

The Ability of Cities to Withstand the Disasters of Pandemic

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Abstract

This study examines the opportunity presented by the COVID-19 pandemic for city planners and leaders to learn from the crisis and build resilient cities with long-term societal, economic, and environmental resilience against future disasters. The research focuses on the relationship between urban planning and policies and the extent of their resilience, particularly in response to pandemic-related disasters. The study evaluates the ability of the city of Baghdad to respond to the pandemic and identifies gaps in its resilience. The study uses the scorecard measurement instrument to examine the disaster resilience of cities, with a focus on governance and financial capability, disaster planning and preparedness, and disaster response and post-event recovery. The study finds that the primary gap between the level of governance and the financial capacity of the city of Baghdad is the lack of financial capacity and the inability to recognize and comprehend existing and future risk scenarios. The study also finds gaps in planning and emergency preparation, including the incorporation of green and blue infrastructure into policies, plans, and projects, and the inability of infrastructure to bear transportation, healthcare, and education facilities. Finally, the study identifies a gap in disaster response in terms of event management strategies, early warning, and training.

Keywords: City planning, Pandemic, Resilience, Baghdad, Scorecard

1 Introduction

Cities are intricate systems whose features impact the health of their inhabitants. Before the pandemic, cities were making substantial

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investments to enhance their resilience in the face of rising population and environmental issues. Given the emergence of a pandemic and the fact that it is a geographical act, it combines several sorts of events and dangers, each with its severity, frequency, and features, and each type of event demands its ideal planning and response approach.

Despite cities' efforts to increase their resistance, the COVID-19 pandemic has had a social and economic impact on cities. It showed the inherent vulnerability of urban infrastructure. As the virus spreads, governments and healthcare institutions struggle to develop and implement measures that effectively minimize transmission. Responses to the epidemic differed substantially from nation to country, country to country, and even city to city, depending on the regimes' power structures and their prior investments in resilience. In light of the preceding, the investigation offers light on this matter. It focuses on the actions necessary to decrease the pandemic's impacts and crises and to improve resistance to urban epidemics before they become pandemic.

2 Literature review

2.1 Epidemics and their risks

The terms disease, epidemic, and pandemic are all related to the occurrence and spread of a health condition. These terms refer to situations where the rate of a particular disease exceeds what is expected, and they are also associated with the geographical spread of the disease. An epidemic occurs when a disease outbreak affects a larger geographic area than expected. A pandemic, on the other hand, is an epidemic that spreads beyond national borders and affects people globally (Afrin et al., 2021a) and exceeds normal expectations in its impact on a large number of people (Afrin et al., 2021b), which can significantly increase mortality rates and cause significant economic, social, and political disruption (Bell et al., 2009). Pandemics have been a recurring feature throughout human history. The shift from hunter-gatherer societies to agricultural societies contributed to the spread of infectious diseases among humans. Increased trade and travel between societies have also resulted in more frequent interactions between humans and animals, leading to the transmission of zoonotic pathogens (Aya Hassan Saddam & Amer Shakir Alkinani, 2021). Additionally, the growth of cities has extended trading routes and increased human mobility. With the increase in population, there has also been a greater impact on environmental systems, further increasing the risk of infectious disease outbreaks and the potential for pandemics (Brand FS & Jax K, 2007). The risk of an epidemic developing into a pandemic is primarily due to the combined effects of the likelihood of the epidemic occurring and the potential for it to

spread widely among the population. Evidence suggests that the likelihood of epidemics has increased over the past century, as a result of increased travel, global integration, and urbanization. In addition, changes in land use and greater exploitation of the natural environment have also contributed to the increased risk of epidemics. These factors have created a perfect storm for the emergence and rapid spread of infectious diseases, making it more important than ever to develop effective strategies for preventing and responding to pandemics. (Carpenter et al., 2001). The spread of epidemics can lead to the emergence of pandemics due to their widespread impact on multiple levels, including the demographic level. Epidemics often result in a significant increase in mortality rates, and when they spread across a larger geographic area, this can have a devastating impact on the population. In some cases, this increased mortality can be a precursor to a pandemic, which occurs when the epidemic crosses national borders and affects people globally. Therefore, it is crucial to prevent the spread of epidemics in order to reduce the risk of them escalating into pandemics (Connolly et al., 2020). In addition to the health impacts, epidemics can also have significant economic and social consequences. These can range from short-term financial shocks to long-term negative effects on economic growth. Individual behavioral changes resulting from fear, such as avoiding public places, can have a direct impact on social interactions. Measures taken to mitigate epidemics, such as quarantines and physical distancing, can also have significant social and economic impacts, including disruption of businesses and loss of jobs. It is essential to strike a balance between implementing effective measures to prevent the spread of epidemics while minimizing the adverse economic and social consequences. (COVID-19 Dynamic Infographic Dashboard Iraq 2020-2022, n.d.)

