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CITIES AFTER PANDEMIC: ENABLING SOCIAL DISTANCING AS A NEW DESIGN STANDARD TO ACHIEVE URBAN IMMUNITY

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ABSTRACT

Motives: COVID-19 pandemic has caused worldwide implementation of unprecedented measures of physical distancing to decrease the potential of the COVID-19 infection. As cities respond to closure measures in order to flatten the infection curve, the challenges associated with the spread of the epidemic and the increasing numbers of infected and deaths that compel us to fundamentally rethink the formation of our cities, especially their streets, the research presents an urban review of the impact of the pandemic on cities and find solutions to recover, achieve a safe and sustainable healthy environment, and prepare better for any pandemic that may occur in the future, the research seeks to strengthen the theory of prevention, which the research proposes to call (urban immunity) by including social distancing as a design criterion in the city that has proven effective in flattening the curve.
Aims: This paper focuses on the mechanisms related to sustainable mobility after COVID-19 in shaping urban mobility and initiating a green transformation in urban transportation rapidly by decarbonizing and promoting cycling and walking across all over the city.
The research methodology depends on identifying the most important urban problems that Al-Dhubat Street suffers from and proposing solutions that reduce dependence on private transportation and move towards sustainable mobility as an important step in strengthening urban prevention against any epidemics that may occur in the future, and then testing indicators on the Al-Dhubat Street to identify effective indicators.
Results: The research concluded that social distancing is the way back to active mobility by relying on walking and bicycles and works to restore the right of pedestrians in the streets and sidewalks instead of cars and thus achieve sustainable urban development, which enhances the urban immunity of the city against any other epidemics may occur in the future. With the proposed interventions on Al-Dhubat Street we can keep car use low and promote walking and cycling for a sustainable, equitable, habitable, and healthy community after the pandemic.

Keywords: physical distancing, urban immune system, hyper POD, 15-minute city, sustainable, COVID-19

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INTRODUCTION

Unprecedented measures of physical distancing have been considered since the appearance of the Coronavirus pandemic to prevent and restrict the outbreak of COVID-19. These measures include the closure of schools, placed people under curfew to remain indoors between specified hours or specified days, and focusing on reducing the number of physical interactions between people [Karl et al., 2020]. Especially since the health and economic repercussions of the epidemic have greatly affected countries [Barbarossa, 2020] the pandemic is expected to reduce global GDP by 5 to 10 percent [Avetisyan, 2020]. Social distancing is seen as one of the most effective methods of containing the virus and protecting public health that has taken from physical distancing as a key policy measure to contain the Pandemic [Honey-Rosés et al., 2020].

Cities grew in a way that promotes the idea of social interaction and thrive in it, but epidemics stand against that and exploit our drive to gather, today and after the epidemic has become a part of life everywhere [Avetisyan, 2020] and with the continuous increase in the number of infections and deaths caused by the COVID-19, that reveals us that our cities are not prepared for fending off such epidemics [Gupta et al., 2020] the infectious diseases that appeared in the past reveal the ability of architecture, design and urban planning to demonstrate the strength of the post-crisis development of our built environment [Megahed & Ghoneim, 2020] therefore, urban thinking must develop in a way that accommodates the infected population and considers the psychological and social ramifications produced by the epidemic to create safe healthy environments [Salama, 2020].

Our streets are the key to our physical, psychological, and immune health. They are an important tool of public health. Streets are places of rest, especially for people who do not have balconies or gardens and provide spaces for sports and playing near their homes, especially in compliance with the guidelines of physical distancing. Therefore, the streets must meet the needs of the people by moving safely, freely, and efficiently around the city, and support walking and cycling to restore the economic recovery and go beyond a return to the unfair and unsustainable patterns of the past [NACTO & GDCI, 2020]. The outbark give an opportunity to reconsiders the principles used to design streets by providing spaces for pedestrians and cyclists, achieving the principle of social distancing, and preventing cars from some streets to create a healthier, sustainable, and green city [Eltarabily & Elghezanwy, 2020] therefore, cities now invited to reconsider their approach to dealing with crises and implement new design strategies capable of dealing with health crises by creating an anti-virus environment [Barbarossa, 2020].

One of the Post-Pandemic design strategies is the model of 15-Minute City that was invented by Carlos Moreno as substitute planning approach during the circumstances of Pandemics [Moreno et al., 2021]. While Paris works with Carlos Moreno idea from the concept of the 15-min approach promotes for planning that takes into consideration the neighbourhood-level urban, Sweden is following a hyper-local twist that endorses to create a new design for each street in the country cites [O'Sullivan, 2021].

This paper proposed a strategy to include social distancing as a new design standard, especially regarding urban mobility, and explain how physical distancing supports safe mobility and access to achieve urban immunity to recover from the current pandemic and prepare for any future pandemic that may occur.

SOCIAL DISTANCING

The term Social Distancing is a precaution procedure to reduce the physical interaction among people by keep safe distance to limit the potential of infection. It is an important strategy and non-pharmaceutical intervention for mitigation spread of infectious diseases that works to delay the spread of infectious diseases and gain time for producing vaccines and drugs [Mishra & Majumdar, 2020]. The World Health Organization (WHO) has explained that the social distancing refers to the distancing physically to keep people in contact, for this the term has changed to physical distancing [Friedland, 2020].

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Social distancing practice promotes the common good and changes the behaviour of people around the world by protecting others as much as a commitment to protect ourselves [Mishra & Majumdar, 2020]. Price and Holm conclude "That the number of state-level COVID-19 infections decrease with respect to our measure of individual social distancing. Our estimates also appear to be practically significant and consequential, suggesting that each minute of social distance lowers COVID-19 infections by approximately 1000 across the states. This would translate into approximately 480,000 less COVID-19 infections across the states if the typical individual were to social distance for 8 hours" [Price & Holm, 2021].

Social distancing is a societal mitigation strategy that works to prevent the spread of an infectious disease or slow down its spread locally, nationally, and internationally by maintaining a physical distance between people in indoor and outdoor spaces and avoiding large gatherings, this distance varies from time to time and from country to country.

URBAN IMMUNITY

Immunity

Urban physical environment of Cities has been affected by the intangible changes that influence to those cities, which represents the receptors of disturbance or the immunity sensors of the urban system. Therefore, designers and planners need to apprehend the mechanism work of immunity of urban systems to discover the value of the inveterate immunity in cities [Chen & Hsu, 2015]. Immunity is the body's ability to distinguish the substances of the original body (itself) and eliminate foreign substances (non-self). The protection from infectious diseases provides by the ability of discriminatory as the immune system identified most microbes as foreign by the immune system and usually Immunity to the microbe is indicated by the presence of the antibody to that organism [Cohen & Bordin, 2015]. Antigens are foreign substances that are recognized by the immune system that stimulate the immune response and restore homeostasis [Pier, 2004].

