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Urban Issues During the COVID-19 Pandemic in Jordan: Case Study of Amman City

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Abstract

Urban planning has always reflected the major crises and technological developments. Throughout history, the most noteworthy advancements and innovations in urban planning have occurred in reaction to serious public health pandemics. The Covid-19 pandemic affected our negligent strategy to resilience in urban planning. The Covid-19 outbreak has touched everyone internationally and has caused us to rethink our lifestyle. This current crisis sheds new light on a number of challenges regarding urban planning. The Covid-19 pandemic has the potential to significantly change urban planning and the existing way of living. This situation demands understanding the obstacles faced, the mistakes, and the undiscovered opportunities in order to allow the construction of epidemic resilient communities. Therefore, this research is set out to investigate the impact of Covid-19 pandemic on urban planning. Taking into consideration several problems brought by the crisis, with an emphasis on the urban planning context and the changes taking place in the planning sector, this study followed the case study approach focusing on Amman – the capital city of Jordan. Urban planning in Amman has witnessed many spatial planning issues during the recent pandemic. Results indicated that we should rethink the current urban design and planning strategies to bring forth a new phase of sustainable and resilient urban cities which will enhance resilience to emerging future disease outbreaks.

Introduction

Urbanization is a major accomplishment of contemporary societies and a necessary element for social and economic growth [1], [2]. Still, it is also considered as an accelerant of infection illness and pandemics [2], [3]. Pandemics have influenced how cities are designed and built [4]. A "pandemic", as defined by the World Health Organization (WHO), is the worldwide spreading of a new illness [5], [6].

Cities have developed over time to address issues of hygiene, sanitation, and health access while also offering space and various opportunities for city inhabitants. Already from the devastating cholera outbreaks in mid-nineteenth century in London to the notorious "Typhoid Mary" pandemic barely over a century ago in New York City, diseases have had a profound influence on contemporary urban planning, design, and development. Our reactions to the spread of such illnesses have mainly resulted in better, safer urban settings during the previous two centuries. The Covid-19 outbreak, like previous comparable occurrences, is compelling us to reconsider the nature of urban space and provides a chance to build for safer, more sustainable communities.

Cities such as Amman, the capital of Jordan, which battle between both the ideals of regulated urban growth and the realities of informal development, are facing the question: What could be done to improve the designed physical environment's resilience?

Jordan established a state of emergency with the passage of the National Defence Law in response to the COVID-19 pandemic in 2020. The lockdown was considered as one of the toughest internationally, with strict limits on people's mobility imposed for more than two months. Amman, Jordan's capital and home to 40 % of the nation's population, or 4 million inhabitants, as well as responsible

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for 80 % of its economic resources, was severely damaged. The city's design is characterized by a lack of public space and limited access to local healthcare services, restricting individual neighbourhoods' self-sufficiency and severely impacting quality of life and resiliency.

Therefore, this paper aims to address the urban planning issues in Amman city during the Covid-19 pandemic, while also identifying key recommendations for critical modifying or altering conditions for future urban development.

I. Literature Review

A. Cities and Pandemics

The ongoing crisis acts as a reminder that the development of cities is inextricably linked to the history of disease [2]. Cities provide a target-rich setting for illness, viral spread, plagues, and pandemics due to the dense concentrations of people who live and work alongside. Urban death penalty existed because ancient cities had high rates of fatalities.[2], [4]. During pandemics, the urge to escape the city was a recurring motif. The backdrop for Giovanni Boccaccio's Decameron is an epidemic in Florence in 1348 [7]. He narrates the story of ten young individuals who move to a villa to live away from the town. They tell stories to one other to pass the time in their self-imposed confinement. It served as the inspiration for Chaucer's Canterbury Tales as well as other examples in world literature, television, and cinema [2]. Isaac Newton remained quarantined in 1665 in his family property, quite far away from Cambridge to avoid the bubonic plague [5]. Newton discovered calculus and laid the groundwork for the Newtonian world during his quarantine. He established a high standard for scholars working from home nowadays, proving that quarantine is not an obstacle for productive work and even inventions.