2.2 The pandemic and the city:

Throughout history, epidemics have had a significant impact on human life, shaping community relations, health systems, and city development. The oldest recorded epidemic dates back to 430 BC, and since then, numerous outbreaks have occurred, each with their unique impact. The most recent and widespread epidemic is the COVID-19 pandemic, which has affected people worldwide and has challenged governments and healthcare systems. Despite advances in medical science, epidemics continue to pose a significant threat to human health and have significant social and economic consequences (Morse, 1995). The current pandemic serves as a stark reminder that the history of cities is intrinsically linked to the history of disease due to the dense concentrations of populations living and working in close proximity. These densely populated areas can create environments that are particularly susceptible to the spread of diseases and viruses,

making them a rich target for epidemics. This connection between cities and disease has been observed throughout history, from ancient civilizations to modern times, highlighting the importance of effective public health measures to prevent the spread of disease in urban environments (Piret & Boivin, 2021). Monitoring the impact of diseases, infection patterns, and death rates has always been a crucial aspect of public health, and remains a major concern for regional and urban management today. In response to emerging health crises, officials, urban designers, and citizens have developed curricula, institutions, and systems since ancient times to address these issues. This has led to the development of physical planning, the provision of basic infrastructure, and housing regulations with rules, instructions, and restrictions to prevent the spread of infection. These efforts have been crucial in reducing the impact of epidemics on human health and wellbeing, and serve as a reminder of the critical importance of investing in public health and infrastructure to ensure the resilience of urban communities (Jones et al., 2008).

The COVID-19 pandemic has triggered the worst public health crisis in a century, with cities serving as the first line of defense in response. The virus has spread globally through travel, trade, and movement, resulting in a staggering number of infections and loss of life. The restrictions implemented to contain transmission, such as lockdowns and curfews, have caused local economies to come to a halt, leading to a decline in GDP, unemployment, underemployment, and social isolation. The costs of the pandemic have been immense, with far-reaching health, social, and economic impacts. In normal times, cities compete on global benchmarks such as livability, competitiveness, and sustainability. However, in the wake of the pandemic, preparedness and response capabilities have become the key determinants of competitiveness. The strength of the urban economy, institutional capacity, political will, and other locally determined factors are crucial, as is the direction and support provided by national governments (Afrin et al., 2021a). Cities are adaptable and can use critical episodes as opportunities to reshape and reimagine their planning to ensure the safety of their inhabitants. Thus, how cities monitor, handle, and respond to crises is vital and can pave the way for resilience and sustainable recovery in the future. Therefore, the research will focus on the concept of cities' resilience in facing epidemics to demonstrate the extent of their ability to recover and undergo positive transformation.

2.3 Cities' resilience to the pandemic

The COVID-19 pandemic has exerted external pressure on several components of the city, with direct impacts on technological, economic, and human factors. It has accelerated significant societal changes in the way we live and work, leading to radical

transformations in urban lifestyles worldwide. Consequently, the emergence of COVID-19 has renewed interest in the vulnerability of cities to epidemics and pandemics. In order to effectively address this emergency, it is crucial to have knowledge of the pandemic patterns, dynamics, and its impacts on cities, as well as the necessary preparedness, response, and adaptation measures (Martínez & Short, 2021). Numerous research studies have been conducted to evaluate the impacts of different types of disasters on urban areas, as well as to plan and adapt to them. This has resulted in the emergence of the concept of resilience in response and recovery approaches, which aims to build the resilience of cities to pandemics and other large-scale crises (Martínez & Short, 2021).

The concept of resilience is crucial in addressing the impact of pandemics on urban areas. Resilience refers to a system's ability to absorb disturbances and maintain its state, self-regulate, and learn and adapt. Through resilience, cities can prepare for and respond to pandemics effectively. By building resilience, cities can become better equipped to cope with future pandemics, minimize damage, and recover quickly. The development of resilience requires a comprehensive approach that encompasses a range of factors, including governance, infrastructure, social systems, and economic systems (Sharifi & Khavarian-Garmsir, 2020). Resilience in the context of a pandemic can be described as a city's capacity to withstand shocks and disturbances without undergoing significant changes in its functioning and structure. In essence, it refers to the ability of urban environments to absorb and adapt to the impacts of a pandemic without experiencing catastrophic effects on their systems and services (Sharifi & Khavarian-Garmsir, 2020). The introduction of resilience to Disaster Risk Management (DRM) offers a significant advantage in terms of creating DRM strategies through conceptual and systemic implications, leading to a paradigm shift. This approach emphasizes the importance of building the capacity to withstand, adapt to, and quickly recover from disruptive events, rather than focusing solely on preventing or mitigating their effects. Therefore, it provides a more comprehensive and integrated approach to DRM, considering social, economic, and environmental aspects and recognizing the complexity of disasters and their impacts on urban areas (Connolly et al., 2020). Viewed through the lens of resilience, the response of urban preparedness and emergency governance to communicable diseases, including the COVID-19 pandemic, has revealed significant gaps and difficulties (Tian et al., 2020). A better comprehension of urban resilience during health emergencies can provide guidance for social and economic recovery after a disaster and identify essential factors and challenges that need to be addressed during a pandemic disaster. Unlike natural disasters, the effects of