Antigens to cities

The city is associated with types of risks, which range from minor stresses to sudden disasters, and cities possess immunity only from the risks that are expected to act in way like organisms gather to gather antibodies against the antigens face in the same way that organisms amass antibodies against the antigens they confront [Bristow & Mohareb, 2020].

The way that immunity work by the urban system begins when antigen attacks the urban system of the city, and cities' antigens basically divide into two main sorts: first unexpected. Second expected discord. The unexpected discord such as fires, epidemics, earthquakes, floods, and inappropriate urban designs plans. The expected discord refers to urban plans/designs appropriate new planning knowledge and the appearance of new human activities [Chen & Hsu, 2015].

Urban Immune system

From the perspective of biological immunity, the comparison between the components of biological immunity and parts of the city can show how the city deals with unexpected and unwanted events. For example, the skin may act like a flood barrier while the response for the new emergency and construction can be considered like the aspects of the lymphatic system and T cells that are like the dangers that are activated for Emergency response to pathogens [Bristow & Mohareb, 2020]. The immune cell receptors within the immune system can detect external disturbances and then trigger a chain reaction towards them. As for the immune-based urban system, the physical urban form is the factor that senses the disturbances and then triggers the response to counter the system change [Chen & Hsu, 2015].

According to Reith, the form of physical complex Urban with variety of scales has variety levels of stability, where city plans can be more stable than the texture of the building and the presence of a building texture may be more stable than a single building unit. The pattern of land use and urban buildings is the smallest unit that can be observed, and it can be

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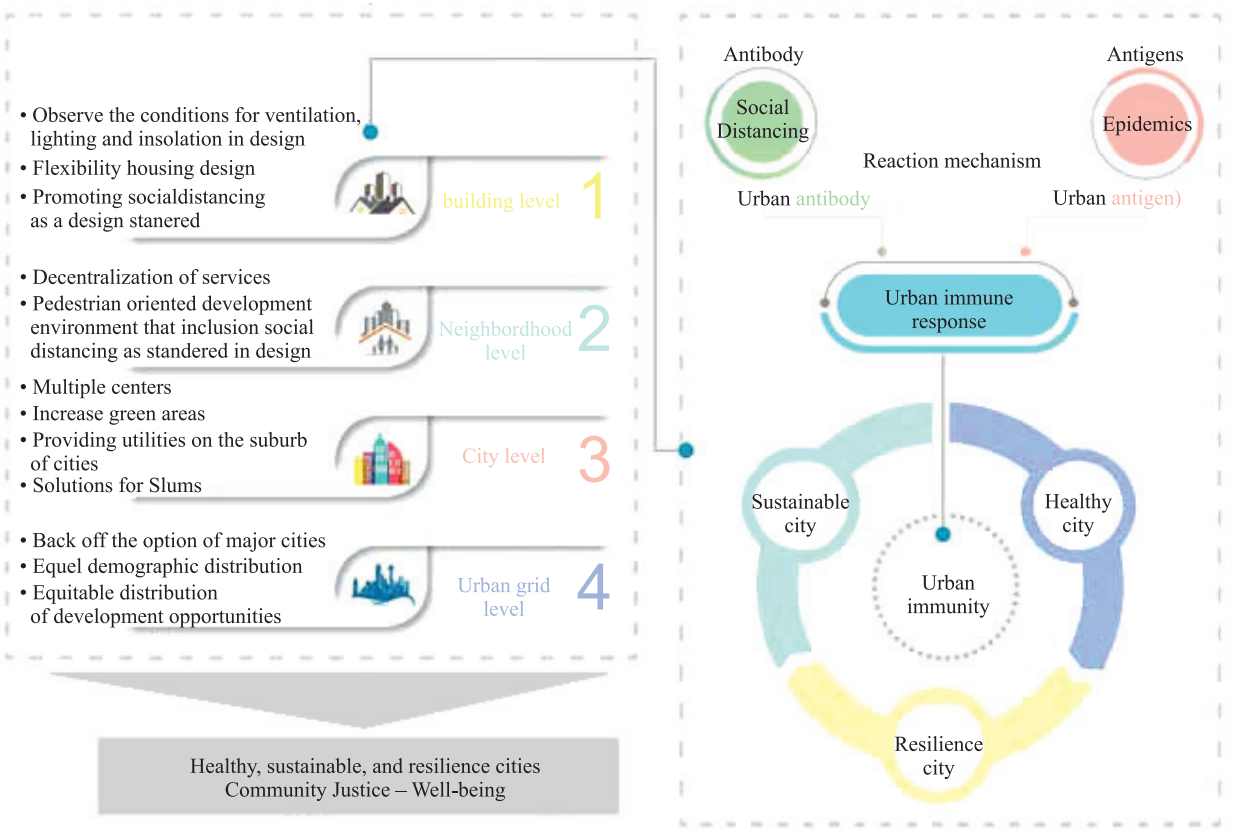

Fig. 1. The urban immunity mechanism
Source: own elaboration.

considered as the basic unit for expressing the change of the city, and it is possible for a transformation to occur at this level easily. As for the second level of the urban form, it is building the fabric level, and at this level, the possibility of interaction of urban form with a group of activities because it consists of different types of buildings, construction pattern, land use, street system [Conzen, 2009].

Cities can improvement by the immune system to adjust for the changing happened in the world and formed as resilient systems. When urban system reached a critical point of urban system influenced by the disturbances, a series of transformation in each level of complex form will be triggered. Whenever, the urban system effected by the disturbance that interfere with the context in spatial temporal specifically. The Urban Form works as corresponding process for the reaction, also the memory of immune response kept in the form of the physical urban. Collect immunity reaction memories for an assigned event make more easier and give ability to eliminate same disturbance in the future. Physical Form will identify the action of people for a certain extent. Accordingly, the system of immune system may take the same routing direction unless the area context changed for a reason [Chen & Hsu, 2015].

Based on the mechanism of urban immunity that will occur through the interaction of the antigens (risks facing cities) and that attacks the urban system of the city with the antibodies to make an adaptive urban response through a mechanism (urban antibody – urban antigen) via an urban immune reaction.

