that the examples of urban green spaces include parks, communal, allotment, or household gardens, urban woodlands, or street trees. Any public green space, including bodies of water like rivers, canals, lakes, and reservoirs that provide significant possibilities for sport and leisure and can also serve as visual amenities, is referred to as "green space" (Maidstone Borough Council, 2003, p. 2).

Greenspace Scotland (2010), claimed that green spaces are the 'green lungs' of towns and cities which play an important role in improving community physical and mental health by providing places for informal recreational activities. The activities such as cycling, walking, sitting and socializing are important in urban areas. Green space brings the countryside into the towns and cities, and makes it accessible.

According to Malaysia's National Landscape Policy (2011), a green space is an ecosystem made up of both natural and man-made elements. Landforms, geology, water bodies, as well as flora and animals, are all components of a green space. Human settlements, plantation areas, open spaces, public parks, and public places, as well as historical and tourism regions are all examples of green space which also encompasses elements such beauty and aesthetic qualities, architecture, and the region's general ecology and history.

Urban green spaces are vegetated areas found in urban area that are referred to as semi-natural places in a city (Jim and Chen, 2006). These regions are prevalent in built-up areas and can be covered by man-made or natural vegetation (Li and Pussella,

2017). The phrase "urban green space" is used to describe both official and informal green spaces, as well as "open places" with the ability to serve ecological roles such as sports clubs, playing fields, and open barren land (Qureshi et al., 2010).

2.3.1 Types of Urban Green Space

According to World Health Organisation (2021), there are seven types of green space which are urban green space, park, garden, forest and woodland, grassland and meadows, tree and other plants and biodiversity. Table 2.3 explains detail about the type of green space and the characteristic:

Table 2.3 Types and characteristics of green space

Green space category	Description	Examples
Urban green space	Urban land covered by vegetation, which does not fall (solely) into one of the other categories such as parks or gardens	Urban forest, street trees, green vegetation cover in the city, informal green spaces
Park	A large area of land with grass and trees, usually surrounded by fences or walls, and specially arranged so that people can walk in it for pleasure	Urban Park, district park, neighbourhood park
Garden	An area where plants and flowers are cultivated; this can be either a private garden (adjacent to the house) or a public garden	Backyard, botanical garden
Forest and woodland	An area mainly covered with trees and undergrowth cover	Deciduous, coniferous, mixed forest
Grassland and meadows	An area mainly covered with grass	Mowed lawn, improved grassland (used for grazing), semi-natural grassland
Trees and other plants	Plants, shrubs or vegetation cover	Tree canopy cover, vegetation cover, shrubs
Biodiversity	Diversity in plants and animals	Flora richness, fauna richness

(Source: World Health Organisation, 2021)

According to Thompson (2008); Francis (2012) and Khan (2014), characterised the urban green space into active and passive recreational place. Playgrounds, sports fields, and stadiums are examples of urban green space for active recreation where individuals may exercise and enhance their physical welfare (Thompson, 2008).

Gardens, parks, parkways, and greenbelts all provide opportunities for small-scale activity and quiet enjoyment in open space (Thompson, 2008).

According to Janet (2014), a concept known as place identification, humans may also be connected to natural areas. According to certain theories, urban green space can help people form emotional and cognitive ties to a particular location, allowing that location to become a part of their identity or the fabled genius loci. According to Howe (2010), the place belonging status can predict civic participation against the development of open and scenic places as well as overall pro-environmental behaviour (Gifford, 2010). When it comes to changing the land-use of specific places, the relationship between nature and place identity is not quite the same. Urban green space and the general public serve various purposes depending on their size and design (Howe, 2010).

2.4 URBAN GREEN SPACE FOR SUSTAINABLE ENVIRONMENTAL HEALTH

The health of the environment is linked to the health of humans and environmental health specialists are trying to further understand the environment and its ties to human health (Maryland Department of Health Mental Hygiene, 2016). The relationship between the environment and human health is discussed in this subtopic, along with the existing research on specific positive benefits including increased mental health and lowered cardiovascular disease risks.

Access to green space was essential during pandemics like Covid-19, but there is insufficient and unequal access to public green space.
In order to increase the network of urban green spaces, local amenity areas can be improved, existing parks can be better connected, and the built environment and larger public realm can be made greener.

During the lockdown, urban green spaces such as parks were extremely significant, and their use soared by 160 % (London Sustainable Development Commission, 2020). After the lockdown, 62% of Londoners believe that protecting and

developing green spaces should be a higher priority (London Sustainable Development Commission, 2020; Sherer, 2003). Green space in London provides considerable health advantages, and it was projected in 2017 that it saved £952 million in healthcare expenditures each year (London Sustainable Development Commission, 2020). This includes £370 million in annual mental health savings and £582 million in annual physical health savings. The latter is because exercise reduces disease risk, which is important given that 37.9% of Year 6 children (ages 10-11) in London are fat, according to UN Sustainable Development Goals (SDGs) indicators. In appreciation of these benefits, the authorities allowed citizens to utilise parks despite other lockdown limitations. Given that green space is one of many variables that contribute to Londoners' happiness, it's also worth noting that over 80 % of the UK population wants the government to prioritise well-being over GDP during the pandemic, and 60 % wants this to continue once it's passed (London Sustainable Development Commission, 2020).

According to Maryland Department of Health and Mental Hygiene (2016), the factors influence health are:

i. Physical Environment Factors

-Air and water quality, food availability

ii. Social Factors

-Health care, education, race, income

iii. Individual Factors

- Behaviours, genetics

The physical environment factors emphasize the importance of urban green spaces roles and benefit to human health. Dr. Maria Neira, a researcher from World Health Organisation (2020), explains public health and environment such as urban green space can prevent disease through healthier environments. She adds that healthy environment helps reducing 25 % of the global burden of disease, promoting a healthier environment and health impact assessment and environmental burden of disease.

The Community Environmental Health Assessment Workbook (2000), explained that environmental health is also a part of public health. It examines the environment in terms of contaminants, human behaviour, and other health-related variables. The environment, in terms of public health, encompasses the food we

consume, the air we breathe (both indoor and outdoor), the housing we live in, the water we use for cooking, drinking, and bathing, as well as the recreational lands we use and have protected for future generations. Because individuals and their surroundings interact and intersect in so many different ways, we like to think of the environment as a whole.

The Malaysia National Landscape Policy (2011), focuses on the well-being of the citizen by providing appropriate landscape places for social interaction and relaxation among Malaysia's multi-cultural community, underscoring the country's goal by guaranteeing holistic and sustainable growth. This policy addresses the relationship between urban green space and sustainable environmental health. "Encourage Manageable and Sustainable Landscape Development Programmes in Order to Achieve Beautiful Garden Nation," is Thrust 3 of the Malaysia National Landscape Policy (2011), action Plan 3.2. A Beautiful Garden Country is a nation whose physical development is coupled with a well-managed green, beautiful, and clean environment (Malaysia's National Landscape Policy, 2011).

The environmental development in Malaysia National Landscape Policy (2011), emphasizes the effective landscape planning, development and management focusing on the well-being of the citizen including the urban green space development in relation to pandemic crises in Malaysia (Azah, 2021). The goal of excellent green space management is to provide a holistic path to a higher quality living environment (Azah, 2021). It is a significant step toward a better quality of life by ensuring a safe and healthy environment. Green spaces are a precious resource whose management and upkeep directly benefit the environment and socioeconomic growth.

SDG 3 (Health and wellbeing) and SDG 11 (inclusive, safe, resilient, and sustainable cities), which seem to be greater than the rest, capture "urban health" as an intersectoral arena that links both the public health and the urban planning sectors. In terms of the relationship between urban green space and sustainable environmental health. Premature deaths brought on by non-communicable diseases like cancer or cardiovascular conditions, as well as illnesses directly related to exposure to dangerous chemicals and pollution of the air, water, and soil, include morbidity and mortality brought on by infectious diseases that have a significant impact on child mortality in developing countries.

Additionally, urban green space like parks, playgrounds, and residential greenery can improve physical and mental health and lower mortality and morbidity in urban areas by promoting psychological relaxation and stress relief, lowering exposure to air pollutants, noise, and extreme heat, and promoting social cohesion and physical activity (Braubach et al., 2017; Lee et al., 2015).

Reduced cardiovascular morbidity and mortality, improved mental health, and lower rates of chronic disease are just a few of the beneficial health consequences of urban green spaces (Lee et al., 2015; Braubach et al., 2017). According to Braubach et al., (2017), there is a link between green spaces and health and wellbeing. They discuss the evidence for specific positive impacts, such as improved mental health and lowered risks of cardiovascular disease, obesity, diabetes, and death. Special attention is paid to the advantages of urban green space for communities and how they affect health equity. In order to reduce the health hazards connected with urban green spaces, such as cardiovascular disease, obesity, diabetes, and death, effective green space design and upkeep are crucial (Lee et al., 2015; Braubach et al., 2017).

The World Health Organization (2017), stated that increased exposure to allergic pollen, infections carried by arthropod vectors like ticks or mosquitoes, and injury risks, as well as the influence of future climate change, injury risks, and the effect of possible detrim, may all be connected to urban green space and health issues. A city's green space is a nature-based solution with several well-known health and wellbeing advantages (Lõhmus and Balbus, 2015; World Health Organization 2017).

The Health 2020 plan of the WHO European Region advocates for the creation of resilient and encouraging local environments. Living conditions in big cities were often crowded, unhygienic, and tainted by physical waste from adjacent industries and companies as European cities grew increasingly urbanised (World Health Organization 2020). The changes in the built environment such as the introduction of different sanitation and sewage projects that have decreased the spread of infectious diseases in cities, many gains in public health have been made in the past (Canadian Public Health Association, 2010). Urban green space such as parks and gardens should be prioritized in terms of reducing the negative impact of pandemic lockdown and social distancing on the public in terms of mental health. To begin with, it can seem counterintuitive to combine two opposing concepts such as "pandemic lockdown" and "public parks. “This

ambiguity will dissipate as soon as we grasp the true potential urban green space (United Nations Human Settlements Programme, 2021).

The goal of social isolation and pandemic lockdown is to safeguard the public's health. In order to further the discussion on elements that contribute to reducing public mental health during pandemic lockdowns and social distancing periods, the following sections will also highlight critical social aspects during the lockdown and social distancing periods. During a pandemic lockdown, it is important to think about the social roles and benefits of public urban green space as well as the kind of social interaction we want to encourage.

Urban green spaces are locations where people congregate or meet away from their homes and places of employment. The main components around which various human activities in cities have been organised throughout history have been streets, squares, and marketplaces. It has been established throughout history that such components that capture the beginnings of city development are valuable. The creation and design of these urban green spaces, such as parks and squares, intersects with human needs (United Nations Human Settlements Programme, 2021).

The true significance of urban green spaces is providing the interaction between people and their surroundings. Many psychological issues, such as anxiety, depression, and distress, are caused by a lack of social interaction among the community. By providing visual pleasure and creating passive and active recreational opportunities, urban green spaces are also important places for communities to socialise and exchange ideas. Community able to sit, relax, and meet one another in the urban green spaces ~~as~~ to fulfil their needs. Urban green spaces improve community's quality of life and contribute to community health by encouraging physical activity, social interaction, and other healthy behaviours in urban areas.

Furthermore, urban green space supports society in a variety of ways (WHO Regional Office for Europe, 2016). Personal psychological benefits include absorbing mental health issues, reducing depression, reducing obesity, reducing disease incidence, and improving perceived quality of life (WHO Regional Office for Europe, 2016). In terms of sociocultural benefits, urban green spaces promote community satisfaction, family bonding, and crime reduction in urban area (WHO Regional Office for Europe,

2016). Environmental benefits are enormous, as they aid in the preservation of heritage and environmental protection (United Nations Human Settlements Programme, 2021).

Moreover, in terms of-the economic benefits, urban green spaces boost property values, boost worker productivity, and, most importantly, help cut health-care costs significantly (M. Sherer, 2003). This is accomplished by having a positive impact on mental health, diabetes, arthritis, asthma, obesity, and cardiovascular diseases (United Nations Human Settlements Programme, 2021).

According to the World Health Organization (2020), mental health, diabetes, arthritis, asthma, obesity, and cardiovascular diseases kill over 36 million people each year and cost over $1 trillion. This is accomplished by having a positive impact on mental health, diabetes, arthritis, asthma, obesity, and cardiovascular diseases. Urban green spaces should be considered as a significant value to both the global health and economic issues in the context of the pandemics. Table 2.4 shows the summary of urban green space for sustainable environmental health from the previous research.

Table 2.4 The summary of urban green space for sustainable environmental health

Keyword	**Summary (Urban green space for sustainable environmental health)**	**Author and Year**
Green space provides clean air, space for activity and give mental health benefit	Urban green space provides a place with fresh air and chances for physical activity. It can also help with the negative aspects of an urban living. The benefits of parks and green space on mental health.	World Health Organization (2020); Barton, J., and Rogerson, M. (2017)
Green spaces improve community health	The link between green space use and health, including improved mental well-being and lower risks of heart disease, obesity, diabetes, and death. Special attention is paid to the benefits of urban green space for at-risk communities and how they affect health equality. The possible health concerns connected to urban green spaces, as well as ways to reduce or eliminate those risks through good green space design and maintenance.	Braubach et al., (2017);Lee A, Jordan H, Horsley J (2015)
Green spaces improve community health and reduced mortality	Urban green spaces have a number of beneficial health consequences, such as lowered rates of chronic disease, improved mental health,	WHO Regional Office for Europe (2016)

	decreased cardiovascular morbidity and mortality, and decreased levels of depression.	
Green spaces improve community health through good maintenance	Urban green space can also be associated with health risks like increased exposure to allergenic pollen, diseases carried by arthropod vectors like ticks or mosquitoes, injury risks, and the impact of future climate change. These risks can be reduced or even completely avoided by operating green space properly, maintaining it, and using the proper design.	World Health Organization (2017) ; Lõhmus and Balbus (2015)
Green space management is to provide a holistic path to a higher quality living environment.	Urban green space ensures a safe and healthy environment. Green spaces are a precious resource whose management and upkeep directly benefit the environment and socioeconomic growth.	Malaysia National Landscape Policy (2011) ; Azah (2021)
Green spaces boost property values, boost worker productivity, and, most importantly, help cut health-care costs significantly	Benefits for city dwellers' mental health that urban green space might offer. The urban planning that made it possible for large, old trees to grow alongside city streets and parks that were accessible to everyone and offered a haven from the city's congestion, noise, and sights.	London Sustainable Development Commission, 2020 ; M. Sherer, (2003)
Green spaces reduce the negative impact of pandemic lockdown and social distancing on the public in term of mental health.	Urban green space improves mental health especially given the increasing prevalence and disease impact associated with mental health issues.	United Nations Human Settlements Programme, (2021); World Health Organization (2020)

2.4.1 Urban Green Spaces for Sustainable Development Approaches

The Brundtland Commission of the United Nations defined sustainable development as "development that meets the needs of the present without hurting the ability of future generations to meet their own needs." (March 20, 1987, p. 37). Since the 1980s, the word "sustainability" has been used more frequently to refer to human sustainability on Earth. Sustainable development takes into account social, economic, and environmental factors. To be considered, a process must be socially beneficial, economically feasible, and not have an irreversible environmental impact.

One of the example illustrations of the interplay among these three spheres is provided below in Figure 2.1.

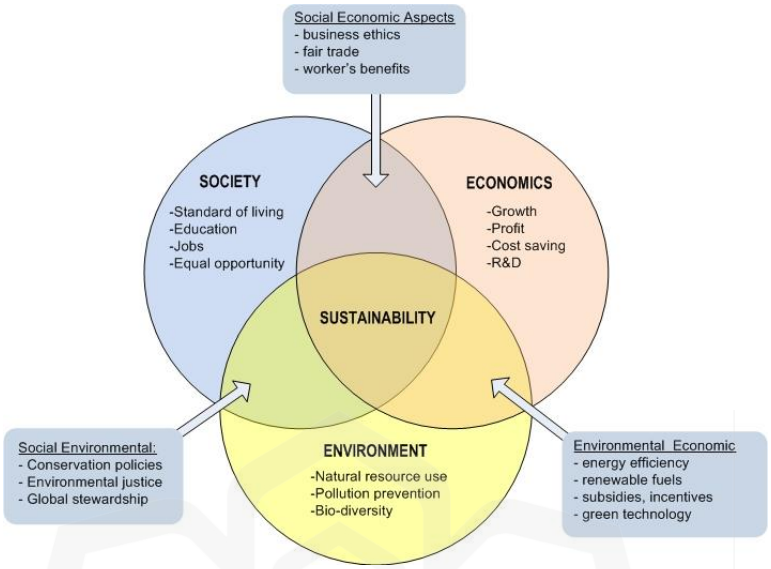

Figure 2.1 Interplay of the environmental, economic, and social aspects of sustainable development. Source: Utama I, Utama M. (2019). p. 11-25.

Sustainability is the interaction of society, economics, and the environment. Taking care of the environment means using natural resources, avoiding pollution, keeping biodiversity, and keeping the health of the ecosystem. The standard of living, ease of access to employment and education, and the availability of opportunities for all members of society are social variables. Economic forces are what drive growth, profit, cost-cutting, R&D spending, and other features. These few are only provided as samples; there are many other factors that can influence how sustainable a social structure is. The interaction between the social and economic realms leads to the development of traits that are both social and economic at the same time. Company ethics, fair trade, and employee benefits are some of them (Rodriguez et al., 2002).

A nexus of economic and environmental interests makes it feasible to increase energy efficiency, produce renewable fuels, and use green technologies, as well as create specific incentives and subsidies for businesses that practise environmental responsibility. When the social and environmental worlds meet, rules are made to protect and preserve the environment. Environmental justice and global stewardship are set up so that natural resources can be used in a sustainable way. Despite various modifications, this paradigm has been successful in highlighting key impact areas and

serving as a framework for impartial research. It's crucial to keep in mind that these three pillars of society, the economy, and the environment are never completely independent of one another. Future classes in the course will frequently investigate how various processes and technologies affect society, the economy, and the environment.

According to Zeinal and Khosravikia (2019), there are three components of sustainability in design which are urban planning, architecture, and social. Following is the explanation three components of sustainability in design:

i. **Urban Planning**: The density of residents and buildings in this development plan is adequate, as are the levels of green and open space. Without considering the Breckenridge Field Lab, the overall quantity of green space on the site is roughly 11%. This development ensures a diverse and walkable neighbourhood with simple access from residential areas to social, cultural, and educational areas because it was created to satisfy all criteria and demands. A mixed-use space has been designed in the region to accommodate a variety of uses.

ii. Architecture: The following strategies are considered to make this growth plan architecturally sustainable:

- Use environmentally friendly building materials, such as recycled and renewable materials, that require the least amount of energy to produce.
- Designed to maximise natural light and minimise the need of artificial lighting.
- Allow for natural ventilation in the structure.
- All buildings must have at least silver LEEDS certification.
- Should be designed with people with special needs in mind.
- Wherever possible, include a green roof and green wall design into the structure.

iii. Social: Socially sustainable communities are equal, varied, connected, and democratic, and they give a good quality of life. This development plan includes a wide range of housing options for diverse lifestyles to give a good life for the residents of the area. Residential sections are designed to offer student accommodation, normal apartments, and large luxury apartments for families. Providing security and safety in the area is also essential for achieving a socially sustainable community. Providing

adequate lighting in streets and public areas will improve the overall sense of security in the region.

Residents' sense of belonging is enhanced through flexible land use, such as allocating the school's sports field to public use after school hours. It's worth emphasizing that, through providing services for all categories of people, sustainable urban development should give equal opportunities for all residents, from young children to the elderly, men and women. By placing libraries and learning centers near residential areas, for example, all individuals can conveniently use the educational services provided in those places. Such consideration leads to a more equitable society with a smaller generation gap.

2.4.2 The Relationships of Urban Green Space and Community

The connections between urban green space and community were established long time ago. It is referring to the word "landscape," which describes the natural features that surround us, including trees, plants, mountains, lakes, and more. In order for human activity to continue on earth, a tranquil atmosphere is crucial. The term "landscape" refers to geographic areas that are spatially heterogeneous and are made up of a variety of interacting patches or ecosystems, ranging from relatively natural terrestrial and aquatic systems like forests, grasslands, and lakes to human-dominated environments like agricultural and urban settings (Beltman et al., 2008). This will develop a single ecosystem and habitat for environmental biodiversity.

The ecosystems that were discovered in the environment, according to Beltman et al. (2008), embodied a food chain that aids all living creatures in surviving and subsequently produces a food cycle. It is possible for biotic elements and people to benefit from one another (Gupta et al., 2017). The environment should be protected and preserved rather than endangering or harming the natural world as has lately happened (Beltman et al., 2008). For instance, unintentionally cut down the trees in order to establish a development project in a sensitive region like Fraser's Hill will influence on the ecosystem and have serious negative effects on the environment including global warming, soil erosion, landslides, flash floods, and several other issues (Gariano et al., 2016; Public Health, 2020).

Urban green space, as it is typically understood, creates or provides a conducive environment for users in the context of delivering maximum satisfaction in terms of aesthetic and function. Consequently, understanding of ethno-botany may be highly helpful and significant in planting design, where plants are used to convey function and as a symbol to the place and its civilization. The use of vegetation that are pertinent to place and society can readily be used to apply the search for identity to a place through its architecture or structure. The use of ethnobotanical plants may help improve the ecological harmony between man and nature by acknowledging that communities carry them with them when they travel from one location to another.

Moreover, it can be seen that the relationships between people are environmental in which Hill (1978), in his research have shown the necessity for "supportive" environment in which people may feel good about themselves and their surroundings. He adds, those who watch trees have slower heartbeats, lower blood pressure, and more relaxed brain wave patterns.

2.5 URBAN GREEN SPACE AS AN INDICATOR FOR ENVIRONMENTAL HEALTH

This section describes the indicator of urban green space usage and health relevance in relation to pandemic crises. Understanding how people's exposure to green space is conceptualised and assessed is key to understanding the relationships between green space and health. How the exposure is quantified is crucial in deciding what associations are visible and what causative pathways and mechanisms may be deduced, as it is with any health consequences connected with an environmental exposure (Nieuwenhuijsen, 2015).

According to UN HABITAT (2021), the preservation and restoration of blue-green networks and landscape corridors across regions should be prioritised in land use and environmental planning in order to reduce the emergence and spread of future infectious diseases and improve long-term health and resilience. In a nutshell, urban green space, green networks, and landscape corridors are becoming more and more significant. According to the World Health Organization (2016) green space utilisation indicators are valuable for determining correlations between health and well-being outcomes, as well as determining how and to what extent green spaces are actually used by local residents and visitors. These indicators may be used to provide information on

underutilised green areas or those with the potential to diversify their uses and users. According to the World Health Organization (2000), stated that there are two issues for Environmental Health Indicators which are related to green spaces which are air quality and recreational water.

The Urban Green Space Indicator (UGSI) aims to fill knowledge in the urban environment and health field, as well as promote the public health advantages of green spaces. The use of this indicator is expected to encourage policy initiatives targeted at enhancing the urban environment, which will, in turn, improve the quality of life of urban people and produce public health advantages in the long-term. According to studies demonstrating the benefits of access to green space for health, the urban green space indicator (UGSI) is employed as an environmental health indicator. The indicator is evaluated based on its usefulness for measuring progress towards the goal of creating healthy urban environments as well as for understanding and comparing cities. The primary health advantages for the indicator that were evaluated were physical activity and stress reduction (WHO Regional Office for Europe, 2016).

Urban green space has several health advantages for the population, for example, merely watching green space has psychological benefits even if it is not accessible to the general public (e.g., private gardens). Considering the unquestionable significance of physical exercise for both mental and physical health, even a little increase in physical activity, which may be facilitated by access to green spaces, can significantly affect public health (WHO Regional Office for Europe, 2016). Green spaces provide an environment that supports the physical and intellectual growth of a community.

According to Wang (2019), urban green open spaces provide a shared space for physical activity that can be enjoyed by a wide spectrum of people to improve their health. A positive association has been discovered between urban green open space and promoting physical activity and reducing a variety of chronic illnesses. According to Liu et al., urban parks are associated with increased public physical activity as well as beneficial mental health benefits (Wang, 2019).

Akpinar and Cankurt (2017), study the correlations between urban green space qualities and the frequency of physical activity in the Turkish city of Aydin. They found that for the general public, being close to urban green spaces, the number of trees, the presence of exercise equipment, and picnic areas were all linked to more physical activity. On the other hand, barbecues and fireplaces were linked to less physical activity.

The link between urban green space and physical activity is interesting from an academic point of view, but it also has important implications for public health and for planning how to use land in cities. It is a reference and planning guide for urban green open spaces. It has information on the size, scenery, and infrastructure of open spaces. On the other hand, the empirical support for these policy recommendations is usually absent. More research is needed to describe and explain the ideal idea of a green, open space, especially in terms of getting people to be more active and improving the health of the community as a whole.

2.6 URBAN GREEN SPACE FOR SUSTAINABLE ENVIRONMENTAL HEALTH

In this section, the explanations about the important of urban green space is for community health and what it does for the health of the environment in a sustainable way. Urban green space has a variety of uses. Wang et al. (2019), said that the external physical quality of the urban green space would determine whether or not people chose to go there for recreation. The optimal time is when the weather outside is ideal, since it is better for community health. The urban green space should be able to meet many different needs and be used for many different activities. For instance, an urban green area that would offer a gathering spot for the neighbourhood where people might relax and work up a sweat by exercise. In addition, urban green space should provide recreational needs for formal and informal sport and recreational activities (Moran, 2020). Janet (2014), agreed with the statement and stated that urban green space able to preserve a community's natural and social history as well as for its psychologically rehabilitative benefits.

Urban quality of life in cities depends heavily on the presence of green space (WHO Regional Office for Europe 2016). For each city, green areas are crucial for the environment and sometimes for historic-ecological purposes (WHO Regional Office for Europe, 2016). Urban green spaces are essential public open spaces that provide locals places to socialise, share experiences, engage in physical activity, appreciate nature, and get away from the stress of cities (United Nations Human Settlements Programme, 2021). It helps individuals to fulfil their demands for comfort, relaxation, and both active and passive engagement. Cities' quality and viability greatly depend on the design, management, and preservation of urban green spaces as well as open and public places in order to fulfil their role as an essential social and visual centre. Cities' green spaces significantly contribute to their improved livability.

The United Nations' 2030 Agenda says that green spaces are important for the long-term health of cities and communities, as well as for the social and environmental health they promote. In order to foster healthy and resilient cities, the World Health Organization asserted that local and central authorities should assure the availability of high-quality green areas.

Urban green space like parks, woodlands, green roofs, streams, and community gardens, provides crucial ecosystem benefit. Green space further encourages city inhabitants to engage in physical activity, feel good about themselves, and maintain general health (Wolch et al., 2014). Urban green spaces provide a social setting for inhabitants and encourage social interaction. Urban green space vegetation is seen as an important component of neighborhood areas. According to Xie et al. (2020) grass encourages residents to spend time outside and promotes social interaction. Visiting urban green spaces can help residents form friendships and promote active and passive leisure activities like conversing and walking. In addition, children and teenagers prefer to play and mingle with their peers in the park, which is very important for their development. In short, urban green space is important for the community (Xie et al., 2020).

Since 2002, the preceding pandemics of SARS, Ebola, and SARS-CoV-2 have spread panic around the world. All three of these very contagious viruses have now spread from wild animals living in deep tropical forests to people (Morand and Lajaunie, 2021). The majority of the infectious viruses that infect people today are transmitted by animals, many of which are found in forests where crops are being cleared for use as fuel, mined, and built upon (Ellwanger et al., 2021). They clarify that more species of animals that carry germs and viruses come into touch with people, which is better suited to kill humans due to human actions that destroy green space like forests.

Green spaces such as forest need to be preserved as place for animals to live. The more human confine those creatures in smaller spaces where they may interchange infectious viruses, the more likely newer strains will emerge. Land clearing reduces biodiversity, and the remaining species are more likely to spread pathogens that can affect humans. The transfer of animal diseases to humans will be accelerated by all of these circumstances (Mora, 2022).

The human activities such deforestation can bring harm to human daily life. Preventing deforestation will reduce our vulnerability to future calamities as well as the spread of other pandemic diseases like Zika, Nipah, Malaria, Cholera, and HIV, all of which are initially associated with tropical rainforests (Public health, 2020).

Stopping deforestation and putting more value on green spaces in cities are two ways to deal with pandemic crises (WHO Regional Office for Europe, 2016). By valuing urban green spaces and stopping deforestation, the United Nations will be able to reach six of its 17 Sustainable Development Goals: ending hunger, achieving gender equality, ending all hunger, promoting responsible consumption and production, managing land in a sustainable way, and fighting climate change. The latest pandemic epidemic, in particular the extremely hazardous Covid-19, can draw attention to the many benefits that humanity can gain by avoiding overusing the natural environment, such as forests and green spaces. The pandemic crisis can be resolved through sustainability.

An urgent plea for more practical and sustainable urban planning and architecture has been made in response to the recent Covid-19 outbreak, which has brought to enhance the value of green space in cities. O'Brien et al. (2017) and Staddon et al. (2018), a number of recent studies have demonstrated that green spaces offer a wide range of ecosystem services and functions necessary to human wellbeing and urban sustainability, which are particularly relevant during health emergencies. During times of lockdown, urban green spaces support the physical and mental welfare of city residents. Urban green space is essential for giving urban areas the resilience they need to be sustainable in the long term. A system of both natural and man-made green spaces that serve social and ecological purposes in urban environments is referred to as "green space" in general.

The concept of social distance is now well-known to everyone. It might even change the meaning of this phrase to "social density" from the standpoint of green space planning and design. It is clear that in the future, the planning, production, and distribution of urban green and recreational spaces will be significantly influenced by concerns about pandemic response and public space management. According to Weber (2019), a Senior Research Advisor at Nord Regio, Scandinavia, "high-quality active public spaces" are created when urban green spaces are well-designed and readily accessible. Fortunately, there are planning solutions for this, like strong green factor goal levels to guarantee a certain amount of green public space and boost regional biodiversity.

Ugolini et al. (2020), found that in countries where movement was only permitted a few hundred metres from home during pandemic lockdown in which people tended to visit nearby green spaces but in countries where social isolation measures were less restricted, urban citizen visited green spaces at greater distances and more frequently. The pandemic and the regulations put in place by governments altered the decisions made by for community for urban green space visitation. Accessibility to urban green spaces was essential in this situation. Despite the fact that urban parks appear to be the most popular sort of green space, people also discover alternatives like neighbourhood gardens, streets lined with trees, or even green spaces outside of cities since they are fantastic places to exercise, unwind, or just walk the dog. Urban planning should provide access to green spaces for instance pocket parks and green corridors in

the city as locations of comfort and shelter because necessary activities are the only ones authorised during a pandemic.

During the pandemic crisis, green space is one of the few available outdoor locations where people want to engage in outdoor exercise (Xie et al., 2020). There have been studies that used the vegetation index to gauge the availability of green space in a given area and its positive impact on health (Braubach et al., 2017). Crowds of people in metropolitan parks are likely to aid in the spread of viruses during a pandemic. Furthermore, it is not obvious how people use social isolation and other safety measures in open green spaces. Several studies have demonstrated the advantages of green space for both physical and mental health, such as lowered stress levels, increased physical activity, and social cohesion. People's interactions with green space are changing as a result of the epidemic, which has numerous positive consequences for society and public health (Heo et al., 2021).

Green space provides sustainability and health advantages in urban areas. Green space includes both naturally occurring vegetation like grass, bushes, plants, and trees as well as man-made green structures like parks and uncontrolled vegetated areas. Two possible ways that green space might improve health are by promoting physical activity and by facilitating close contact with nature. Having an understanding of green space may help communities cope with the stress of quarantine and pandemics, for example, by offering a different location for physical activity given the prohibitions on people meeting or gathering, especially in indoor settings during pandemics. Covid-19.

When the pandemic lockdown was implemented, outdoor physical activity levels climbed, with the gains being largest on routes with greener and farther-flung locales, according to research conducted in Oslo, Norway (Heo et al., 2021). According to study done in the United States, The Organization for Economic Co-operation and Development found that the loss of mobility to parks impacted by state-of-emergency declarations was smaller than the decline in mobility to other venues throughout the states (OECD, 2020). The significant green space acts as a modulator to the efficacy of Covid-19 mitigation methods, and such initiatives may indirectly affect the benefits of greenness for public health (Surico, 2020).

Green spaces serve a crucial role in maintaining high levels of biodiversity and offering a number of ecosystem services, including provisioning, regulating, and cultural functions, which have a positive impact on the physical and emotional health of city people (Tzoulas et al., 2007; Felappi et al., 2018; Ochoa et al., 2020). By purifying the air and water, lowering noise pollution, raising property values, and boosting neighbourhood and landscape aesthetics, urban green zones may improve people's physical and emotional health. Yet, research done during the current pandemic has shown exactly how crucial urban green space is for city dwellers' physical and emotional welfare (Noszczyk et al., 2022). By providing a haven for city dwellers at times of extreme stress, it demonstrates how urban green space may enhance the social resilience of cities. Access to leisure areas outside of cities has been severely restricted by lockdowns and other measures. Venter et al. (2020) have shown that during the pandemic, pedestrian activity rose in city parks and peri-urban forest regions in Oslo, Norway. This shows the value of urban green space to the urban community during a pandemic. According to Samuelsson et al. (2020), urban green space can temporarily lower stress and promote relaxation after protracted periods of social isolation and domestic confinement. Ugolini et al. (2020) and Gavrilidis et al. (2020), published evidence showing that urban green space influences community quality of life in the city. Making green spaces accessible and usable is important for raising urban communities' quality of life (Quatrini et al., 2019). Green space promotes social wellbeing through sports or physical activity (Hunter et al., 2015). According to Carrus et al. (2015) and Zijlema et al. (2017), green space provides beautiful nature view in middle of the city for improve community lifestyle. In brief, urban green space is significance during pandemic for community in urban area.

Sturm and Cohen (2014), found a link between urban green areas and mental health, with communities that were 400 metres or less from such spaces having a better perception of their own mental health. Being in a green environment and visiting urban green spaces can improve community mood and reduce anxiety. Regular Park visitors are also more likely to be in good health than people who do not frequent visit parks. Urban green spaces provide space and opportunities for a variety of outdoor activities,

and it promotes sports participation among people of all ages, ethnicities, and socioeconomic backgrounds. A study done in developing countries found that frequent trips to parks reduce health issues and increase enjoyment in life (Samuelsson et al., 2020). He continues by saying that it's believed that going to these parks improves users' health.