Furthermore, diseases and pandemics had a significant influence on the development of urban environment. Parks, public squares, and promenades, for instance, were early attempts to offer healthier urban areas in European towns [2]. The emergence of the public health concept in the 19th and 20th centuries had even higher impact on the approach to urban planning [8]. Public health efforts were attempts to find solutions for cities to deal with infectious and deadly illnesses [8].

Cities became proving grounds for the advancement of public health. One of such cases is John Snow's 1854 maps of cholera in London's neighbourhoods [9]. Cities were designed to supply safe drinking water, eliminate waste, and treat sewage. To some extent, the contemporary metropolis was reinvented, reengineered, and rebuilt in response to the threat of illness [9]. The significance of cities as separate political entities in reacting to pandemics is extensively documented in the case of the 1918 flu outbreak and for H1N1 [2], [4], [9], [10].

Infectious disease reactions have transformed cities previously and will continue leading to transformations in the future. The contemporary urban world population was predicted to reach its peak in 2021, with all population increase occurring in cities [2]. The context for this and other current epidemics is international urbanization, with concomitant land-use change and increased worldwide connectedness.

According to a recent research, the loss of natural ecosystems increases the quantity of disease-carrying rats, bats, as well as other animals [2]. Conversion of natural regions eliminates the number of big species, enabling population growth of the smaller creatures, including such as rats and bats, which transmit most of the diseases. People are exposed to significant human-pathogen interactions, and cross-species spillover effects inside the Anthropocene. Wild animals are responsible for more than 60 % of emerging infectious illnesses [2], [4], [10].

The expansion of urbanization, in conjunction with commercial agriculture, alters natural regions and raises the potential of novel viruses against which we have no protection. Large towns surrounded by agricultural land-uses, especially in tropical climates with greater mammalian variety, have a greater risk of human emerging serious diseases [3]. The Covid-19 virus highlights the zoonotic hazard posed by the conversion of wildlands to farming, urban areas, and pasture. The interconnectedness of global urbanization is also a significant contextual element [2].

Disease transmission is influenced by the space–time convergence of metropolitan environments. Considering greater and faster global travel between urban regions, local outbreaks may quickly become epidemics, which can lead to international pandemics. For example, in the first two weeks of January 2020, there were 1300 flights from China to the United States, carrying 380 000 passengers, including 4000 from Wuhan [2], [5]. Covid-19 was brought to the United States from Europe as well [2], [5]. The severe impact on New York City was most likely caused by an aviation passenger corridor connecting China, Italy, and the United States [2]. The infection propagated to the neighbouring areas from these worldwide centres. It was the more affluent global visitors, the rich cosmopolitans, who introduced the illness to numerous places. In Houston, for instance, the disease arrived with foreign visitors and first affected white, wealthy neighbourhoods before spreading to lower-income, minority populations [3]. A similar scenario took place in many cities all over the globe [2]. Globalization has made foreign travel less expensive, simpler, and much more common. The virus was planted and spread worldwide within months, if not weeks, following the initial occurrence. It took place against the

backdrop of a modernized world. Cities are home to most of the global population (55 %) (World Health Organization, 2020). Rapid growth is explained by people expectations that cities would provide greater opportunities, quality of life, jobs, and access to better facilities and commodities. Cities have become densely populated areas, and thus became a stage where disease may transmit rapidly and efficiently [2].

B. COVID-19 and Urban Planning

Physical actions, including such as quarantines, social distance, and a limitation in use of public places to limit the spreading of the Covid-19 virus have had a significant influence on urban centres and cities that rely on social connections and crowding [5], [7].

Corona virus (Covid-19) is an infectious illness caused by corona virus 2, which was identified lately (SARS-CoV-2) [7]. "As in two preceding instances of emergence of corona virus disease in the past 18 years; SARS (2002 and 2003) and Middle East respiratory syndrome (MERS) (2012 to the present), the Covid-19 outbreak has posed critical challenges for the public health, research, transportation sector, medical communities and livelihood means" [7]. Covid-19 was classified a pandemic by the World Health Organization (WHO) on March 11, 2020 [7].