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Considered that the antigen (epidemics) and the antibody produced by the urban immune system of the city against this antigen is (social distancing) and thus will achieve adaptive immunity with the ability to change and adapt in the face of those disasters to become the urban immunity as a strategy in dealing with any future pandemics. Accordingly, urban immunity can be defined as the immunity that the city possesses through the ability to resist and the ability to change and adapt by the mechanism of urban immunity through the interaction of the urban antigen (risks that cities face) with the urban antibodies (any emergency response to pathogens in cities such as a new building or Amendment or creation of a new design standard etc.) with the aim of restoring balance to the body of the city.

SOCIAL DISTANCING AS A NEW DESIGN STANDARD

Paul Lewis and others introduced a visual graphic to the challenges of living in the time of COVID-19 with a particular attention to a range of scales, from classrooms to urban areas. With social distancing protocols now in place and a better understanding of the virus's transmission through aerosol particles there is an increased insistence for outdoor public space, particularly along the commercial corridors that endure a community's everyday needs. Measures like Open Restaurants allows businesses to more rapidly expand into nearby sidewalk and parking zones to provide outdoor dining space. A more equitable division of street space can be distributed amongst pedestrians and vehicles. The widening of sidewalks allows more space for business frontage, creating a more permeable storefront that better engages the sidewalk and community. Bike lanes could gain greater prioritization through widening and added protection with the installation of their own curb [Lewis et al., 2020].

Among the most common measures that adopted by frontline cities against pandemic: removing vehicle traffic from residential streets, the sidewalks close to shops, schools and parks extended to anticipated more safe streets and give priority for the public transit, cycling raiders and walkers. Eventually, the previous procedures work to support local economies and enable the communities to participate in the process. Furthermore, providing safe spaces for public and green spaces across neighbourhood and take actions to prevent roads and squares used for the traffic motorization [NACTO & GDCI, 2020].

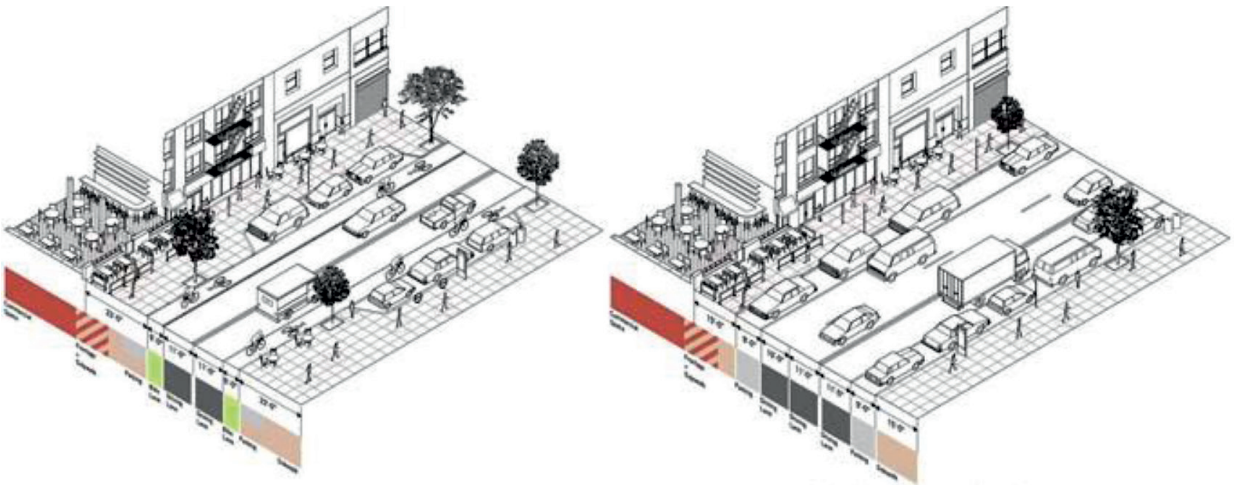

Fig. 2. Existing Condition for tow way commercial street and suggested best practices for Future Streets Condition to Many of New York's streets
Source: Lewis et al., 2020.

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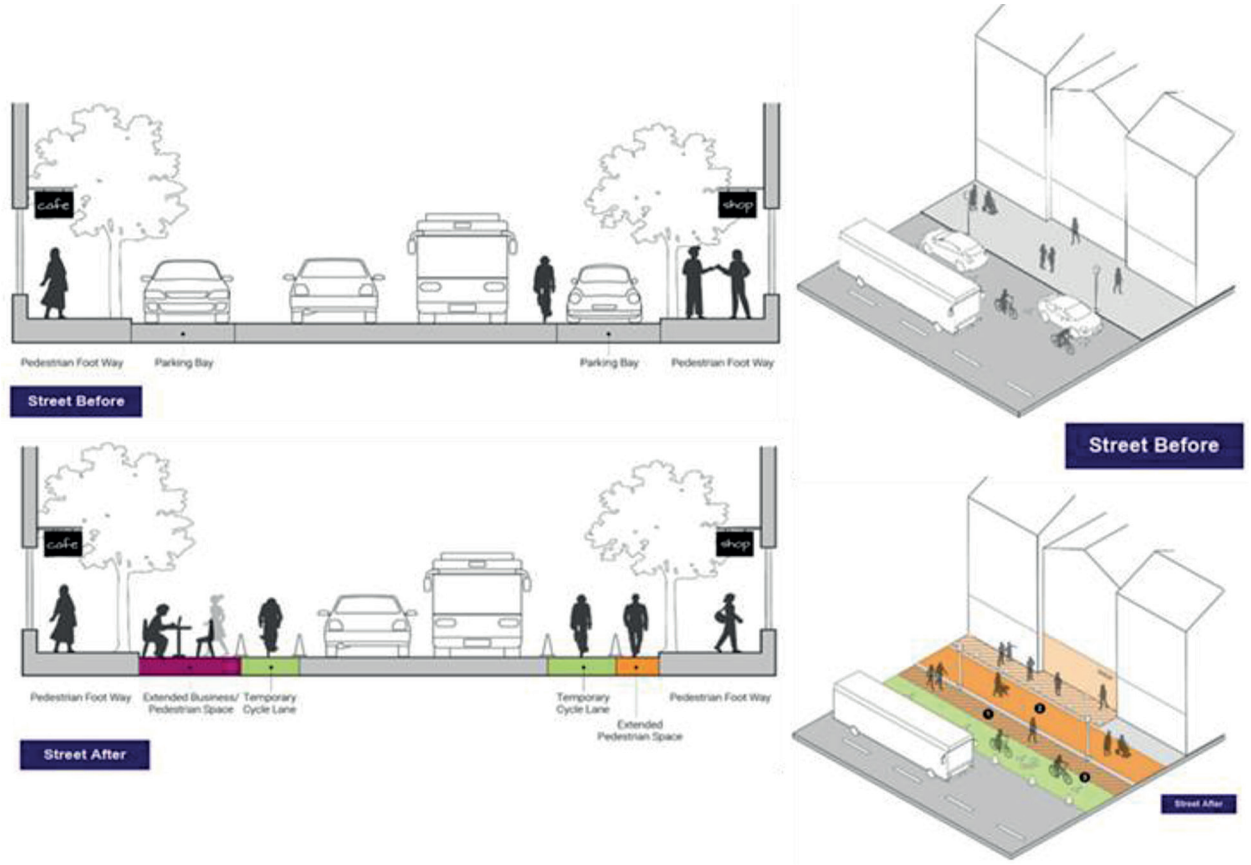

Fig. 3. Temporary active travel infrastructure/Extended Pedestrian Space and Clear Footways
Source: Government, 2020.