2.7 THE PANDEMICS AND EPIDEMICS

This section describes the different between epidemic and pandemic, the history and timeline of pandemics. Living near top-notch urban green areas is linked to benefits for one's physical and mental wellbeing (WHO Regional Office for Europe, 2016). Urban green space also important during pandemic as their roles provide space to community. The term of pandemic is often confused between epidemic. According to the Center for Disease Control and Prevention CDC (2020), the difference between an epidemic and a pandemic is that:

- **Epidemic** is the sudden spread of a disease in a particular region.
- **Pandemic** is a disease outbreak that has crossed numerous continents or countries. In essence, it is an epidemic that has spread globally and throughout a larger geographic area.

An epidemic according to the Centers for Disease Control and Prevention (CDC) is defined as a sudden rise in the number of disease cases in a particular region (Global Health, Infectious Disease, Public Health Education, 2020). In other word an epidemic is any rise in disease cases beyond the baseline for that geographic area.

Epidemics can occur:

- when the number of people in an area where an infectious agent (like a virus) already lives goes up quickly;
- when a previously unknown illness spreads throughout a community;
- when people who were previously unaffected by an infectious agent become ill as a result of it.

Global Health, Infectious Disease, Public Health Education (2020), states that some of the worst epidemics in American history include polio, measles, smallpox, cholera, yellow fever, typhoid, and yellow fever. HIV and drug-resistant tuberculosis are currently regarded as epidemics.

During the H1N1 pandemic in 2010, the World Health Organization said that a pandemic was when a new illness spread around the world. There are different phases in a pandemic's development, according to the World Health Organization. First phase, involves a virus that spreads among animals and is not known to cause sickness in people. Second phase, the virus is found in animals that are known to have spread viruses to people. Third phase, when a human contracts the illness from an animal. Fourth phase, human-to-human contact makes it evident that a community outbreak could occur. Fifth phase, the virus spreads from person to person in at least two countries within the same region. Sixth phase, occurs when localised epidemics emerge in a third country in a different region, indicating the occurrence of a pandemic.

The Centers for Disease Control and Prevention (CDC) released the Pandemic Intervals Framework in 2017. It is very similar to the WHO's pandemic stages. Both the WHO's phases and the Centers for Disease Control and Prevention (CDC) framework define flu pandemics in which understanding the stages might help to a better understand how public health experts react to international health emergencies, like the current Covid-19 outbreak.

The following phases are part of the Pandemic Intervals Framework developed by the Centers for Disease Control and Prevention (CDC) (CDC, 2020):

1. **Investigation:** Authorities monitor for new flu infections in humans and animals to determine whether a pandemic is imminent.

2. **Recognition:** Public health professionals are treating people and trying to stop the illness from spreading because the virus could make a lot of people sick.

3. **Initiation:** The virus spreads quickly and for a considerable amount of time.
4. **Acceleration:** As the disease spreads more quickly, public health professionals take steps like physically separating people and closing schools.
5. **Deceleration:** As the number of new cases continues to go down, and public health professionals' officials may reduce community interventions.
6. **Preparation:** After the initial wave has passed, public health officials monitor viral activity and look for subsequent waves.

The WHO announced its intention to discontinue using the term "pandemic" in February 2020. The group has also stopped using the six-phase system for categorising pandemics. (Cucinotta and Vanelli, 2020).

2.7.1 The Definition of Pandemics

Pandemic/pandemik / (of a disease) widespread across a country or the globe. Infectious diseases have expanded over the universe as humans have now (Nicolas, 2020). Today's world outbreaks are practically continuous, not every outbreak reaches pandemic level like Covid-19. From the Antonine Plague to the current Covid-19 outbreak, it is visualisation depicts some of history's most devastating pandemics (Global Health, Infectious Disease, Public Health Education, 2020).

2.7.2 A Timeline of Historical Pandemics

Humanity has struggled with illness and disease since the beginning of time. Before things seemed to change in society, these diseases didn't spread or get worse in a big way. As trade grew, there were more chances for people and animals to meet, which made these diseases spread faster. People have previously been infected with diseases including malaria, tuberculosis, leprosy, influenza, smallpox, and others (Global Health, Infectious Disease, Public Health Education, 2020). As people became more civilised and built bigger cities, trade routes that went farther, and had more contact with different people, animals, and ecosystems, pandemics became more common (Nicolas, 2020). It has been noted that practically every pandemic, from the Antonine Plague to the current Covid-19, has its roots in an animal-to-human virus transmission, underscoring the importance of zoonotic viruses. Table 2.5 following is History of pandemics.

Table 2.5 History of pandemics

Name	Time period	Type/pre human host	Death toll
Antonine Plague	165-180	Believed to be either smallpox or measles	5M
Japanese smallpox epidemic	735-737	Variola major virus	1M
Plague of Justinian	541-542	Yersinia pestis bacteria / Rats, fleas	30-50M
Black death	1347-1351	Yersinia pestis bacteria / Rats, fleas	200M
New World Smallpox outbreak	1520 – onwards	Variola major virus	56M
Great Plague of London	1665	Yersinia pestis bacteria / Rats, fleas	100,000
Italian plague	1629-1631	Yersinia pestis bacteria / Rats, fleas	1M
Cholera Pandemics 1-6	1817-1923	V. cholerae bacteria	1M+
Third plague	1885	Yersinia pestis bacteria / Rats, fleas	12M (China and India)
Yellow fever	Late 1800s	Virus / Mosquitoes	100,000-150,000 (U.S.)
Russian Flu	1889-1890	Believed to be H2N2 (avian origin)	1M
Spanish Flu	1918-1919	H1N1 virus / Pigs	40-50M
Asian Flu	1957-1958	H2N2 virus	1.1M
Hong Kong flu	1968-1970	H3N2 virus	1M
HIV/AIDS	1981-present	Virus / Chimpanzees	25-35M
Nipah virus	1998- present	Nipah Virus/ Bats, Pigs	701 human cases (1998 to May 2018).50 to 75% risk of death
Swine Flu	2009-2010	H1N1 virus / Pigs	200,000
SARS	2002-2003	Coronavirus / Bats, Civets	770
Ebola	2014-2016	Ebolavirus / Wild animals	11,000
MERS	2015-Present	Coronavirus / Bats, camels	850
Covid 19	2019-Present	Coronavirus – Unknown (possibly pangolins)	2.7M (Johns Hopkins University estimate as of March 16, 2021)

Source: https://www.visualcapitalist.com/history-of-pandemics-deadliest/

2.7.2.1 Spanish Flu: 1918-1919

An estimated 500 million people died from the Spanish Flu globally, from the South Seas to the North Pole (Owen, 2020). A quarter of the population perished, placing several native tribes in danger of becoming extinct. Soldiers' close quarters and the subpar food provided during conflict, as many civilians experienced during World War I, contributed to the flu's spread and severity. Despite its name, it seems doubtful that the illness came from Spain.

Spain was a neutral country throughout the war and did not severely control its press, enabling the first accounts of the disease to be published in public (Martini et al., 2019). As a consequence, the name "Spanish Flu" gained popularity and many people believed wrongly that the virus was only present in Spain (Owen, 2020).

2.7.2.2 Asian Flu: 1957-1958

The Asian Flu pandemic, according to Owen (2020), was a new worldwide influenza outbreak. The sickness, which started in China, killed more than a million people. The virus that started the pandemic was a concoction of avian flu viruses. According to the Centers for Disease Control and Prevention, the pandemic quickly spread. In February 1957, cases were reported in Singapore, in April 1957 in Hong Kong, and in the summer of 1957 in coastal areas of the United States. Moreover, 1.1 million people died worldwide, with 116,000 of them died in the United States (Owen, 2020).

2.7.2.3 AIDS Pandemic and Epidemic (1981-present day)

An estimated 35 million individuals have died as a result of AIDS since it was first identified. A chimpanzee virus that infected humans in West Africa in the 1920s is assumed to be the source of HIV, the virus that causes AIDS (Sharp et al., 2011). By the end of the 20th century, AIDS had spread over the globe and was considered a pandemic. Over 64 % of the estimated 40 million HIV-positive persons worldwide are currently found in Sub-Saharan Africa (World Health Organisation, 2016). There was no known treatment for the disease for decades, but medicine developed in the 1990s now enables people with the condition to live normal lives with the right care.

2.7.2.4 H1N1 Swine Flu pandemic: 2009-2010

According to Owen (2020), a brand-new H1N1 strain that started in Mexico in the spring of 2009 and then spread globally was the root cause of the 2009 swine flu pandemic. The Centers for Disease Control and Prevention (CDC) reported in 2009 that the virus killed between 151,700 and 575,400 people worldwide and infected 1.4 billion people in a single year. The 2009 flu pandemic, which killed 80% of people under the age of 65, largely afflicted children and young adults, according to the Centers for Disease Control and Prevention (CDC) (2009). This was shocking because most types of flu viruses, especially seasonal flu viruses, kill most adults 65 and older. However, given that they were less affected, older people appear to have developed adequate

defences against the H1N1 virus family in the case of the swine flu. The swine flu-causing H1N1 vaccine is now included in the annual flu shot (Centers for Disease Control and Prevention CDC, 2009).

2.7.2.5 West African Ebola epidemic: 2014-2016

West Africa was ravaged by Ebola between 2014 and 2016, with 28,600 cases and 11,325 deaths reported (Owen, 2020). In December 2013, Guinea was the first country to report a case, and the illness quickly spread to Liberia and Sierra Leone. The majority of illnesses and deaths occurred in those three nations (Centers for Disease Control and Prevention CDC, 2016). In Nigeria, Mali, Senegal, the US, and Europe, there were fewer instances, according to the Centers for Disease Control and Prevention (2017). While there is still no cure for Ebola, efforts to develop a vaccine are moving forward (Centers for Disease Control and Prevention CDC, 2016). When the first Ebola cases were discovered in Sudan and the Democratic Republic of the Congo in 1976, the virus was once believed to have originated in bats (Owen, 2020).

2.7.2.6 Zika Virus epidemic: 2015-present day

It will take several years before the latest Zika outbreak in South and Central America's long-term effects are recognised (Owen, 2020). Scientists are currently in a battle against time to contain the virus. Aedes mosquitoes are the primary carriers of the Zika virus, although humans can potentially get it through sexual contact. Zika is often safe for both adults and children, although it can cause birth defects in unborn children (Centers for Disease Control and Prevention CDC, 2019). As mosquitoes that spread the Zika virus favour warm, humid climates, South America, Central America, and some of the southern United States have suitable habitats (World Health Organization, 2016)

2.7.2.7 Middle East respiratory syndrome coronavirus (MERS-CoV) 2013-present day

A virus called the Middle East respiratory syndrome coronavirus (MERS-CoV) is transferred to people from infected dromedary camels (World Health Organization

WHO, 2022). As a zoonotic virus, it can be contracted through direct or indirect contact with sick animals and spread from animals to humans. Many Middle Eastern, African, and South Asian countries have reported finding MERS-CoV in dromedaries.

Since 2012, instances have been reported in 27 counties, and the virus and its effects have killed 858 people (Owen, 2020).

Although the virus's origins are unknown, it is believed to have originated in bats and spread to camels at some unspecified time in the distant past based on the analysis of several virus genomes. Even though it is possible for the virus to spread from person to person, only a small number of cases have been found among family members who live in the same house. On the other hand, it seems that human-to-human transmission occurs more frequently in medical settings (World Health Organization WHO, 2022).

2.7.2.8 Coronavirus Disease (Covid-19)

According to the World Health Organization WHO (2022), the recently identified coronavirus that causes Coronavirus Disease (Covid-19) is a contagious disease. The majority of Covid-19 virus-infected people will experience mild to moderate respiratory symptoms and will recover without the need for any special treatment (Huang et al., 2020). Chronic disease is more likely to affect the elderly and persons with underlying medical conditions such cancer, diabetes, respiratory disease, and cardiovascular disease (World Health Organisation WHO, 2022). The best way to stop and slow down transmission is to learn everything there is to know about the Covid-19 virus, its origins, and how it spreads. In order to stop the spread of viruses and protect others, exercise good personal hygiene by washing your hands, wearing a face mask, and avoiding eye contact in public places (Owen, 2020). The primary means of transmission for the Covid-19 virus are saliva droplets or discharge from the nose when an infected person coughs or sneezes (World Health Organisation WHO, 2022).

2.8 URBAN GREEN SPACE AS A HEALTHY CITY

The relevance of urban green space and social contact during pandemics is discussed in this section, along with how urban green space contributes to a healthy city. According to the World Health Organization (WHO) (2021), a healthy city is one that continuously creates and improves physical and social environments, as well as increases access to community resources to allow residents to support one another in carrying out all of life's functions and reaching their full potential.

The Ottawa Charter for Health Promotion (1986) describes that a healthy city is a city in the framework of people's daily lives, where they learn, work, play, and love in which people construct and live healthily. The goal of the framework is to use a "whole system" approach to disease prevention that incorporates multi-disciplinary activity across risk factors (The Ottawa Charter for Health Promotion, 1986).

The Healthy City themes include community participation, partnership, empowerment, and equity. The most well-known example of a successful Healthy Settings strategy is the Healthy Cities programme (World Health Organization WHO, 2021). Healthy Cities, which were first established by WHO in 1986, have quickly spread across Europe and other parts of the world (World Health Organization, 2020). A Healthy City aims to:

- to create a health-supportive environment,
- to achieve a good quality of life,
- to provide basic sanitation and hygiene needs,
- to supply access to health care.

Being a Healthy City is dependent on a commitment to enhance a city's surroundings and a determination to establish the necessary linkages in political, economic, and social arenas, rather than on current health infrastructure (World Health Organisation, 2020).

The agenda for sustainable development was developed in order to realise the idea of a healthy city. For example, Sustainable Development Goal 3 aims to promote healthy lifestyles and well-being for all people of all ages. This objective aims to communicate the global effort to realise the idea of a healthy city throughout pandemic crises.

Safety and security, the quality of the air and water, mental health, and other factors all contribute to a healthy city. To attain the goal of a healthy city during pandemic crises, interactions between community design, patterns of social interaction, and the building are also important factors to take into account (World Health Organization WHO, 2021).

2.8.1 The Importance of Urban Green Space During the Pandemics

The pandemic is changing how we view public spaces and igniting important questions about parks and how they may be designed to promote the health and wellbeing of the population (The Organisation for Economic Co-operation and Development OECD, 2020). The global pandemic has highlighted the importance of close-to-home parks to a community's quality of life. People have turned to local parks like never before for fresh air, exercise, meditation, and a sense of tranquilly during this crisis (Xie, 2020). Researchers have discovered that being outside has numerous health benefits (Muqueeth, 2020). People's psychological, emotional, and general well-being have been demonstrated to improve when they spend time in parks and other green areas.It lowers stress, improves brain function, and is linked to better health in general (Surico, 2020).

Wide walkways, arboretums, and botanical gardens are a few examples of public green spaces that are suitable for upholding social distancing regulation (Xie, 2020). Beaches and playgrounds, for example, require more law management because people are more inclined to gather there (Muqueeth, 2020).

Moran (2020), states that parks and greenspaces benefit environmental and human health in a variety of ways, from reducing heat and air pollution to encouraging physical exercise and restoring mental health. During a pandemic, parks' health-promoting potential is amplified even more. Social isolation increases as a result of many individuals being confined to their houses, and mental health issues such as stress, anxiety, and depression emerge as a result (Moran, 2020).

According to Moran (2020), cities offer opportunities for safe outdoor recreation during the pandemic and beyond as per below:

i. During the pandemic

- Monitor/schedule park visits
- Extend supervised park hours after dusk
- Providing access to existing open spaces such as golf courses, college campuses
- Provide clear regulations for safe park use

ii. Beyond the pandemic/longer term

- Equally distribute public spaces within cities to provide high park access (<10min walk) for all residents
- Provide different parks varying by size, shape and potential activities for all residents.

During pandemic Covid-19 the government of Shanghai, China, has reopened most of the city's parks and major attractions, such as the Chenshan Botanical Garden and the city zoo (Xie et al., 2020). Park visitations are limited to two hours for tourists and require a successful temperature check and online reservations (Surico, 2020). Being physically active is one of the greatest ways to maintain mental and physical health (the Centers for Disease Control and Prevention CDC; 2020). By visiting parks, trails, and open places, people can decrease stress, get some vitamin D and fresh air, stay active, and securely interact with others (Muqueeth, 2020).

There are many ways to open up parks while keeping appropriate levels of security during pandemics. One strategy is to put agents at access points to keep an eye on capacity controls and make sure they are being followed (the Centers for Disease Control and Prevention CDC; 2020). In order to keep people from crowding into a park, managers can do things like check people's temperatures, make them wear face masks, limit the number of people who can enter at once, limit the number of cars that can park in a certain area, For instance, several public parks in New Jersey have reopened to allow for strolling, hiking, bicycling, and fishing but have kept their restrooms, playgrounds, picnic areas, and camping areas closed during pandemics. Furthermore, they are only using half of their parking space (Moran, 2020).

However, urban green spaces and nature provide numerous advantages that are particularly crucial during a pandemic. The spread of the pathogen during the pandemic and the resulting closures of offices, restaurants, and entertainment venues, people are eager to get outside and spend time in nature. Sunlight, fresh air, exercise, and access to green places are all good for our physical and mental health (Muqueeth, 2020). The importance of parks and park equality as part of a larger healthy urban planning agenda is highlighted in pandemic. Park design strategies in reaction to the pandemic highlight some of the underlying issues of healthy urban planning (Xie et al., 2020).

Healthy urban planning is a strategy that focuses on various health outcomes rather than a single disease.

2.8.2 Urban Green Spaces as a Social Interaction

A crucial aspect of daily life is social interaction. It is a process in which at least two people interact and stimulate each other, and it has to do with the many ways people act and react to each other (Sarah et al., 2002). The residents have a common experience. It's a type of externality in which the decisions of a group affect the decisions of a single person. Using all of one's natural senses allows one to fully engage in social contact, which emphasises the value of green places (Davis, 2015). It includes all forms of communication and can be exhibited through four main behaviours: attitude or expression, speech, action, and gesture. It also includes collaboration, imitation, helping, playing, informing, negotiating, and bargaining (Sarah et al., 2002). The parts of social contact are important because they help us understand what this idea means.

The re-emergence of infectious diseases is a significant public health issue. The health of people around the world is currently threatened by pandemics and epidemics including Avian influenza, SARS, Ebola, pandemic influenza, the emergence of anti-microbial organisms, and the current pandemic Covid-19 (World Health Organization WHO, 2020). Some people say that the return of these diseases marks the end of medicine's "golden age" and the beginning of a time when infectious diseases that come back will put public health and safety at risk (Chattu and Yaya, 2020). According to Davis (2015), pandemics stand out in this scenario because they affect millions of individuals worldwide and spread swiftly. It's linked to a significant risk of death, and the world just had a well-publicized pandemic that was, for the most part, moderate. For these reasons, public health officials prioritise informing the general people about infectious disease concerns and urging them to change their health habits (Chattu and Yaya, 2020).

Public communications in the event of a pandemic influenza are part of preparedness and response planning, which demands that the general public observe specific safety measures in the event of a public health emergency, such as personal hygiene (such as covering the mouth and nose when coughing or sneezing, washing hands, keeping surfaces clean, and not sharing personal items), and avoiding close contact with other people (World Health Organization WHO, 2020). For the study that

helps with response planning, it is just as important to know how people react. For instance, biological, psychological, and sociological assumptions about how people react to infectious diseases are incorporated into mathematical models that direct planning for the pandemic response (Davis, 2015). In order to effectively manage pandemics and other new infectious diseases, it is crucial to effectively communicate with the general population and understand how they react.

According to sociological theory, there are two different types of social interaction (Goffman, 1972). The first type is the act of seeing and being seen by others, which is the earliest sort of social contact. The second type of social engagement is active social interaction, which is like semi-primary interactions like talking, hanging out, and playing with people. It also involves quick, impromptu encounters with neighbours or total strangers. The intensity of social interaction that creates dynamic public spaces is shaped by these types of acts and reactions (Goffman, 1972). In this way, urban green space meets the greatest number of social demands for residents. They encourage people to engage in physical activities, socialise with friends and family, participate in leisure activities, enjoy nature, and observe others (Akpinar, 2016).

During the long lockdown and intense social isolation caused by the pandemic, it is important to use anything that can help reduce stress, hopelessness, and other mental health problems (Centers for Disease Control and Prevention, 2009). This is because the pandemic is having an effect on both the global economy and health. In this sense, the idea of social isolation promoted by the pandemic has no conflict with "passive interaction" as a fundamental human need, i.e., seeing people and being seen (Chen et al., 2016).

Chen et al. (2016) say that urban green space should not be overlooked or undervalued during major global crises because it is so important for giving people places to do nothing. In order to respect social distance, urban planners and landscape architects should come up with innovative ideas for urban green space. These solutions could include the location and size of various gathering spaces inside the parks or green space, the width of the tracks, and the creation of creative physical barriers between benches that are not visible (Chattu and Yaya, 2020).

The purely medicinal function of urban green spaces against viruses is another reason for a healing process throughout the lengthier pandemic lockdown. According to the World Health Organization WHO (2020) getting enough vitamin D from the sun is essential for fighting infections in human bodies. Given all of the benefits of urban green space listed above, the reasonable question is why urban green space is not yet being utilised as an integral part of the worldwide pandemic's curative solution.

Mujahed (2021), debates that considering urban areas account for 90 % of Covid-19 infections, some cities encourage the use of private cars, while others support sustainable modes of transportation such as bicycles and walking. Globalization, interconnection, and shared mobility aided in the spread of Covid-19 over the world; to combat the pandemic, worldwide communication and collaboration are required (Mujahed, 2021). Cities must be redesigned to match the requirements of the "social-distance" definition, with more open and free areas for pedestrians in streets that are already constructed for automobiles (Yang et al., 2022). The solution to this pandemic may be difficult to obtain, but offering urban city stability, shared duties, and healthcare infrastructure for citizens can be the foundation of the solutions (Cheng, 2021). Apart from incomes, access to services, and race, the city's parts should be divided in other ways.

Mujahed (2021), further explains some actions can assist combat the Covid-19 pandemic, such as improving the city's digitalization, which reduces greenhouse gas emissions. Residents in a location with more green areas can enjoy greater health. People who live in the county region are more accepting of nature but limited access to health centers. People in areas where there are no green spaces and where people are required to stay in their houses all of the time can suffer negative consequences; for example, elders may experience anxiety, while children may experience long-term post-traumatic stress (Cheng, 2021). In urban areas, physical activity has a significant impact on the human body (Mujahed, 2021).

2.9 ROLES OF URBAN GREEN SPACE IN RELATION TO PANDEMIC CRISES

Green space in cities can benefit both mental and physical health (Sandy et al., 2021). By promoting psychological well-being and stress alleviation, fostering social cohesiveness, promoting physical exercise, and minimising exposure to air pollution,

noise, and extreme heat, it may also reduce urban morbidity and mortality (Brooks et al., 2020). Moreover, green areas contribute to enhance mental health and reducing the risk of mortality and cardiovascular disease, obesity, and diabetes (Kelly, 2005).

Deforestation puts animal's creatures that are reservoirs for viruses like the new coronavirus into closer proximity with one other and humans, therefore conserving urban green space is extremely vital to preventing pandemics (Yusuf et al., 2022; Moran, 2020). Early in the Covid-19 outbreak, UN Environment Chief Inger Andersen (2020), describes that the coronavirus pandemic tells us that nature is delivering us a message that human activities bring destruction led to diseases to human. Failure to care for the Earth implies failing to care for ourselves." Olmsted recognized the benefits of nature, saying that urban trees have a "calming and freshening sanitary influence (Rainforest Alliance, 2021). "His "sanitary style" of design was more than just ornament and decoration (Rainforest Alliance, 2021).

The further discussion on the roles of urban green space in relation to pandemic crises such as improved functioning of the immune system, improved social capital and cohesion, reduced mortality and increased life span, potential adverse health effects, beautifying and make healthier environment, promoting biodiversity and creating valuable usable space for people (Kuo, 2015; Lõhmus and Balbus, 2015; Yang et al., 2016; Gascon et al., 2016; Braubach et al., 2017; Holland et al., 2018; Rice and Pan, 2020).

2.9.1 Improved Functioning of the Immune System

Without an immune system, our bodies would be vulnerable to attack from bacteria, viruses, parasites, and other pathogens (Murrell, 2018). He adds that the immune system is crucial for human survival. Immune system keeps us healthy to do daily routines. According to Murrell (2018), the immune system is made up of many different cells, organs, proteins, and tissues all over the body. Connections between nature and health and the role of urban green space in boosting immune system function (Kuo, 2015).

According to Li et al. (2008), visiting to forest triggers positive immunological reactions that include the production of anti-cancer proteins. This demonstrates how interaction with certain components present in green areas or direct exposure to natural

settings might enhance immune systems. The likelihood of recurrent wheeze and allergy sensitization was shown to be lowest in children who were exposed to the most allergens or microbes during their first year of life (Lynch et al., 2014). Living in an area with more street trees has been associated with a lower risk of asthma (Lovasi et al., 2008). Rook (2003), identified one proposed immunological route as exposure to commensal bacteria in biodiverse natural settings, which may have an immunoregulatory function.

An environment with more biodiversity near dwellings has been linked to a lower risk of allergies (Hanski et al., 2012; Ruokolainen et al., 2015). The skin and gut microbiomes may become more diversified with increased exposure to commensal microbes, particularly in early life, and this may give protection against allergies and autoimmune disease (Kondrashova et al., 2013; Braubach, 2017). Also, it has been suggested that when interact with natural environments, the human microbiota might promote mental wellbeing (Logan, 2015).

2.9.2 Improved Social Capital and Cohesion

"Features of social organisation, such as networks, norms, and social trust that promote coordination and collaboration for mutual benefit" are the definition of social capital (Putnam, 1995, p. 67). The strength of bonds and a feeling of oneness among community members are referred to as social cohesiveness. Social capital is a crucial indicator of social cohesiveness and has a big impact on health. Although social isolation is a known predictor of illness and death, social relationships are known to benefit health and well-being (Nieminen et al., 2010; Pantell et al., 2013; Yang et al., 2016).

Kim and Kaplan (2004) and Lengen and Kistemann (2012), say that people need social connections and a sense of community for their health and for society as a whole to work well. Public green spaces in cities have been found to encourage social interaction and social inclusion in children and teenagers (Seeland et al., 2009; Ward Thompson et al., 2016). While a lack of green space has been connected to better social cohesiveness at the neighbourhood level, it has also been linked to feelings of isolation and a lack of social support (Maas et al., 2009; Vries et al., 2013). According to Hartig et al. (2014), there are significant links between green space and social wellness, with observational research demonstrating its significance in fostering user satisfaction.

2.9.3 Reduced Mortality and Increased Life Span

The Oxford Dictionary defines mortality as death, particularly when it occurs often. Having more access to green space is linked to a reduced mortality rate (Gascon et al., 2016). For instance, a study conducted in Japan discovered that older citizens' five-year survival rates were positively connected with their proximity to walking-friendly green space, parks, and tree-lined streets (Takano et al., 2002). More green space in the area was associated with decreased all-cause mortality, according to another study of England's pre-retirement population (Mitchell and Popham, 2008). The results are consistent with studies based on the population of England's 2001 census, which showed a relationship between an area's larger percentage of green space and better self-reported health (Mitchell and Popham, 2007).

In a Canadian research, more green space in homes was linked to a decline in mortality (Villeneuve et al., 2012). In the United States, living near a green area has been associated with a decreased risk of stroke mortality and greater survival rates after ischemic stroke (Hu et al., 2008; Wilker et al., 2014).

2.9.4 Potential Adverse Health Effects

Health is described by cellular ecological equilibrium and the absence of excessive loss of the body's structural and functional reserves, whether reversible or irreversible (Sherwin, 1983). He says that a negative health effect is the cause, promotion, facilitation, or worsening of a structural or functional abnormality. This means that the structural or functional abnormality can lower the quality of life, lead to an illness that makes it hard to do things, or cause an early death. While there is negative evidence, Lõhmus and Balbus (2015) evaluated that increased access to and usage of green space may potentially be linked to exposure to health risks. Less research and inconsistent data support the health advantages of urban green space than the opposite. The 11 Impacts of Urban Green Space on Environmental Health, Equality, and Resilience 196 was assessed by the WHO Regional Office for Europe in 2016. Arthropod-borne disease vectors, infectious organisms in soil tainted with animal faeces, greater exposure to pesticides, allergic pollen, and a higher chance of injury are all potential health risks.

According to study, there are connections between increased biodiversity around houses and decreased allergy sensitivity (Hanski et al., 2012; Ruokolainen et al., 2015). More thorough research is required to evaluate pollen exposure, resolve any confounding, and define the processes behind age-specific negative and positive health effects. It's also crucial to remember that children need to take risks and engage in exploratory behaviour for optimal development, and that surroundings that support risky play stimulate greater playtime, social connections, creativity, and resilience (Brussoni et al., 2015). By effectively developing, maintaining, and managing green space, the majority of undesirable effects may be prevented or minimised (Lõhmus and Balbus, 2015). These possible negative effects should be taken into account when building green areas like parks, greenways, and playgrounds, and steps should be made to minimise the chance of allergies or serious injuries.

Shah (2011), found that when exposed to a natural setting, people's stress levels quickly decreased, however when exposed to an urban environment, their stress levels stayed high. Patients in a hospital who had rooms that overlooked a park recovered 10% quicker and needed 50% less harmful painkillers than those who had rooms that overlooked a building wall Mujahed (2021). There is clear evidence that urban green areas may enhance residents' physical and mental health. Another research conducted in Swedish cities discovered that individuals are less anxious the more time they spend outdoors in urban natural areas (Braubach et al., 2017). In addition to improving physical health and reducing respiratory illnesses, vegetation improves the air quality in green spaces for human activities (Lõhmus and Balbus, 2015). The interaction of people with nature in green spaces is crucial for the welfare of the community as well as for citywide productivity and mental health (Bratman et al., 2019).

The amount of clearly visible green areas might promote the flexible sharing of green space in cities (Mujahed, 2021). During a pandemic lockdown, public green areas are a crucial component of the city and its culture. According to Heo et al. (2021), the lockdown has led to a rise in the average age of those who suffer from non-communicable diseases including anxiety and depression. He continues by saying that urban green space is important for enhancing psychological elements (Heo et al., 2021).

2.9.5 Beautifying and Make Healthier Environment

According to Van Renterghem and Botteldooren (2009), the green area may reduce noise levels both within and outside of the building and enhance the structure's aesthetic appeal. Kosareo and Ries (2007) assert that green space benefits both construction and human living. According to Hodson (2009), their position at the centre of networks gives them a sense of stability and security and ensures that the places where they work and reside are more desirable and controllable. Actively planting trees helps stop desertification (the United Nations Convention for Desertification, 2018). They suggest that growing trees may enhance air quality by lowering particle matter levels and decreasing erosion and stream pollution. According to Hartig et al. (2014), higher air quality, more physical activity, stress reduction, and enhanced social cohesion are the four interrelated ways that green space may promote health and well-being. The network of green spaces in an urban region is made up in large part of urban green space. Maintaining green space, according to Tian and Well (2012), relieves mental tiredness and promotes community engagement in leisure activities in busy areas and stressful urban contexts. The study, which was written up in the medical journal "The Lancet," found a negative correlation between death rates and exposure to greenery (Kosareo and Ries, 2007).

Hoe et al. (2021), found that greenery is linked to more physical activity, better mental health, better sleep, less stress, better thinking, and faster patient recovery. According to studies, patients who were given rooms with views of nature recovered more rapidly and with less difficulty than those whose windows looked out into a brick home (Raanaas et al., 2011). Hoe et al. (2021), stated that green spaces in cities are good for the environment and for the social, mental, and physical health of the people who live there. Holland et al. (2018); Thomsen et al. (2013), have found that parks and green spaces make a big difference in people's emotional and physical health as well as their social well-being during health emergencies and global pandemics. Parks and green spaces have a favourable effect on people's mental and physical health as well as their social wellness during public health emergencies and global pandemics.

2.9.6 Promoting Biodiversity for Healthier Environments

Biodiversity refers to the variety of living species on Earth, including plants, animals, bacteria, and fungi (Brown, 2022). Urban green space plays an important role in enhancing the quality of environment especially for urban biodiversity (Karuppannan et al., 2013). Many researchers claim that by promoting green space it able to bring benefit to the wildlife by creating space for them to live (Braubach, 2017). He adds that the trees in the urban green space used by birds to create their own nest as place to live and grow in which give habitat to the animals and promote biodiversity and create healthier environment. Rocha (2021), describes that green space also provides benefits for animals and green space design must follow specific local biodiversity conservation purposes. Conserving forests or green space is also key to preventing pandemics, since it's forest destruction that brings wildlife which are reservoirs for pathogens like the novel coronavirus into closer proximity with each other and humans (Sandy et al., 2021).

Cities do not take the role of a diverse biological landscape (Erica et al., 2021). Cities can be compact as well as 'green,' with precise attention devoted to every part of the urban greening complex is the argument stated here, which is pertinent to urban green areas at all scales (Russo et al., 2018). Parks are important and they must be balanced by the value of vegetable or communal gardens, as well as private or allotment gardens (Batra, 2014). In brief, urban green space such parks in the city is has significant role in promoting biodiversity for healthier environments. They clearly need to be part of a green space system, as "urban ecology" is merely a supplement to the countryside (Braubach, 2017). Marinelli (2021), explains that cities bound with a wonderfully diversified and variety of unconventional habitats provide significant habitat or resources for native biodiversity. These include remnants of original habitats including forests, marshes, and grasslands, as well as parks, backyards, and cemeteries, as well as golf courses, urban farms, and community gardens.

Moreover, green space can help urban areas better manage their storm water. Rain serves to store water that plants in green spaces can utilise and then release through evapotranspiration into the air or environment. Collective sewage overflow is still a problem in big cities, but it happens less often when there is more green space and less water runs off into the sewage system.

Softscape elements like climbers, bushes, and trees are perfect for filtering toxins that are washed off in the rain, which is crucial during pandemics. Indirectly, it helps to increase the quality of the run-off. Besides that, green space may boost membrane durability, obtainable to supply additional outside green space for humans and animals as well as increase asset prices (Liu, 2002, p. 17).