According to the Intergovernmental Science Policy Platform on Biodiversity and Ecosystem Services "there is a single species that is accountable for the Covid-19 epidemic – humans" [7]. As the world's population has nearly tripled and the global economy has nearly quadrupled, rural to urban migration has led to significant changes in urban patterns, demography, and consumer behaviours [7]. There are three types of significant changes in our urban lifestyle which have both direct and indirect contribution to the present crisis.

The first type is environmental changes. Human habits, which are influenced by the wish to increase territories for urban population, agriculture, entertainment, and industry, have led to the depletion of forests and other nature reserves [7]. As a result, society has deteriorated natural barriers among animals and humans, as well as sensitive ecosystems and fauna. Changes in temperature and humidity are caused by climate change and carbon dioxide emissions that have a significant impact on microbial survival. According to a recent UNEP and ILRI zoonotic fast assessment, plagues are becoming more common as the climate continues to change [2], [7].

The second type is behavioural changes that have developed from increased demand for animal products, resulting in the growth of uniform farmland and intensive livestock husbandry in rural regions and near towns. Wet markets, where wild animals are bred and sold in frequently filthy and unhygienic circumstances, necessitate special attention [7]. According to a 2017 IPBES analysis, genetic diversity increases disease resistance in animal populations and reduces the risk of epidemics of high-impact animal illnesses. Intensive livestock husbandry, on the other hand, might result in genetic similarity across herds and flocks, lowering resistance and making them more susceptible to diseases. As a result, humans are put at a larger danger [7], [11].

The third are pathogen changes. Pathogens are growing more resistant to the treatments that were once successful in treating zoonotic illness due to more intensive farming and usage of antimicrobial agents for both animals and humans [5], [7]. Due to overcrowding, lack of resources, and poor hygienic standards, many of urban inhabitants in developing nations are especially vulnerable to airborne contagions both at home and in public [12].

Although many of the decisions and suggestions mentioned earlier in this study are also relevant for cities in the developing world, one of the main issues for impoverished families, most of whom live in informal squatter settlements, including such as Dharavi in Mumbai or Kibera in Nairobi or Jordan in west Amman, is access to essential services including clean water and sanitary facilities without exposing themselves to CovidD-19 [13]–[15]. The danger of catching and transmitting the Covid-19 virus is extremely high in the poorest regions, where large groups of people must share a small amount of water distribution and/or bathroom services [4], [16].

II. Methods

As this research aims to investigate urban planning issues, challenges, obstacles, and opportunities during Covid-19 pandemic in the developing countries, the study followed the case study approach. This method is "an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not obvious" [17], [18]. The case study approach is regarded as a method that is deliberately chosen to cover contextual conditions, such as the entangled relations of the phenomenon with its context or the presence of much more variables of interest than data points.

The case study approach is mainly a method that helps researchers to maintain the holistic and substantive properties of real-life events when studying a particular phenomenon [17]. Accordingly, this research adopted the case study approach to address and identify urban issues during the Covid-19 pandemic within its real-life context of Amman, Jordan. In doing so, the study adopted primary and secondary data regarding the case study of Amman city, and they were developed as follows:

- Primary data included semi-structured, face-to-face interviews with Jordanian architects and stakeholders, who are involved in urban loaning and design strategies.

- The secondary data included official statistical demographic information: population data, facilities and services, and social data. In addition, a greater Amman municipality report provided district and community details and maps, as well as information on urban initiatives and policies.

The interviews targeted different stakeholders with different ideas and thoughts to get responses based on diversified knowledge and experience. The selected interviewees varied from novelist, architects, urban activists, and architecture professors, each of them having various levels of engagement within the topic.