Programs Post COVID urban mobility recovery that set up by main Italian cities included: temporary bike lanes, permanent bike lanes, new pedestrian areas, public spaces renewal, sharing mobility programs, public spaces renewal [Barbarossa, 2020].

Scotland launched the Spaces for People initiative to enable better physical distancing, as the Scottish government funded an infrastructure program for walking and cycling roads in addition to temporary improvements to existing roads and this is supported by a package of improvements such as Extended Pedestrian Space and Clear Footways. The number of car trips has decreased due to the restrictions of the Corona pandemic. Many cities have responded to this shift by reallocating road space better and making it safer for people who choose to walk or cycle for essential commutes or for physical activity. The expansion of pedestrian areas and corridors included measures such as utilizing existing transport corridors to expand pedestrian paths, which provides additional spaces for queuing, maintaining a clear and free-of-obstacles road with ease of entry and exit for pedestrians to commercial areas, with special consideration for the needs of persons with disabilities and ensuring that appropriate safety measures are in place. For clear separation between traffic lanes, bicycle lanes, and pedestrian areas [Government, 2020].

15-MINUTE CITY – ONE-MINUTE CITY

The 15-Minute City one of the important ideas in urban planning to mitigate the global warming gasses and reinforcements the style life of the major

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cities particularly Paris, Mayor Anne Hidalgo adopted the model as a blueprint for recovery in the French capital after COVID [O'Sullivan, 2021].

A 15-minute city drifted from the neighbourhood of Jane Jacobs which is based on the concept of (chrono urbanization) which shows that the quality of urban life is inversely proportional to the amount of time invested in transportation more using cars. This concept originated from Carlos Moreno who advocated an urban creation where local people would be able to reach their needs at distances of no more than 15 minutes on foot or by bike to become closer, engage and interact more in activities that ultimately strengthen social bonds, building character and confidence, which ultimately leads to building healthier urban landscapes. Four significant dimensions were determined after watching the challenges that different cities across the world faced during the height of widespread cases of COVID-19. Includes (1) The Density, (2) The Proximity, (3) The Diversity and (4) The Digitalization that Contributed to mitigate the spread the virus [Moreno et al., 2021].

While Paris mechanisms deal with a 15-minute radius. Sweden straggling to create hyperlocal variation, in scale that cover the nation by Swedish national innovation body Vinnova and design think tank ArkDes. The project calls the one-minute city Sweden's operates at the single street level, pay interest for the space outside your door – and your neighbours' adjacent and opposite space Called Street Moves the initiative allow the local communities to participate and be a co-architect of their own street's layouts. Residents can organize how much space of the street they need for parking or public activity through workshops and consultations. street furniture kits developed and designed to suit the standard dimensions for car space parking. Inserted into dock space, these units can be fitted as needed with seat planters, bike or scooter racks, children's play areas or electric vehicle charging stations attached. Deck panels can be clearly connected, either as stand-alone units, or configured to fit an entire street [Ali, 2021].

The design of every single street is based on workshops and discussions with local including schoolchildren. Streets close transit stops might prefer more bike parking, while those with cafés could choose for more seating. Some units emerge planters full of trees, also playgrounds. Piece by piece. This configuration can change the street into social area, mixing and leading directly to neighbourhoods where the space used daily by residents which extends bigger and bigger in the open air [Hill, 2020]. Here, we can point out the importance of the role of tactical urbanism in the development of city streets by restore and revive the urban spaces to activate positively impact local communities [Hussein & Abrahem, 2019].

Fig. 4. Sweden's Street Moves project
Source: Hill, 2020.

According to the above, this project allows local residents to have direct control over their surroundings and transform their streets into healthy, safe, and sustainable places where the streets represent the basic unit of the city and all systems converge in it, so the street space is the starting point for change, spreading culture, enhancing identity, and building sustainable societies. Urban proximity, social cohesion, and democracy in community decision-making during the COVID-19 pandemic are more important than ever. If 15 Minute City promotes a pedestrian oriented neighbourhood-level development, then 1 Minute City is highly dependent on local street-level development. We suggest that the development of the level of the one-street which adopted by One Minute City is Hyper pedestrian-oriented development (Hyper POD).