2.9.7 Creating Valuable Usable Space for Community

Rice and Pan (2020), explain parks and green spaces are gaining attention once again because of their crucial role in providing locations for safe outdoor leisure during the Covid-19. Green space serves as a location for human activities as a result of the population's rapid development. People visit parks and gardens for a variety of reasons, including leisure, sightseeing, getting fresh air, getting together with friends and family, and many more. Urban green space serves as a leisure area for people, which is beneficial to all of us. Being in touch with nature will help the community learn more about environmental education (Castletona, et al., 2010). In order to promote a healthy living and working environment, high-rise buildings may use rooftop gardens as a means of providing green space (Wan, 2009).

Green space may be utilised as a venue for educational events including fairs, flora exhibitions, temporary displays, and agricultural technology demonstrations (WHO Regional Office for Europe WHO, 2017). Occupational therapy, horticultural therapy, and healing and palliative care activities may all be carried out in green spaces (Söderback et al., 2009). Moreover, open-air cultural activities like as theatre, music, family gatherings, and kid's parties may be held in green spaces (Sepe, 2021).

The majority of people's leisure demands are satisfied at their places of residence (Shah, 2011). As more than 80% of people in the United Kingdom reside in cities, green spaces inside cities provide a sustainable part of all outdoor recreational activities (Nicol and Blake, 2000). About 97% of city community in Helsinki, Finland, participate in outdoor activities at least some of the time (Neuvonen et al., 2007). Around half of the locals go outside every day or every other day. Urban green areas are a handy place to unwind and find emotional solace. Up to three million visitors every week enjoy a range

of activities at Mexico City's Chapultepec Park (Neuvonen et al., 2007). In other words, green areas provide individuals' usable space.

2.10 THE BENEFITS OF URBAN GREEN SPACE

This section introduces the benefits of Urban Green Space. There are four categories which is economic benefits, social benefits, environment benefits and benefits of applying urban green space into the design.

2.10.1 Economic Benefits

Urban green space enhances the building's (Davis, 2008). The owner of the surrounding garden can charge more for leasing space since the garden has the power to affect building costs and serves as a tourist attraction (Sherer, 2003). Moreover, parking is provided by office buildings, conference centres, theatres, retail malls, and other urban projects to ensure their success (Davis, 2008). A developer or designer can include a rooftop garden rather than merely adding a parking lot or carport on the property or nearby. It increases the value of both parking structures (Osmundson,1999, p. 27). Urban green space gives a lot of benefits and lead and encourage individuals to decide to include it into their home construction as the residential value increasing.

2.10.2 Social Benefits

Urban green spaces provide as locations for individuals to engage in activities like socialising with loved ones and exercising to maintain a healthy lifestyle (Nieminen et al., 2010). With the beauty of a green garden, people may enjoy mingling or engaging in interactions to meet friends or family (Davis, 2015). The green space offers as a tranquil and relaxed environment inside the urban environment (Holland, 2018). Urban green space or gardens express a sense of isolation from the bustle, traffic, noise or clamour, residue, and overall disorder of the typical downtown city road (Davis, 2015). Green space may also be utilised to commemorate places that were significant historically and socially (Odmundsin, 1999). Gardens may hide the quality of new structures when they must be erected on sensitive locations; some of these structures may even be completely below grade and hidden by the garden (Holland, 2018).

2.10.3 Environmental Benefits

Urban green space is important as the vegetations element able filtering the air and provide fresh environment. Greenery purifies the air by absorbing carbon dioxide and releasing oxygen via photosynthesis, which sustains all forms of life, including human life (Kruize, 2019). Maintaining air quality in urban areas requires a significant amount of urban green space (Osdmundson, 1999, p. 29). Urban green space may also assist in lowering energy consumption by shielding a building from changes in air temperature if it is below grade or serving as an insulating layer to prevent heat transfer if it is above grade (Rocha, 2021). Urban green spaces with vegetation serve to improve the environment (Kruize, 2019). Urban green space may play a significant role in maintaining the healthy biological system and improving the ecology (Hanski et al., 2012).

a) Benefits of urban green space on mental health and stress reduction

According to the National Recreation and Parks Association (2020), public health emergencies are a time when green spaces are widely recognised as providing considerable public benefits. Several long-ignored uses of urban green space are now finally acknowledged by the public as a consequence of the disease's spread and the execution of government solutions (Hockings et al. 2020). The Covid-19 pandemic has had a profound psychological impact on a large number of individuals worldwide (Bavel et al., 2020). According to Freeman and Eykelbosh (2020), the pandemic is expected to have a substantial impact on mental health as well as self-quarantine and other response measures.People's mental health is greatly impacted by the duration of the quarantine, worries of infection, boredom and frustration, lack of understanding, and other factors (Brooks et al., 2020).

Reynolds et al. (2008), Wilken et al. (2017), Bavel et al. (2020), Bell et al. (2020), Brooks et al. (2020), and Hossain et al. (2020), all made note of the fact that self-quarantining for longer periods of time can have adverse psychological effects, including poor mental health and post-traumatic stress symptoms. Those who have been quarantined for more than 10 days exhibit considerably greater stress symptoms than those who have been quarantined for less than 10 days (Hawryluck et al., 2004). Mayer et al. (2013) and Brooks et al. (2020), stated that stress during pandemic quarantine is attributed, to worries about infection for people and their families, changes

in routine, limitations on social and physical contact, and a lack of clear standards or guidelines for the Covid-19 awareness program.

Parks and other green areas have helped to lessen the psychological impact that comes from Covid-19 (Freeman et al., 2020). Parks may ease tension and provide a range of psychological and emotional advantages (Seaman et al., 2010; Annerstedt et al., 2012; Hockings et al., 2020; Nicola et al., 2020). According to Annerstedt et al. (2012), green space has qualities including calmness, openness, wildness, culture, and a lush environment that may all reduce the risk of mental illness. Numerous studies have demonstrated the benefits of spending time in natural settings, such as parks and green spaces, in reducing mental stress, improving sleep quality, lowering the risk of depression and anxiety, and strengthening people's resilience and ability to handle daily responsibilities (Hammen, 2005; Roe and Aspinall, 2011; Rasmussen and Laumann, 2013; Cox et al., 2017; Fong et al., 2018; Bratman et al., 2019).

Pocket parks and other green areas are helpful to one's health, mostly via social cohesion and stress reduction (Kulinkina, 2015). Even a window with a view of some vegetation seems to be helpful. Although bigger, maybe remoter green spaces may inspire adults and older children to exercise, smaller green space areas may be ideal for youngsters to play in (Sandy, 2021).

b) Benefits of Urban Green Space on Physical Health

Several everyday activities have been restricted by the government during pandemic qurantine, but urban green spaces have made up for this by offering areas for exercise and fresh air (Sandy, 2021). Some individuals have discovered that a prompt and coordinated immune system response, combined with being in excellent physical condition, is the first line of protection against illness (Catanzaro et al., 2020). Visits to green parks and other natural areas have long been recognised to have positive bodily effects (Seaman et al., 2010; Fisher and Grima 2020). According to the Centers for Disease Control and Prevention in the United States, going to parks may enhance both individual and community health. Those who exercise in parks at least three times per week report a 25% improvement in their perception of their physical health (National Recreation and Parks Association, 2020).

It is well established that access to urban green space has positive effects on one's physical health, particularly their respiratory and cardiovascular systems (Lee 2014; Tamosiunas et al., 2014). Spending time in parks, green spaces, and other natural settings may stimulate the Natural Killer (NK) cells in humans. In the human immune system, NK cells are essential because they induce virus-infected cells to die (Li et al., 2007; Vivier et al., 2008; Tsao et al., 2018).

Provide children with access to urban green spaces where they may play and engage in physical activity, as promoted by the Urban Green Space Indicator (UGSI) (Kulinkina, 2015). The main health advantages for the indicator were physical exercise and reduced stress, although additional advantages were not expressly prohibited. Considering the unquestionable value of exercise for both physical and mental health, even a little increase in physical activity, which may be facilitated by access to green spaces, can have a major effect on public health. Particularly green areas provide a setting that's good for kids' physical and intellectual growth (Kulinkina, 2015).

According to Kulinkina (2015), research showing the advantages of access to green space for health have led to the introduction of the Urban Green Space Indicator (UGSI) as an environmental health indicator. The technique, which uses the percentage of a city's population living within a set linear distance from a green space as a proxy measure for a healthy lifestyle, is an approach that is both user-friendly and informative to assess the accessibility of urban green spaces. The indicator is judged on how effectively it can be interpreted, used to compare cities, and used to monitor progress towards the goal of creating healthy urban environments. The declaration of data sources is necessary for any comprehension of values and comparisons for the Urban Green Space Indicator (UGSI) (Bosch et al., 2015).

According to Bosch et al. (2015), the Urban Green Space Indicator (UGSI) is intended to assist and promote planning efforts and policy changes that aim to build or improve a healthy urban infrastructure that may support active lifestyles and stress reduction. Data from various nations may be more easily compared if an indicator tool with agreed-upon standards was used to evaluate accessibility to urban green areas. By presenting summary data in the European Environment and Health Information System (ENHIS), administered by WHO, it would offer a presently lacking, public and

complete database on the supply of public green spaces in European towns. It would be possible to follow the growth of specific cities across time (Kulinkina, 2015).

Recognizing the importance of green spaces for health is a critical first step in fostering collaboration between urban planners and health experts, as well as strengthening cross-sectoral efforts to improve public health. The Urban Green Space Indicator (UGSI) aims to fill a knowledge gap in the urban environment and health sector, as well as promote the public health benefits of green spaces. The use of this indicator is expected to encourage policy initiatives targeted at enhancing the urban environment, which will improve the quality of life of urban dwellers and produce public health benefits in the long term (Kulinkina, 2015).

c) Urban Green Space in Reducing Disease Transmission and Increasing Social Cohesion

Through increasing communal and social bonding and reducing the risk of pandemic spread access to parks (Seaman et al., 2010). If parks are closed or access limited, people may move to less desirable public places, such as sidewalks and pavements (Freeman and Eykelbosh, 2020). On the other hand, these public spaces are not intended to encourage and maintain physical distance (Barkhorn, 2020).

People may spread out in urban green spaces, which relieves congestion in less attractive places (Freeman and Eykelbosh, 2020; Public Health England, 2014). Urban green spaces, especially neighbourhood parks, have the ability to improve social cohesion at the local level. Increased social and interpersonal cohesiveness, as well as feelings of integration and belonging, may minimise antisocial behaviour, particularly during times of public health emergencies (Seaman et al., 2010). Urban green space visitation may enhance social cohesiveness and the spread of pandemic viruses like Covid 19 may be decreased (Heo, 2021).

2.10.4 Benefits of Applying Urban Green Space into the Design

Green spaces are great for social, economic, cultural, and environmental growth over the long term. Sa'adu et al. (2017), said that green spaces in cities could be a complete solution for long-term environmental sustainability. This is because green spaces improve the quality of life and the air, increase the value of real estate because of their amenities and aesthetics, and reduce the energy costs of living together. Urban green spaces may help both people who live in cities and people who come to visit

(Shah, 2011). This is because they provide ecosystem services like aesthetic and relaxation. A particular degree of qualitative advancements and distribution of green spaces within the metropolitan area should be taken into consideration in order to establish the various purposes of green spaces and effectively include them in the environmental sustainability plan (Shah, 2011).

According to Shah (2011), urban green spaces can be crucial to long-term sustainability. Multidisciplinary and integrative methods like economic, political, social, cultural, management, and planning must be taken into account in order to improve current urban green space facilities and services and optimise urban green space policies. Urban green spaces are public and private open spaces in urban areas that are primarily covered by vegetation for active or passive recreation, give positive impact on the urban environment and are accessible to users (Sa'adu et al., 2017).

Urban green spaces can bring social, economic, cultural, and psychological benefits, particularly for the well-being of city dwellers and visitors. Since nearly half of the world's population now lives in cities, the pace of rural-urban migration and pressure from international migration in developed countries is still high, as most immigrants in developed countries live in the country's central or large cities, sustainable city development and development of urban green spaces are important (Abdul et al., 2021). Furthermore, improving urban people's lifestyles is significant, and a special focus on the environmental impact of human activities should be placed on promoting understanding of the rational use of energy, water, and food consumption, as well as natural resources, for environmental sustainability (Sa'adu et al., 2017).

According to Shah (2011), the design, management, and protection of urban green spaces have an impact on the quality of cities. The management, planning, design, and policy implementation of urban green spaces are heavily integrated and incorporated into sustainable development at the local and global levels as significant discussion themes of sustainable environment (Sa'adu et al., 2017). Green areas in cities not only help the environment, but they also help with social, economic, recreational, cultural, visual, and commercial development (Abdul et al., 2021).

Diversity of land uses, contribution to health and active lifestyles in cities, social justice by incorporating all groups and ages of people into green spaces, opportunities to interact and expand social networks, and enhancement of cultural life for different communities living in the city by providing a platform to share views, feelings, and to celebs are all social aspects of urban green spaces (Shah, 2011). In terms of planning, urban green spaces include commercial, retail, leisure, and tourism developments, employment centres and residential areas should have well-designed networks within the park and with other areas, as green space can serve as a visual screen, a noise barrier, and a place for commuting and recreation (Sa'adu et al., 2017).

Urban green spaces are beneficial to the economy because they can be used to grow and sell fruits and vegetables, provide wood to green business centers, and create new jobs. They can also increase the area's economic value by encouraging people to be more environmentally friendly and by attracting tourists with a nice environment, safety, and amenities (Davis, 2008).

From an ecological point of view, urban green spaces are important because they give off oxygen, filter pollution, keep the air, water, and soil clean, and protect the local natural and cultural history with a variety of urban species and resources (Yusuf, 2021). The incorporation of urban green space with development plans for novel concepts must be based on a variety of factors (Elizelle, 2015).

2.11 ISLAMIC PERSPECTIVE ON URBAN GREEN SPACES

Islam embraces a wide definition of the environment. It covers the climate and all of its elements, as well as all living creatures on or in the atmosphere, including humans, sand, plants, and animals. The idea of the environment in Islam is "a complete idea that covers earth, sky, and mountains with all species, in addition to people and their motives, feelings, and instincts" (Abdusslam, 2010). Each and every one of these beings was designed to help humanity. The maintenance and conservation of the environment are thus the responsibility of the people. Islam strictly prohibits resource waste and environmental destruction. During the conflict, the Muslims were prohibited from felling trees by the Prophet (peace be upon him). He made a point of emphasizing

environmental protection and mitigating its deterioration. Consequently, protecting the environment is a priority.

It has always been crucial to understand how people and vegetation interact. We cannot easily exist in our world without vegetation since they have an enormous impact on every part of our life. Vegetations are the only living things that can convert sunlight into food energy, which allows them to manage the concentration of gases in the air. In order to provide humanity with clean air and a means of removing pollutants from the atmosphere, Allah also created vegetation.

On the other hand, we were aware that Islam had crossed both political and geographical barriers and had expanded far. Muslims of various races may be found all over the globe (OthmanYatim,1995, p. 2). We might refer to that individual as the "Khalifah" the vicegerent of Allah in this nature according to Islamic teachings. According to Tawhid (belief in the oneness of Allah) and Rububiyyah (praise be to Allah the cherisher and sustainer of the world), which is the actual way of life, man has been created as an evolutionary being with a purpose to design urban green space in order to sustain the "Amanah" of Allah, which is the world (Omer, 2020).

Muslims are encouraged to practise stewardship, which involves protecting the environment and green space. Man is a logical creature with a balanced and healthy growth of knowledge across all areas (Abdusslam, 2010). The creation of water has its own objectives, including to irrigate vegetation, moisten the dry environment, and to soothe the dusty atmosphere. As one of the methods for preserving nature outlined in the Quran, we may relate water components through observation and experimentation to Islamic gardens.

As a Khalifah, it is our duty to uphold Allah's holy law since He is the only one worthy of obedience because He is the Creator of everything. In the Qur'an, Allah S.W.T. says.*" God has created the heavens and the earth and He sends you down rain from sky, with it we cause to grow well-planted orchards full of beauty and delight'* (Surah an Naml, 27:60). The beauty of plants in paradise, according to the Qur'an, emphasises the aesthetic value of plants.

Hence, one approach to moisten and maintain the mineral content of soil, which is a component of the earth that has to be maintained, is by growing trees and vibrantly coloured flowers. According to Islamic Sharia Law, it is vital to keep the soil green, grow trees in cities and villages, and care for them. The Prophet says, "Whoever plants a tree or sows' grain that a human, animal, or bird eats from, that person will constitute charity," according to Ummu Mubessir, Zaid b. Harise's wife (Omer, 2020).

Since humans and the environment coexist, the Prophet Muhammad S.A.W. constantly encouraged us to take steps to make the environment greener and more forested. (Hidayah, 2020). There are some important roles of plants in Islamic gardens such as:

a) Serve as the sign of Allah S.W.T

b) Serve as Allah S.W.T greatest contribution to mankind

c) Serve as the source of food, shelter, recreational activities'

d) Serve as complement to man-made structure

e) Serve as a cooling element, shadow and create a good breeze'

f) Serve as filter to provide oxygen and

g) Serve as aesthetic value to please the eyes

2.11.1 Islamic Stance on Diseases such as Pandemics

According to Shabana (2021) there are five pandemics in Islam. For instance, al-Nawaw (d. 676/1277) outlines the five primary plagues that occurred in the early days of Islam. The first, often referred to as the Shirawayh's plagues, struck al-Madin in Iraq in the years 6/627–628 when the Prophet was alive. The second was the infamous Amws's plaque, which struck in the year 18/639 and claimed roughly 25000 lives during the reign of Umar (r. 13-23/634-44). The third, also known as the spreading plague (al-n al-jrif), took place in the year 69/688 during the reign of Abd Allh ibn al-Zubayr (r. 64-73/683-692). An estimated 70.000 individuals each day perished for three days during this plague outbreak. The fourth, known as the plague of the girls (al-fatayt), took place in Iraq and Syria in the year 87/706 and was characterised by the predominance of young girls as victims. The fifth plague pandemic occurred in the year 131/749V

according to al-Nawaw 1929:106 and Ibn ajar n.d.:361-370.References to further plague pandemic outbreaks in historical sources demonstrate that these occurrences were fairly common or recurrent rather than isolated or occasional phenomena (Shabana, 2021).

Hadith literature contains more than fifty traditions that inform about Black Death, 22 a plague that affects humans and animals at an equal rate (Dols and Michael, 1977). In Arabic the term for the plague (ṭāʿūn) is derived from the origin that denotes piercing with a sharp tool or weapon such as an arrow (Shabana, 2021).

In Arabic, the term "wbā'" is mainly used for a pandemic, which however, does not occur directly in the Quran (Shabana, 2021). On the other hand, it uses the term rijz to explain such sorts of calamities. For example, it reads: "Hence, we stroke upon the evil-doers a rijz from heaven for their evil-doing." The word rijz has several connotations, including sin, punishment (ʿadhāb), plague, idolatry, and insinuating whispers (waswasah) (Shabana, 2021). In 1300-1373, Ismail Ibn Kathir who is a persuasive exegete of the Quran, describes that the verse was discovered about the Israelite nation-state that did evil deeds and was punished by Allah (Ibn Kathīr, 2005). Some agreed rijz as ʿadhāb, while others claimed it as anger, plague, or cold. Consequently, almost all English translators of the Quran desired word punishment or disease while interpreting the verse (Shabana, 2021). Different from the Quran, the hadith literature delivers plenty of evidence about the plague discussing the source of its appearance, spread, and preventative measures (Shabana, 2021).

The wife of prophet Muhammad which is Aisha, said: I asked the messenger of Allah about plague, he told me that it was a punishment sent by Allah to who He decided to give and Allah made it a source of mercy for the believers, for if one in the time of an epidemic plague stays in his place patiently hoping for Allah's reward and accepting that nothing will come upon him aside from what Allah has composed for him, he will get the award in martyr (Ibn Kathīr, 2005). Primarily, this hadith (Ibn Kathīr, 2005). indicates the emergence of a pandemic (Shabana, 2021). According to it, a plague is a form of ʿadhāb, which is controlled by Allah. He can inflict it upon anyone He wishes. The Quran, on the other hand, clearly shows a pattern of its emergence (Ahmad et al., 2020). For instance, it was sent to the Egyptians, because of their mistrust.

Moreover, Islamic sources also indicate that the evil deeds of people eventually lead to disasters. Hence the Quran reads: “Whatever ill comes to you is because of what your own hands earned and (yet) He pardons most (of your faults)” Quran Verse 35:45 (Ahmad et al., 2020). Ibn Kathir (2005), mentioning a hadith, explains that an oversupply of sins leads to misery. According to Islam, the continuation of bad practices might lead to plagues and disasters like Covid 19 (Farooqi, 2020).

The under-discussion hadith also points out that Allah made pandemics as a source of mercy for the believers (muʾminīn) (Ahmad et al., 2020). If a muʾmin dies due to a plague, she or he will be considered as a martyr (shahīd). Not to mention the fact that martyrdom (shahdah) is held in such high rank in Islam that the Quran forbids calling shahid dead (Farooqi, 2020).

. Thus, for Muslims, a plague is an ʿadhāb for those who do not obey God and a trial for those who follow Him. In this way, a pandemic becomes a source of mercy for muʾminīn by not only bringing them closer to Allah but also ensuring their success in this world and the Hereafter (Ahmad et al., 2020).

With reference to Qurah Surah Al-Muddathir there are seven subsections which represent a stage of understanding pandemics (T. Khenenou et al., 2020) in Table 2.6.

Table 2.6 The stage of understanding Pandemics in Qurah Surah Al-Muddathir

Verse	**Pandemics explanation**
1- Verses 1-7	warning from an imminent threat, provide the anti-pandemic protective measures (sanitary prophylaxis): briefly, cleanliness of clothing and avoidance of the factors compromising the immune system such as depression. The seventh verse, in particular, urges patience and repentance in hard times.
2- Verses 8 and 9	mention the announcement of the pandemic news by mass media and the warning from a global threat
3- Verses 11-25	present the etiology of pandemics: God Almighty vows to inflict hardship and fatigue on those who have denied His blessings (health, wealth and good life); this seems the case today.
4- In Verses 26-31	the Arabic word (Saqar) refers to the heat that hurts the brain. This has been interpreted by, Ibn Katheer, a well-known interpreter of the meanings of the Quran, wrote that Saqar will swamp him from all sides by the order of God Almighty. We identify this to catching hyperthermia, which is among the symptom of a pandemic. Verse 31, on the other hand, describes pandemics as God’s soldier travelling freely across the world.
5- Verses 32-34	provide an approximate microscopic image of virus pandemic (it looks like a sun from which sparks are emitted and on which a dark moon-like shape is placed)

6- In Verses 48-55	the section reading (Like zebras fleeing a lion) constitutes an analogy to today's world imposed by Covid-19. Such analogy may bear a meaning in that the lion, representing the king of all animals –for humans-, may be a representation of the crown of the virus. Besides, this Quranic scene of zebras fleeing a lion in horror resembles today's chaotic situation in many countries.
7- Verses 31-56	In Verse 31, the word (reminder)" "may be related to the memory cells, which are part of the immune system requiring boosters to function effectively against viruses. Therefore, it may be argued that the genetic makeup of pandemic virus is not unfamiliar to the adults' immune system, which requires boosters only to be fully operational again and able to effectively respond to the attacking virus. The above leads to conclude that this particular disease is familiar to the immune system.

2.11.2 The Concept of Ad-Deen in Reducing Pandemic Crises

The aspects of well-being are physical well-being, mental well-being and spiritual well-being (Dunn, 1973; Naci and Ioannidis, 2015). Each of the aspect's present respective Quranic verses or hadiths that are related to the Islamic ethical values to reduce pandemic spreads. Those three aspects influence the quality of life of human and altogether they form a concept of Ad-Deen which brings the meaning of complete way of life.

Within the physical aspect of well-being, four aspects are being highlighted as Islamic intervention to reduce the pandemic spread as per below (Dunn, 1973; Naci and Ioannidis, 2015; Farooqi, 2020; Khan, 2021):

i. hygiene,
ii. quarantine and travel bans,
iii. seeking medical treatment, and
iv. social distance and isolation.

First physical aspect of wellbeing to reduce pandemic spreads is hygiene. From Jami'al-Tirmidhi mentioned that as effectively containing the spread of airborne bacteria and viruses, the Prophet Muhammad would cover his face and muffle the sneeze ."Indeed, Allah loves those who turn to Him [repenting], and he loves those who keep themselves clean and pure," the Holy Quran (Ch.2: V.223, Surah al-Baqarah). The proper handwashing techniques thorough hygienic practices act as hallmark of Islam. Muslim child is being teach that "Cleanliness is half of the faith" (Khan, 2021). Every Muslim performs an ablution that comprises of ritual cleaning from head to toe with clean water before each of the five daily prayers (Khan, 2021).

Second aspect of physical wellbeing is quarantine and travel bans. The Prophet Muhammad highlights the importance of travel bans and quarantine in places sullied with infection in order to reduce the spread of disease. The prophet Muhammad said, "If you hear of an outbreak of plague in a land, do not enter it; and if the plague breaks out in a place while you are in it, avoid leave the place." (Sahih al-Bukhari). By strict travel bans forced much earlier such in this era of Covid-19's timeline may exceptionally well have diminished the spread of the pandemic.

Third aspect of physical well-being to reduce pandemic spread is seeking medical treatment. Islam, as taught by the Holy Prophet (PBUH), is a practical and progressive faith-based system. The Holy Prophet (PBUH) urge people to strive for medical assistance together and trust in the power of prayer. He was questioned by a group of Bedouins if it would be considered sinful if they did not strive for medical treatment. Sunan Ibn Majah, may Allah be pleased with him, reported: the Prophet Muhammad said, "seek for medical treatment, O Slaves of Allah, for Allah does not make any disease but Allah creates the disease with the cure exclude the old age". (Khan, 2021, p. 2)

Sahih Muslim said that the Prophet Muhammad also clarified that seeking medical assistance coupled with divine intervention was the key to successful treatment. Every disease has a cure with the permission of Allah the Almighty. Those people asked the Prophet Muhammad about should we use medicine and the He replied, "Yes, you may use medicine." Abū Dāwūd also mentioned that Allah has not created any disease without creating its cure, excluding old age.

The last aspect of physical well-being to reduce pandemic spread is social distancing and isolation. The Holy Prophet practiced social distancing as well. From Sunan Ibn Majah it is reported that a leprous man once wished to pledge his allegiance to him, an act that would require him to touch or hold the Prophet's hand. The Prophet Muhammad keeping his distance then kindly sent word to him that his pledge had already been accepted and that he should return home. For the isolation, the Prophet Muhammad taught that those who are sick should not in any way compromise the community at large. Khan, (2021) reported: The Prophet Muhammad said, "Do not place a sick patient with a healthy person". This teaching was extended to animals as well; "The cattle with a disease must not be mixed with healthy cattle." Muslims in the

time of the Holy Prophet and thereafter practiced social distancing and isolation as if it was a religious injunction (Sahih al-Bukhari).

Within the spiritual aspect of well-being, three aspects are being highlighted as per below (Shabana, 2021):

i. intention for betterment,
ii. du'a, and
iii. dhikr.

The function of spirituality also is to create confidence and sustain the lifestyle as a habit, not just a life changing goal. "Actions are only by intention, and every man shall obtain only that which he intended," Omar bin Al-Khattab overheard the Prophet Muhammad declare (Khan, 2021). Bukhari and Muslim said that He whose migration was for Allah and His messenger, his migration was for Allah and His messenger, and he whose migration to take some woman in marriage or to achieve some worldly benefit, his migration was for that for which he migrated." There is nothing in the hadith of the Rasulullah that is as comprehensive, rich, and more beneficial than this Hadith (Khan, 2021, p. 3).

For intention for betterment, 'Innamal a'malu binniyat' of Sahih Bukhari Shareef have introduce as a whole collection where it indicates the author's sincerity together to give the reader about good and noble deeds and highlight the sincerity attached to our intentions and told that useless if the sincerity is not in the motive (Shabana, 2021). Hence, the one who is looking for (Taalib), the one who is listening or the one who is perusing the book to remedy his intention exclusively for the delight of Allah. Ibn al-Qayyim said that "Du'a is the most beneficial remedy. Du'a is the against of calamity; it repels it, cures it, avoids its occurrence, and alleviates it or reduces it if it befalls (Shabana, 2021). Du'a also is the weapon of the believer." Allah prefers a strong believer over a weak believer although there is good in both, so in the eyes of Allah a firm and healthy believer who stands up and prays is better than the one who has to sit down and pray. Dua for protection from illness and disease.

The du'a for protection from illness should be our constant prayer at this time and it carries an important reminder that our refuge is always in Allah (SWT):

اللَّهُمَّ إِنِّي أَعُوذُ بِكَ مِنَ الْبَرَصِ، وَالْجُنُونِ، وَالْجُذَامِ، وَمِنْ سَيِّئِ الأَسْقَامِ

"O Allah, I seek refuge in You from leprosy, insanity, elephantiasis, and the worst of diseases."*[Abu Dawud]*.

Allah loves believers who love to pray, fast, make *dhikr*, and perform the rest of the acts of worship, and are more active in seeking after these affairs, and keep close watch over his performance of them. The evidence for this is when the Prophet pubs said, “The strong believer is better and more beloved to Allah than the weak believer, while there is good in both.” Al-Quran mentioned in Al-syua’ra, 26:80 “And when I am ill, it is Allah who cures me” Al Quran also mentioned about its function as cure and remedy for human disease through word shifa’. When it is tested positive for any disease it is good to use dhikr to cure it. In short, intention for betterment, du’a and dhikr is important as a whole spiritual aspect in order to reduce the spread of pandemic.

For mental aspects, it is divided into two aspects which as per below (Shabana, 2021):

i. Sunnah, and

ii. Hijrah.

The Arabic proverb which is “Al-aqlu salim fi jismi salim” means a good mind is in a good (healthy) body proving the need of physical activity to create a positive mind (Khan, 2021). The meaning of Sunnah is the Prophet Muhammad’s practice and sayings. Sunnah is good to practice in order to prevent diseases such as pandemic Covid 19. For Sunnah, the Prophet (pbuh) has strongly advised that one should wash his hands before and after a meal (Khan, 2021). Moreover, the Allah’s Messenger also taught that the right and left hands should be used to handle pure and impure things respectively, as cleanliness in Islam (Khan, 2021). Jami‘al-Tirmidhi mentioned that the Prophets would cover his face and muffle the sneeze, effectively containing the spread of airborne bacteria and viruses (Khan, 2021). From these Sunnah we can conclude that Islam is really concern about the cleanliness aspect in the daily life for healthy lifestyle in related to reduce the pandemic.

Thus, Muslims are taught that physical cleanliness and spiritual purity have a close affinity with one another (Najwa, 2015). Martyr Shaikh Murtadha Muahhari mentioned an immigrant is the one who abandons the evil (Shabana, 2021).

Moreover, hijrah (migration) involves moving from one place to another. At the moment, many people move abroad in search of better living conditions, job opportunities, educational opportunities, or marriage prospects. But according to Islamic law, the reasons are much broader. Hijrah happens quietly in the heart, and it changes how a person acts and deals with the rest of the world over time (Shabana, 2021). The Prophet made it clear that leaving what God forbade means not only physically moving to a new place but also spiritually and morally choosing integrity over immorality and good over evil and committing to struggle all your life to stay on that path (Najwa, 2015). Islam encourage seeking for better living for us and others (Khan, 2021). As for pandemic era people need to concern about Hijrah in Islam as for better living and life as to reduce to pandemic spread by practicing new norm life such social distancing, using face mask as virus protection, regularly wash hand, avoid crowded places and many more (Najwa, 2015). Muslim should set up mental aspect in good way through practice Sunnah and Hijrah to new norm life in order to reduce to pandemic spread (Shabana, 2021).

In summary, Islam is the perfect and all-encompassing complete way of life (Ad-Deen), provided to humanity by the Messenger of Allah, which governs life and humanity and serves as the cornerstone of good morality (Shabana, 2021). Islam should serve as the foundation and guiding principles of all systems, forms, and institutions of government, as well as of national administration, organisation, justice, and law, as well as of social and economic life, because it establishes each person's roles and responsibilities within society and the nation (Shabana, 2021).

2.11.3 The Relationship of Ad-Deen in the Urban Green Space

In built environment, Islam provides guidance and teachings for the development of a peaceful and successful society (Hassan et al., 2019). The concept of Ad-Deen which brings the meaning of complete way of life in reducing pandemic crises can be applied in the urban green spaces to reduce pandemic spread (Sharifi et al., 2020). For example, within the physical aspect of well-being, two aspects are being highlighted as Islamic intervention to reduce the pandemic such as hygiene and social distancing or isolation as important aspects to reduce virus transmission in urban green space through the element of the softscape as well as hardscape of water element (Sharifi et al., 2020).

For mental aspects, the Sunnah practices is good as to follow such as Prophet Muhammad keeping his distance or social distancing with who are sick and then kindly sent word to him that his pledge had already been accepted and that he should return home (Khan, 2021). For the isolation, the Prophet Muhammad taught that those who are sick should not in any way compromise the community at large (Khan, 2021).

Within the spiritual aspect of well-being, the du'a is the most beneficial remedy (Shabana, 2021). Du'a is the against of calamity; it repels it, cures it, avoids its occurrence, and alleviates it or reduces it if it befalls. Du'a also is the weapon of the believer." as self-protection towards pandemic spreads (Shabana, 2021). Islamic regulations and laws explain the rights and responsibilities of the individual, the family and the society (Sharifi et al., 2020). It guarantees a virtuous and noble social and cultural development in the era of pandemic Covid 19.

2.12 CONCLUSION

This chapter reviewed the literature that has explained the urban green space for sustainable environmental health in relation to pandemic crises**.** Moreover. this chapter explained this chapter with the definition of urban green space and following with the relation of sustainable environmental health and urban green space. The Islamic perspective and western perspective about the research topic are also being highlighted in this chapter to firm the discussion. This chapter also explained well about the social and individual's reasons behind the interaction between people and urban green space from several perspectives. In order to examine the main reasons impacting this relationship. The literature reviews from this chapter are correlated to the research methodology as the relationship between people and urban green space has been examined from several perspectives. Next chapter will present the methodology employed in the research.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The chapter explains the methodological framework with detailed study procedures and instruments to ease the data collection stage, followed by a method of analysis. The methodology for this research is focusing on the roles of urban green spaces for sustainable environmental health in relation to pandemic crises.