Twenty-five interviews were conducted in March 2021. The main objective of the interviews was to obtain more information and interpretations about the topic and context of the study. In this regard, the questions were oriented to find out more about the issues and difficulties of urban planning during the Covid-19 pandemic. The discussed topics included city density issues, inclusiveness, public spaces and streets, Amman healthcare system and strategies, and migrant population movement, as well as travel and tourism issues during the Covid-19 pandemic. Therefore, average length of each interview was 45 minutes. The semi-structured interviews were based on a directed method defining the key topics to be discussed in the interview in advance. Moreover, digital recording and note taking methods were both adopted, when possible, to document the dialogue that took place during the interview and provide a permanent and full record to refer later.

C. Case Study of Amman City in Jordan

Since the foundation of Transjordan in 1921, a number of development plans have been launched in Amman, Jordan's capital city, with varying degrees of concentration on development projects and parcelling, reflecting the city's planning and openness [19]. Despite the fact that several planning projects accompanied the master plan of 1955, the first comprehensive master plan for the metropolitan area was not really finished till 1988 [20]. The concept, with the exception of spin-off initiatives, was mostly unrealizable. The current master plan, completed in 2008, attempted to break away from traditional planning by adopting a more strategic approach. Despite this, its implementation has been restricted, and urban issues attributable to poor implementation have remained [19]–[21].

Recently, due to the Covid-19 pandemic, cities all around the world are struggling with urban development challenges that are becoming increasingly pressing. The Covid-19 crisis has both emphasized and worsened the need for urban planning methods to be reconsidered. The crisis in Amman city has highlighted the limitations of the built environment and prompted new thinking about urban design at the city and neighbourhood levels [15].

The Greater Amman Municipality (GAM) published a study in 2021 entitled Amman City's Institutional Performance and Covid-19 Resilience to better analyse the city's reaction to the crisis and highlight neighbourhood-level risks. The study investigated data on mobility, access to services, and air quality, revealing that most neighbourhoods had limited access to everyday amenities such as grocery and healthcare as shown in Figs. 1, 2, and 3. When the lockdown was activated, all non-motorized movement was prohibited. The city's layout is characterized by a lack of public space and limited access to local healthcare, which leads to restriction of particular neighbourhoods' self-sufficiency and negatively impacts quality of life and resilience [15].

As a result, and within those circumstances, planners now have the chance to reconsider established approaches and look for new methods to make planning more effective and implementable. Education of planners regarding these new circumstances is a long process, but it begins with the recognition of the present planning system, as well as the present planning models that have developed through time, analysing also what has not worked well in the past and is inappropriate for the current situation.

III. Results and Discussion

The pandemic's exposure of general planning risks, along with GAM's valuable diagnostic report and

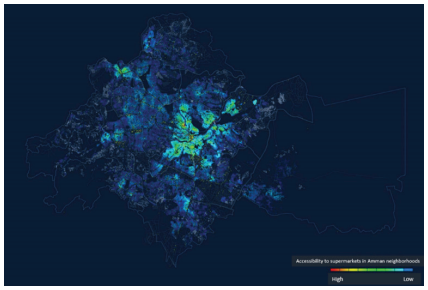


Fig. 1. Accessibility to supermarkets in Amman's neighbourhood [15].

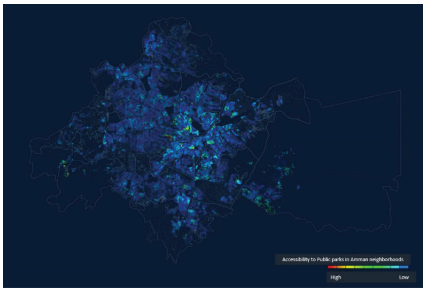


Fig. 2. Accessibility to public parks in Amman's neighbourhood [15].