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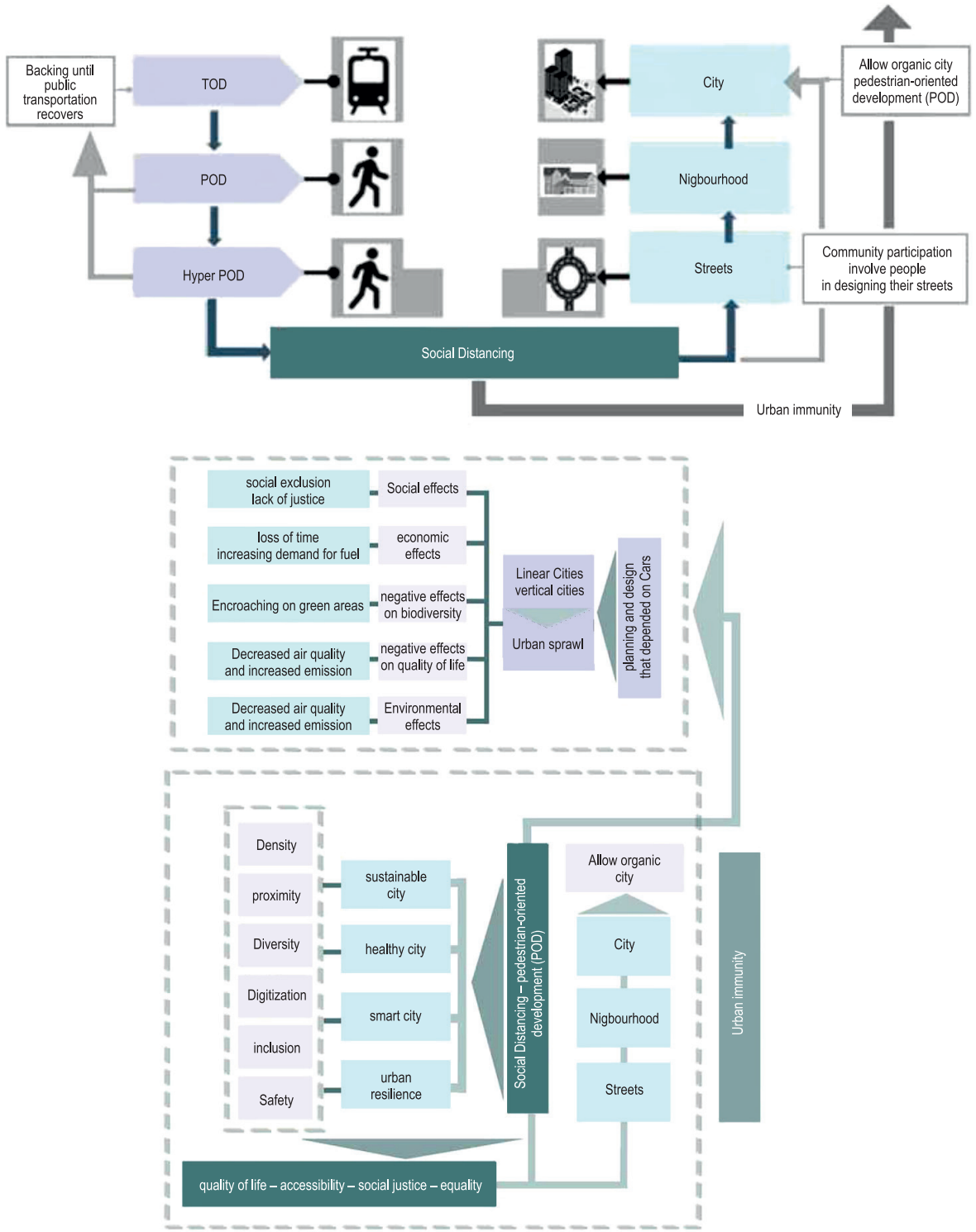

Fig. 5. Illustrates how social distancing contributes to sustainable urban development from the bottom up
Source: own elaboration.

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Table 1. Indicators of the theoretical framework

Indicators	Sub-dimension			
1	2			34
Movement system in main streets and city centers	Pedestrian movement level (People-first approach)	Expanding and creating pedestrian paths to walk safely and maintain physical distancing		X1-1
		The possibility of queuing safely in front of the shops		X1-2
		Priority is given to narrow streets		X1-3
		Allow restaurants and cafes exploiting the parking lot on the street for external service		X1-4
		Use signage to remind pedestrians of distance requirements		X1-5
		Cleaning and sterilization systems for streets and public spaces		X1-6
		Provide separate entrances and exits and make movement one-way directions		X1-7
		Amendment to the traffic to give priority to pedestrian		X1-8
		The zero separation between the sidewalk and the right of way in the street creates a sense of plaza		X1-9
		Wide sidewalks accommodate both pedestrian and retail activity		X1-10
		Accessibility for people specially for disabilities people		X1-11
		Safe pedestrian paths		X1-12
	Transport movement level (pedestrian right-of-way recovery approach)	Transport paths can be one-way, partially closed, or completely closed for pedestrians		X1-13
		Making car parks on the outskirts of the city helps reduce congestion from the streets		X1-14
		Provide signage on changes that happen road plans		X1-15
		Establishment of bicycle paths and bicycle parking		X1-16
		Safety measures to separate the paths of cars, bicycles, and pedestrians		X1-17
		Reduce the capacity of parking spaces as much as possible		X1-18
		High connectivity between active transmission lines and major transportation routes		X1-19
	Restructuring of street infrastructure services	Safe and level crossings and removal of obstacles		X1-20
		Sterilization and clean water in urban streets		X1-21
		Street furniture and seating areas equipped with social distancing signs sustainable sanitation		X1-22
		Providing streets and squares with lighting		X1-23
Land use	Proximity	Diversity of land use	Activating the laws of mixed uses	X2-1
			Providing health services	X2-2
			Enhancing flexibility in use and adaptation by reusing buildings	X2-3
	Inclusion	Mixed use to improve physical activity	Supporting community activities to develop the place	X2-4
			Encourage local activities	X2-5
	Diversity		Activities close to parks and green spaces to reduce stress	X2-6
			High permeability for parks	X2-7
			Affordable housing	X2-8
Urban balcony	Urban balcony capacity			X3-1
	Adaptation of the design to a more flexible space			X3-2
	The facades of buildings are open and provide a view			X3-3
	Support the balcony as a garden or landscape to bring nature closer to home life to improve health factors			X3-4

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cont. Table 1

1	2	34
Green areas	It is possible to set up an outdoor theatre for entertainment and social activity, with social distancing requirement	X4-1
	Provider of urban furniture	X4-2
	Signs about social distancing	X4-3
	Places to share and use bicycles	X4-4
	Expansion of pedestrian paths near park entrances	X4-5
	Expansion of pedestrian paths into the park	X4-6
	Ease of access, especially for disabilities people	X4-7
Integration of health in the design	Compact design for a walkable environment	X5-1
	Improved local marketability and streets that improve local economic value to promote self-sufficiency and reduce outbound travel	X5-2
	The vitality of the neighborhood that allows the citizen to be more active	X5-3
Empowerment for health (Participatory design)	Developing and distinguishing the local community, enhancing the role of activities with physical activity, and promoting health awareness	X6-1
	Pedestrian and bicycle opportunities and improved access to local food shops	X6-2
	Empowering community members and taking a bottom-up approach	X6-3
	Leadership comes from the community, not just the government	X6-4
	Building trust between groups during participation and work	X6-5
	Engaging in health activities and programs	X6-6

Source: own elaboration.

METHODOLOGY THE CASE STUDY AND DISCUSSIONS

Al-Adhamiya, which is an important functional, social, and economic part of the city of Baghdad it is one of the nine sectors that make up the city of Baghdad and is in the northeastern part of Al-Rusafa side and along the eastern bank of the Tigris River, which is linked to the rest of the city's sectors by a network of main streets and bridges. The Adhamiya sector was elected because it complies with the requirements of the study and provides a residential environment that is characterized by the diversity and multiplicity of public spaces (gardens and parks) because it has an important role in addressing the epidemic in protecting mental health and psychological health, as well as the presence of commercial streets and squares, in addition to containing an especially important recreational public space it is the Adhamiya Corniche.