3.2 RESEARCH DESIGN

The research is exploratory research. According to Babbie (1989), exploratory research is conducted to find solutions to real-world issues rather than simply accumulating knowledge for its own sake. Described as a sort of research that "generates early insights into the nature of a problem and gives issues to be addressed by more prolonged studies," exploratory research aims to understand the nature of a problem (Marlow, 2005).Exploratory research typically acts as a starting point for deeper inquiries and able to be a substantial topic of research (Alston and Bowles, 2003).Exploratory research examines the circumstances in a community, the ways in which people interact with one another in their surroundings, the meanings people give to their daily activities, and the issues they are concerned (Engel and Schutt, 2013).

In order to investigate new topics, address current concerns by looking into current problem areas, work on topics about which there is little information available, and gain a thorough understanding of a situation, community, or person, large amounts of unstructured data are typically collected for exploratory research (Royse, 2011). An explorative purpose, or beginning to familiarise oneself with the issue and to develop a preliminary grasp of a topic, does not simply apply to fresh concerns (Babbie, 2013a). Exploratory research is also suitable for more persistent phenomena to establish the methodologies to be utilised in the research, to develop more focused research questions and hypotheses for further investigations, and to test the viability of performing more extensive research (Royse, 2011; Babbie, 2013a; Babbie and Mouton, 2010).

It may employ mixed methodologies consists of qualitative and quantitative in exploratory research. According to Rubin and Babbie (2010); Dane (2011), the researcher can even try to ascertain whether a phenomenon occurs or to attempt to get

a basic knowledge with the issue. Exploratory research is at the bottom of the knowledge hierarchy and rarely produces satisfying and conclusive answers to research challenges (Rubin and Babbie, 2011). Exploratory research might offer a solution, the concept creation and outcomes are usually imprecise, limited in scope, and unrepresentative (Babbie, 2013a).

Exploration is typically the first stage in a succession of stages for the same inquiry in order to learn enough to organise and carry out a more systematic and extensive research, establish hypotheses that may be explored and assessed later, and identify generalisations (Rubin and Babbie, 2011). Everything the researcher finds during exploratory research may appear to be potentially relevant for the research because the methodologies are not yet well defined and the investigation's direction may alter frequently. Researchers must adopt an inquisitive mentality and be adaptable, open-minded, and creative when studying all accessible sources of knowledge. In exploratory research it is essential to raise interesting questions and make use of unexpected situations that could affect or change a situation and potentially have more significant effects.

When obtaining information for exploratory investigations, qualitative methods are widely employed and are virtually usually of an inductive character (Adler and Clark, 2008). Struwig and Stead (2001) and Babbie (2010), exploratory research involves the investigation of secondary sources of data, focus groups, in-depth interviews, and an analysis of selected cases as data gathering techniques. Large-scale surveys that are intended to gauge requirements provide the majority of the quantitative data utilised in the exploratory method.

"What" inquiries can also call for a descriptive response and they are intended to identify and describe the qualities of a certain social phenomena like age and sex (Becket et al., 2004). They add "Why" questions are focused with comprehending or elucidating the links between events or processes and seek either the causes of, or the explanations for, the presence of features or regularities. Becket et al. (2004), "How" inquiries are focused on enacting social change as well as on useful results and actions. Normal order is for "what" inquiries to come before "why" ones, and vice versa for "how" questions (Becket et al., 2004).

The majority of research projects typically involve one or two types of research questions, most often "what" and "why," however some may just address "what" (Beck et al., 2004). The most important and maybe most challenging aspect of any research design is the creation of research questions. The purpose of the hypothesis is to offer hesitant explanations for "why" and, occasionally, "how" questions. For "what" inquiries, hypotheses are inappropriate since the investigation will eventually provide an answer, and speculation is useless in this sense (Beck et al., 2004)

This research emphasizes the roles of urban green space for environmental health in relation to pandemic crises. The relationship of urban green space with potential health regularly being discussed through approaches to reduce the risks with the sustainable design and maintenance of green spaces for healthy urban areas. Table 3.1 shows the current approaches investigating of the effectiveness roles of urban green space which related to the research.

The research use mixed methods consists of qualitative and quantitative approaches. The term "mixed methods " is defined as "research in which the investigator collects and analyses data, integrates the findings, and develops conclusions in single research using both qualitative and quantitative approaches or methods" (Tashakkori and Creswell, 2007). In research, conventional data collection techniques are not constrained and they are led by an inquiry that acts as the activity's foundation (1994, Creswell). Mixed methods research contains qualitative and quantitative elements, but when the researcher tries to explain how the two elements interact, problems can arise (Tashakkori and Creswell, 2007). There is disagreement among researchers as to what exactly qualifies as mixed methods research (Bryman, 2004; Tashakkori and Creswell, 2007). The gathering and analysis of quantitative and qualitative data are considered to be examples of mixed approaches (Doyle et al., 2009).

Similarly, Johnson, et al. (2007), explained that the definition of mixed methods research will evolve over time as the field matures. Mixed methods research, which allows for the blending of qualitative and quantitative methodologies throughout the study process, is guided by philosophical presumptions (Hanson et al., 2005).The field of mixed methods research, according to Johnson and Onwuegbuzie (2004), should stop debating quantitative versus qualitative issues and instead concentrate on recognising

the value of both paradigms and figuring out how to combine them in a single study to maximise their strengths and minimise their weaknesses.

Table 3.1 Current approaches of research in investigate urban green space green roles

Exploratory research area	**Methodology approach**	**Author**
From the standpoint of the urban built environment, look into the crucial function that urban parks played during the pandemic period. Assessment of Physical and Mental Health, and Social Interaction Level through site research	A quantitative methodology was used for collecting and analyzing data Internet-based survey instrument (Online surveys).	Xie et al., (2020) Urban Parks as Green Buffers During the Covid-19 Pandemic Sustainability.
Site-specific study on the value of urban natural areas and urban ecosystem services during the Covid-19 pandemic	Exploratory quantitative data collection. Internet-based survey instrument (Online surveys).	Grima et al., (2020) The importance of urban natural areas and urban ecosystem services during the Covid-19 pandemic.
Assess the the crucial social role of public urban parks and what type of social interaction we want to promote during the lockdown and social distancing era. Gain a better understanding of role of public urban parks during pandemic Covid-19	Qualitative and quantitative methodology Participatory inputs from stakeholders and local decision-makers.	Moulay (2020). The Post Covid-19 Aspect of Public Open Spaces – An Economic and Urban Design Perspective.
Explores the role and benefit of the Urban green space Defining, assessing and valuing the multifunctional character of UGS through site research Search for information on the roles and concern regarding benefit to the affected pandemic zones and their surrounding area.	Quantitative - Questionnaire survey. Convenience sampling method	Derkzen, et al., (2017) Shifting roles of urban green space in the context of urban development and global change. Current Opinion in Environmental Sustainability

Therefore, the research employs qualitative and quantitative methods in eliciting the data which consists of questionnaire surveys and semi-structured interviews.

3.3 QUESTIONNAIRE SURVEY APPROACH

A questionnaire survey is a type of data collection technique used to compile, examine, and evaluate the opinions of a sample of a target population (Kabir, 2016). The benefits of utilising this method are minimal expenses, good data collection, high statistical

significance, as well as a precise result because it offers standardised stimuli (Sarah, 2012). Data is gathered through the use of questionnaire surveys as the method. A questionnaire is a set of written or printed questions with multiple choice responses developed for the purposes of a survey or statistical study, whereas a survey is defined as the act of obtaining information from a group of individuals by asking them questions (Sarah, 2012). A survey's tool of choice is a questionnaire. When conducting a survey, questionnaires are a set of questions. A survey covers all aspect of a research design such execution including the survey's design, sampling strategy, data collecting, and response analysis (Kabir, 2016). The research is conducting using an online and face-to-face questionnaire survey to gather information from respondents during the Covid-19 pandemic in Malaysia.

3.3.1 Questionnaire Design

There are different types of questions asked in the survey. First are demographic questions in Section A to have a better understanding of the sample population and have a better picture of the respondent's characteristics. Second, Section B also has a ranking question that requires respondents to rank the answers. The third type of question is a multiple-choice question for respondents to choose whichever answer meets the answer to the question such as their type of transportation daily. Next is Likert-type questions which are the most type of questions applied in this survey. The questionnaire will be scored using a five- and six-point rating scale or five and six Likert scale. This type of question will later on help the researcher to run different varieties of tests for the purpose of analysis. The last type is an open-ended question. An open-ended question is essential in getting an unpredicted or unexpected answer from respondents, but it also has a weakness in the instances respondents are not able to provide the answer. An outline of the survey design is shown in Table 3.2.

i) Section A: Demographic Information

The first section namely Section A discusses the Demographic Information of respondents. The background information of the respondents will later be analysed together with some of the answers in Section B, Section C and Section D to identify the relationship between demographic information and respondents' understanding and perception of urban green space. In this section, respondents were asked about their general background and profile of respondents such as gender, age, nationality,

race/ethnicity, religion, residential area, length of stay, and marital status. In addition, in terms of socio-economic characteristics, the respondents were asked about their educational level.

ii) Section B: The Understanding of Urban Green Space

Section B is designed to understand the understanding of the respondent toward the urban green areas. For example, to understand the public opinion about the definition, type, characteristic, preferences and good criteria of urban green space. In addition, this section also examines the respondent's usage of urban green areas such as respondent's frequency usage, preference period, come along with who to the urban green space. Moreover, in this section the respondent is about the element used in urban green space, the reason come to urban green space, the activities done in urban green space and the feeling when visiting the urban green space. Under this section, there is a mixture of Likert-type questions, multiple choice questions, dichotomous questions and open-ended questions.

iii) Section C: Function of Urban Green Spaces

Section C explores the respondent's understanding of the function and the effectiveness of elements of urban green areas. Under this section, the type of questions used is Likert-type questions only. In this section, respondents were asked personally about the effectiveness of elements such as planting/vegetation elements, water elements and facilities, jogging track, bicycle lane, court, and gazebo elements of urban green space for sustainable environmental health during pandemic crises.

iv) Section D: Urban Green Space for Sustainable Environmental Health

Section D identifies the respondent's understanding of urban green space for sustainable environmental health. Under this section, there is a mixture of Likert-type questions and multiple-choice questions. In this section, the respondent was asked about the benefits and the roles of urban green space in relation to pandemic crises. The last question asks respondents what their suggestions are for improving current green space to reduce pandemic spread.

As illustrated in Table 3.2, the questionnaire is generally divided into four main sections based on the objective of the research;

Table 3.2 Survey outline for questionnaire survey

Section A: Demographic information	**Section B: The Understanding of Urban Green Space**	**Section C: Function of Urban Green Spaces**	**Section D: Urban green space sustainable environmental health**
• Gender • Age • Ethnicity • Religion • Residential area • Length of stay • Educational level • Education/occupation	• Definition urban green space. • Type urban green space, • Characteristic urban green space. • Frequency usage of urban green space • Preference period and come along with who to the urban green space • The element use in urban green space • The purpose come to urban green space. • The activities done in urban green space • Good criteria of urban green space. • The reason come to urban green space. • The feeling when visiting the urban green space	• The function of urban green areas • The effectiveness of element of urban green areas such as planting/ vegetation element, water element and facilities	• Respondent's understanding about the benefit of urban green space in relation to pandemic crises • Respondent's understanding about the roles about the benefits of urban green space in relation to pandemic crises. • Respondent's suggestion as to improve the current urban green space

The sample of questionnaire survey's question is presented in *Appendix I.*

3.3.2 Sampling Technique

The sampling technique implied in this research is simple random sampling which is intended to give equal chance inclusion to the samples collected in Malaysia. The aim of the sample survey is to draw conclusions about the population in the chosen area based on the data obtained from the sample. The amount of data in the sample and the accuracy of the inference-making process are both influenced by two different variables. The first element is the size of the population sample and the second is the degree of data fluctuation, which is typically impacted by the selection process. The sample survey design refers to the selection process for the sample. Thus, sample

selection has to be done systematically. The population is the set of cases from which researchers draw the sample. The sampling method is necessary as researchers may work under limitations in terms of the available resources of time and money, and hence, the sampling technique can reduce the number of cases out of the entire population counts.

Sampling is taking a subset from the entire population and choosing a sampling frame. The sampling technique can be used in making inferences to generalize relation to existing theory. Probability or random sampling and non-probability or non-random sampling are the two categories of sampling procedures. This study focused on the probability sampling technique, which shows that each member of the population has an equal chance of being selected as a sample.

The Population and Housing Census of Malaysia Department of Statistics Malaysia (DOSM, 2021) was used to estimate the population in the research area. This estimate was then modified based on the most recent information available from the district offices and reports such the Local Structure Plans. The estimated total population of Malaysia is 32.7million people based on the Population and Housing Census of Malaysia Department of Statistics Malaysia (DOSM, 2021).

This estimation is then verified and adjusted using the information obtained from site surveys, interviews with the village headmen and other relevant government officers. The following is the list of relevant agencies referred:

(i) Department of Statistics Malaysia

- Population and Housing Census of Malaysia 2021.
- Total of household (assets) based on items and ethnic group

A more straightforward formula for calculating sample sizes is provided by Yamane (1967) who computed the number of samples by applying the pro-rate approach. The sample sizes for this study were determined using this formula. P=0.5 and a 95% confidence level are taken as givens. N is the size of the population, n is the sample size, and e is the degree of accuracy. Thus, the number of samples determined by using the Yamane method is as follows:

$$n = \frac{N}{1 + N(e)^2}$$

$$n = \frac{32{,}700{,}000}{1 + 32{,}700{,}000\ (0.05)^2}$$, 95% confident level, e = 0.05.

$$\therefore n = 399.9 \approx 400$$

Based on the calculation above, the respondents are from Malaysia only. There is 421 number of respondents for questionnaire survey. The selection of respondents is random sampling to ensure equal probability chances are given to everyone to be selected through an online questionnaire survey. Targeted respondents are about 400 to achieve 95 % confidence level. Table 3.3 shows sampling techniques implemented in the research.

Table 3.3 Sampling technique implemented

Total population (N)	**% of total population (Y)**	**Estimated Sample Population(n) (Y x 399.8)**	**survey sample population**
32,700,000	100	399.9	400

(Source for total population: Department of Statistics Malaysia)

3.4 SEMI-STRUCTURED INTERVIEWS APPROACH

A semi-structured interview is a technique for gathering data in which questions are provided within a pre-established thematic framework (George, 2022). Nevertheless, neither the sequence of the questions nor their wording is set. The semi-structured interviewing method promotes dialogue on both sides. Questions are permitted from both the interviewer and the candidate, allowing for a thorough discussion of important subjects (Doyle, 2022). Semi-structured interviews typically have a qualitative feel for interviewer and the candidate. It is typical in field studies with many interviewers, giving everyone access to the same theoretical framework while enabling them to look at different facets of the subject (George, 2022). Due to the conversational tone, the interviewer and the candidate may feel more at ease discussing techniques and experiences that will highlight the attributes that make them a good fit for the position (Doyle, 2022).

In order to conduct this semi structured interview, the chosen candidate was contacted via email asked to schedule an appointment, and then had questions based on

the main concerns to achieve research objective. The chosen candidate is divided into two groups in which those working in the built environment and medical officers. For individuals involved in the built environment field, the targeted candidates are landscape architects, architects, town planners, and academicians from the university. The research has targeted candidates for people who are working in private and government sectors. The questions are mostly focused on the effective roles of urban green space for sustainable environmental health in reducing pandemic crises to achieve some of the research aims. There are three subtopics for the interview questions. Table 3.4 below are the subtopics for the interview question.

Table 3.4 Outline for interview question

No	Section	Content/subtopics
1.	Section A:	**Definition of urban green space** - definition of urban green space in relation to community health in urban areas.
2.	Section B:	**Urban green space for sustainable environmental health** -the important of urban green space to mental and physical health -the function of elements of urban green space such as vegetation, water features, facilities.
3.	Section C:	**Urban green space and pandemic crises** - the role and benefit of urban green space in reducing pandemic crises.

Among the questions that asked are the definition of urban green space, the importance of urban green space to mental and physical health, the function of elements of urban green space such as vegetation, water features, and facilities, and the role and benefit of urban green space in reducing pandemic crises as to achieve some of the research objectives. The sample of semi structured interview's question is presented in *Appendix II*.

In a semi-structured interview, the researcher asks only a select few preset questions and leaves the rest up to the candidate. They offer a chance to impromptuly examine issues pertinent to that candidate and enable the objective comparison of contenders.

3.5 METHOD OF DATA ANALYSIS

Data from the questionnaire survey were analysed using statistical and descriptive analysis. Descriptive and inferential statistics are used to analyse the numerically measured quantitative data. Using content analysis, the semi-structured interview data were examined.

3.5.1 Descriptive Analysis

Descriptive analysis is statistical process of describing, aggregating, and displaying the relevant constructs or relationships between them (Kabir, 2016). Statistical Package for the Social Sciences (SPSS) Version 27 was used to evaluate the data from the quantitative method, which involved a questionnaire survey. Data are organised and summarised using descriptive statistics, which show how different variables in a sample or population relate to one another (Vikas, 2018). Creating descriptive statistics is a crucial first step in doing research and should never be followed by inferential statistical comparisons. Descriptive statistics also contain measures of frequency, central tendency, dispersion/variation, and location as categories of variables such as nominal, ordinal, interval, and ratio (Vikas, 2018).

The data from the questionnaire survey were analysed using the method of descriptive analyses (e.g., Frequencies and % age) from (SPSS) software and were presented using a tabled tabular format, including the demographic information from Section A, the urban green space from Section B, the function of the urban green space from Section C, and the urban green space for sustainable environmental health from Section D.

The objective of this research was accomplished utilising statistical tests, which are elaborated using descriptive analysis to generalise the data. Continuous data is displayed in the form of summary averages and % age analysis according on the statistical test that was run. Continuous data, such as gender, age, religion, and the number of household members are some examples of continuous data in the research.

Table 3.5 Question in questionnaire survey corresponding to research objectives

Research Objectives	**Operational Definitions**	**Statistical Tests**
To investigate the roles of the urban green space for sustainable environmental health	Respondent's understanding of the role and benefit of urban green space during pandemic crises.	**Descriptive Statistics** • Describes the profile of respondents. •Describes the data Characteristics.
To evaluate the contribution of the urban green space in relation to pandemics spread.	Respondents to ask about the understanding on urban green space and its function.	**Statistical Analysis (SPSS)** • Analyze data in form of variables that are labeled according to nominal, ordinal, or categorical data • Chi-square and cross-tabulation (relationship test).
To propose the urban green space framework for sustainable environmental health.	Respondents to give their idea/suggestions as to improve urban green space about pandemic crises.	**Correlation (Pearson and Spearman rho)** • Compute the relationship between related variables with the respondent's background information.

3.5.2 Content Analysis

A set of qualitative data, such as text, may contain specific words, subjects, or concepts that can be found by using content analysis (Elo et al., 2014). Using content analysis, researchers may quantify and investigate the incidence, importance, and linkages of such particular words, themes, or concepts (Elo et al., 2014). For instance, to check for bias or partiality, researchers can evaluate the language used in a news report. Researchers can infer the writings' intended meanings, the author(s), the intended audience, even the culture and historical setting of the work.

In this research, content analytic techniques were used to analyze data from the semi-structured interview. Two steps are involved to analyze the data which are;

a) frequent keywords used by respondents were identified as important themes,

b) involves focused coding where the process to eliminates, combining, or subdividing the keywords based on the objectives of conducting the semi-structured interview which has been highlighted in the Sub-topic 3.5.

These steps enable a systematic coding of data by organizing the information based on recorded tapes or the transcripts prepared by the rapporteur (Nyumba et. al., 2017). The full transcription of all the comments and opinions, as well as the quotes, was used to determine the key findings for each of the three (3) primary subtopics as stated in Table 3.4 and to construct the results and conclusion as necessary.

3.6 TRIANGULATION DESIGN

There are certain methods that can be employed in qualitative research to improve the data validity of the researcher. Triangulation is one of them. The practise of gathering data through the integration of various sources and methods of gathering data is known as triangulation (Moleong, 2006). Triangulation was utilised in this study to ensure that the results were accurate. Triangulation is a method for evaluating the reliability of data that compares it to something else (Moleong, 2006).

According to Moleong (2006), there are four different categories of triangulation procedures: (a) source triangulation; (b) methodology triangulation; (c) investigator triangulation; and (d) theoretical triangulation. The credibility technique was employed as part of the triangulation methodology to assess the reliability of the data (Sugiyono, 2016). It made reference to the researcher's deeper involvement, steadfast observation, and triangulation.

According to Hameed (2020), regarding the issues of Triangulation some scholars suggest that the two research approaches are complementary rather than incompatible and competitive. The term triangulation refers to the combination of three techniques described triangulation as "the combining of techniques in the investigation of the same topic (Hameed, 2020). According to Jick (1979), triangulation allows the researcher to have higher confidence in the data, especially when data obtained using several methodologies converge. Triangulation may also reveal previously unknown phenomena. When multiple methodologies produce conflicting results, the researcher is forced to adapt his approach to reconcile the data, which may lead to the discovery of hidden phenomena (Hameed, 2020). This not only adds to his explanations, but allows him to update his theories in light of fresh information. Figure 3.1 shows the triangulation used in this research.

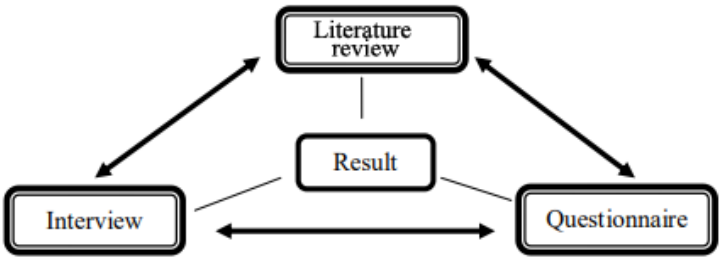

Figure 3.1 Triangulation design

3.7 CONCLUSION

The methodologies utilised and the data analysis are examples of the sort of data collected in this research. The combination of questionnaire surveys and semi-structured interviews to achieve accuracy in the research aims, objectives and questions. The next chapter indicate the results and analyses of the research.

CHAPTER FOUR

RESULTS AND FINDINGS

4.1 INTRODUCTION

This chapter presents the results and data analysis of questionnaire surveys and semi-structured interviews conducted. The chapter is divided into three main sections. The first section presents the results of the questionnaire surveys, and the second section the roles of urban green spaces for sustainable environmental health and third section describes the results of semi-structured interviews analysis.

4.2 QUESTIONNAIRE SURVEY RESULTS

This section presents the data analysis for questionnaire surveys conducted. The total 421 respondents have responded to the questionnaire. The focus of the section is to investigate the roles of urban green space for the sustainable environmental health in relation to pandemics crises. The data was analysed using the Statistical Package for the Social Sciences (SPSS) for Windows, Version 27.0. The section is divided into four sub-sections. The first sub-section presents the respondents generalbackground; the second sub-section presents the community understanding on urban green space together with the respondent's usage of urban green space; thethird sub-section presents the respondent's responses on the function of urban green spaces and the effectiveness of elements of urban green space.

The fourth sub-section presents the urban green space for sustainable environmental health. The results are important to comprehend the respondent's understanding and the usage of the urban green space, respondent responses on function of urban green spaces and the effectiveness of element of urban green space in relation to the urban green space for sustainable environmental health during pandemic crises.

4.2.1 Background of Respondents

This section provides information on the general background of the respondents. The characteristics of the respondents are considered pivotal to unravel understanding the roles of urban green space during pandemic crises. Questions related to respondents' living area, ethnicity, age,households' income, marital status and matters related to their socio-economic background were asked during the survey.

As shown in Table 4.1, 80% of the total respondents who participated in the survey were aged between 25 to 54 years old, 7.6% aged 15 to 24 years old,7.4% aged 55 to 64 years old and 3.6% aged under 14 years old. While the remaining 1.4 % aged more than 65 years old. According to their marital status,40.6% were single, and the majority, with 58.7%, were married.

Based on race distribution, most of them with 87.2% were Malay ethnic followed with 6.9% were Chinese ethnic and 4.3% were Indian ethnic. Others ethic contribute 1.6% for the questionnaire survey.

From the totalof 421 respondents, 89.6 % claimed they have attended tertiary education and learned at an institutional level in which 52.3% were degree holders,18.3% were master's degree holders,12.6% were STPM and Diploma holders followed by 6.4% were PhD holders. Moreover, 9.7% of them claimed to have finished their secondary school, 0.7% have attended at least primary school.

Table 4.1 Summary of the background of respondents

Characteristics	**Categories**	**Frequency (n)**	**Percent (%)**
Age	Under 14 years old	15	3.6
	15 - 24 years old	32	7.6
	25-54 years old	337	80.0
	55-64 year sold	31	7.4
	Above 65 years old	6	1.4
	Total	**421**	100
Race	Malay	367	87.2
	Chinese	29	6.9
	Indian	18	4.3
	Others	7	1.6
	Total	**421**	100
Marital status	Single	171	40.6
	Married	247	58.7
	Divorcee	3	0.7
	Total	**421**	100
Education level	Primary school	3	0.7
	Secondary school	41	9.7
	STPM/Diploma	53	12.6
	Degree	220	52.3
	Master	77	18.3
	PhD	27	6.4
	Total	**421**	100
Households' monthly income inRM	< RM 1500	42	10.0
	RM1501-RM3000	98	23.3
	RM3001-RM5000	112	26.6
	> RM 5000	82	19.5
	No fixed income	87	20.7
	Total	**421**	100

Sex of Respondents	Male	206	48.9
	Female	215	51.1
	Total	**421**	100
Religion	Islam	367	87.2
	Buddhism	16	3.8
	Hinduism	20	4.8
	Christian	17	4.0
	No religion	1	0.2
	Total	**421**	100
Occupation	Unemployed	78	18.5
	Government worker	122	29.0
	Private sector	157	37.3
	Self-employed	49	11.6
	Housewife	15	3.6
	Total	**421**	100

The results indicate, 51.1% of the respondents were female and 48.9% of the respondents were male. On the other hand, 87.2%of respondents were Muslim,4.8% were Hinduism 4.0% are Christian, 3.8% are Buddhism and only 0.2% of them claimed to have no religion.

In terms of employment category, Table 4.1 shows that 37.3% of respondents worked in private sector while 29.0% worked as government worker and 11.6 % of respondent were self-employed.18.5% of respondent were unemployed and 3.6% as housewife with 20.7% of the respondents with no fixed income during this era of pandemic. 26.6% of the respondents earned RM3001-RM5000 per month, 23.3% of the respondents earned RM1501-RM3000 per month and 19.5% % of the respondents earned more than RM5000 per month.Meanwhile, 10% of respondents claimed they were below RM 1500 per month.

4.2.2 The Understanding of Urban Green Space

Respondents' understanding gives them different perceptions towards the roles of urban green space during pandemic crises. Table 4.2 shows the result of respondent's understanding towards urban green spaces.

Table 4.2 The definition of urban green space based on respondent's understanding

Urban green space definition	**F**	**%**
All urban land covered by vegetation of any kind; Open-space areas reserved for parks and other "green spaces"; Spaces that allow for promoting activities.	175	41.6
Open-space areas reserved for parks and other "green spaces".	76	18.1
All urban land covered by vegetation of any kind; Open-space areas reserved for parks and other "green spaces".	66	15.7
Open-space areas reserved for parks and other "green spaces"; Spaces that allow for promoting activities.	49	11.6
All urban land covered by vegetation of any kind.	35	8.3
All urban land covered by vegetation of any kind; Spaces that allow for promoting activities.	9	2.1
Spaces that allow for promoting activities.	5	1.2
Other definition	6	1.4
Total	**421**	**100**

The result shows that 41.6% of the respondents claimed that the definition of urban green space is all urban land covered by vegetation of any kind; open-space areas reserved for parks and other "green spaces"; spaces that allow for promoting activities. 18.1% claimed they claimed that the definition of urban green space is open-space areas reserved for parks and other "green spaces" and 15.7% claimed that the definition of urban green space is all urban land covered by vegetation of any kind and open-space areas reserved for parks and other "green spaces". Moreover, 6% of respondents answered other definition of urban green spaces such as any type of land that accessible by human eye (open) that contain any plant species horizontally or vertically which have potential for any form of human activity; reserved land with trees; buffer zone for industrial and environmental; and a space used for plant cultivation, has an attractive landscape, leisure space and activity space for the use of local residents. The findings are discussed further in Chapter 2, Section 2.3.

The cross-tabulation test is used to determine the relationship between respondents' understanding towards urban green spaces with their education background shown in Table 4.3. The chi-square result is chi square= 90.762; df= 60; p= 0.006). It indicates that there are significant relationships between respondent's education background and respondents' understanding of urban green spaces. In brief, education background influenced the respondent's understanding of urban green space.

Table 4.3 Cross-tabulation tests between respondents' understanding of urban green spaces and respondent's education background

Respondents' understanding of urban green spaces	Respondent's education background													
	PhD		Master		Degree		STPM/ Diploma		Secondary school		Primary school		Total	
	F	%	F	%	F	%	F	%	F	%	F	%	F	%
All urban land covered by vegetation of any kind; Open-space areas reserved for parks and other "green spaces"; Spaces that allow for promoting activities.	7	1.6	24	5.7	92	21.9	27	6.4	23	5.5	2	0.5	175	41.6
Open-space areas reserved for parks and other "green spaces".	10	2.38	20	4.8	37	8.8	5	1.2	3	0.7	1	0.2	76	18.1
All urban land covered by vegetation of any kind; Open-space areas reserved for parks and other "green spaces".	3	0.7	13	3.1	38	9.0	6	1.4	6	1.4	0	0	66	15.7
Open-space areas reserved for parks and other "green spaces"; Spaces that allow for promoting activities.	3	0.7	12	2.8	26	6.2	6	1.4	2	0.5	0	0	49	11.6
All urban land covered by vegetation of any kind.	1	0.2	6	1.42	16	3.8	6	1.42	6	1.42	0	0	35	8.3
All urban land covered by vegetation of any kind; Spaces that allow for promoting activities.	0	0	2	0.5	7	1.6	0	0	0	0	0	0	9	2.1
Spaces that allow for promoting activities.	0	0	0	0	2	0.5	2	0.5	1	0.24	0	0	5	1.2
Other definition	3	0.7	0	0	2	0.47	1	0.23	0	0	0	0	6	1.4
Total	27	6.4	77	18.3	220	52.3	53	12.6	41	9.7	3	0.7	421	100

Chi square= 90.762, df= 60, P= 0.006

4.2.3 Types of Urban Green Spaces

As shown in Table 4.4, most respondents answered that the types of urban green space are park; garden; street planting; forest and woodland; grassland; pocket space with 30.4%. Moreover, it is followed by park; garden (8.1%) and park; garden; street planting; forest and woodland; grassland. (7.6%) are for the second and third highest answer from the respondents. Moreover, 13.1 % for the other types of urban green space in which the respondents choose the answer among park; garden; street planting; forest and woodland; grassland and pocket space.

Table 4.4 Types of urban green space based on respondent's understanding

The types of urban green	Frequency (n)	Percent (%)
Park; Garden; Street planting; Forest and woodland; Grassland; Pocket space.	128	30.4
Park; Garden.	34	8.1
Park; Garden; Street planting; Forest and woodland; Grassland.	32	7.6
Park; Garden; Forest and woodland; Grassland.	25	5.9
Park.	19	4.5
Park; Garden; Street planting; Grassland.	18	4.3
Park; Garden; Forest and woodland.	17	4.0
Park; Garden; Forest and street planting	16	3.8
Park; Garden; Pocket space	16	3.8
Park; Garden; Street planting; Pocket space.	15	3.6
Park; Garden; Forest and woodland; Grassland; Pocket space.	13	3.1
Park; Garden; Street planting; Forest and woodland.	11	2.6
Park; Pocket space	9	2.1
Park; Garden; Street planting; Forest and woodland; Pocket space.	7	1.7
Park; Garden; Street planting; Grassland; Pocket space.	6	1.4
Other	55	13.1
Total	**421**	**100**

4.2.4 Characteristics of Urban Green Spaces

Table 4.5 The characteristic of urban green space based on respondent's understanding

The characteristic of urban green space	Frequency (n)	Percent (%)
Size;Location;Topography ;Function ;Facilities ;Activities	153	36.3
Size;Location;Function;Facilities;Activities	20	4.8
Function;Activities	17	4.0
Function.	17	4.0
Location;Topography;Function;Facilities ;Activities.	15	3.6
Activities.	14	3.3
Size;Location ;Topography;Function.	10	2.4
Other	169	40.1
Total	**421**	**100**

According to the results in Table 4.5 above, the majority of the respondents claimed that the characteristic of urban green space is size; location; topography; function; facilities; activities (36.3%) followed by size; location; function; facilities; activities. (4.8%) and function; activities and function (4.0%). Moreover, 40.1% for the other characteristic of urban green space in which the respondents choose the answer among size; location; topography; function; facilities and activities.

4.2.5 The Distances of Urban Green Spaces with the Parks Users

As shown in Table 4.6, the highest percentage with 46.1% claimed that travel distance from home to urban green space is around 0-1km. This is followed by 2-3 km with 29.9% claimed that the travel distance from home to urban green space. Only 2.4% of respondents claimed that travel distance from home to urban green space in which more than 5km.

Table 4.6 The respondent's travel distance from home to urban green space

Travel distance from home to urban green space	Frequency (n)	Percent (%)
0-1km	194	46.1
2-3km	126	29.9
4-5km	70	16.6
More than 5km	31	7.4
Total	**421**	**100**

Table 4.7 The respondent's mode of transportation to urban green space

Mode of transportation to urban green space	Frequency (n)	Percent (%)
Car.	133	31.6
Car; Motorcycle.	46	10.9
Bicycle.	41	9.7
Motorcycle.	40	9.5
Car; Motorcycle; Bicycle.	36	8.6
Walk.	27	6.4
Car; Bicycle.	13	3.1
Bus; Taxi; Car; Motorcycle; Bicycle.	9	2.1
Motorcycle; Bicycle.	8	1.9
Bus; Taxi; LRT/Train; Car; Motorcycle; Bicycle.	7	1.7
LRT/Train; Car.	6	1.4
Car; Walk.	6	1.4
Bicycle; Walk	6	1.4
Other	43	10.2
Total	**421**	**100**

Respondents were asked what the preferable mode of transportation to urban green space. Based on Table 4.7, results show that 31.6 % claimed they reached the urban green space by cars, 10.9% by motorcycles, 9.7% used bicycle, 9.5% used motorcycle,8.6% used car; motorcycle; bicycle. Around 6.4% of respondents walking to urban green space. Moreover, 10.2% for the other mode of transportation to urban green space in which the respondents choose the answer among walk; bus; taxi; lrt/train; car; motorcycle; and bicycle.