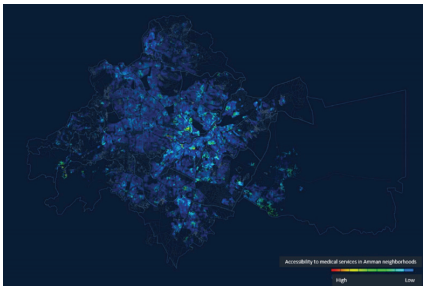


Fig. 3. Accessibility to medical services in Amman's neighbourhood [15].

TABLE I

Summary of Interview Findings [developed by the authors]

Aspects	Number of interviewees	Profession of interviewees	Statement
City density	8	Stakeholders	Densification plans must be revisited by municipal governments to better comprehend congestion and land usage.
	5	Architects	
	7	Architectural lecturers	
Public spaces & streets	5	Stakeholders	Emphasized the importance of considering new methods in public space design, with a focus on resilience.
	15	Architects	
	5	Architectural lecturers	
Health- care systems	6	Stakeholders	Rising investments in digital platforms and a growing reliance on artificial intelligence (AI) for telemedicine-based therapy.
	10	Architects	
	5	Architectural lecturers	
Travel & Tourism	15	Stakeholders	Attractions and the tourism infrastructure system are being rebuilt. Support and rehabilitation strategies must be implemented.
	7	Architects	
	6	Architectural lecturers	

interview results (Table I), allowed development of urban planning recommendations and strategies for Amman city. According to fifteen interviewees, a greater emphasis on localized analytics might assist in understanding how effectively the present built environment operates by evaluating the gap between planned objectives and inhabitants' personal experiences. The popularization and integration of evidence-based analytics inside GAM will be critical for day-to-day activities as well as medium- and long-term planning initiatives. Furthermore, rethinking of the entire planning strategy is important for the city if post-pandemic planning efforts are to be managed effectively.

One of the most important recommendations in the city's report and stakeholders' interviews is the establishment of a new master plan for Amman city. Nonetheless, despite the implementation of at least two master plans in the meantime, the same urban issues have remained for more than four decades. This suggests that a new master plan is not the best solution for the mentioned issues. Instead, Amman's urban issues may be ascribed to poor execution of earlier plans, or even to unsuitable measures recommended in them entirely. Furthermore, recommendations for new resilient urban design strategies in Amman city are defined in four key planning elements, as indicated below.

D. City Density

One of the most serious flaws exposed by the pandemic is the rapid spread of viruses in densely populated cities. People interact more in densely populated neighbourhoods, making them potential centres for the rapid spread of disease outbreaks. Previously, density has been seen as a technique for determining how many people inhabit any given amount of land. However, the Covid-19 pandemic has prompted us to reconsider density by considering the type of density. The concept of crowding is factored into this typification: the amount of interior space available to affect the degree of interaction between a group of individuals across a specific area of land. Density may not always indicate crowding. Singapore and Mumbai, for instance, have nearly the same density, yet Singaporeans have over 10 times the built-up area per person. Although Amman's metropolitan density in 2017 was 260 people per square kilometre, some of its districts, such as the Marka district, reached 48 000 people per square kilometre, as can be seen in Fig. 4.

Ten interviewees suggested that densification plans must be revisited by municipal governments to better comprehend congestion and land usage in residential, commercial, and office zones, as well as in public areas. They also recommended that knowledge management be used

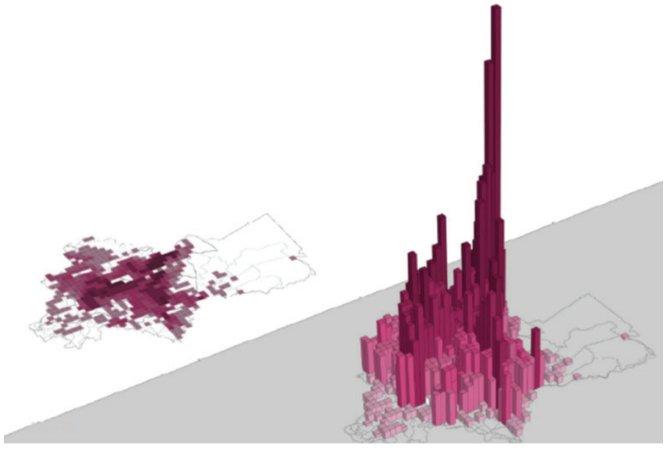


Fig. 4. Left – density map of Amman's neighbourhoods; right – maximum density in Marka neighbourhood at 48 000 persons/km^2 [15].

to better identify density and crowding vulnerabilities, as well as neighbourhood-level measures that may be used to assess vulnerabilities and operationalize healthy levels.