Al-Dhubat Street in Al-Adhamiya

Al-Adhamiya, is a district with a cohesive social fabric distinguish by special social customs and traditions, including gathering on sidewalks, exchanging information, walking, and shopping especially as it contains important streets such as Imam Al-Azam Abi Hanifa Street, Omar Bin Abdulaziz Street and other. Al-Dhubat Street is one of the most important commercial streets which is 1763 meters long that are crowded with pedestrians and cars, and it contains mixed uses represented in commercial, health and industrial activities in addition to residential.

Spatial design problems of Al-Dhubat Street

Iraq has come to the top of the list of countries in the Arab world most affected by the emerging corona virus, as infections exceeded the threshold of one

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Fig. 6. (a) Refers to the path of Al-Dhubat Street within Adhamiya city (source: Adhamiya municipality) (b) Shows the activities in Al-Dhubat street during the night.
Source: Real life shots from social media. https://www.facebook.com/138370926818778/posts/708449716477560/.

million infections, amid a terrible outbreak of the disease in various Iraqi regions, which is raising the alarm that things will escalate more and more and get out of control completely. This is what prompted the authorities and public health officials to apply closure measures, whether at the level of complete closure or partial closure of the country, and these measures negatively affected the shops in Baghdad.

Al-Dhubat, being one of the most vibrant commercial streets in the Adhamiya area. Shop owners have suffered from the deterioration of the economic reality due to the closure of shops. With the gradual lifting of the closure measures, the people's fear of contracting the virus and the spread of infection remains due to the lack of a safe environment for the street with design standards that accommodate prevention measures, the most important of which is social distancing. The research seeks to diagnose the most important problems that the Al-Dhubat suffers from and then proposes a model for urban reorganization of the street to provide a healthy, safe, and sustainable environment.

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Problems identified based on Al-Dhubat street survey

Through a visit to the site, the following problems were identified:

- The absence of urban organization represented in organizing the spaces between pedestrian and car movement due to Auto mobile controlling the street and the exploitation of a large part of the street as parking spaces, and this in turn causes air pollution that negatively affects people's health;
- The sidewalks do not provide lanes for queuing, in addition to the lack of outdoor seating;
- Lack of signs of social distancing and prevention guidelines;
- The sidewalks do not provide fully secure, flat places along the road due to the difference in levels, which adversely affects the safe movement of people, especially for the handicapped and the elderly;
- Lack of dedicated lanes for cycling.

The urban environmental transformation of Al-Dhubat Street

The proposal seeks to re-design Al-Dhubat street in the time of social distancing for people to move safely in the street and becomes better and safer options for all in the street, by facilitating the movement of pedestrians and cyclists to contribute to the recovery the economy and avoid traffic congestion of the street. The re-design proposal provide street more than flexibility of movement and provide safe spacing distances so that people can safely access services, and the street should contain spaces for res-

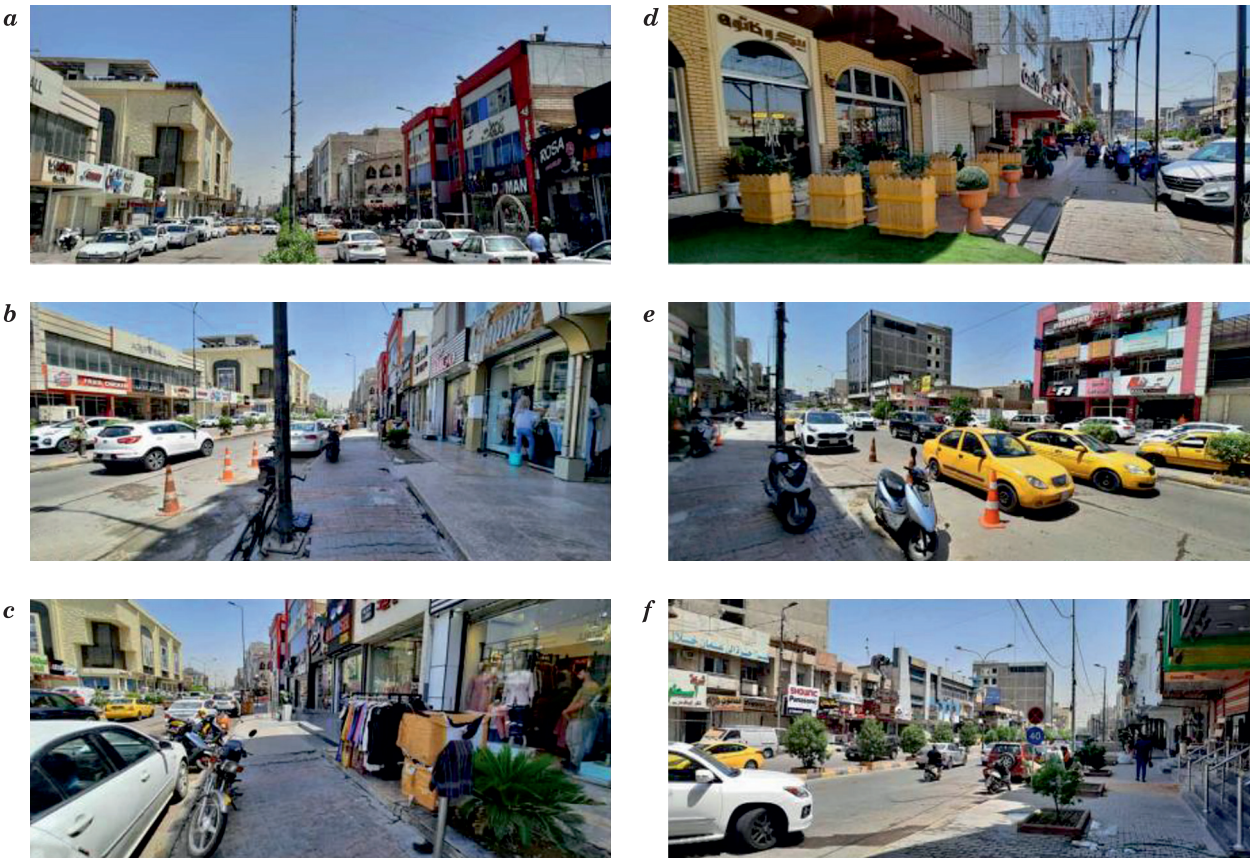

Fig. 7. Illustrates the problems of Al-Dhubat Street (a) Street view (b) Pavement level difference (c) The sidewalks do not provide lanes for queuing (d) lack of outdoor seating (e) Auto mobile controlling the street (f) Lack of dedicated lanes for cycling
Source: own elaboration.