On the other hand, there are 2.1% respondents used bus; taxi; car; motorcycle; bicycle as modes of transportation followed by 1.9% used motorcycle; bicycle ,1.7% used bus; taxi; lrt/train; car; motorcycle; bicycle and 1.4% used lrt/train; car., car; walk, bicycle; walk as their transportation to reach at urban green space. In short, the majority of respondents prefer to use cars as transportation to urban green space.

Moreover, a cross-tabulation test is conducted to see the relationship between mode of transportation to urban green space with a travel distance from home to urban green space and the result is displayed in Table 4.8 below.

Table 4.8 Cross-tabulation tests between respondent's mode of transportation to urban green space and respondent's travel distance from home to urban green space

The mode of transportation to urban green space	**Travel distance from home to urban green space**									
	0-1km		**2-3km**		**4-5km**		**More than 5km**		**Total**	
	F	%	F	%	F	%	F	%	F	%
Car.	35	8.32	44	10.45	34	8.09	20	4.75	133	31.6
Car; Motorcycle.	10	2.4	16	3.80	17	4.03	3	0.71	46	10.9
Bicycle.	34	8.04	6	1.42	1	0.24	0	0	41	9.7
Motorcycle.	18	4.28	11	2.61	8	1.9	3	0.71	40	9.5
Car; Motorcycle; Bicycle.	14	3.34	19	4.54	3	0.72	0	0	36	8.6
Walk.	27	6.4	0	0	0	0	0	0	27	6.4
Car; Bicycle.	6	1.43	5	1.19	2	0	0	0	13	3.1
Bus; Taxi; Car; Motorcycle; Bicycle.	4	0.93	3	0.7	1	0.23	1	0.23	9	2.1
Motorcycle; Bicycle.	6	1.43	2	0.48	0	0	0	0	8	1.9
Bus; Taxi; LRT/Train; Car; Motorcycle; Bicycle.	1	0.24	5	12.1	0	0	1	0.24	7	1.7
LRT/Train; Car.	3	0.7	1	0.23	0	0	2	0.47	6	1.4
Car; Walk.	6	1.4	0	0	0	0	0	0	6	1.4
Bicycle; Walk	6	1.4	0	0	0	0	0	0	6	1.4
Other	24	5.69	14	3.32	4	0.95	1	0.24	43	10.2
Total	194	46	126	29.9	70	16.6	31	7.4	421	100

Chi square= 210.718, df= 111, P= <0.01

Based on the result in Table 4.7, chi-square result indicates that there are significant relationships (chi square= 210.718, df= 111, P= <0.01) between the travel distance from home to urban green space and mode of transportation to urban green space. It shows that the respondent's mode of transportation to urban green space was influenced by respondent's travel distance from their home to urban green space**.**

4.2.6 Frequency and Time of Visits to Urban Green Spaces

Respondents were asked on the frequency to urban green space. Based on Table 4.9, results show that 65.3% claimed they visited the urban green space 1-2 times a week followed by 27.6% respondents claimed that they visited urban green spaces 2-3times a week and 7.1% respondents claimed that they visited urban green spaces every day and daily. In short, the majority of respondents prefer to visit urban green space about 1-2 times a week.

Table 4.9 The respondent's frequency to urban green space

Frequency to urban green space	**Frequency (n)**	**Percent (%)**
1-2 times a week	275	65.3
2-3times a week	116	27.6
Every day/Daily	30	7.1
Total	**421**	**100**

Table 4.10 The respondent's time/period visit to urban green space

Time/period visit to urban green space	**Frequency (n)**	**Percent (%)**
Afternoon	1	0.2
Evening	256	60.8
Morning	156	37.1
Night	8	1.9
Total	**421**	**100**

Respondents were asked on the time/period visit to urban green space. As shown in Table 4.10, results show that 60.8% claimed they visited the urban green space in the evening followed by 37.1% respondents claimed that they visited urban green spaces in the morning. Moreover, 1.9 % respondents claimed that they visited urban green spaces at night and only 0.2% respondents claimed that they visited urban green spaces in the afternoon. In short, the majority of respondents prefer to visit urban green spaces in the evening.

Table 4.11 The respondent's companion visit to urban green space

Companion visit to urban green space	**Frequency (n)**	**Percent (%)**
Alone	12	2.9
Both friend and family	4	1.0
Family	255	60.6
Friend	150	35.6
Total	**421**	**100**

Respondents were asked on their companion visit to urban green space. Based on Table 4.11, the result shows that 60.6% claimed they visited the urban green space with family followed by 35.6% respondents claimed that they visited urban green spaces with friends. Moreover, 2.9 % respondents claimed that they visited urban green spaces alone and only 1.0% respondents claimed that they visited urban green spaces with friends and family. In short, the majority of respondents prefer to visit urban green space with family.

4.2.7 Preferred Elements of Urban Green Spaces

Question-related to the respondent's preferred elements when visiting urban green space during pandemic were asked during the survey. A Likert scale using the 6-rating scale of response was used to gauge responses from the respondents. The result of the survey is shown in Table 4.12.

Table 4.12 The preference element of urban green space among respondents

The element of urban green	***Responses***													
	low like		**Less like**		**Slightly like**		**Moderately like**		**Very like**		**Extremely like**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Vegetation	49	11.6	10	2.4	3	0.7	11	2.6	51	12.1	297	70.5	421	100
Water features	9	2.1	50	11.9	29	6.9	48	11.4	238	56.5	47	11.2	421	100
Jogging track	9	2.1	16	3.8	80	19.0	233	55.3	61	14.5	22	5.2	421	100
Seating area/bench	67	15.9	74	17.6	193	45.8	78	18.5	8	1.9	1	0.2	421	100
Convenient resting areas	65	15.4	229	54.4	65	15.4	13	3.1	43	10.2	6	1.4	421	100
Bicycle lane	216	51.3	52	12.4	53	12.6	33	7.8	18	4.3	49	11.6	421	100

As shown in Table 4.12, the highest percentage with 70.5% claimed that they extremely like vegetation and followed by 11.6% extremely like bicycle lane and 11.2% extremely like water features as preference element of urban green space. While the highest percentage with 51.3% claimed that they low like bicycle lane followed by 15.9% low like seating area/bench and 15.4% low like convenient resting area as preference element of urban green space. On the other hand, 55.3% of total respondents claimed they moderately like jogging track as preference element of urban green space during the pandemic.

Respondents were asked on the preference element of urban green space. Based on Table 4.12, the result shows that 85.2% claimed they extremely like, very like and moderately like the element of vegetation of urban green space followed by water features with 88.8% and jogging track with 75%. Moreover, the result shows that 85.2% claimed they slightly like, less like, low like the element of convenient resting areas followed by seating area/bench with 79.3% and bicycle lane with 76.3%.

A ranking of action was made using the Relative Importance Index (RII) analysis, and the result is shown in Table 4.13 RII analysis allowed the researcher to identify the most preference element of urban green space among respondent based on their preferable concern and reflect the important of urban green spaces during pandemic.

Table 4.13 RII ranking on the preference element of urban green space among respondents

The element of urban green	***Responses***												**I of R scores**	**Rank**
	Low like		**Less like**		**Slightly like**		**Moderately like**		**Very like**		**Extremely like**			
	F	**Rscore**	**F**	**Rscore**	**F**	**Rscore**	**F**	**Rscore**	**F**	**Rscore**	**F**	**Rscore**		
Vegetation	49	49	10	20	3	9	11	44	51	255	297	1602	1979	1
Water features	9	9	50	100	29	87	48	192	238	1190	47	282	1860	2
Jogging track	9	9	16	32	80	240	233	932	61	305	22	132	1650	3
Seating area/bench	67	67	74	148	193	579	78	312	8	40	1	6	1152	4
Convenient resting areas	65	65	229	458	65	195	13	52	43	215	6	36	1021	5
Bicycle lane	216	216	52	104	53	159	33	132	18	90	49	294	995	6

Referring to Table 4.13, the RII score representing the preferable element of urban green by respondents during pandemic. Based on the result in Table 4.13 above, the most chosen element with RII score of 1979 ranked as 1st element was vegetation followed by water features (RII score = 1860) ranked as the 2nd element and jogging track RII score of 1650 as 3rd element.The least preferred element was the bicycle lane ranked as no 6 with an RII score of 995.

4.2.8 Reasons to Visit Urban Green Spaces During the Pandemic

As shown in Table 4.14, the highest percentage with 80.1% claimed that they often and always exercise as the reason for visiting urban green space during pandemics. This is followed by attracted by the beauty of garden (77.2%), nearest to the house (74.1%), free to find greenery areas (70.3%), easy access and attracted with facilities (69.1%), stress (50.1%), invited by friends (9.7%) as the reason visit urban green space during pandemic among the respondents. On the other hand, 53.4% and 22.8 % of total respondents claimed they were never and rarely invited by friends and stress as the reason for visiting urban green space during the pandemic.

Table 4.14 The respondent's reason visit to urban green space

Reason visits to urban green space	**Responses**											
	Never		**Rarely**		**Sometimes**		**Often**		**Always**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Stress	35	8.3	61	14.5	114	27.1	65	15.4	146	34.7	421	100
Easy access	6	1.4	31	7.4	93	22.1	179	42.5	112	26.6	421	100
Attracted with facilities	8	1.9	31	7.4	91	21.6	174	41.3	117	27.8	421	100
Free to find greenery areas	5	1.2	29	6.9	91	21.6	150	35.6	146	34.7	421	100
Invited by friends	33	7.8	192	45.6	140	33.3	30	7.1	11	2.6	421	100
Attracted by the beauty of garden	5	1.2	27	6.4	64	15.2	167	39.7	158	37.5	421	100
Exercise	5	1.2	19	4.5	60	14.3	148	35.2	189	44.9	421	100
Nearest to the house	16	3.8	28	6.7	65	15.4	127	30.2	185	43.9	421	100

Table 4.15 Chi-square test between respondent's reason visit to urban green spaces and gender

Respondent's reason visits to urban green spaces	**Gender**		
	Value	**p-value**	**% Count less than 5**
Stress	2.968	0.563	0
Easy access	7.571	0.109	20
Attracted with facilities	8.330	0.080	20
Free to find greenery areas	9.661	0.047	20
Invited by friends	3.553	0.470	0
Attracted by the beauty of garden	0.990	0.911	20
Exercise	13.188	0.010	20
Nearest to the house	4.722	0.317	0

Chi square= 0.990-13.188; df=4,8; P=0.010-0.911

Note: For result to be valid, the % of count less than 5 must be not more than 20%

In order to identify the relationship between respondent's reason visit to urban green space with gender, the Chi-square test is used. In this context, the survey examines the respondent's reason for visiting urban green space with gender in the study area (Table 4.15).

Based on table 4.15, the chi-square tests result is (Chi square= 0.990-13.188; df= 4, 8; P= 0.010-0.911). It indicates that there are significant relationships between respondent's gender with their reason for visiting green space with p value as such as free to find greenery areas (0.047) and exercise (0.010). Furthermore, there no significant relationships between gender with their reason visit to green space such as stress (0.563), easy access (0.109), attracted with facilities (0.080), invited by friends (0.470), and nearest to the house (0.317) and attracted by the beauty of garden (0.080) due to p value is above than 0.05.

Besides, another inferential test using the Pearson correction test was conducted to test the relationship between the variables of respondents' reason visiting the urban green space with their travel distance from home to urban green space (Table 4.16).

Table 4.16 Pearson correlation test between respondents' reason visit to urban green space with respondent's travel distance from home to urban green space

Respondents' reason	**Travel distance from home to urban green space**	
	CC	**p-value**
Stress	-0.207**	<0.001
Easy access	-0.058	0.232
Attracted with facilities	0.031	0.520
Free to find greenery areas	0.086	0.078
Invited by friends	-0.089	0.067
Attracted by the beauty of garden	-0.027	0.575
Exercise	-0.138**	0.004
Nearest to the house	-0.219**	<0.001

Note: * and ** Correlation is significant at the 0.01 level (2-tailed). cc= Coefficient correlation.

As shown in Table 4.16 above, there is significant p-values for the result between respondents' reason visit to urban green space with their travel distance from home to urban green space such as stress (<0.001), exercise (0.004) and nearest to the house (<0.001). In addition, there is a negative relationship between respondents' reason visit to urban green space with their travel distance from home to urban green space such as stress (-0.207**), exercise (-0.138**) and nearest to the house (-0.219**), all the p- values are less than the critical value of 0.05.

4.2.9 Perceived Benefits and Respondents Feelings of visiting Urban Green Spaces During the Pandemic

As shown in Table 4.17, 86.5% of respondents stated that they often and always feel enjoyable and happy when visiting urban green space and it is followed by 81.8% feeling relaxed and refreshed, 80.8% feel comfortable visiting urban green spaces during pandemics. Meanwhile, 57.7% never and rarely feel bored, 54.8% feel unsafe, 46.9% feel crowded and messy and 43% feel warm and uncomfortable visiting urban green spaces during a pandemic. Furthermore, 30.2% is the highest percentage for sometimes feeling warm and uncomfortable for respondent's feeling when visiting urban green space.

Table 4.17 The respondent's feeling visit to urban green space

Feeling visit to urban green space	**Responses**											
	Never		**Rarely**		**Sometimes**		**Often**		**Always**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Warm and uncomfortable	59	14.0	122	29.0	127	30.2	58	13.8	55	13.1	421	100
Unsafe	86	20.4	145	34.4	118	28.0	56	13.3	16	3.8	421	100
Bored	83	19.7	160	38.0	105	24.9	48	11.4	25	5.9	421	100
Crowded and messy	73	17.3	124	29.5	137	32.5	47	11.2	40	9.5	421	100
Relaxed and refreshed	5	1.2	17	4.0	55	13.1	156	37.1	188	44.7	421	100
Comfortable	5	1.2	16	3.8	60	14.3	162	38.5	178	42.3	421	100
Enjoyable and happy	5	1.2	13	3.1	39	9.3	152	36.1	212	50.4	421	100

In order to identify the relationship between respondent's feelings of visiting urban green space with occupation, the cross-tabulation test is used. In this context, the survey examines respondent's reason for visiting urban green space with occupation in the study area (Table 4.18).

Table 4.18 Chi-square test between respondents' feeling visit to urban green space with respondent's occupation

Respondent's feeling	**Occupation**		
	Value	**p-value**	**% count less than 5**
Warm and uncomfortable	32.486	0.009	20
Unsafe	26.450	0.048	28
Bored	14.642	0.551	24
Crowded and messy	31.238	0.013	24
Relaxed and refreshed	16.881	0.393	40
Comfortable	10.423	0.844	40
Enjoyable and happy	9.441	0.894	48

Chi square= 9.441– 32.486; df=, 16; P= 0.009-0.894

Note: For result to be valid, the % of count less than 5 must be not more than

As shown in Table 4.18, the Chi-square results show that relationship between respondent's feeling of visit to urban green space with occupation (Chi square = 9.441–32.486; df=, 16; P= 0.009-0.894). There is a significant relationship between respondent's feelings of visiting urban green space with occupations such as warm and uncomfortable (0.009), unsafe (0.048) and crowded and messy (0.013). Moreover, respondent's feelings such as bored, relaxed and refreshed, comfortable, enjoyable and happy indicate no significant relationships with occupation due to p values more than 0.05.

4.2.10 Activities in Urban Green Spaces During the Pandemic

As shown in Table 4.19, 88.1% of respondents often and always have fresh air when visiting urban green space followed by 85.1% enjoying the scenery or sightseeing, 82.7% seeking for peace and 82% exercising during pandemics in urban green space. On the other hand, respondents claimed they rarely and never do activities such as gathering with family and friends (25.9%), accompany others (21.8%) and meeting points (11.2%) as their activities when visiting urban green space.

Table 4.19 The respondent's activities visit to urban green space

Activities visit to urban green space	**Responses**											
	Never		**Rarely**		**Sometimes**		**Often**		**Always**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Having fresh air	3	0.7	6	1.4	41	9.7	118	28.0	253	60.1	421	100
Gathering with Family and Friend	12	2.9	35	8.3	84	20.0	141	33.5	149	35.4	421	100
Cycling/Jogging	11	2.6	32	7.6	75	17.8	132	31.4	171	40.6	421	100
Enjoy the scenery/Sightseeing	5	1.2	14	3.3	44	10.5	159	37.8	199	47.3	421	100
Seeking for peace	5	1.2	18	4.3	50	11.9	157	37.3	191	45.4	421	100
Exercising	4	1.0	21	5.0	51	12.1	154	36.6	191	45.4	421	100
Accompany others	30	7.1	62	14.7	88	20.9	113	26.8	128	30.4	421	100
Meeting point	36	8.6	73	17.3	95	22.6	96	22.8	121	28.7	421	100

As shown in Table 4.20, male respondents have the higher percentage for activities such as cycling/jogging (76%) and exercising (73%) when visiting urban green space. Female respondents have higher percentage for activities such as having fresh air (67%), gathering with family and friend (71%), enjoy the scenery/sightseeing (63%), seeking for peace (55%), accompany others (52%), meeting point (52%) when visiting urban green space.

Table 4.20 The respondent's activities and gender visit to urban green space

Activities visit to urban green space	Gender			
	Male		Female	
	F	%	F	%
Having fresh air	140	33	281	67
Gathering with Family and Friend	122	29	299	71
Cycling/Jogging	321	76	100	24
Enjoy the scenery/Sightseeing	154	37	267	63
Seeking for peace	188	45	233	55
Exercising	309	73	112	27
Accompany others	200	48	221	52
Meeting point	201	48	220	52

A Spearman Rho correlation test was conducted to test the relationship between respondent's activities visit to urban green space with their gender and educational level as shown in Table 4.21 below.

Table 4.21 The Spearman Rho correlation test between respondent's activities visit to urban green space with gender and educational level

Respondent's activities	Gender		Educational level	
	CC	p-value	CC	p-value
Having fresh air	-0.038	0.434	-0.105*	0.031
Gathering with Family and Friend	-0.018	0.712	-0.157**	0.001
Cycling/Jogging	-0.126**	0.009	0.004	0.929
Enjoy the scenery/Sightseeing	-0.074	0.130	-0.101*	0.038
Seeking for peace	-0.076	0.118	-0.083	0.089
Exercising	-0.131**	0.007	0.016	0.746
Accompany others	-0.022	0.655	-0.154**	0.001
Meeting point	-0.052	0.288	-0.207**	<0.001

Note: * and ** Correlation is significant at the 0.01 level (2-tailed). cc= Coefficient correlation

As shown in Table 4.21 above, there are significant p-values of respondents' gender against their activities visiting urban green space due to cycling/jogging (0.009) and exercising (0.007), which are less than the critical value of 0.05. In addition, there is significant p values between variables of respondents' education level against activities visit to urban green space due to having fresh air (0.031) and gathering with family and friend (0.001), enjoy the scenery/sightseeing (0.038), accompany others (0.001) and meeting point (<0.001) in which all the p- values are less than the critical value of 0.05. Furthermore, there is a negative relationship between all respondent's activities visiting urban green space with their gender and educational background.

4.3 THE ROLES OF URBAN GREEN SPACES FOR SUSTAINABLE ENVIRONMENTAL HEALTH

Question-related to respondents' opinion of roles of green space for sustainable environmental health during pandemic were asked during the survey. A *Likert scal*e using the 5 and 6 rating scale of response was used to gauge responses from the respondents.

4.3.1 The Effectiveness of Green Planting in Urban Green Spaces

As shown in Table 4.22, the highest percentage with 95.8% claimed that they agreed that green plantings provide fresh air during pandemics in urban green space. This is followed by green plantings reduce heat and air pollution (95.7%), green plantings filter the air (94.8%), green plantings promote biodiversity (92.9%) and green plantings reduce virus transmission (76.2%) of respondents who agreed that the effectiveness of green planting in urban green space during pandemic. On the other hand, 7.3% and 2.9 % of total respondents claimed they disagreed and strongly disagreed that green plantings reduce virus transmission and green plantings filter the air during pandemics. In order to identify the relationship between respondent's opinion about the effectiveness of green planting and their age, the cross-tabulation test is used as shown in table below.

Table 4.22 The effectiveness of green planting/vegetation element of urban green space

Effectiveness of green planting	**Responses**											
	Strongly Disagree		**Disagree**		**Neutral**		**Agree**		**Strongly Agree**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Green plantings filter the air	5	1.2	3	0.7	14	3.3	136	32.3	263	62.5	421	10
Green plantings reduce heat and air pollution.	3	0.7	1	0.2	14	3.3	149	35.4	254	60.3	421	100
Green plantings provide fresh air.	3	0.7	2	0.5	13	3.1	132	31.4	271	64.4	421	10
Green plantings promote biodiversity	3	0.7	2	0.5	25	5.9	143	34.0	248	58.9	421	100
Green plantings reduce virus transmission	14	3.3	17	4.0	69	16.4	134	31.8	187	44.4	421	100

Table 4.23 Cross-tabulation test effectiveness of green planting element of urban green space and respondent's age

Effectiveness of green planting	**Age**		
	Value	**p-value**	**% count less than 5**
Green plantings filter the air	23.834	0.093	68
Green plantings reduce heat and air pollution.	10.458	0.842	64
Green plantings provide fresh air.	33.694	0.006	68
Green plantings promote biodiversity	18.757	0.281	64
Green plantings reduce virus transmission	27.002	0.041	52

Chi square= 10.458– 33.694; df=, 16; P= 0.006-0.842

Note: For result to be valid, the % of count less than 5 must be not more than

As shown in Table 4.23, Chi-square test results indicate significant relationships (Chi square= 10.458– 33.694; df=, 16; P= 0.006-0.842) between respondent's opinion about the effectiveness of green planting and their age. Based on the results, green plantings provide fresh air with p value of 0.006 and green plantings reduce virus transmission with p value of 0.041 in which indicates significant relationships due to the p values being less than 0.05.

A Spearman Rho correlation test was conducted to test the relationship between respondent's opinion about the effectiveness of green planting and their educational level as shown in below Table 4.24.

Table 4.24 The Spearman Rho correlation test between the effectiveness of green planting element of urban green space with respondent' educational level

Effectiveness of green planting	**Educational level**	
	CC	**p-value**
Green plantings filter the air	0.071	0.146
Green plantings reduce heat and air pollution.	0.044	0.369
Green plantings provide fresh air.	0.165**	<0.001
Green plantings promote biodiversity.	0.095	0.050
Green plantings reduce virus transmission.	-0.150**	0.002

Note: * and ** Correlation is significant at the 0.01 level (2-tailed). cc= Coefficient correlation

As shown in Table 4.24 above, there is significant p-values of between respondent's opinion about the effectiveness of green planting and their educational level due to green plantings provide fresh air (<0.001), green plantings promote biodiversity (0.050) and green plantings reduce virus transmission (0.002) in which the p values less than the critical valueof 0.05. Furthermore, there is a positive relationship between respondent's opinion about the effectiveness of green planting and their educational level due to green plantings providing fresh air (0.165**). The positive relationships indicate that the higher the educational level the among the respondent the more respondents agreed that green plantings provide fresh air.

4.3.2 The Effectiveness of Water Elements in Urban Green Spaces

Table 4.25 shows respondent's feedback of effectiveness of water element in urban green space during pandemic. The results show they agreed and strongly agreed that the sound of the water element helps to release stress (94.5%) and the water element makes them feel relaxed and calm (94.3%). On the other hand, 1.4 % of total respondents claimed they disagreed and strongly disagreed that the sound of the water element helps to release stress and the water element makes them feel relaxed and calm during a pandemic.

Table 4.25 The effectiveness of water element of urban green space

Effectiveness of water element	**Responses**											
	Strongly Disagree		**Disagree**		**Neutral**		**Agree**		**Strongly Agree**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Water elements make you feel relax and calm.	3	0.7	3	0.7	18	4.3	117	27.8	280	66.5	421	100
The sound of water element helps to release stress.	3	0.7	3	0.7	17	4.0	160	38.0	238	56.5	421	100

4.3.3 The Effectiveness of Recreational Facilities in Urban Green Spaces

As shown in Table 4.26, 92.6 % agreed that the facilities create convenient resting areas and facilities create valuable usable space for people during pandemics. It is followed by 92.4% facilities providing spaces for activities to improve mental and physical health promote biodiversity and 89.3% Facilities provide spaces to release stress. On the other hand, 2.4% and 2.2 % of total respondents claimed they disagreed and strongly

disagreed that the facilities provide spaces for activities to improve mental and physical health and facilities provide spaces to release stress during pandemic.

Table 4.26 Effectiveness of recreational facilities of urban green space

Effectiveness of facilities	**Responses**											
	Strongly Disagree		**Disagree**		**Neutral**		**Agree**		**Strongly Agree**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Facilities provide spaces for activities to improve mental and physical health.	3	0.7	7	1.7	22	5.2	132	31.4	257	61.0	421	100
Facilities create convenient resting areas	3	0.7	5	1.2	23	5.5	182	43.2	208	49.4	421	100
Facilities provide spaces to release stress	4	1.0	5	1.2	36	8.6	162	38.5	214	50.8	421	100
Facilities create valuable usable space for people.	3	0.7	3	0.7	25	5.9	169	40.1	221	52.5	421	100

4.3.4 Urban Green Spaces for Sustainable Environmental Health

As shown in Table 4.27, the highest percentage with 94.1% claimed that they agreed and strongly agreed that the roles of urban green space are able to beautify and make a healthier environment. This is followed by urban green space able to create valuable usable space for people (92.7%), urban green space as promoting biodiversity (92.4%), urban green space to improve social capital and cohesion (86.2%) and urban green space able to improved functioning of the immune system (81.3%) of respondents who agreed that the roles of urban green space during pandemic. On the other hand, 27.3% and 7.1 % of total respondents claimed they disagreed and strongly disagreed that the roles of urban green space have potential adverse health effects and urban green space able to reduce mortality and increased life span during pandemic.

Table 4.27 The roles of urban green space

Roles of urban green space	Responses											
	Strongly Disagree		Disagree		Neutral		Agree		StronglyAgree		Total	
	F	%	F	%	F	%	F	%	F	%	F	%
Urban green space able to improve functioning of the immune system.	10	2.4	10	2.4	59	14.0	159	37.8	183	43.5	421	100
Urban green space to improve social capital and cohesion.	6	1.4	5	1.2	47	11.2	205	48.7	158	37.5	421	100
Urban green space able to reduce mortality and increased life span.	11	2.6	19	4.5	83	19.7	161	38.2	147	34.9	421	100
Urban green space has potential adverse health effect.	70	16.6	45	10.7	47	11.2	131	31.1	128	30.4	421	100
Urban green space able to beautify and make healthier environment.	4	1.0	1	.2	20	4.8	172	40.9	224	53.2	421	100
Urban green space as promoting biodiversity.	3	0.7	4	1.0	25	5.9	180	42.8	209	49.6	421	100
Urban green space able to create valuable usable space for people.	4	1.0	3	0.7	24	5.7	167	39.7	223	53.0	421	100

To identify the relationship between respondents' opinion on roles of urban green spaces with frequency visit to urban green space, the Spearman Rho correlation test is used as shown in Table 4.28.

Table 4.28 Spearman Rho correlation test between respondents' opinion on roles of urban green space during pandemic with their frequency visit urban green space

Roles of urban green space	Frequency visits urban green space	
	CC	p-value
Urban green space able to improve functioning of the immune system.	0.074	0.131
Urban green space to improve social capital and cohesion.	0.110*	0.024
Urban green space able to reduce mortality and increased life span.	0.117*	0.016
Urban green space has potential adverse health effect.	0.086*	0.077
Urban green space able to beautify and make healthier environment.	0.140**	0.004
Urban green space as promoting biodiversity.	0.078	0.110
Urban green space able to create valuable usable space for people.	0.149**	0.002

Note: * and ** Correlation is significant at the 0.01 level (2-tailed). cc= Coefficient correlation

A Spearman Rho test was used to identify the relationship between respondents' opinion on roles of urban green spaces with frequency visit to urban green space. As the results show in Table 4.27, p-values of respondent' response on their opinion about the urban green space to improve social capital and cohesion (0.024), urban green space able to reduce mortality and increased life span (0.016), urban green space able to beautify and make healthier environment (0.004) and urban green space able to create valuable usable space for people. (0.002). From the results, it shows that there is a positive relationship between respondents' opinion on roles of urban green spaces with frequent visits to urban green space. The positive relationship indicates that as the more frequency respondents' visit to the urban green space, the more respondents agreed that that the roles of urban green space such as urban green space to improve social capital and cohesion (0.110*), urban green space able to reduced mortality and increased life span (0.117*), urban green space has potential adverse health effect (0.086*), urban green space able to beautify and make healthier environment (0.140**) and urban green space able to create valuable usable space for people (0.149**) .

In order to identify the relationship between respondents' opinion on roles of urban green spaces with educational level, the Spearman Rho correlation test is used as shown in Table 4.29.

Table 4.29 Spearman Rho correlation test between respondents' opinion on roles of urban green space during pandemic with their educational level

Roles of urban green space	**Educational level**	
	CC	**p-value**
Urban green space able to improve functioning of the immune system.	-0.160**	<0.001
Urban green space to improve social capital and cohesion.	-0.092	0.060
Urban green space able to reduce mortality and increased life span.	-0.081	0.098
Urban green space has potential adverse health effect.	-0.119*	0.014
Urban green space able to beautify and make healthier environment.	0.071	0.145
Urban green space as promoting biodiversity.	0.073	0.133
Urban green space able to create valuable usable space for people.	0.050	0.309

Note: * and ** Correlation is significant at the 0.01 level (2-tailed). cc= Coefficient correlation

A Spearman Rho test was used to identify the relationship between respondents' opinion on roles of urban green spaces with educational level. As the results show in Table 4.29, p-values of respondents' response on their opinion about urban green space able to improve functioning of the immune system (<0.001) and urban green space has potential adverse health effects (0.014). In short, there is a significant relationship

between respondent's education level and respondents' opinion on roles of urban green spaces such as urban green space able to improve functioning of the immune system and urban green space has potential adverse health effect as discussed in Chapter 2, Section 28.1 and 2.8.4. From the results, it shows that there is a negative relationship between respondents' opinion on roles of urban green spaces with educational level. The negative relationship indicates that as the lower respondent's educational level, the less respondents agreed that the roles of urban green space such as urban green space able to improved functioning of the immune system (-0.160**), urban green space to improve social capital and cohesion (-0.092), urban green space able to reduced mortality (-0.081) and increased life span and urban green space has potential adverse health effect (-0.119*). The findings are further discussed in Chapter 2, Section 2.8.

4.3.5 The Contributions of Urban Green Spaces for the Sustainable Environmental Health

Question-related to respondents' opinion of the benefit or contribution and function of green space during pandemic were asked during the survey. A *Likert scal*e using the 5-rating scale of responsewas used to gauge responses from the respondents.

4.3.5.1 The Contribution of Urban Green Spaces During the Pandemic

As shown in Table 4.30, 96% agreed that the benefits of green space as for a better quality of air followed by 95.7% improve mental health and stress reduction, 94.3% improve physical health, 94.3% beautify the environment during pandemic. On the other hand, 7.4% and 6.0 % of total respondents claimed they disagreed that the benefit of urban green space was reducing the risk of disease transmission and boosting the property value.

Table 4.30 The benefit of urban green space

Benefit of urban green space	**Responses**											
	Strongly Disagree		**Disagree**		**Neutral**		**Agree**		**Strongly Agree**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Improve mental health & stress reduction.	3	0.7	-	-	15	3.6	134	31.8	269	63.9	421	100
Improve physical health.	3	0.7	-	-	21	5.0	172	40.9	225	53.4	421	100
Reducing the risk of disease transmission.	10	2.4	21	5.0	86	20.4	144	34.2	160	38.0	421	100
Increasing social	6	1.4	4	1.0	68	16.2	175	41.6	168	39.9	421	100

cohesion.												
Recreational areas for people	4	1.0	3	0.7	39	9.3	160	38.0	215	51.1	421	100
Buffer area.	3	0.7	9	2.1	54	12.8	171	40.6	184	43.7	421	100
Beautify the environment.	3	0.7	-	-	21	5.0	156	37.1	241	57.2	421	100
More greenery and refreshed.	3	0.7	1	0.2	17	4.0	155	36.8	245	58.2	421	100
Lower the temperature.	3	0.7	1	0.2	32	7.6	142	33.7	243	57.7	421	100
For a better quality of air.	3	0.7	-	-	14	3.3	149	35.4	255	60.6	421	100
For a better social interaction.	4	1.0	4	1.0	47	11.2	175	41.6	191	45.4	421	100
For entertainment and exercise.	3	0.7	2	0.5	39	9.3	168	39.9	209	49.6	421	100
Better urban environment.	5	1.2	1	0.2	20	4.8	149	35.4	246	58.4	421	100
Boost the property value	10	2.4	15	3.6	46	10.9	175	41.6	175	41.6	421	100

A Pearson correlation test was conducted to test the relationship between respondents' opinion on the benefit of urban green space during pandemics with their frequency visit urban green space in table 4.31.

Table 4.31 Pearson correlation test between respondents' opinion on benefit of urban green space during pandemic with their frequency visit urban green space

Benefit of urban green space	**Frequency visit to urban green space**	
	CC	**p-value**
Improve mental health & stress reduction	0.112*	0.021
Improve physical health	0.131**	0.007
Reducing the risk of disease transmission	0.100*	0.040
Increasing social cohesion	0.147*	0.003
Recreational areas for people	0.111*	0.023
Buffer area	0.123*	0.012
Beautify the environment	0.115*	0.019
More greenery and refreshed	0.112*	0.021
Lower the temperature	0.105*	0.032
For a better quality of air	0.109*	0.025
For a better social interaction	0.094	0.053
For entertainment and exercise	0.091	0.062
Better urban environment	0.036	0.464
Boost the property value	-0.016	0.745

Note: * and ** Correlation is significant at the 0.01 level (2-tailed). cc= Coefficient correlation

Based on the result in Table 4.31 above, there are significant p-values for the result between respondents' opinion on benefit of urban green space with their frequency visit to urban green space such as improve mental health and stress reduction

(0.021), improve physical health (0.007),reducing the risk of disease transmission (0.040),increasing social cohesion (0.003), recreational areas for people (0.023), buffer area (0.012), beautify the environment (0.019), more greenery and refreshed (0.021), lower the temperature (0.032),for a better quality of air (0.025), for a better social interaction (0.053), and for entertainment and exercise (0.062) ,as highlighted in Chapter 2, Section 2.9.