E. Public Spaces and Streets

Currently in Amman, there are no formal rules for urban street layout. Amman's streets are primarily filled with street merchants, beggars, hawkers, and so forth. GAM's important diagnostic analysis, as well as the interviews, indicate that all roadways and walkways should be at least the minimum width required by the planning regulations.

As the availability of public space has implications, such as fewer car corridors, efforts will be required to reduce the number of cars in the city and develop a better transit system. Achieving this goal promises to minimize congestion, boost efficiency, and improve well-being by lowering the risk of infection and improving mobility.

Fifteen interviewees emphasized the importance of considering new methods in public space design, with a focus on resilience. This requires ensuring the healthy design and distribution of public spaces to enhance accessibility in neighbourhoods and provide open-air recreational activities for well-being, thereby mitigating lockdown impacts.

F. Healthcare systems

Worn-out hospital buildings, as well as physical and mental exhaustion among healthcare personnel, indicate that healthcare institutions lack the necessary resources to deal with the issue. The growing backlog of procedures in the healthcare industry, has led to the situation when globally, general practitioners' consultations have declined.

Stakeholders indicated rising investments in digital platforms and a growing reliance on artificial intelligence (AI) for telemedicine-based therapy. In addition, increased demand for healthcare professionals' protective equipment would need the creation of alternative supply chains. The future of pandemic-resilient cities is flexible hospital design.

G. Travel and Tourism

Tourism also was affected by the global pandemic, threatening millions of jobs around the world in one of the most labour-intensive sectors of the economy. According to the World Tourism Organization figures, the epidemic has resulted in a significant decrease in foreign visitor arrivals by the beginning of 2020. This has had an impact on many people's lives who rely on the sector.

GAM's important diagnostic report, as well as the interviews have indicated necessity of re-thinking the tourism sector. As a result of the crisis, the tourist sector now has the chance to explore a more sustainable and resilient future. In addition, attractions and the tourism infrastructure system are being rebuilt. Support and rehabilitation strategies must be implemented, giving priority to the issues of accessibility, connection, and transportation.

IV. Findings and Conclusion

This study investigated the impact of Covid-19 pandemic on the current urban planning strategies in Amman city. The performed analysis faced many limitations: 1) the current pandemic is still unfolding, with no way of knowing what will happen in the long run; 2) the shortage of literature on the effects of Covid-19 in urban environments, design, and planning. Most of the literature published in response to the epidemic is concerned with public health challenges.

Despite these limitations, this research showed that pandemics actualized previously existing and the new concerns, including such as urban resilience to future epidemics.

The research discusses some of the short-term consequences as well as some of the long-term implications for city design, planning, and living in cities. We do not yet know all of the pandemic's long-term consequences and whether it will change cities in the future. Nevertheless, we have already started to see some changes. There is evidence that Amman's layout is characterized by a lack of public space and poor access to local healthcare, limiting individual neighbourhood's self-sufficiency and negatively influencing quality of life and resilience.

After investigating and evaluating the situation of the mentioned planning aspects pre- and post-crises, the final section of the research provided suggestions and recommendations for strategic planning in Amman city to add resilience to a range of selected planning areas including density, public spaces and streets, healthcare systems, as well as travel and tourism.

Recommendation

Even though Covid-19 has confirmed to be a significant challenge for urban infrastructure, adaptation of science-based best practices and regulations, as well as planning in support of public health now and in the future, gives opportunities for urban areas to remain resilient and thriving throughout this globalized era.

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