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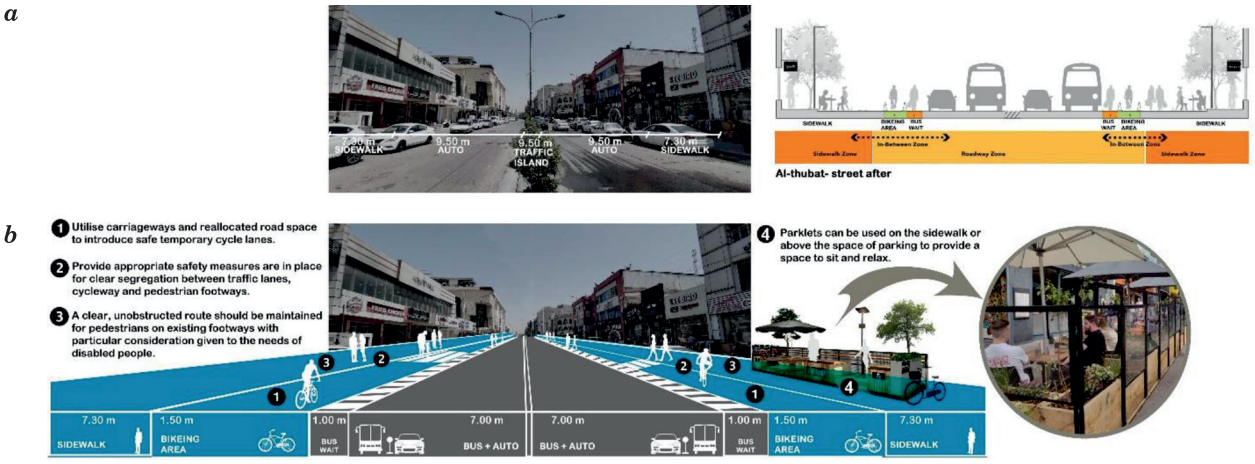

Fig. 8. Al-Dhubat Street (a) Before (b) After
Source: own elaboration.

taurants, vendors, and shops to serve outdoor work, especially with use of (parklets) that provides places for Safe seating.

The research aims at a process of change towards sustainable urban mobility for the city of Adhamiya by respecting the rules of social distancing and introducing non-motorized means of transportation, currently absent, in the urban mobility habits of a city characterized by high rates of cars ownership to improve public spaces and promote walking and cycling by revisiting and reorganizing streets, squares, parks and other public spaces on a humanization and giving more space to people by increasing more sustainable and unpolluted transportation, redefining urban streets for recreational, cultural or retail uses by Respecting social distancing requirements. The Suggested interventions for Al-Dhubat Street:

- Promote active transport as the main way of transport for short trips;
- Reducing streetcar lanes with two (or more) lanes per road to accommodate bike paths and wider sidewalks for pedestrians;
- Preparing cycling and walking lanes parallel to vehicle lanes especially that cycling, which ensures social distancing and does not pollute, is the most effective means of transportation for post pandemic urban commuting, solidly establishing real cycling cities soon;
- Closing streets to vehicles in more residential areas to open them to pedestrians and cyclists;
- Reduce the speed of traffic on the streets;
- Reducing parking spaces;
- Exploitation of parking spaces by restaurants and cafes for the purpose of external service.

Maintaining the shift towards non-motorized transportation has the potential to contribute to active lifestyles that improve personal health and reduce carbon dioxide emissions. Improvements to sidewalks, bike paths and other infrastructure can increase road safety by reducing conflicts between different modes of transportation such as cars and bicycles. This in turn creates an enhanced pedestrian-oriented development that supports the local economy, is self-sufficient and flexibility to accommodate the spatial distances of any epidemic that may occur in the future.

Table 2. Test the effective indicators to Al-Dhubat Street

Indicators	Sub-dimension	Symbol
1	2	3
Movement system in main streets and city centers	X1-1	✓
	X1-2	✓
	X1-3	
	X1-4	✓
	X1-5	✓
	X1-6	✓

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cont. Table 2

1	2	3
	X1-7	✓
	X1-8	✓
	X1-9	✓
	X1-10	✓
	X1-11	✓
	X1-12	✓
	X1-13	
	X1-14	
	X1-15	✓
	X1-16	✓
	X1-17	✓
	X1-18	✓
	X1-19	✓
	X1-20	✓
	X1-21	✓
	X1-22	✓
	X1-23	✓
Land use	X2-1	✓
	X2-2	✓
	X2-3	
	X2-4	
	X2-5	✓
	X2-6	
	X2-7	
	X2-8	
Urban balcony	X3-1	
	X3-2	
	X3-3	
	X3-4	
Green areas	X4-1	
	X4-2	
	X4-3	
	X4-4	✓
	X4-5	✓
	X4-6	
	X4-7	
Integration of health in the design	X5-1	✓
	X5-2	✓
	X5-3	✓
Empowerment for health (Participatory design)	X6-1	✓
	X6-2	✓
	X6-3	
	X6-4	
	X6-5	
	X6-6	

Source: own elaboration.

CONCLUSIONS

Social distancing is the way back to active mobility by relying on walking and bicycles and works to restore the right of pedestrians in the streets and sidewalks instead of cars and thus achieve sustainable urban development, which enhances the urban immunity of the city against any other epidemics may occur in the future.

Social distancing works as a health standard for cities is ready to act as an urban antibody against any antigens that threatens cities and saves time to give full opportunities to the medical field to produce vaccines and treatments. The COVID-19 pandemic has touched the fragile limits of the designs of our cities and indicated the absence of societal justice, and because social distancing promotes pedestrian-oriented transport, it provides support for the recovery of poor communities and the recovery of retail stores, thus contributing to urban development from bottom – up and allows the community to participate in decision-making to shape the lifestyle of their cities. Yes, it can be said that calls for sustainable transportation have been emphasized previously, but the COVID-19 pandemic has forced cities and their leaders to consider these problems and social distancing forced about using sustainable transportation and push the button on urban reset.

Physical distancing measures will remain in place for the foreseeable future, so with the proposed interventions on Al-Dhubat Street we can keep car use low and promote walking and cycling for a sustainable, equitable, habitable, and healthy community after the pandemic. Walking and cycling are the healthiest,

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sustainable, equitable options that ensure social distancing, especially as the rules of social distancing renew the importance of urban life. The ways in which the residents of Adhamiya are used streets must change, refocus social, economic, and cultural activities at the neighbourhood level and enhance the value of life Compact local areas that contribute to the well-being of their residents. By testing the indicators on the study area (Table 1), the results showed that the effective indicators in Al-Dhubat Street (Table 2) achieved 60%, and this shows the importance of adopting sustainable mobility as an important principle for achieving urban immunity.