From the result, there is a positive relationship improve mental health & stress reduction (0.112*), improve physical health (0.131**), reducing the risk of disease transmission (0.100*), increasing social cohesion (0.147*), recreational areas for people (0.111*), buffer area (0.123*), beautify the environment (0.115*), more greenery and refreshed (0.112*), lower the temperature (0.105*), for a better quality of air (0.109*), that indicate an increase in respondents' frequency visit to urban green space, the more they perceive benefit of urban green space.

In addition, there are negative relationships between respondents' opinion on the benefit of urban green space with their frequent visit to urban green space such as boosting the property value (-0.016). The negative relationship shows that the more frequently the respondent visits urban green space the more they disagree that urban green space boosts the property value.

4.3.5.2 The Function of Urban Green Space During the Pandemics

As shown in Table 4.32, 92.8 % agreed that the function of green space as an exercise area followed by 90.3% promote biodiversity, and 90% flora and fauna habitat. On the other hand, 7.2% and 2.7 % of total respondents claimed they disagreed and strongly disagreed that the function of urban green space was to boost the property value and aesthetic value during a pandemic.

Table 4.32 The function of urban green space

Function of green space	**Responses**											
	Strongly Disagree		**Disagree**		**Neutral**		**Agree**		**Strongly Agree**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Flora and Fauna habitat	3	0.7	5	1.2	34	8.1	166	39.4	213	50.6	421	100
Aesthetical value	4	1.0	7	1.7	41	9.7	191	45.4	178	42.3	421	100
Boost the property value	12	2.9	18	4.3	71	16.9	162	38.5	158	37.5	421	100
Exercise area	4	1.0	1	0.2	25	5.9	166	39.4	225	53.4	421	100
Promote Biodiversity	3	0.7	2	0.5	36	8.6	165	39.2	215	51.1	421	100

A ranking of action was made using the Relative Importance Index (RII) analysis, and the result is shown in Table 4.33 RII analysis allowed the researcher to identify the function of urban green space among respondent based on their preferable concern and reflect the important of urban green spaces during pandemic.

Table 4.33 RII ranking on the function of urban green space criteria among respondents

The function of urban green space	***Responses***											
	Strongly disagree		**Disagree**		**Neutral**		**Agree**		**Strongly Agree**		**I of R scores**	**Rank**
	F	**Rscore**	**F**	**Rscore**	**F**	**Rscore**	**F**	**Rscore**	**F**	**Rscore**		
Flora and Fauna habitat	3	3	5	10	34	102	166	664	213	1065	1844	3
Aesthetical value	4	4	7	14	41	123	191	764	178	890	1795	4
Boost the property value	12	12	18	36	71	213	162	648	158	790	1699	5
Exercise area	4	4	1	2	25	75	166	664	225	1125	1870	1
Promote Biodiversity	3	3	2	4	36	108	165	660	215	1075	1850	2

Referring to Table 4.33, the highest RII score representing the function of urban green space by respondents. The result shows the most chosen function of urban green space with RII score of 1870 ranked as 1st function was exercise area followed by promote biodiversity with RII score = 1850 ranked as the 2nd function of urban green space and flora and fauna habitat RII score of 1844 as 3rd function of urban green space. The least preferred function of urban green space was ranked as no 5 with RII score of 1699, which is boost the property value among respondents.

4.3.6 The Criteria of Urban Green Spaces for the Sustainable Environmental Health

Respondents were asked on the good criteria of urban green space. Based on Table 4.34, the result shows that 89.1% claimed they somewhat agree, agree, strongly agree the good criteria of urban green space is comfortable followed by providing a space for many human activities with 88.8% and safe and secure with 65.1%. Moreover, the result shows that 87.6% claimed they somewhat disagree, disagree, strongly disagree the good criteria of urban green space is followed by a variety of facilities with 82.5% and good accessibility and linkages with 63.7%.

Table 4.34 The good criteria of urban green space based on respondent's opinion

The good criteria of urban green space	***Responses***													
	Strongly disagree		**Disagree**		**Somewhat disagree**		**Somewhat agree**		**Agree**		**Strongly agree**		**Total**	
	F	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**	**F**	**%**
Good accessibility and linkages	232	55.1	13	3.1	23	5.5	5	1.2	8	1.9	140	33.3	421	100
Provide a space for many human activities	7	1.7	53	12.6	26	6.2	197	46.8	131	31.1	7	1.7	421	100
Comfortable	5	1.2	12	2.9	29	6.9	138	32.8	98	23.3	139	33.0	421	100
Safe and secure	5	1.2	4	1.0	138	32.8	50	11.9	141	33.5	83	19.7	421	100
Variety of facilities	15	3.6	140	33.3	192	45.6	30	7.1	33	7.8	11	2.6	421	100
Habitat for flora and fauna	158	37.5	203	48.2	8	1.9	8	1.9	1	.2	43	10.2	421	100

A ranking of action was made using the Relative Importance Index (RII) analysis, and the result is shown in Table 4.35 RII analysis allowed the researcher to identify the good criteria of urban green space criteria among respondent based on their preferable concern and reflect the important of urban green spaces during pandemic.

Table 4.35 RII ranking on the good criteria of urban green space criteria among respondents

The good criteria of urban green space	***Responses***													
	Strongly disagree		**Disagree**		**Somewhat disagree**		**Somewhat Agree**		**Agree**		**Strongly Agree**		**I of R scores**	**Rank**
	F	**Rscore**	**F**	**Rscore**	**F**	**Rscore**	**F**	**Rscore**	**F**	**Rscore**	**F**	**Rscore**		
Good accessibility and linkages	232	232	13	26	23	69	5	20	8	40	140	840	1227	4
Provide a space for many human activities	7	7	53	106	26	78	197	788	131	655	7	42	1676	3
Comfortable	5	5	12	24	29	87	138	552	98	490	139	834	1992	1
Safe and secure	5	5	4	8	138	414	50	200	141	705	83	498	1830	2
Variety of facilities	15	15	140	280	192	576	30	120	33	165	11	66	1222	5
Habitat for flora and fauna	158	158	203	406	8	24	8	32	1	5	43	258	883	6

Referring to Table 4.35, the highest RII score representing the good criteria of urban green space by respondents during pandemic. Based onthe result in Table 4.10 above, the most chosen criteria of urban green space with RII score of 1992 ranked as 1st criteria were comfortable followed by safe and secure with RII score = 1830 ranked as the 2nd criteria and provide a space for many human activities with RII score of 1676 as 3rd criteria.The least preferred criteria were ranked as no 6 with RII score of 833 were habitat for flora and fauna.

Moreover, the respondents were asked about the current urban green space in Malaysia whether it play a role in reducing pandemic spread or not. Table below shows the respondent's opinion about the current urban green space in Malaysia.

Table 4.36 shows the respondent's opinion about whether the current urban green space in in Malaysia useful in reducing pandemic spread or not.

Table 4.36 The respondent's opinion about the current urban green space in Malaysia

Urban green space in Malaysia plays its roles in reducing pandemic spread						**Total**	
Yes		**No**		**Neutral**			
F	**%**	**F**	**%**	**F**	**%**	**F**	**%**
274	65.1	119	28.3	28	6.7	421	100

Results in Table 4.36 shows that most of the respondents (65.1%) agreed that the current urban green space in Malaysia is reducing pandemic spread. The result shows that (28.3%) of the respondents disagreed that the current urban green space in Malaysia plays its roles in reducing pandemic spread.

Moreover, (65.1%) respondents agreed that among their reasons are that community awareness is increasing about the needs of nature or green spaces for mental health and physical wellbeing for recreational activities after a long pandemic lockdown. Respondents also highlighted that urban green spaces are lowering the chances of virus transmission between communities in which it provides open air ventilation to do activities as compared to indoor areas which are more enclosed. Thus, respondents emphasized that policymakers, planners, and built environment experts also need to create more sustainable communities in the future by planning infrastructure and design incorporating health demands. They added the design of urban green space for example the hardscape element such as seating, playground, walkway should be in proper distance as to standard operating procedures (SOPs) as to suit pandemic condition. Respondents also emphasized the presence of greenery elements in green space helps to improve community physical and psychological health and they highlighted that urban green spaces as a safe place to do activities with spacious, wide and less the virus spread while reducing stress and improving mental and physical health.

Thus, (28.3%) respondents disagreed that the current urban green space in Malaysia play it roles in reducing pandemic spread and among their solutions and ideas are community need to do self-care such as they need to maintain physical distance and practice strict standard operating procedures (SOPs) provided by the policy maker. Furthermore, government and local authority have to provide guidelines to improve green space conditions to reduce the risk of pandemics such as the use of “Mysejahtera”, physical spacing, hand washing before entering green areas and they need to monitor community activities in urban green space, by improve sanitation on park facilities and review current standard operating procedures (SOPs).Respondent also highlighted that to suit the urban green space design and current pandemic condition or the design need to incorporate social distancing designs and urban green space designs must consider

more open to encourage air ventilation for community do recreational activities together improving mental and physical health.

4.4 SEMI-STRUCTURED INTERVIEWS RESULTS

This section presents the findings of the semi-structured interview of 17 participants on the roles of urban green space and pandemic crises. The findings obtained from the analysis help give more understanding of the roles of urban green space for the sustainable environmental health in relation to pandemics crises.

This section presents the key findings of semi-structured interview conducted with various profession and agencies, including local authority, university lecturer, doctor, landscape architect, architect and town planner based on content analysis of their transcripts' words and phrases. The overall contents from the semi-structured interview were transcribed in verbatim format and elaborated according to the themes that were designed for the research topic. There are three main themes that were deliberated to gauge respondents' response: definition of urban green space; urban green space for sustainable environmental health; and the roles of urban green space and pandemic crises (discussed in Chapter 3, Section 3.6). Further, descriptive statistics (frequency and percentage) are used to describe the characteristics of the respondents.

4.4.1 Background of Respondents

A total of 17 participants were involved in the semi-structured interview and grouped according to their profession towards the roles of urban green space and pandemic crises. The type of respondents is among the people who are involved in the built environment and medical profession. As tabulated in Table 4.37, the participants consist of six respondents (35.3%) are Landscape Architects, three respondents (17.6%) are Architect, three respondents (17.6%) are Town Planners, and three respondents (17.6%) are University Lecturers, and two respondents are Medical Doctors (11.8%). The respondents came from different working backgrounds and experiences and held various positions in the current departments, agencies and communities (as described in Chapter 3, Section 3.6).

Table 4.37 The respondent's Profession, Agencies, Department, Authority,Position and Code

Profession, Agencies, Department and Authority	Position	Code
Landscape Architect		
Jabatan Landskap Negara	Director	LA 1
Jabatan Landskap Negara	Assistant Director	LA 2
Jabatan Landskap Negara	Assistant Director	LA 3
Majlis Bandaraya Shah Alam (MBSA)	Senior Landscape Architect	LA 4
Taib Landscape Sdn. Bhd.	Senior Landscape Architect	LA 5
Verona Design Sdn. Bhd.	Principal	LA 6
Architect		
Jabatan Kerjaraya(JKR)	Architect	AR1
Nry Architects Sdn Bhd	Architect	AR2
Aker Solution, Aker Engineering Malaysia Sdn Bhd	Architect	AR3
Town Planner		
Jabatan Perancangan Bandar dan Desa Negeri Sembilan	Director	TP1
Iktisas Planners Sdn Bhd	Junior Executive	TP2
Ajm Planning and Urban Design Group (APUDG)	Executive	TP3
University Lecturer		
International Islamic University Malaysia (IIUM/UIAM)	Senior Lecturer	UL1
Universiti Teknologi Mara (UITM), Shah Alam	Senior Lecturer	UL 2
Universiti Teknologi Mara (UITM), Puncak Alam	Lecturer	UL 3
Medical Doctor		
Hospital Kuala Lipis	Medical Officer	DO1
Hospital Tanah Merah	Medical Officer	DO2

4.4.2 The Definition of Urban Green Space

Definition of urban green space key component to achieve the aim of the research in which to investigate the roles of urban green space for the sustainable environmental health in relation to pandemics crises as discussed in Chapter 2, Section 2.3. Definition of urban green space is very important for discovering the contribution and the good criteria of green space during pandemic crises. Urban green spaces have various definitions according to different professions such as people who are involved in the built environment as well as in the medical field. This section exposes the definition of urban green spaces based on people who are involved in the built environment and medical field. In this section, all participants have been asked about their knowledge and opinion about the definition of urban green.

LA6 highlighted that the term "urban green space" refers to open-space areas set aside for parks and other "green spaces" in cities. LA6 added that urban green spaces are the area that covered by greeneries or trees in cities area.

> "The components of green spaces include land that is partially or totally covered with grass, trees, shrubs, or other vegetation and also facilities

> and elements for instance open plaza, playgrounds, water feature, and public seating areas.” LA6

While UL1 explained that urban green spaces comprise spaces either big or small, where urban dwellers connect and conduct activities directly or indirectly. UL 1 emphasised that those spaces don't need to be 'green' in nature with grasses and trees because, like a plaza or a courtyard, most areas are covered with hard surfaces. So, if the space is suitable and convenient for gathering a group of people, it can be considered UGS. UL1 added that urban green space is not compulsory to be on land and it can be at the rooftop of building in the cities area.

> “UGS doesn't need to be on the ground because, in a high-rise building, rooftop gardens are provided as a substitute for landed spaces due to limited land available in the cities. UGS can also be small pocket-parks or areas located in the middle, behind or between buildings if it serves as a place where people can pass through, meet, or conduct activities.” UL1

TP1 highlighted that, in the context of planning ‘Urban green space’/Green open space is an open space/green area that is used as a focal point for residents/communities to interact with each other or with the environment. It can be defined as an area overgrown with naturally occurring or planted plants.TP 1 added the definition of urban green space according to Town and Country Planning Act 1976 in which it is open space that covered by vegetation and located on the land in cities areas.

> “If viewed from a legal point of view under Subsection 2 (1) of the Town and Country Planning Act 1976 (Act 172), green areas (referred to as open space) can be construed as any land whether enclosed or which is not laid out or reserved to be laid out in whole or in part as a public flower garden, public park, public sports and recreation field, public winding place, public walkway or as a public place.” TP1

AR3 highlighted that urban green space is pocket space or parcel of land in the city that dedicated for green/vegetative element. Perfect example of green space in urban areas is public park and pocket garden. For the past few years, integration of green space in the city is essential to improve quality of life in urban area.

DO2 highlighted that the definition of urban green space is designated area with nature and greeneries for recreation at the urban centres while DO 1 highlighted that urban green space is an area that is developed with facilities that accommodate the uses of human, flora & fauna in a densely populated place.

The findings show that the definition of urban green spaces is the open space or land that covered by vegetation such as tree, shrubs and grass used by community in cities for recreational activity and gathering together as a medium to improve quality of life in urban areas.

4.4.3 The Relationship of Urban Green Space and Community Health

DO2 highlighted green space emphasise environment close to nature for relaxing and recreation amidst busy urbanisation, aimed to balance community health especially mental health as over urbanization may increase life stresses.

> "Being able to have green space in the urban community helps community distress and improve mental health well-being" DO2

Moreover, for the definition of urban green space in relation to community health in urban areas, DO1 highlighted that urban green spaces allow community to improve mental and physical health while interact with green planting and animals at the same time helps to release stress with fresh air provided in the urban area.

> "Urban green space is a reserved place that encourages people to interact with nature and animals well as facilities provided in urban settings as to improve mental health. Thus, urban green spaces are place for community to do recreational activities as to improve physical health with the fresh air provided in urban green space." DO1

UL3 emphasized that urban green spaces have significance value in improving the quality of life for community health in urban area especially as recreational place to improve physical and mental health.UL3 also added that urban green space a place for community to do passive activities for example relaxing and enjoying while release stress with nature.

> "Urban green space is definitely having the relationship with the community health, as it would allow activities such as sport and recreation that would promote better physical and mental health to the urban dwellers. Besides such physical activities, passive activities such as just sitting relaxing at the park and enjoying the nature have been proven to benefit the people in term of the betterment of one's mental health." UL3

AR1 highlighted that the exposure to more green space in urban community bring the people close to nature. AR1 added despite offered the nature- treat therapy,

the urban green spaces could contribute more oxygen and give more breathedable area especially in the compact & busy environment.

> "By having gardens and parks, the community can have more space for physical interaction among the peoples. It not just provides a green space but also promotes healthier activities." AR1

LA 1 highlighted that urban green space as a supplier of clean oxygen through air filtration from plants for community health. Urban green space as a space to do recreational activities to improve community health such as mental and physical health as well as reducing diseases transmission as discussed in Chapter 2, Section 2.9.3.1,2.9.3.2 and 2.9.3.3.

> "The implementation of urban green areas can improve community health by preventing and reduce infectious diseases together improving mental and physical health." LA1

Furthermore, TP2 highlighted that urban green spaces are important to be allocated to every development no matter in urban or rural neighborhoods. Urban green space is very important in ensuring a vibrancy and healthy community through improving mental and physical health added TP2. Thus, TP3 highlighted that urban green space is very important in ensuring harmonious community that indirectly promotes social interaction between together improving mental and physical health as discussed in Chapter 2, Section 2.8.2 ,2.9.3.1 and 2.9.3.2.

> "Urban green space able to ensure the balance of community life and the need for a healthy lifestyle through improving mental and physical health as well as creating a harmonious community that indirectly promotes social interaction between urban/rural residents." TP3

In short, all statement above representing both perspectives between people who are involved in built environment and medical field (DO1, DO2, UL3, AR1, LA1 and TP3) emphasized that urban green space spaces such as park and gardens able to improve mental and physical health by doing recreational activities through interactions with nature that provide clean and fresh air in urban green spaces as the relationship of urban green space and community health in urban areas.

4.4.4 Urban Green Space for Sustainable Environmental Health

Urban green space for sustainable environmental health due to it is improving mental and physical health of community. The section is divided into 2 subsections. The first

subsection discusses about the importance of urban green space to mental health and physical health while the second subsection discusses the functions/benefit of elements of urban green space such as vegetation, water feature and facilities during pandemic crises. In this section, all respondents have been asked about their knowledge and opinion about the importance of urban green space to mental health and the importance of urban green space to physical health. The results are important to comprehend the respondent's opinion according to their profession in order to achieve research aim and objectives.

4.4.4.1 The Importance of Urban Green Space to Mental Health

In built environment perspectives, AR 2 emphasized that urban green spaces have significance value in improving mental health by reducing stress through the peacefulness or calmness of greeneries provided in urban green space in which boost the mood and motivation of the community in the cities.

> "Being surrounded within green space can reduce stress and improve mental health by providing a calm and peaceful environment for the citizens. As a matter of fact, greeneries are also found to boost one's creativity, mood and motivation in carrying out daily activities." AR2

In term of the importance of urban green space to mental health, UL2 highlighted that urban green space reduces stress through the joyful environment together with fresh air provided by green space to community do activities such as gathering and sightseeing.

> "Mental health among people in urban area is because of stress problem especially workers in urban area. Urban green space can reduce the stress of them because the area brings joyful to them as well as can get fresh oxygen and reduce carbon." UL2

Moreover, LA5 and TP2 also highlighted that urban green spaces able to reduce stress due to the green environment and the sound of animal such as bird or the sound water feature can make people feel relax and calm directly boost mental health.

> "People need to areas to relaxation from daily work routine and release stress levels in peaceful place such as urban green space." LA5

> "Sound of chirping birds and fresh air can prevent from stressful environment" TP2

DO1 and DO2 highlighted urban green space highlighted promotes healthy mental development and as a place for stress reliever for people after work and life stress through beautiful and calmness environment in which provide fresh air for community.

> "It promotes healthy mental development and acts as a "stress reliever" after a busy day at work. The green scenery also helps in calming a person's mind and is easy on the eyes as stress has a negative impact on mental health." DO1

> ".. green spaces help to distress, wind away from daily hustle and life stress, help to cope through nature". DO2

In short, all statement above emphasized that urban green space spaces such as park and gardens able to reduce stress through interactions with nature that provide clean and fresh air in urban green spaces as the importance of urban green space to mental health as discussed in Chapter 2, Section 2.9.3.1.

4.4.4.2 The Importance of Urban Green Space to Physical Health

DO1 and DO2 highlighted urban green space provide place for community to practice healthy lifestyle by doing physical exercise with facilities provided without invest a cost just like go to gymnasium.DO1 added that urban green spaces also give opportunity for community to do outdoor activities at the same time encourage social interaction between people and nature.

> "Facilities provided at the urban green space provides a good place for people to participate in physical activities and helps in promoting healthy lifestyle. It also attracts people to go outdoors and interact to create social relationships." DO1

> ".. availability of urban space made it possible for urban community to practice recreation and physical exercise in the real environment more freely, and with less cost, a better option than gyms and exercise centres." DO2

LA4 and AR1 emphasized that urban green spaces provide space for community to do various recreational activities such as cycling jogging, picnic, Tai Chi, Zumba and sport in which importance to community for practicing healthy lifestyle at the same time improve physical health.

> "The importance of green areas in the city center offers recreational spaces such as cycling, jogging, Tai Chi, Zumba and recreational activities in groups such as playing badminton, football and so on as well as can improve physical health." LA4

> "The existence of urban green space gives some space for urban community to enjoy some healthy activities such as play games, picnic, sports, other recreational activities and others. It promotes a better healthy lifestyle for urban community and the most importantly it brings the benefits from the nature to peoples." AR1

Moreover, TP 1 highlighted that the availability of urban green areas and physical and mental health are closely linked. The change to this equilibrium is to change the stability between development and the health of community and the environment in general. Changes and reductions in the proportion of urban green space composition certainly affect the quality of the urban environment and the health of the urban population is disturbed (physically and mentally). TP1 added it is because these changes are due to human land use activities that have directly affected the ecological processes of an area. It has directly changed the stability of the environment such as temperature, air and water quality.

UL1 and UL3 highlighted urban green space provide place for community to do recreational activities and encourages people to walk within the cities.UL3 added that the usage of vehicle such as car and motorcycle is decreasing with existing of urban green spaces and lead to less carbon monoxide release and decrease the chance of air pollution within the cities.

> "Other than a space where people can do recreation. Instead of driving, a well-connected urban green space encourages people to walk in the city from one area to another. Walking improves physical health." UL1

> "Space (with facilities) that support the physical and recreational activities such as cycling, jogging, yoga, tai-chi and many more. Thus, free from conflict with the vehicles and jogging at the roadside's track. Good designed urban green spaces would encourage people to have healthy physical activities which would contribute to a better physical health." UL3

In brief, all the statement above claimed that urban green space provides a space for community to do recreational activities with nature as the importance of urban green space to physical health as discussed in Chapter 2, Section 2.9.3.2. Only from perspectives of university lecturer highlighted the the importance of urban green space

to physical health as to encourages people to walk and decrease the usage of vehicle and reduce carbon monoxide release at the same time avoid air pollution for community health within the cities.

4.4.5 The of Elements of Urban Green Space During Pandemic Crises

The elements of urban green space such as vegetation, water features and facilities are important for human daily life especially during pandemic crises in order to improve community health. This section is divided into two subsections the first subsection discusses on the respondent's opinion about the current condition of elements of urban green space for pandemic crises in Malaysia and the second subsections discusses on the benefit and contribution of elements of urban green space during pandemic crises. Both subsections are significance in order to achieve the aim of the research as to investigate the roles of urban green space for the sustainable environmental health in relation to pandemics crises.

4.4.5.1 The Current Condition of Urban Green Space Elements for Pandemic Crises

DO1 highlighted as most of the facilities are created with the intention to be shared among its users, depending on the mode of transmission of the infectious disease, it may be unwise to share the facilities. For example, infectious disease with droplet transmission will contaminate any surfaces and by direct physical exposure will pose a risk of infection.

DO2 added that the facilities are adequate, but needs more improvement. Some of our green space may be small in size or inadequate to occupy community at the same time, especially in time of pandemic. It tends to became cramped with public.

According to TP 1, the elements and composition of green areas that have been planned if they follow the standards outlined are sufficient in meeting the needs of the community. Various studies and research have been carried out by experts that what has been outlined is sufficient if it is adhered to.

> "If the intended pandemic is Covid-19, it is no longer a pandemic, but has become endemic. It is something that is temporary. However, if viewed from the aspect of the probability of the emergence of other variables in the future, the suitability the elements and the composition of the green area must be seen in the current context." TP1

TP1 added that what is important to do is to determine the type and classify of urban green areas g in order to preserve the function and maintain the distribution of urban green areas. Thus, the inconsistency and imbalance in the classification of urban green areas results in ineffective management of urban green areas and at the same time encourages the encroachment of urban green areas.

AR3 highlighted that hardscape and softscape are co-exist element to balance and improve green environment. Common facilities such water features/ seating area are some examples of hardscape that commonly seen on the public park. AR3 added in term of Covid-19 pandemic perspective, these facilities are considering high touch point facilities and high potential to spread Covid-19 virus.

> "Based on current standard of procedures in public park, community does not require to wear mask in open space, this guideline raised concern among the community whether public park is a safe enough from spread of Covid-19 since it is air Bourne virus. Some research stated risk to be infected from Covid-19 is lower in open space but the risk is there." AR3

According to LA6, Individuals' health, safety, and well-being may be harmed by public health emergencies, which can result in insecurity, confusion, emotional isolation, and stigma, as well as communities' health, safety, and well-being (due to economic loss, work and school closures). It revealed a variety of emotional effects linked with quarantine, including stress, depression, irritability, insomnia, fear, confusion, anger, frustration, boredom, and stigma, some of which continued after the quarantine was lifted.

> "The most significant leisure activities for boosting human well-being are being outside in the fresh air. Urban Green spaces played a critical role in how people have dealt with the pandemic's effects, particularly the increasingly limited recreational activities, widespread financial insecurity, which resulting increased anxiety." LA6

Moreover, according to LA 6 social interaction is very important in the daily lives of city dwellers, and it has been linked to improved health, well-being, and life quality. Limited outdoor activities and social interaction, social media exposure to negative news, and financial problems all had negative physiological and psychological effects on people during the pandemic. Urban green spaces helped communities retain

their physical and emotional health during pre-pandemic, lockdown, and recovery periods.

Staying at home may have unpredictable consequences, as efforts to prevent human-to-human transmission of the virus might lead to reduced physical activity. Maintaining a regular exercise routine also was beneficial in reducing negative emotions. Parks provide area for physical activities, which these activities can help with a greater vaccine response, which is why being active and exercising can help with this pandemic. It boosts physical and psychological well-being by giving city dwellers places to exercise and socialise on a regular basis, Physical activity also will encourage people to be more active could help them cope with continuous stress and avoid mental illness health. Urban Green spaces provide possibilities for high levels of interaction among people of various social and ethnic backgrounds.

According to UL3, some urban green spaces really do have good elements that are suitable for the pandemic situation. But as the pandemic rises, some alteration and modification for the design / installation might or could be done. For example, maybe certain elements like par course, workout stations or even playground need to be made wider / distance space between one element to another to provide a better distance between users.

> "The elements and facilities that do not require physical contact should be taken into consideration during the pandemic era." UL3

In summary, the statement above emphasize that the current facilities of urban green space are created with the intention to be shared among its users. They explained that the hardscape and softscape are co-exist element to balance and improve green environment. Thus, these facilities are considering high touch point facilities and high potential to spread diseases such as Covid-19 virus. They also highlighted that the facilities are adequate, but needs more improvement according current context of pandemic as to reduce pandemic spread. Urban green spaces played a critical role in how people have dealt with the pandemic's effects, particularly the increasingly limited recreational activities, widespread financial insecurity, which resulting increased anxiety.

4.4.6 The Benefit and Contribution of Urban Green Space Elements During Pandemic Crises

According to LA6, environmental psychologists have discovered that simply looking at nature can improve one's mood, and that exposure to natural settings can help people cope with the stresses of city life. It also has been proven that spending time in nature and exposure to fresh air and greenery reduces stress and improves physical and mental health. LA6 highlighted that the environment in green space such as human voices and the sound of water help to improve mental health. Experiencing and seeing positive signs of life, as evidenced by sounds of other human voices such as chatter and laughter, as well as natural elemental sounds such as wind rustling leaves or water flowing, may have therapeutic effects that can help strengthen thoughts, emotions, and improve sanity."

LA6 added that unclean air has been linked to an increased risk of acute respiratory distress syndrome, which is extremely deadly and a cause of Covid-19-related deaths, as well as other respiratory illnesses. Exposure to air pollution is an essential risk factor for many of the chronic diseases that make people become seriously ill, unhealthy, require intensive care. Moreover, LA6 emphasize that the vegetation in urban green spaces act as to filter the polluted air to clean air and the sound of water features help to give relax and calm effect for community in urban area.

> "Large trees are good filters for pollutants and fine particles found in metropolitan areas. They absorb polluting gases (such carbon monoxide and nitrogen oxides) and filter fine particles like dust, dirt, and smoke from the air by trapping them on leaves and bark. In urban green spaces, water features like fountains can serve to create a natural ambiance. It is inspired by the sound and aesthetics of water. Being in close proximity to water can help people to relax. The sound of water and nature has a calming effect and can aid in psychological stress recovery." LA6

According to UL3, some of those elements would definitely contribute to a healthier environment in the city as example vegetation and water features in urban green space able to reduce the temperature in the cities and filtering the polluted air.

> "Vegetation, large water bodies would of course help in combating urban heat island, reducing the urban areas' temperature, balancing the ratio or amount of green surface: paves surface / gray infrastructure. And of course, vegetation could act as the natural filter for the air, by trapping the dust and particles in the air on their tiny hair on the leaves' surface,

> converting the carbon dioxide to oxygen, carbon storage and sequestration, besides scrubbing the air of cancer-causing volatile organic compounds like formaldehyde and benzene." UL3

TP3 described that urban green spaces also act as buffer zone, zoning between spaces and natural disaster mitigation areas in cities area.

> "Urban green spaces also act as separation zones/buffers/natural disaster mitigation areas. For example, a pond or lake can serve as a catchment area when floods occur, green areas can also be a buffer zone for noise, air pollution control and also a place to ensure the survival of ecosystems and living habitats." TP3

A2 highlighted that urban green space as a source of nutrient especially herbal and fragrance trees to community in urban area. Thus, AR2 added that urban green space helps to reduce the temperature and create comfortable environment in urban area.

> "The elements of green space such as vegetation gives advantage towards its beneficial nutrients especially herbal plants and fragrant floras. Meanwhile, water features give cooling effect to the body while at the same time regulates surrounding's temperature to comfortable condition for human living." AR2

DO1 and DO2 highlighted that urban green spaces provide facilities that have not offered in the house and could improve mental health. Thus, DO1 added that the urban green spaces produce clean oxygen to community and maintaining balanced ecosystem.

> "They can provide facilities that are not commonly found in a house as well as provide a good place for gaseous exchange from carbon dioxide to oxygen in urban areas. It can also be a place to promote growth of flora & fauna and help in maintaining a balanced ecosystem." DO1

> "Study showed that nature therapy helps boost mental health wellness it contributes by providing a serene space, a place of peace of mind, important to balance mental health." DO2

In short, the statement above from respondents emphasize that the element of urban green space such as vegetation helps to reduce the temperature and help to filter the air. They also added that the sound of water feature help community to feel calm and relax at the same time reduce stress and improve mental health.

4.4.7 Urban Green Space and Pandemic Crises

Urban green space and pandemic crises are important key findings for the research. The section is divided into 2 subsections. The first subsection discusses about the roles of urban green space reduce pandemic spread in urban areas while the second subsection discusses the current urban green space in Malaysia playing its role in reducing pandemic spread. The results are important to comprehend the respondent's opinion according to their profession in order to achieve research aim and objectives.

4.4.7.1 The Roles of Urban Green Space Reduce Pandemic Spread in Urban Areas

UL2, UL3 LA2, LA4, TP2 and TP3 highlighted that urban green space able to reduce the virus transmission as its roles during pandemic due to the bigger space and open air provided for people to do recreational activities. Thus, they added that when community do outdoor activities in urban green space able to less the risk of being affected by pandemic such as Covid-19 compared to do indoor activities in enclose space in which can lead the virus spread rapidly.

> "Urban spaces are open air spaces where the virus is not in the static condition. The area cannot spread the virus compare to enclose spaces." UL2

> "With the existence of urban green spaces (with good coverage and size of land area), we can avoid people from swarming an enclosed facility / attractions like shopping malls, cinemas, and of course it would be better and less risky for people to go to the spaces with open-air rather than the enclosed, in the building, with internal-circulated air." UL3

> "Open air area for people to enjoy doing activities is better as compared to indoor enclosed areas. Chances of transmitting the virus are lower in an open space as compared to indoor area." LA2

> "Urban green space can be used as a health therapy area and if the green area is wider, more health benefits for consumers, especially in the city center will be guaranteed. However, it does not guarantee a direct reduction in the spread of the epidemic." LA4

> "A wide-open space can reduce the possibility of people to go to crowded place like shopping malls & etc." TP2

> "The community is not crowded in the enclosed ventilation area to carry out recreational and leisure activities, the spacious open space is a good choice to make activities." TP3

Moreover, according to LA3 less intensity and distance between users in the outdoor environment can reduce the spread of the virus, especially by respiratory droplets.LA3 added that more open and widespread air movement in green areas as to low virus concentration are also among the factors that can reduce the spread of the pandemic. The community is also more sensitive to self -care such as social distance and the wearing of face masks when outside than inside the building.

DO2 highlighted the same opinion as all above statement in which there is less risk of pandemic spread when community do recreation activities in outdoor space such urban green spaces. DO2 added that the roles of urban green spaces as to reduce risk of infection transmission as current pandemic is airborne due to green space in wider and provide open air to community do outdoor activities with nature.

> "..with larger size green space, it suits the community to spend time healthily as the area is open air, filled with nature and its ecosystem that circulate naturally, able to reduce risk of infection transmission as current pandemic is airborne." DO2

LA6 highlighted that during a pandemic, people are stressed, particularly when they are trapped indoors. Self-isolation and quarantine are likely to have a bad impact on one's mental health. City dwellers are believed to be anxious and fearful of quarantine regulations. The pandemic's long-term spread increased widespread fear and anxiety.LA6 added that people's physiological and psychological health also suffered as a result of a lack of outdoor activities, social media exposure to unfavourable news, and financial difficulties.

Furthermore, during the pandemic lockdown such as coronavirus pandemic's lockdown and prohibitions on public activities, urban green spaces has become one of the few sources of resilience, due to their beneficial benefits on psychological, physical, and social cohesiveness, as well as spiritual wellness.

> "Urban green space helped communities retain their physical and emotional health during pre-pandemic, lockdown, and recovery periods, and play critical roles in providing an escape from the stress of being confined indoors. People in city dwellers find having an outdoor space that still offers them an alternative safe environment to run activities are essential." LA6

LA6 also highlighted that high population density may result in unhygienic environments and the spread of several infectious illnesses. Crowding raises the risk of volatile illnesses and infection spread by droplets. Due to the substantial area, urban green spaces can maintain physical distance. People can spread out in parks, which reduces congestion in less desirable areas. People tend to embrace an inactive lifestyle during the lockdown's periods.LA6 added that the park will become an important location for exercise locations that may help people overcome pandemic spread such as Covid-19 risk factors like poor cardiovascular health and obesity.

AR1 and AR3 highlighted that the roles of urban green space reduce pandemic spread in urban areas as place for community to improve mental and physical health together reduce stress among community during pandemic lockdown.

> "The urban green space can act as therapy to promote more human interaction which can helps lots especially after the quarantine period. Besides, it gives more spaces for people to enjoy do some activities within the nature setting area**."** AR1

> "Urban green area helps reduced pandemic by providing space to the community to keep healthy physically and mentally." AR3

In brief, the roles of urban green space reduce pandemic spread in urban areas such as urban green space able to reduce the virus transmission as its roles during pandemic due to the bigger space and open air provided for people to do recreational activities. Urban green space able to less the risk of being affected by pandemic such as Covid-19 compared to do indoor activities in enclose space in which can lead the virus spread rapidly. Thus, more open and widespread air movement in green areas as to low virus concentration are also among the factors that can reduce the spread of the pandemic. Urban green spaces have become one of the few sources of resilience, due to their beneficial benefits on psychological, physical, and social cohesiveness, as well as spiritual wellness together reducing the stress among community. Finally, urban green space as place for community to improve mental and physical health together reduce stress among community during pandemic lockdown.

4.4.7.2 The Current Condition of Urban Green Space in Malaysia and Its Role in Reducing Pandemic Spread

Out of 17 respondents for semi structured interview, there is 9 (53%) respondents agreed that urban green space in Malaysia play its role in reducing pandemic spread while there is 7 (41.1%) respondents disagreed that urban green space in Malaysia play its role in reducing pandemic spread and only 1 respondent (5.9%) neutral that urban green space in Malaysia play its role in reducing pandemic spread.

DO1, UL1, LA1, LA4, LA5, AR3 and TP3 disagreed that urban green space in Malaysia play its role in reducing pandemic spread.DO1 highlighted that as urban green areas are a place where people gather, it is easy for a pandemic to spread.

> "There must be rules to be observed at all times to prevent it from happening. People need to maintain physical distance and practice strict standard operating procedures (SOPs) provided by the policy maker. It is also wise to consider smaller urban green areas to limit people using the facilities and improve accessibility as some people have difficulty going to the facilities. In this way, people will have equal access to the facilities and reduce commuting time." DO1

UL1 highlighted that most of the UGS provided does not address the pandemic. Thus, according to LA1, LA4 and LA5 emphasized that urban green space need improvement in term of following Standard Operation Procedure (SOP) of in which should be imposed by local authorities, improvement of green spaces design that suit the current pandemic that require cost and highlighted that current urban green spaces only able to give spaces for leisure activities and therapy purposes as discussed in Chapter 4, Section 4.1.5.

> "All improvements require cost. To improve urban green space, the authorities, need to provide guidelines to improve green space conditions to reduce the risk of epidemics such as the use of "MySejahtera", physical spacing, hand washing before entering green areas as made by the National Landscape Department. LA1

> "In my opinion, it is not directly, but with the existence of urban green space in Malaysia, the area can be used therapeutically and the space and more space can be used for leisure activities." LA4

> "The current designs are not to cater the pandemic as they are completed before that. For future design we can incorporate social distancing designs and designs that are more open to encourage air ventilation." LA5

According to AR3 Urban green space is not playing role in reducing pandemic such as Covid-19. Even though public park is an open space but it is not guaranteeing as safe space from spread of Covid-19 added AR3. The high touch point facilities such playground is not regularly sanitised and amount of people visited to public park is not in control.

> "Small park with high density community living around caused high volume of people at one time. To move further, government and local authority have to closely monitor community activities in public park, by improve sanitation on park facilities and review current SOP." AR3

Moreover, TP3 highlighted green areas are able to reduce the spread of the virus in major urban areas with adequate green area preparation measures and being within walking distance (600m or 15 minutes' walk).

> "The distribution of communities using urban green spaces for recreation can be distributed by providing scattered open space that indirectly reduces physical interaction and does not need to be crowded in an urban green space." TP3

Moreover, DO2, LA2, LA6, UL2, UL3, AR1, AR2, TP1, and TP2 agreed that urban green space in Malaysia play its role in reducing pandemic spread.DO2 and LA2 highlighted green space plays a role in reducing pandemic spread, as more people are now shifting from malls and closed areas to spend time in, into green space and recreational activities.

> "The experience of lockdown in pandemic struck the community and now people are having more awareness about the needs of nature for mental health wellbeing and are now more engaged in green spaces activities." DO2

LA2 emphasized that open air ventilation of green space allows people to enjoy doing activities is better as compared to indoor enclosed areas. Chances of transmitting the virus are lower in an open space as compared to indoor area as discussed in Chapter 5, Section 4.15.

LA6 highlighted that the majority of large and well-maintained urban green spaces, such as KLCC Park and Taman Tasik Titiwangsa, are only found in major cities. It is a vital tool for urban inhabitants seeking refuge during a pandemic. In my opinion, the green spaces play important roles in reducing pandemic spread, but the areas are mainly focus at the developed cities. However, because the number of large parks is

limited, it can be crowded when a pandemic strike. This will have caused some of the Urban Green spaces need to be closed due to overcrowding added LA 6.

This pandemic may also affect the type and distribution of urban parks and green spaces we desire, as well as our ideas of what Urban Parks should provide. Access to urban green spaces is not distributed equally in many cities. There is unequal access to urban green spaces. Property prices in places with more green space tend to be higher, resulting in gentrification in the neighborhood.

> "..local council and private sectors should determine that the inclusion of Urban Green Spaces is prioritized on neighborhood areas where they are lacking. They also must ensure that individuals, regardless of where they live, have access to good Urban Green Spaces." LA6

Emphasis on interconnected cycling and pedestrian networks. Urban Green Spaces should be accessible incorporated in every neighborhood within cycling and walking distance as a public health intervention with beneficial psychological and physical effects. According to LA6, to incorporate '15 minutes City Concept' by Mayor of Paris, Anne Hidalgo, which all facilities including Urban Green Spaces is accessible - A walk of 5 to 10 minutes, to green space.

Incorporating greenways into transportation corridors or providing access to informal greenspaces such as organically revegetated abandoned areas are needed in addition to the creation of new urban green spaces.

> "Rethinking how such spaces are used to facilitate multi-functionality. This include retrofitting urban environment to enhance the multi-functionality of Urban Green Spaces, for instance preserve open space with street improvements that can be created with Parklets." LA6

Thus, LA6 highlighted that mobile application can also inform the capacity of the visitors at the current state of time, give information on the capacity of the visitors in the parks and limiting the density of user at specific times and allowing visitor to schedule their visit to avoid big crowd in parks. LA6 added that communication between built environment and health professionals is essential.

> "Incorporating health demands and impacts into the conceptualization, design, and planning of infrastructure projects could help policymakers, planners, and built environment experts create more sustainable communities in the future." LA6

UL2 highlighted that current green space is good to reduce the spread of the virus, especially in the saturated urban area, however the design of static landscape hardscape furniture, such as seating, playground, walkway, should be in proper distance to follow SOP. UL2 added more plants and shade trees also can produce more oxygen and extract carbon as well as can reduce urban heat island effects which was happened all over the world in urban surrounding.

UL3 highlighted being in the open spaces is definitely better and less risky than being in an enclosed space together with the other people / strangers. But, the condition and situation of the urban green spaces in Malaysia could have been better for the public to enjoy during the pandemic era. Of course, after so long of being trapped in the house during the Movement Control Order, people want to go out, to exercise, enjoying the nature, but with a lot of other people at the park, it is worrisome. People need and want to feel safe while enjoying the green spaces added UL3.

UL3 emphasized as for the solution, business activities like hawker stalls in the green spaces should be controlled / banned – more spaces for other beneficial activities in the green spaces, lesser conflict with the hawkers' stalls and vehicles, more opportunity for healthier activities.

> ".. wider / distance space between one element to another to provide a better distance between users. Other than that, elements and facilities that do not require physical contact should be taken into consideration during the pandemic era." UL3

According to AR1, by having more approachable green spaces in urban area, peoples will be closer to nature and can more chances to do recreational and healthy activities. However, the most importance approaches to attract people to access for the urban green area is to create more safe settings, especially after the pandemic people are being more careful in choosing place to go added A1. So, the designer must consider the safety and also applied the recommended SOP in order to facing the pandemic.

AR1 highlighted that the planning of urban green space in Malaysia is holistic enough to combat the pandemic spread due to some of Malaysian local plants' characteristics; as air purifiers, as antiviral medicine and as air pollutants filter.

According TP1, availability of urban green areas is adequate if current standards and guidelines are adhered to by all relevant parties.

> "What is important is our ability to assess changes in the landscape structure of urban green areas spatially while understanding its relationship with the development of areas provided and develop a comprehensive classification of urban green areas in the long run while improving and assisting planning and management of urban green areas. sustainable to obtain a quality of life and a healthy and comfortable environment." TP1

Moreover, TP2 highlighted that urban green space able to reduce pandemic spread if there's limitation of visitors to enter park. LA3 neutral that urban green space in Malaysia play its role in reducing pandemic spread. LA3 added the increase number to urban green space indicates a relevant and urgent need in facing and recovering from a pandemic crisis.

> "..to reduce the spread of pandemic, the community needs to practice hygiene and personal care practices at all times in the open spaces. However, some green areas are quite far from the population concentration areas. To promote a healthier lifestyle and raise awareness for healthcare, the availability of green areas in the city that are more accessible within walking distance is essential. The provision of facilities for the convenience of users also needs to be enhanced." LA3

Table 4.38 below is the summary of respondent's opinion about the current urban green space in Malaysia playing its role in reducing pandemic spread

Table 4.38 The summary of respondent's opinion about the current urban green space in Malaysia playing its role in reducing pandemic spread

Is the current urban green space in Malaysia playing its role in reducing pandemic spread?	**Idea/Solution/Reason**	**Code**
No	There must be rules to be observed at all times to prevent it from happening. People need to maintain physical distance and practice strict standard operating procedures (SOPs) provided by the policy maker. It is also wise to consider smaller urban green areas to limit people using the facilities and improve accessibility as some people have difficulty going to the facilities.	DO1
No	Because most of the UGS provided does not address the pandemic.	UL1
No	All improvements require cost. To improve urban green space the authorities, need to provide guidelines to improve green space conditions to reduce the risk of epidemics such as the use of mysejahtera, physical spacing, hand washing before entering green areas as made by the National Landscape Department.	LA1
	In my opinion, it is not directly, but with the existence of urban green space in Malaysia, the area can be used therapeutically and the space and more space can be used for leisure activities.	LA4
No	Again as above answers, the current designs are NOT to cater the pandemic as they are completed before that. For future design we	LA5

	can incorporate social distancing designs and designs that are more open to encourage air ventilation.	
No	Even though public park is an open space but it is not guarantee as safe space from spread of Covid-19. The high touch point facilities such playground is not regularly sanitised and amount of people visited to public park is not in control. Small Park with high density community living around caused high volume of people at one time. To move further, government and local authority have to closely monitor community activities in public park, by improve sanitation on park facilities and review current SOP.	AR3
No	Green areas are able to reduce the spread of the virus in major urban areas with adequate green area preparation measures and being within walking distance (600m or 15 minutes' walk). The distribution of communities using urban green spaces for recreation can be distributed by providing scattered open space that indirectly reduces physical interaction and does not need to be crowded in an urban green space.	TP3
Yes	Green space plays a role in reducing pandemic spread, as more people are now shifting from malls and closed areas to spend time in, into green space and recreational activities. The experience of lockdown in pandemic struck the community and now people are having more awareness about the needs of nature for mental health wellbeing and are now more engaged in green spaces activities	DO2
Yes	Open air ventilation of green space allows people to enjoy doing activities is better as compared to indoor enclosed areas. Chances of transmitting the virus are lower in an open space as compared to indoor area	LA 2
Yes	local council and private sectors should determine that the inclusion of Urban Green Spaces is prioritized on neighborhood areas where they are lacking. They also must ensure that individuals, regardless of where they live, have access to good Urban Green Spaces. Incorporating health demands and impacts into the conceptualization, design, and planning of infrastructure projects could help policymakers, planners, and built environment experts create more sustainable communities in the future	LA6
Yes	Current green space is good to reduce the spread of the virus, especially in the saturated urban area, however the design of static landscape hardscape furniture, such as seating, playground, walkway, should be in proper distance to follow SOP. More plants and shade trees also can produce more oxygen and extract carbon as well as can reduce urban heat island effects which was happened all over the world in urban surrounding.	UL2
Yes	Being in the open spaces is definitely better and less risky than being in an enclosed space together with the other people / strangers. But, the condition and situation of the urban green spaces in Malaysia could have been better for the public to enjoy during the pandemic era. Of course, after so long of being trapped in the house during the Movement Control Order, people want to go out, to exercise, enjoying the nature, but with a lot of other people at the park, it is worrisome. People need and want to feel safe while enjoying the green spaces. As for the solution, business activities like hawker stalls in the green spaces should be controlled / banned – more spaces for other beneficial activities in the green spaces, lesser conflict with the hawkers' stalls and vehicles, more opportunity for healthier activities. Other than that, wider / distance space between one element to another to provide a better distance between users.	UL 3

	Other than that, elements and facilities that do not require physical contact should be taken into consideration during the pandemic era.	
Yes	By having more approachable green spaces in urban area, peoples will be closer to nature and can more chances to do recreational and healthy activities. However, the most importance approaches to attract people to access for the urban green area is to create more safe settings, especially after the pandemic people are being more careful in choosing place to go. So the designer must consider the safety and also applied the recommended SOP in order to facing the pandemic.	AR1
Yes	In my opinion, the planning of urban green space in Malaysia is holistic enough to combat the pandemic spread due to some of Malaysian local plants' characteristics; as air purifiers, as antiviral medicine and as air pollutants filter.	AR2
Yes	Availability of urban green areas is adequate if current standards and guidelines are adhered to by all relevant parties. What is important is our ability to assess changes in the landscape structure of urban green areas spatially while understanding its relationship with the development of areas provided and develop a comprehensive classification of urban green areas in the long run while improving and assisting planning and management of urban green areas as sustainable to obtain a quality of life and a healthy and comfortable environment.	TP1
Yes	There's limitation of visitors to enter park.	TP2
Yes and no	The increase number to urban green space indicates a relevant and urgent need in facing and recovering from a pandemic crisis. However, to reduce the spread of pandemic, the community needs to practice hygiene and personal care practices at all times in the open spaces. However, some green areas are quite far from the population concentration areas. To promote a healthier lifestyle and raise awareness for healthcare, the availability of green areas in the city that are more accessible within walking distance is essential. The provision of facilities for the convenience of users also needs to be enhanced.	LA3

4.5 CONCLUSION

This chapter presents overall of the results and data analysis of questionnaire surveys and semi-structured interviews conducted. The results and analysis of questionnaire surveys and semi-structured interviews conducted are used to be interpreted in the next chapter.

CHAPTER FIVE

INTERPRETATION AND CONCLUSION

5.1 INTRODUCTION

This chapter synthesizes the research findings from Chapters 2, 3, and 4 of this thesis. The focus of this chapter is to interpret and discuss the analysis of Chapter 4 of this thesis. This chapter begins by interpreting and discussing the current condition of urban green space in Malaysia and its role in reducing the pandemic spread. The following section discusses the key findings of the roles of urban green space for sustainable environmental health in relation to pandemics crises. The discussion on the factors influencing the roles of urban green space for sustainable environmental health during pandemic crises. Moreover, the formation of the framework of urban green space for sustainable environmental health in relation to pandemic crises for future usage and Islamic perspective on the framework and recommendation for future study is discuss in this chapter.

5.2 KEY FINDINGS OF THE ROLES OF URBAN GREEN SPACE FOR SUSTAINABLE ENVIRONMENTAL HEALTH CONCERNING PANDEMICS CRISES

The interpretation and discussion of this section are undertaken to reflect on how the respondent responds to the roles of urban green space for sustainable environmental health during pandemic crises as the research aim. The finding is advocating objectives one and two which are to evaluate the roles of the urban green space to reduce pandemics spread for a healthy environment and to investigate the contribution of the urban green space in relation to pandemics crises.

The research indicates that there are two key findings which are social factors and environmental factors. Below is the detail about the key findings of social factors and environmental factors.

5.2.1 Social Factors

For the social factors the finding explains that the community need and demand on urban green spaces in determine the roles and contribution of urban green spaces during pandemic. For example, community need space for recreational activities in order to improve physical and mental health. Thus, the finding reveals that the significance of

urban green space roles in which cater the need of community during pandemic by providing the space as to improve health through reducing stress and provide place for exercise.

For the social factors the research revealed that the roles and contribution of urban green spaces for sustainable environmental health such as:

a) The roles of urban green spaces for sustainable environmental health

There are four roles of urban green space for sustainable environmental health. There are:

i) Urban green space improves functioning of the immune system.

The interaction with nature such as green space helps to boost immune system and lower the risk of diseases such as allergy, cancer and asthma spread.

ii) Urban green space improves social capital and cohesion.

The findings reveal that social connections between people in urban green space are recognized to improve health and well-being. Social isolation during pandemic lockdown is a predictor of disease and mortality during pandemic as discussed in Chapter 2 Section 2.9.2. During the pandemic, green space able to enhance social connections and develop a sense of community in which significance to social cohesion and human health. Urban green spaces also help community to balance their physical and emotional health during pandemic.

iii) Urban green space reduces mortality and increased life span

The findings revealed that urban green space provide space for community to perform physical health by doing recreational activities through interactions with nature that provide clean and fresh air in which improve community health. The research discovered that urban green space also improves community mental health by lowering the stress level during pandemic and offered more community access to green space.

iv) Urban green space adverse health effect

The research discovered that the greater availability and enhanced use of green space may also be associated with exposure to health hazards. The usage of urban green space also gives positive health effect such as improve mental and physical health during pandemic crises.

b) The contribution of urban green spaces for sustainable environmental health

There are two contributions urban green spaces for sustainable environmental health. There are:

i) Urban green space improves community's mental and stress reduction

The research discovered that spending time urban green space can help people avoid feeling alone, reduce mental stress, enhance sleep quality, and so reduce the risk of depression and anxiety, as well as enhance people's resilience and capacity to manage everyday responsibilities during pandemic through the elements of urban green space such as vegetation, water and recreational facilities. The findings revealed that urban green space provides peaceful place that offer quiet, spaciousness, wildness, culture, and a lush environment in which help to minimise the risk of mental illness during pandemic.

ii) Urban green space improves community's physical health lifestyle

The findings revealed that urban green space provide place for community to practice healthy lifestyle by doing physical exercise with facilities provided and give opportunity for community to do outdoor activities at the same time encourage social interaction between people and nature. The research findings discovered that urban green space defense against infection is a quick and well-coordinated immune system response along with good physical condition.

5.2.2 Environmental Factors

For the environmental factors the research revealed that the roles and contribution of urban green spaces for sustainable environmental health such as:

a) The roles of urban green spaces for sustainable environmental health

There are three roles of urban green space for sustainable environmental health. There are:

i) Urban green space beautifies and make healthier environment

The findings discovered that urban green space increase the aesthetic value of the city and make healthier environment during pandemic. The research indicates that green space helps to boost mental health and increase community to perform physical activities in crowded neighbourhoods and stressful urban environments as mentioned by Tian and Well (2012). Large trees are good filters for pollutants and fine particles

found in metropolitan areas. They absorb polluting gases (such carbon monoxide and nitrogen oxides) and filter fine particles like dust, dirt, and smoke from the air by trapping them on leaves and bark. In urban green spaces, water features like fountains can serve to create a natural ambiance. It is inspired by the sound and aesthetics of water. Being in close proximity to water can help people to relax. The sound of water and nature has a calming effect and can aid in psychological Urban green space ensures the balance of community life and the need for a healthy lifestyle through improving mental and physical health as well as creating a harmonious community.

ii) Urban green space promoting biodiversity

The findings revealed that urban green space is a place for human and also wildlife. Community use urban green space as to improve mental and physical health. While wildlife use nature to live and grow. For example, trees in the urban green space used by birds to create their own nest as place to live and grow in which give habitat to the animals and promote biodiversity and create healthier environment. The sound of chirping birds and fresh air can prevent from stressful environment during pandemic. Research also discovered that the conservation of green space such as forest may prevent the pandemics crises. The forest destruction may bring wildlife which are reservoirs for pathogens like the novel coronavirus into closer proximity with each other and humans.

iii) Urban green space creates valuable usable space for community

The findings indicates that urban green space provide the recreational facilities for community to improve mental and physical health during pandemic crises. Urban green spaces have big attention due to their significant attribute in providing places for healthy outdoor recreation during pandemic as discussed by Rice and Pan (2020), Chapter 2 Section 2.9.7.

b) The contribution of urban green spaces for sustainable environmental health

There is one contribution of urban green spaces for sustainable environmental health. There is:

i) Urban green space reduces the virus transmission

The research discovered that urban green space could reduce the virus spread because urban green spaces provide open-air spaces where the virus is not in static conditions. The area cannot spread the virus compared to enclosed spaces which reduces the virus

transmission. Open-air areas for people to enjoy activities are better than enclosed indoor areas. The chances of transmitting the virus are lower in an open space than in an indoor area. The more open and widespread air movement and ventilation in green areas as too low virus concentration are also among the factors that can reduce the spread of the pandemic.

Moreover, for the environmental factors, the finding describes the roles and contributions of the element of urban green space, such as vegetation, water element and recreational facilities of the urban green space criteria during the pandemic required by the community. For instance, vegetation helps to reduce the temperature and help to filter the air; the sound of water features helps the community feel calm and relaxed while reducing stress and improving mental health. The facilities in urban green spaces help reduce the risk of infection transmission as the current pandemic is airborne due to green spaces wider and providing open air to outdoor community activities with nature.

The interpretation shows that the understanding of urban green space discovered that the definition of urban green space is land covered by vegetation that allows recreational activities for community health, highlighting those social aspects for activities and environmental for land such as a park. The research revealed that the urban green space visitation among the community due to stress during the pandemic quarantine, and they need to exercise to improve their mental and physical health by doing recreational activities through interactions with nature that provide clean and fresh air in urban green spaces as well as nearest to the house during the pandemic in which this also emphasises social and environmental factor that need to be considered during pandemic crises.

Moreover, the roles of urban green space were discovered through three elements: vegetation, water element and facilities, and social and environmental factors. For instance, vegetation creates a conducive environment during the pandemic as green plantings provide fresh air; green plantings promote biodiversity. Thus, the water element in urban green spaces gives positive vibes during the pandemic through the sound of water that helps the community feel calm and relaxed while simultaneously reducing stress and improving mental health. Facilities in urban green spaces provide spaces for activities to improve mental and physical health and reduce the risk of

infection transmission as the current pandemic is airborne due to green spaces wider and providing open air to the community to do outdoor activities with nature.

The research also revealed that the good criteria of urban green space must be comfortable, safe and secure; provide a space for many human recreational activities and have equal accessibility, which describes environmental factors. Furthermore, the research revealed that urban green spaces are lowering the chances of virus transmission between communities because they provide open-air ventilation to do activities as compared to indoor areas, which are more enclosed and emphasize that policymakers, planners, and built environment experts also need to create more sustainable communities in the future by planning infrastructure and design incorporating health demands. The design of urban green space, for example, the hardscape element such as seating, playground, and walkway, should be within the proper distance to standard operating procedures (SOPs) to suit the pandemic condition. The current facilities of urban green space are created to be shared among its users. The hardscape and softscape are co-existed elements to balance and improve the green environment. Thus, these facilities are considered high touch point facilities and have a high potential to spread diseases.

These interpretations and discussions lead to forming the urban green space framework for sustainable environmental health concerning pandemic crises, which advocates research objective three, proposing the urban green space framework for sustainable environmental health about the pandemic crises. There is to propose the urban green space framework for sustainable environmental health concerning pandemic crises.

5.3 URBAN GREEN SPACES AS AN INDICATOR FOR SUSTAINABLE ENVIRONMENTAL HEALTH

The research findings reveal seven indicators that influence the roles of urban green spaces sustainable environmental health. There are:

i. Demographic Factors (gender, age and educational background);

ii. Knowledge and understanding of urban green spaces;

iii. Urban green space visitation;

iv. Activities in urban green space during a pandemic;

v. The effectiveness of urban green spaces elements;

vi. Urban green space for mental health treatment;

vii. Urban green space for physical health lifestyles;

The findings revealed that the respondents' demographic in particular, gender, age, educational level and occupation were the indicators that directly influenced community's understanding of the roles of urban green space. On the other part the knowledge and understanding of urban green space, urban green space visitation among community, activities in urban green space during a pandemic and the effectiveness of urban green spaces elements also contribute to expose the roles of urban green space during pandemic crises.

Moreover, the findings revealed that the community began to realize the critical role of urban green spaces as treatment for community's mental health and for physical health lifestyle during the pandemic. Urban green spaces provide a place for recreational activities and provide fresh air.

5.3.1 Demographic Factor Affected the Usage of Urban Green Space

Demographic factors affected the usage of urban green space is divided into three elements which are gender, age, and educational background.

a) Gender

The research revealed that gender influenced respondents' visits to urban green spaces. The research revealed that males visit urban green spaces to improve physical health through exercising such as jogging, cycling, and playing sports using recreational facilities provided in the urban green space. Moreover, the research revealed that females visit urban green spaces to improve mental health through activities such as gathering and having fresh air. The findings also indicate that males go to urban green spaces as they desire to perform exercise due to long-term quarantine during the pandemic lockdown. The findings show that most females visit urban green spaces due to stress post-quarantine during the pandemic lockdown. Moreover, the survey indicated that females mostly feel relaxed, refreshed, and happy visiting urban green

spaces, while males feel comfortable and enjoy performing activities in urban green spaces.

b) Age

The research revealed that most people aged between 25 to 54 years old are users of urban green space during the pandemic. People range between 25 to 54 years old is the age of adult. Adults are divided into early, middle, and late adulthood. Adult is the age in which seeking to improve their healthy lifestyles through interaction with the natural environment in the urban green space. The research revealed that adults mostly visit the urban green space 1-2 times and 2-3 times a week, highlighting the significance of urban green space during the pandemic. The research revealed a significant relationship between respondents' age and urban green space usage. The aged 25 to 54 are visiting urban green spaces to improve their mental and physical health during the pandemic. Based on the findings, they believed that vegetation provides fresh air and outdoor space, such as urban green space providing wide and open ventilation, which reduces virus transmission as the roles of urban green space during the pandemic.

c) Educational background

The research revealed that people's education background with STPM and above have a high tendency to use urban green space to improve their mental and physical health during the pandemic. It indicates that people with knowledge commonly use urban green space because they know the roles and benefits of urban green space in improving physical and mental health. The findings show that most respondents who have attended tertiary education and learned at an institutional level were degree holders, master's degree holders, STPM and Diploma holders and PhD holders. The research revealed significant relationships between respondents' educational background and understanding of urban green spaces. Thus, educational background influenced the respondent's understanding of urban green space. The higher the educational background, the higher the understanding of urban green space, especially regarding the roles and contribution of urban green space during the pandemic.

5.3.2 Knowledge and Understanding on Urban Green Spaces

The findings indicate that communities with adequate knowledge would enhance their awareness of the roles and contributions of urban green spaces during a pandemic. A well-prepared community is resilient to any incoming pandemic crisis. As discussed in

Chapter 2, Section 2.2, resilience is the ability to resist stress, survive, adapt, get over the crisis, and move on with the post-pandemic crisis life. Therefore, these findings established a direction for respondents to improve community health in the urban area, especially in communities living near urban green spaces during pandemic crises.

The findings indicated that urban green space is essential for mental and physical health during pandemic crises. Urban green spaces can improve individual and community moods, and exposure to the natural environment can help people cope with the stresses of city life. It also revealed that spending time in nature and exposure to fresh air and greenery reduces stress and improves mental and physical health, as highlighted in Chapter 5 (Section 5.2.2).

5.3.3 Urban Green Space Visitation

Urban green space visitation affected the usage of urban green space is divided into three elements: travel distance to urban green space, frequency and preferable period to visit urban green space, and reason for urban green space and the feeling when visiting urban green space.

a) Travel distance to urban green space

Factors such as travel distance from home to urban green space influenced respondents' usage of urban green space. The travel distance between 0-1km encourages people to visit urban green spaces during the pandemic. The research revealed that a distance of 0-1km is the preferable distance among the community to travel to the urban green space during the pandemic to reduce the risk of pandemic infection. The research also revealed that the travel distance from home to urban green space, which is more than 4km is the non-preferable distance among the community during the pandemic.

b) Frequency and preferable period to visit urban green space

The research revealed that people visit 1-2 times a week to urban green space during the pandemic, emphasizing the role of urban green space as a recreational place to improve mental and physical health. During the pandemic, people prefer to visit the urban green space in the evening and the morning. The research revealed that people prefer visiting the urban green space with family and friends.

c) Reason to urban green space and the feeling when visit to urban green space

The findings indicate that a higher percentage of respondents' reason for visiting urban green spaces is to exercise, attracted by the beauty of garden and nearest to the house during the pandemic. Both reason and feeling are connected in determining the roles of urban green space in which stress and exercise indicate that urban green space is a place for the community to do activities such as cycling, jogging and picnic as they recover from the pressure of life. Thus, respondents' feelings, such as relaxed and refreshed, comfortable, enjoyable and happy, also highlighted that urban green space is a medium for the community to improve their health and well-being during pandemic crises, as highlighted in Chapter 5, Section 5.2.2.

5.3.4 Activities in Urban Green Space during Pandemic

The findings indicate that there is a clear connection between community and activities in urban green spaces to portray the roles of urban green space during pandemic. The finding revealed that having fresh air, enjoy the scenery/sightseeing and exercising are among the preferable activities among community. It indicates that the respondent using urban green space as place to improve their health due to they go to green space as to get fresh air and perform exercise as to improve their physical health during pandemic.

On the other hand, findings revealed that urban green spaces a place that for people to participate in physical activities and helps in promoting healthy lifestyle through facilities. Recreational activities such as cycling jogging, picnic, Tai Chi, Zumba and sport in which importance to community for practicing healthy lifestyle at the same time improve physical health as elaborated by Faber et al., 2014; Torani et al., 2019.

5.3.5 Effectiveness of Urban Green Space Elements

The research discovered there are three elements of urban green space are effective during pandemic. They are vegetation; water elements and recreational facilities. The further elaboration is described in the next section.

a) Effectiveness of vegetation in urban green spaces

Elements such as vegetation in urban green space during pandemic are a key factor for evaluation of factors influencing the roles of urban green space as an indicator for the sustainable environmental health in relation to pandemics crises. In terms of the roles

of urban green space during pandemic, the findings indicate that the importance of vegetation to filter the air and provide fresh air. The vegetation also promotes biodiversity as well as reduce virus transmission during pandemic.

The findings revealed the vegetation in urban green space act as nature- treat therapy and contribute more oxygen and give more breathed able area especially in the compact & busy environment. The findings also revealed that vegetation such as tree, shrubs and grass planted in urban green space used by community in cities for recreational activity and gathering together become as a medium to improve quality of life in urban areas. Furthermore, it revealed that the human interaction with vegetation at the same time helps to release stress with fresh air provided in the urban area during pandemic.

b) Effectiveness of water elements in urban green spaces

The research revealed that water elements in the urban green space help to improve community health through three of human sensory such as touching, sighting and hearing. For the sensory of touching the research discovered that water elements make people feel enjoy and happy through the interaction with nature. For sighting, people feel relax and calm towards the appearance of water which is cold and clear. The sound of water element helps to release stress during pandemic crises. The findings revealed that people need areas for relaxation from daily work routine and release stress levels in peaceful place such as urban green space due to the element such as water features provide the sound able to make people feel relax and calm directly boost mental health during pandemic crises.

c) Effectiveness of recreational facilities in urban green spaces

The findings indicates that the importance of recreational facilities in which a good place for people to participate in physical activities and helps in promoting healthy lifestyle. The findings revealed that facilities such as outdoor gym, jogging track, and bicycle lane provide spaces for activities to improve mental and physical health, create valuable usable space for people and act as spaces to release stress.

Recreational facilities also attract people to go outdoors and interact to create social relationships during pandemic. Recreational facilities in urban green space also give urban community to practice recreation and physical exercise in the real environment more freely, and with less cost, a better option than gyms and exercise

centres. The importance of green areas in the city center offers recreational spaces and recreational activities such as playing badminton, football and so on as well as can improve physical health.

5.3.6 Urban Green Space for Mental Health Treatment

Urban green space able to reduce stress through the joyful environment together with fresh air provided by green space to community do activities such as cycling and jogging. Moreover, the research revealed that urban green spaces able to reduce stress due to the green environment and the sound of animal such as bird or the sound water feature can make people feel relax and calm directly boost mental health. The importance of urban green space on mental health emphasized the role of urban green space during pandemic.

The findings revealed that urban green spaces help to improve mental health through stress reduction by the peacefulness or calmness offered by greeneries such as tree. It helps to boost the mood and motivation of the community in the cities.