Social distancing acts as (urban antibody) to any epidemic (urban Antigen) that may spread in the future through urban reorganization of the built environment and promotion of Hyper pedestrian-oriented development (Hyper POD) to achieve urban immunity.

REFERENCES

Ali, A. (2021). *Sweden's One-minute City Features a More Local Approach*. https://allwork.space/2021/01/swedens-one-minute-city-features-a-more-local-approach/, date: 07.01.2021.

Avetisyan, S. (2020). *Coronavirus and Urbanisation: Do Pandemics Are Anti-Urban?* Available at SSRN 3584395, pp. 1–19. doi:10.2139/ssrn.3584395.

Barbarossa, L. (2020). The Post Pandemic City: Challenges and Opportunities for a Non-Motorized Urban Environment. An Overview of Italian Cases. *Sustainability*, 12(17), 7172. doi.org/10.3390/su12177172.

Bristow, D., Mohareb, E. (2020). From the urban metabolism to the urban immune system. *Journal of Industrial Ecology*, 24(2), pp. 300–312. doi:10.1111/ jiec.12919.

Chen, C., Hsu, L. (2015). A study of immunity-based urban system: A morphological approach. *Journal of Procedia Computer Science*, 60(1), pp. 652–661. doi:10.1016/j.procs.2015.08.201.

Cohen, N., Bordin, A. (2015). *Principles of vaccination*. doi:10.1002/9781119086512.ch28, date: 06.11.2015.

Conzen, M., Whitehand, J., Samuels, I. (2009). Alnwick, Northumberland: a study in town-plan analysis. *Transactions and Papers* (Institute of British Geographers), 33(6), pp. 859–864. doi:10.1177/0309132509334948.

Eltarabily, S., Elghezanwy, D. (2020). Post-pandemic cities-the impact of COVID-19 on cities and urban design. *Journal of Architecture Research*, 10(3), pp. 75–84. doi:10.5923/j.arch.20201003.02.

Friedland, S. (2020). *Social Distancing Is Not What You Think*. Available at SSRN 3661785. doi:10.2139/ssrn.3661785.

Ghorai, A., Gawde, S., Kalbande, D. (2020). *Digital Solution for Enforcing Social Distancing*. Proceedings of the International Conference on Innovative Computing & Communications (ICICC). doi:10.2139/ssrn.3614898.

Government, S. (2020). *Coronavirus (COVID-19): guidance on safer public spaces – urban centres and green spaces*. Scotland, The Scottish Government.

Gupta, M., Abdelsalam, M., Mittal, S. (2020). *Enabling and enforcing social distancing measures using smart city and its infrastructures: a COVID-19 Use case*. arXiv preprint arXiv:2004.09246, pp. 1–5. https://arxiv.org, date: 13.04.2020.

Hill, D. (2020). *Slowdown landscapes: One-Minute City – Fifteen-Minute City*. https://medium.com/slowdown-papers/35-slowdown-patterns-one-minute-city-fifteen-minute-city-5bfeeaaff01e, date: 24.09.2020.

Honey-Roses, J., Anguelovski, I., Bohigas, J., Chireh, V., Daher, C., Konijnendijk, C. (2020). The impact of COVID-19 on public space: an early review of the emerging questions – design, perceptions and inequities. *Journal of Cities & Health*, Special Issue: COVID-19, pp. 1–17. doi:10.1080/23748834.2020.1780074.

Hussein, S., Abrahem, S. (2019). Reviving urban spaces through tactical urbanism in Baghdad: Five common tactics. *Journal of Periodicals of Engineering and Natural Sciences*, 7(1), pp. 361–368. doi:10.21533/pen.v7i1.330.

Jaiswal, R., Agarwal, A., Negi, R. (2020). Smart solution for reducing the COVID-19 risk using smart city technology. *Journal of IET Smart Cities*, 2(2), pp. 82–88. doi:10.1049/iet-smc.2020.0043.

Karl, S., Barthel, S., Colding, J., Macassa, G., Giusti, M. (2020). Urban nature as a source of resilience during social distancing amidst the coronavirus pandemic. *Journal of Landscape and Urban Planning*. doi:10.31219/osf.io/3wx5a.

Lewis, P., Nordenson, G., Tsurumaki, M., Lewis, D.J., Ajayi, O., Algiere, S., Barstow, M., Calvert, B., Guan, V., Guimaraes, L., Himelman, D., Kim, N., Knoell, N., Debiasi, S., Mayyas, Y., Munoz, L., Leon, J., Roth, C.,

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Schairbaum, J. (2020). *Manual of Physical Distancing*. Princeton University.

Megahed, N., Ghoneim, E. (2020). Antivirus-built environment: Lessons learned from Covid-19 pandemic. *Journal of Sustainable Cities and Society*, 61(1), p. 102350. doi:10.1016/j.scs.2020.102350.

Mishra, M., Majumdar, P. (2020). Social Distancing During COVID-19: Will it Change the Indian Society? *Journal of Health Management*, 22(2), pp. 224–235. doi:10.1177/0972063420935547.

Moreno, C., Allam, Z., Chabaud, D., Gall, C., Pratlong, F. (2021). Introducing the "15-Minute City": Sustainability, Resilience and Place Identity in Future Post-Pandemic Cities. *Journal of Smart Cities*, 4(1), pp. 93–111. doi:10.3390/smartcities4010006.

NACTO & GDCI. (2020). *Streets for Pandemic: Response & Recovery*. https://nacto.org/publication/streets-for-pandemic-response-recovery/, date: 25.06.2020.

O'Sullivan, F. (2021). *Make Way for the 'One-Minute City*, date: 05.01.2021.

Pier, G. (2004). Antigens, Antigenicity, and Immunogenicity. In: G.B., Pier, J.B., Lyczak, L.M., Wetzler (eds.). *Immunology, Infection, and Immunity*. doi:10.1128/9781555816148.ch8, date: 08.04.2004.

Price, G., van Holm, E. (2021). The Effect of Social Distancing on the Early Spread of the Novel Coronavirus. *Journal of Social Science Quarterly*. doi:10.1111/ssqu.12988.

Salama, A. (2020). Coronavirus questions that will not go away: interrogating urban and socio-spatial implications of COVID-19 measures. *Emerald Open Research*, 2. doi:10.35241/emeraldopenres.13561.1.

Wasdani, K., Prasad, A. (2020). The impossibility of social distancing among the urban poor: the case of an Indian slum in the times of COVID-19. *Journal of Local Environment*, 25(5), pp. 414–418. doi:10.1080/13549839.2020.1754375.

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