5.3.7 Urban Green Space for Physical Health Lifestyle

The research revealed that urban green space provide place for community to practice healthy lifestyle by doing physical exercise with facilities provided. Urban green spaces also give opportunity for community to do outdoor activities at the same time encourage social interaction between people and nature. Urban green spaces provide space for community to do various recreational activities such as exercising and having fresh air.

5.4 THE FRAMEWORK OF URBAN GREEN SPACE FOR SUSTAINABLE ENVIRONMENTAL HEALTH

This proposed framework is an integrated approach that reflects the integrated supporting links between local authorities, agencies and the community. This framework aims to prepare the community for usage of urban green space among community in the urban area. The framework was bound to strategies, design and prepare usage at the community level with consideration of multi-level stakeholders' participation. The framework emerged systematic methodology to minimise pandemic spread impact to communities for urban green space usage. The framework is presented in Figure 5.1.

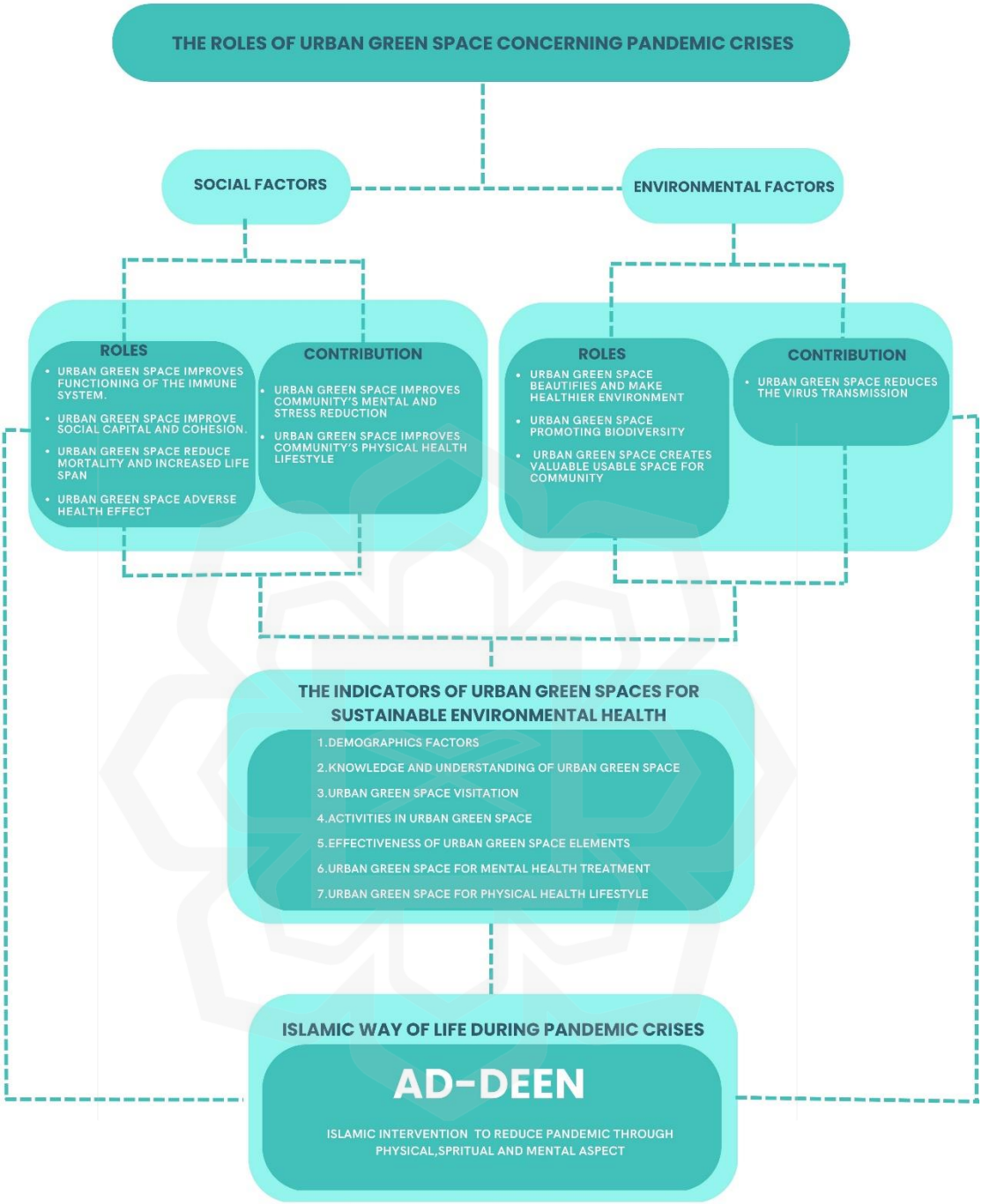

Figure 5.1 The Framework of Urban Green Space during Pandemic Crises

The framework indicates the roles of urban green space during pandemic such as improved functioning of immune system; improved social capital and cohesion; reduced mortality and increased life span; potential adverse health effect; beautifying and make healthier environment; promoting biodiversity an creating valuable usable space for people. The framework also highlights the contribution of urban green space during pandemic such as benefit on mental health and stress reduction; benefits on physical health and benefit for reducing the risk of disease transmission.

The framework also emphasises on the factor of urban green space as a sustainable environmental health in which consist of seven indicators such as demographic, knowledge and understanding; urban green space visitation; activities in urban green space, effectiveness of urban green space elements; urban green space for mental health treatment and urban green space for physical health lifestyles. The Figure 5.2 below shows The Concept of Ad-Deen in the framework which is Islamic Perspective through physical well-being, mental well-being and spiritual well-being in reducing pandemic spread.

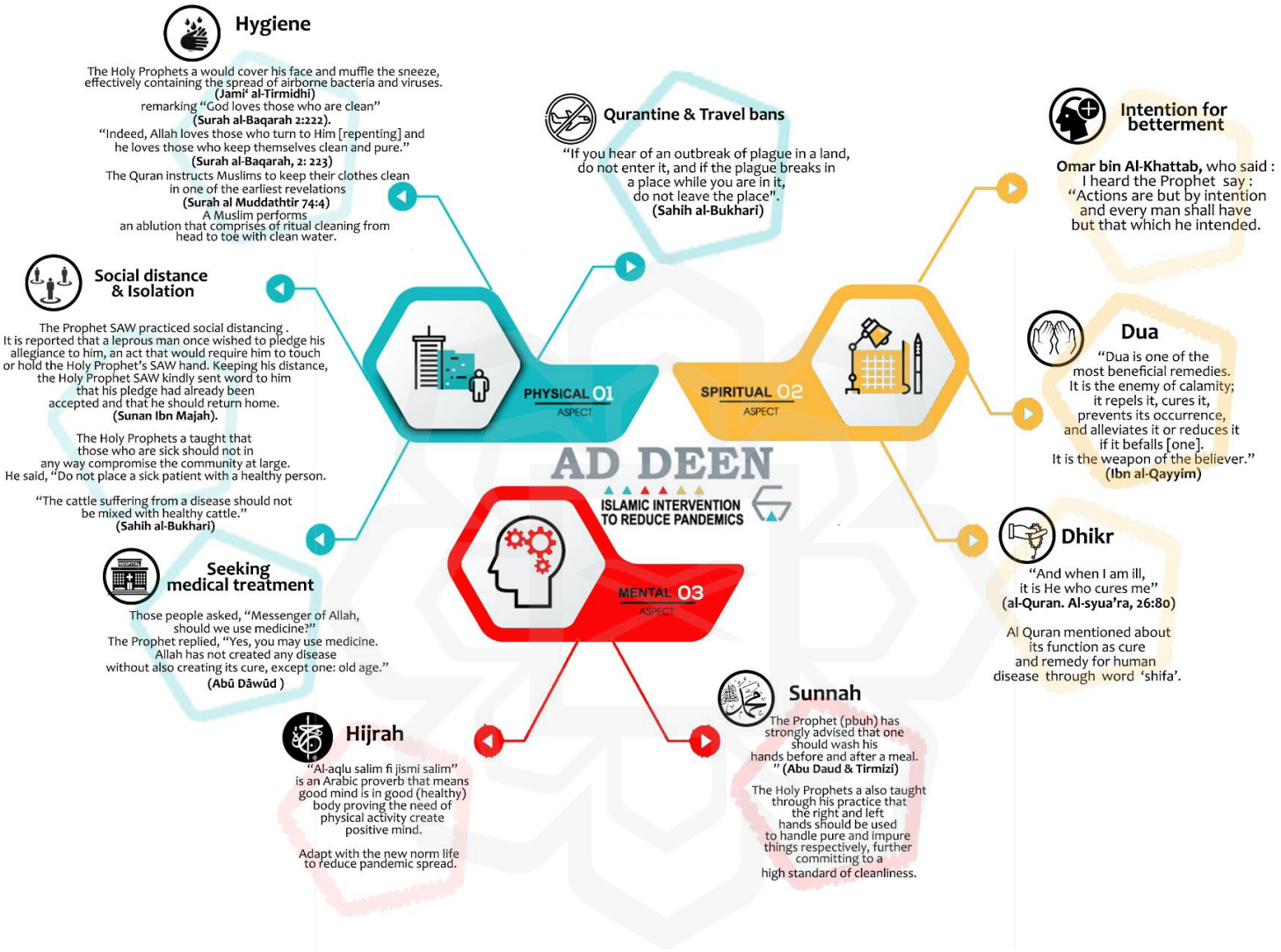

Figure 5.2 The Concept of Ad-Deen, Islamic Perspective through physical well-being, mental well-being and spiritual well-being in reducing pandemic spread

Figure 5.2 above is the details of The Concept of Ad-Deen in Reducing Pandemic Crises. The concept of Ad-Deen which brings the meaning of complete way of life in reducing pandemic crises is produced after three stages in the framework. The Ad-Deen concept that highlights three aspects which are physical well-being, mental well-being and spiritual well-being, in reducing pandemic spread, will become the fundamental framework of the function and role of urban green space in reducing the pandemics crises.

5.5 FURTHER RESEARCH

The future research could focus on the roles of urban green space during pandemic on specific categories of people. Future researches could focus on in-depth subjects the roles of urban green space by considering the people with disabilities (PWD) and children during pandemic as to reduce pandemic spread of urban green space as sustainable environmental health. The specific focus will able to provide a detail guideline on the roles and contributions of urban green spaces.

5.6 CONCLUSION

The research emphasizes on the roles of urban green space as an indicator for the sustainable environmental health in relation to pandemics crises. The research consists of five distinct chapters and each chapter had a specific focus and objective. The research aim is to investigate the roles of urban green space as an indicator for the sustainable environmental health in relation to pandemics crises.

The research on the understanding of urban green space, pandemic crises and sustainable environmental health and the Islamic perspective on urban green space in reducing pandemic as to meet the research objective in which to evaluate the roles of the urban green space to reduce pandemics spread for a healthy environment and to investigate the contribution of the urban green space in relation to pandemics crises.

The research employs qualitative and quantitative methods in eliciting the data which consists of questionnaire surveys and semi-structured interviews. For questionnaire surveys, there is 421 number of respondents. The selection of respondents is random sampling to ensure equal probability chances are given to everyone to be selected through an online questionnaire survey. For semi structured interview a total

of 17 participants were involved in the semi-structured interview and grouped according to their profession towards the roles of urban green space and pandemic crises.

The evaluation of this research's findings has concentrated on the analytical and theoretical issues raised by the research. The underlying the whole discussion is about the role and contribution of urban green space for sustainable environmental health in Malaysia. The roles of urban green space were influenced by two key findings which are social factors and environmental factors. For the social factors the finding explains that the community need and demand on urban green spaces in determine the roles and contribution of urban green spaces during pandemic. For the environmental factors the finding describes the roles and contribution of the element of urban green space such as vegetation, water element and facilities of the urban green space criteria during pandemic that required by community. The roles and contribution of urban green space as an indicator for the sustainable environmental health in relation to pandemics crises is determined by community's characteristics which include education level, age factors, genders, knowledge and understanding on urban green spaces, reason and feeling when visit to urban green spaces during pandemic, activities in urban green space during pandemic, effectiveness of elements such as vegetation, water element and facilities in urban green space during pandemic.

Urban green space is a significant component of urban quality of life during pandemics such as Covid-19. Furthermore, the proved that the benefits of urban green space under pandemics are divided into two categories which are physiological benefits (social factor) and environmental benefits (environmental factor) such as improved mental health and stress reduction, improved physical health and reducing the risk of disease transmission and increasing social cohesion.Urban green space as an indicator for sustainable environmental health in relation to pandemic crises as roles able to improve the functioning of the immune system, enhanced social capital and cohesion, reduced mortality and increased life span, potential adverse health effects, beautifying and making a healthier environment, promoting biodiversity and creating valuable usable space for people.

The research discovered seven indicators that influence the roles of urban green spaces as an indicator for sustainable environmental health which are demographic factors (gender, age and educational background); knowledge and understanding of

urban green spaces; urban green space visitation; activities in urban green space during a pandemic; the effectiveness of urban green spaces elements; urban green space for mental health treatment and urban green space for physical health lifestyles. Creating a healthy urban environment that incorporates nature-based solutions help cities become more resilient to the problems of the twenty-first century. The formation of the framework of urban green space for sustainable environmental health in relation to pandemic crises become as the overall findings of the research that indicate the roles of urban green space for sustainable environmental health.

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APPENDIX I: The Sample of Questionnaire Survey's Question

Name: Ali Saifuddin bin Nor Azhar Matric No: G201287 Contact No:014-5055937

Dear Respondents / *Responden yang dihormati*

I am student of Doctor of Philosophy in Built Environment**,** International Islamic University Malaysia, Gombak Selangor conducting a research about "Urban Green Space for Sustainable Environmental Health In Relation to Pandemic Crises". The purpose of this survey is to get public opinion and feedback through the question listed below. All data given will be private and confidential. Thank you. *Saya adalah pelajar Doktor Falsafah dalam Alam Bina, Universiti Islam Antarabangsa Malaysia, Gombak Selangor menjalankan penyelidikan tentang " Kawasan Hijau Bandar sebagai Penunjuk Kesihatan Persekitaran Mampan Berkaitan dengan Krisis Pandemik". Tujuan tinjauan ini adalah untuk mendapatkan pendapat dan maklum balas orang ramai melalui soalan yang disenaraikan di bawah. Semua data yang diberikan adalah peribadi dan sulit. Terima kasih.*

Please tick [√] in the box provided to answer the questions. You may tick more than one for each question.
Sila tandakan [√] pada petak yang disediakan untuk menjawab soalan. Anda boleh menanda lebih daripada satu untuk setiap soalan.

Section A: Demographic information *Bahagian A: Maklumat demografi*
This section is to identify the characteristics of respondent.
Bahagian ini bertujuan untuk mengenal pasti ciri-ciri responden.

1. Gender (*Jantina)*
☐ Male (*Lelaki)*
☐ Female (*Perempuan)*

2. Age *(Umur)*
☐ Under 14 years *(Bawah 14 tahun)*
☐ 15-24 years *(tahun)*
☐ 25-54 years *(tahun)*
☐ 55-64 years *(tahun)*
☐ Above 65 years *(Atas 65tahun)*

3. Race *(Bangsa)*
☐ Malay (*Melayu)*
☐ Chinese (*Cina)*
☐ Indian *(India)*
☐ Others *(Lain-lain)*: _____

4. Religion *(Agama)*
☐ Islam *(Islam)*
☐ Christian *(Kristian)*
☐ Buddhism *(Buddha)*
☐ Hinduism *(Hindu)*
☐ Others, please specify (*Lain-lain,nyatakan)*:_____

5.Marital status (*Status perkahwinan)*
☐ Single *(Bujang)*
☐ Married *(Berkahwinan)*
☐ Divorcee *(Becerai)*

6. Education level *(Tahap pendidikan)*
☐ Spm
☐ STPM/Diploma
☐ Degree (*Ijazah)*
☐ Master (*Sarjana)*
☐ PhD
☐ Others *(Lain-lain)*: _____

7. Occupation (*Pekerjaan*)
☐ Unemployed *(Tidak bekerja)*
☐ Government worker *(Penjawat Awam)*
☐ Private sector *(Pekerja Swasta)*
☐ Self-employed (*Bekerja sendiri*)
☐ Housewife *(Suri rumah)*
☐ Other, please specify *Lain-lain nyatakan:* _____

8. Monthly income *(Pendapatan bulanan)*
☐ *< RM 1 500*
☐ *RM1501-RM3000*
☐ *RM3001-RM5000*
☐ *>RM 5000*
☐ No fixed income *(Tiada pendapatan tetap)*

9. Travel distance to green space
Jarak penjalanan ke kawasan hijau
☐ 0-1km
☐ 2-3km
☐ 4-5km
☐ Above 6km please state *(Atas 6km) nyatakan:*_____

10.Mode of transportation to green space
(*Cara pengangkutan ke kawasan hijau)*

☐ Public transport *Pengangkutan awam*
☐ Bus*(Bas)* ☐ Taxi*(Teksi)* ☐ *LRT*

☐ Personal transport *Pengangkutan peribadi*
☐ Car(*Kereta)* ☐ Motorcycle *Motosikal* ☐ Bicycle *Basikal*

☐ Others, please state (*Lain-lain, nyatakan)*:_____

Section B: Urban green space *Bahagian B: Kawasan Hijau Bandar*

This section is to understand the understanding of the respondent towards the urban green areas. In addition, this section also examines the respondent 's usage of urban green areas. The questions are to understand the respondent's movement towards urban green areas based on their common sense and basic knowledge *(Seksyen ini adalah untuk mengambiltahu pemahaman responden terhadap kawasan hijau bandar. Selain itu, seksyen ini juga mengkaji penggunaan responden terhadap kawasan hijau bandar.Soalan- soalan ini adalah untuk memahami pergerakan masyarakat terhadap kawasan hijau bandar berdasarkan akal fikiran dan pengetahuan asas mereka.)*

Urban Green Space Understanding
Pemahaman Kawasan Hijau Bandar

11. In your opinion, what is urban green space?
Pada pendapat anda, apakah kawasan hijau bandar?

- ☐ All urban land covered by vegetation of any kind (*Semua tanah bandar dilitupi oleh pelbagai jenis tumbuh-tumbuhan)*
- ☐ Open-space areas reserved for parks and other "green spaces" *(Kawasan lapang yang dikhaskan untuk taman dan "ruang hijau" lain*)
- ☐ Spaces that allow for promoting activities *(Ruang yang membolehkan aktiviti)*
- ☐ Others, please state: *(Lain-lain, nyatakan:)*

_____
_____

12. Types of urban green space? You may tick more than one answer. *Jenis-jenis kawasan hijau bandar? Anda boleh menanda lebih daripada satu jawapan.*

- ☐ Park (*Taman)*
- ☐ Garden *(Kebun taman*)
- ☐ Street planting *(Tanaman jalanan)*
- ☐ Forest and woodland *(Hutan)*
- ☐ Grassland *(Padang rumput)*
- ☐ Pocket space (*Ruang poket)*

13. What characteristic influence the urban green space? *Apakah ciri yang mempengaruhi kawasan hijau bandar?*

- ☐ Size (*Saiz)*
- ☐ Location *(Lokasi)*
- ☐ Topography (*Topografi)*
- ☐ Function (*Fungsi)*
- ☐ Facilities *(Fasiliti-fasiliti)*
- ☐ Activities *(Aktiviti-aktiviti)*
- ☐ Others; please state:
  *(Lain-lain, nyatakan:)*_____

14. Please rank from 1 to 6, which element that you like the most about the urban green space? *Sila susun mengikut susunan dari 1-6, elemen kawasan hijau bandar yang manakah yang anda suka?1-6*

- ☐ Vegetation (*Tanaman)*
- ☐ Water features *(Elemen air)*
- ☐ Jogging track *(Trek berlari)*
- ☐ Seating area/bench *(Ruang duduk)*
- ☐ Convenient resting areas *(Ruang berehat)*
- ☐ Bicycle lane *(Lorong berbasikal)*
- ☐ Others; please state
  Lain-lain, nyatakan : _____

15. From 1 to 6, please rank a good criteria of urban green based on your opinion. 1-very good,6-good.*Dari 1 hingga 6, sila susun kriteria yang baik bagi kawasan hijau bandar berdasarkan pendapat anda.1-Sangat baik,6-baik.*

- ☐ Good accessibility and linkages
  Kebolehcapaian dan hubungan yang baik
- ☐ Provide a space for many human activities
  Menyediakan ruang untuk banyak aktiviti manusia
- ☐ Comfortable *Selesa*
- ☐ Safe and secure *Selamat dan terkawal*
- ☐ Variety of facilities *Pelbagai kemudahan*
- ☐ Habitat for flora and fauna *Habitat flora dan fauna*

Usage of Urban green space *Penggunaan kawasan hijau bandar*

16. How frequent do you visited the urban green space?
Berapa kerapkah anda melawati kawasan hijau bandar?

- ☐ 1-2 times a week *(1-2 kali seminggu)*
- ☐ 2-3times a week *(2 -3 kali seminggu)*
- ☐ Every day/Daily *(Setiap hari)*

17. When do you prefer to visit the urban green space? *Waktu manakah yang anda selalu lawati kawasan hijau bandar?*

- ☐ Morning (*Pagi)*
- ☐ Afternoon *(Tengahari)*
- ☐ Evening *(Petang)*
- ☐ Night*(Malam*)

18. Who do you come with to urban green space?
Dengan siapa anda pergi ke kawasan hijau bandar?

- ☐ Friend (*Kawan)*
- ☐ Family (*Keluarga)*
- ☐ Other,please state*Lain-lain, nyatakan):*_____

19. The reason visiting the urban green space? Please circle your answer. *Apa sebab anda melawati kawasan hijau bandar.Bulatkan jawapan anda.*

Reason/Answer Sebab/Jawapan	Never *Tidak pernah*	Rarely *Jarang*	Sometimes *Kadang-kadang*	Often *Selalu*	Always *Sentiasa*
Stress (*Tekanan)*	1	2	3	4	5
Easy access (*Akses mudah)*	1	2	3	4	5
Attracted with facilities (*Tertarik dengan kemudahan*)	1	2	3	4	5
Free to find greenery areas (*Berkelapangan untuk ke kawasan hijau)*	1	2	3	4	5
Invited by friends (*Dijemput rakan)*	1	2	3	4	5
Attracted by the beauty of garden *(Tertarik dengan kecantikan hijau)*	1	2	3	4	5
Exercise (*Senaman)*	1	2	3	4	5
Nearest to the house (*Berhampiran dengan rumah)*	1	2	3	4	5

20.How do you feel when visiting urban green space?*Bagaimanakah perasaan anda semasa melawati kawasan hijau bandar?*

Feeling/Answer Perasaan/Jawapan	Never Tidak pernah	Rarely Jarang	Sometimes Kadang-kadang	Often Selalu	Always Sentiasa
Warm and uncomfortable (Panas & tidak selesa)	1	2	3	4	5
Unsafe (Tidak selamat)	1	2	3	4	5
Bored (Bosan)	1	2	3	4	5
Crowded and messy (Sempit dan tidak teratur)	1	2	3	4	5
Relaxed and refreshed (Nyaman dan tenang)	1	2	3	4	5
Comfortable (Selesa)	1	2	3	4	5
Enjoyable and happy (Gembira dan seronok)	1	2	3	4	5
Enjoyable and happy (Gembira dan seronok)	1	2	3	4	5

21. Which activities did you usually do when visiting the urban green space? You need to circle the answer. *Aktiviti yang manakah yang sering anda lakukan semasa melawati kawasan hijau bandar? Bulatkan jawapan anda.*

Activities/Opinion **Aktiviti //Pandangan**	Never Tidak pernah	Rarely Jarang	Sometimes Kadang-kadang	Often Selalu	Always Sentiasa
Having fresh air *Mendapatkan udara segar*	1	2	3	4	5
Gathering with Family and Friend *Berkumpul dengan kawan dan keluarga*	1	2	3	4	5
Cycling/Jogging *Berbasikal/berlari*	1	2	3	4	5
Enjoy the scenery/Sightseeing *Menikmati pemandangan/bersiar-siar*	1	2	3	4	5
Seeking for peace *Mencari ketenangan*	1	2	3	4	5
Exercising *Senaman/Riadah*	1	2	3	4	5
Accompany others *Menemani kenalan*	1	2	3	4	5
Meeting point *Berkumpul*	1	2	3	4	5

Section C: Function of Urban Green Spaces **Bahagian C: Fungsi Kawasan Hijau Bandar**

This section is to understand the understanding of the respondent towards the function of urban green areas. The questions are to understand the respondent 's movement towards urban green areas based on their common sense and basic knowledge *(Seksyen ini adalah untuk mengambil tahu pemahaman responden dalam kawasan kajian terhadap fungsi dan elemen kawasan hijau bandar. Soalan- soalan ini adalah untuk memahami pergerakan masyarakat terhadap kawasan hijau bandar berdasarkan akal fikiran dan pengetahuan asas mereka.)*

22. The function of urban green space? You need to circle the answer. *Fungsi Kawasan Hijau Bandar? Bulatkan jawapan anda.*

Function of Urban Green Spaces /Opinion ***Fungsi Kawasan Hijau Bandar/Pendapat***	**Strongly Disagree** ***Sangat tidak setuju***	**Disagree** ***Tidak setuju***	***Neutral***	**Agree** ***Setuju***	**Strongly Agree** ***Sangat setuju***
Flora and Fauna habitat *Habitat flora dan fauna*	1	2	3	4	5
Aesthetical value *Nilai estetika*	1	2	3	4	5
Boost the property value *Meningkatkan nilai hartanah*	1	2	3	4	5
Exercise area *Kawasan senaman*	1	2	3	4	5
Promote Biodiversity *Menggalakkan biodiversiti*	1	2	3	4	5

23. Effectiveness of green planting/vegetation element of urban green space, water features and facilities; jogging track, bicycle Lane, court, gazebo .*Keberkesanan elemen kawasan hijau seperti tumbuhan hijau,ciri air dan kemudahan fasiliti seperti trek joging, lorong basikal, gelanggang, gazebo.*

Element of green spaces/Answer ***Elemen kawasan hijau***	Strongly Disagree *Sangat tidak setuju*	Disagree *Tidak setuju*	*Neutral*	Agree *Setuju*	Strongly Agree *Sangat setuju*
i. Green planting/vegetation ***Tumbuhan hijau***					
Green plantings filter the air *Tumbuhan hijau menapis udara.*	1	2	3	4	5
Green plantings reduce heat and air pollution. *Tumbuhan hijau mengurangkan haba dan pencemaran udara.*	1	2	3	4	5
Green plantings provide fresh air. *Tumbuhan hijau memberikan udara segar.*	1	2	3	4	5
Green plantings promote biodiversity. *Tumbuhan hijau menggalakkan kepelbagaian biologi.*	1	2	3	4	5
Green plantings reduce virus transmission. *Tumbuhan hijau mengurangkan penghantaran virus.*	1	2	3	4	5
ii.Water features ***Unsur air***					
Water element make you feel relax and calm. Unsur air membuatkan anda berasa santai dan tenang.	1	2	3	4	5
The sound of water element help to release stress.*Bunyi unsur air membantu melepaskan tekanan.*	1	2	3	4	5
iii.Facilities;Jogging track, Bicycle lane ,Court, Gazebo ***Kemudahan;trek joging, lorong basikal, gelanggang, gazebo***					
Facilities provide spaces for activities to improve mental and physical health. *Kemudahan menyediakan ruang untuk aktiviti meningkatkan kesihatan mental dan fizikal.*	1	2	3	4	5
Facilities create convenient resting areas *Kemudahan mewujudkan kawasan rehat yang selesa.*	1	2	3	4	5
Facilities provide spaces to release stress *Kemudahan menyediakan ruang untuk melepaskan tekanan.*	1	2	3	4	5
Facilities create valuable usable space for people. *Kemudahan mewujudkan ruang berguna untuk orang ramai.*	1	2	3	4	5

Section D: Urban green space for sustainable environmental health
Bahagian D : Kawasan hijau bandar untuk kesihatan alam sekitar yang mampan
This section is to understand the understanding of the respondent towards the benefits and roles of urban green space. The questions are to understand the community's movement towards urban green areas based on their common sense and basic knowledge. *Seksyen ini adalah untuk mengambil tahu pemahaman responden terhadap faedah dan peranan kawasan hijau bandar. Soalan- soalan ini adalah untuk memahami pergerakan masyarakat terhadap kawasan hijau bandar berdasarkan akal fikiran dan pengetahuan asas mereka.*

Benefits of Urban green space *Faedah ruang hijau Bandar*

24. Pada pendapat anda apakah kelebihan kawasan hijau bandar semasa wabak? dalam kotak di bawah: *In your opinion what is the benefit of urban green space during pandemic?*

Pandangan/*Opinion* **Kelebihan kawasan hijau *bandar/Benefits of urban green space***	Sangat tidak setuju *Strongly Disagree*	Tidak setuju *Disagree*	*Neutral*	Setuju *Agree*	Sangat setuju *Strongly Agree*
Improve mental health & stress reduction *Meningkatkan kesihatan mental & pengurangan tekanan*	1	2	3	4	5
Improve physical health *Meningkatkan kesihatan fizikal .*	1	2	3	4	5
Reducing the risk of disease transmission *Mengurangkan risiko penularan penyakit .*	1	2	3	4	5
Increasing social cohesion *Meningkatkan perpaduan sosial.*	1	2	3	4	5
Recreational areas for people *Kawasan rekreasi untuk orang ramai*	1	2	3	4	5
Buffer area *Kawasan penampan*	1	2	3	4	5
Beautify the environment *Mencantikkan persekitaran*	1	2	3	4	5
More greenery and refreshed *Lebih hijau dan segar*	1	2	3	4	5
Turunkan suhu *Lower the temperature*	1	2	3	4	5
For a better quality of air *Untuk kualiti udara yang lebih baik*	1	2	3	4	5
For a better social interaction *Untuk interaksi sosial yang lebih baik*	1	2	3	4	5
For entertainment and exercise *Untuk hiburan dan senaman*	1	2	3	4	5
Better urban environment *Persekitaran bandar yang lebih baik*	1	2	3	4	5
Boost the property value *Meningkat nilai hartanah*	1	2	3	4	5

The Roles Urban green space *Peranan Ruang hijau bandar*
Please circle(O) from 1-(Strongly disagree) to 5- (Strongly agree) *Sila bulatkan(O) dari 1-(Sangat tidak setuju) hingga 5- (Sangat setuju)*

25. Urban green space and pandemic crises *Kawasan hijau bandardan krisis pandemik*

Opinion *pendapat* **The Roles Urban green space** ***Peranan Ruang hijau bandar***	Strongly Disagree *Sangat tidak setuju*	Disagree *Tidak setuju*	*Neutral*	Agree *Setuju*	Strongly Agree *Sangat setuju*
Urban green space able to improved functioning of the immune system. *Kawasan hijau bandar mampu meningkatkan fungsi sistem imun.*	1	2	3	4	5
Urban green space to improve social capital and cohesion. *Kawasan hijau bandar untuk meningkatkan modal sosial dan perpaduan.*	1	2	3	4	5
Urban green space able to reduced mortality and increased life span. *Kawasan hijau bandar mampu mengurangkan kematian dan meningkatkan jangka hayat.*	1	2	3	4	5
Urban green space has potential adverse health effect. *Kawasan hijau bandar mempunyai potensi kesan kesihatan yang buruk.*	1	2	3	4	5
Urban green space able to beautify and make healthier environment. *Kawasan hijau bandar mampu mengindahkan dan menjadikan persekitaran lebih sihat.*	1	2	3	4	5
Urban green space as promoting biodiversity. *Kawasan hijau bandar sebagai mempromosikan biodiversiti.*	1	2	3	4	5
Urban green space able to create valuable usable space for people. *Kawasan hijau bandar mampu mencipta ruang berguna yang berharga untuk orang ramai.*	1	2	3	4	5

26. In your opinion, is it the current urban green space in Malaysia play it roles in reducing pandemic spread. If you answer NO, please state the idea or solution as to improve current green space as to reduce pandemic spread?
Pada pendapat anda,adakah kawasan hijau bandar yang sedia di Malaysia memainkan peranan untuk mengurangkan risiko penyebaran wabak .Jika anda menjawab tidak ,sila nyatakan cadangan untuk memperbaiki kawasan hijau bandar yang sedia ada untuk mengurangkan risiko penyebaran wabak.

APPENDIX II: The Sample of Semi Structure Interview's Question

Name: Ali Saifuddin bin Nor Azhar Matric No: G201287 Contact No:014-5055937

Dear Respondents /*Responden yang dihormati*

I am student of Doctor of Philosophy in Built Environment**,** International Islamic University Malaysia, Gombak Selangor conducting a research about "Urban Green Space for Sustainable Environmental Health in Relation to Pandemic Crises". The purpose of this interview is to get opinion and feedback through the question listed below. All data given will be private and confidential. Thank you. *Saya adalah pelajar Doktor Falsafah dalam Alam Bina, Universiti Islam Antarabangsa Malaysia, Gombak Selangor menjalankan penyelidikan tentang " Kawasan Hijau Bandar untuk Kesihatan Persekitaran Mampan Berkaitan dengan Krisis Pandemik". Tujuan tinjauan ini adalah untuk mendapatkan pendapat dan maklum balas melalui soalan yang disenaraikan di bawah. Semua data yang diberikan adalah peribadi dan sulit. Terima kasih.*

Section A: Definition of urban green space

1.In your opinion, what is urban green space?

2.Can you further explain the definition of urban green space in relation to the community health in urban area?

Section B: Urban green space is for sustainable environmental health

1. Urban green spaces, such as parks, playgrounds, and residential greenery, can promote mental and physical health.

i.What is the importance of urban green space to mental health?

ii.What is the importance of urban green space to physical health?

2. The elements of urban green space such as vegetation, water features, facilities are important for human daily life.

i. Do you think the current elements of urban green space is suitable for pandemic situation? please state your reason.

ii. In your opinion, how the elements of urban green space *(i.e vegetation,water features,facilities)* beneficial/contribute for healthy environment in urban area?

3.How the element of urban green space give contribution to community health in urban area?

Section C: Urban green space and pandemic crises

1. Can you further explain how the roles of urban green space reduce pandemic spread in urban area?

2. In your opinion, is it the current urban green space in Malaysia play it roles in reducing pandemic spread? If you answer YES, please state the reason. If you answer NO, please state the idea or solution as to improve current green space as to reduce pandemic spread.