epidemic disasters are not usually beyond human control, and their duration may vary depending on the preparedness and interventions taken in urban areas (Peak et al., 2020). Flexibility should be proactive rather than reactive. In many cases, a city's emergency response system is primarily focused on rescue efforts during a crisis, rather than on recovery and post-disaster reconstruction. Therefore, it is important for cities to design emergency response plans that prioritize resilience and preparedness, rather than just reactive measures (Zhou et al., 2020). To accurately define a city's resilience against the pandemic, a thorough understanding of its systems and their functions at each stage is crucial. This understanding is essential in enabling effective response strategies and ensuring a swift recovery. Therefore, the following phases represent key factors in a city's ability to withstand a pandemic:

2.4 The response phases

To achieve an effective response to a pandemic, it is crucial to adopt a monitoring approach that integrates various programs such as the public health system and infrastructure. In addition, it is necessary to evaluate different aspects of urban livelihoods, including financial, social, political, physical, and natural assets, in order to identify areas of vulnerability that may be affected by pandemic-related stresses and shocks. These shocks and stresses can be triggered by various factors operating at the local and national levels, and can impact different urban groups. The response phase should include an early adaptation strategy for pandemic preparedness programs (Bell et al., 2009).

2.5 Dilution stage

The mitigation phase of a pandemic response aims to address urban challenges in densely populated areas that have resulted from the outbreak. Factors like excessive connectivity, inadequate sanitation, and limited water supply can all contribute to increased vulnerability. To improve pandemic management, new technological approaches can be introduced during this stage. The mitigation phase can be broken down into physical and non-physical dimensions, each of which is critical to reducing the impact of the pandemic on urban environments (Lak et al., 2020). To mitigate the impact of a pandemic, the physical environment plays a crucial role in the response and recovery phases. The built environment, transportation accessibility, land use, and infrastructure are key physical characteristics that must be considered (Tambo et al., 2018). The COVID-19 pandemic has highlighted the importance of considering not only the physical environment but also the social, economic, cultural, and governance aspects in building resilience. This non-physical environment plays a crucial role in the effectiveness of the public health system and its ability to tackle various challenges. It is essential to integrate cost-effective measures in the response and recovery phases to support

these non-physical characteristics and enhance urban resilience in the face of pandemics (Tambo et al., 2018).

2.6 Preparedness stage

The preparedness phase aims to enhance people's ability to withstand any disease outbreak. Some cities that have previously experienced disease outbreaks have developed reliable surveillance systems using digital information. These systems help track the spread of the disease, identify high-risk areas, and inform the public about preventive measures. Additionally, effective communication and collaboration between government agencies, healthcare providers, and the public play a critical role in preparedness. Building public awareness through educational campaigns and emergency drills can also contribute to enhancing preparedness for pandemics (Tang et al., 2018). The use of complex simulations in urban areas is crucial to model the pattern of disease transmission and identify effective health measures to prevent disease transmission. This approach can help cities to prepare and respond to pandemics more effectively. By simulating disease outbreaks, policymakers and public health officials can test various scenarios and evaluate the effectiveness of different strategies in containing the spread of the disease. This can help cities to identify gaps in their preparedness and develop better pandemic response plans. Additionally, simulations can be used to communicate risk and potential impacts to the public, enabling them to make informed decisions and take appropriate actions to protect themselves and their communities (Ahn et al., 2018). One of the most significant challenges posed by the pandemic is finding ways to balance the need for social interaction and economic activity with the imperative of reducing face-to-face interactions to limit the spread of the disease. To address this challenge, people have turned to technology to facilitate virtual communication and maintain their social and economic connections. This has led to the development of new virtual platforms and tools for communication and collaboration at the local, regional, national, and global levels. However, there are still limitations to virtual communication, and it is important to find ways to ensure that it remains effective and accessible to all (Ahn et al., 2018; Antonio Bocca, 2021). Thus, these procedures can be useful for planning the preparedness phase.

To measure the aforementioned three stages, it is necessary to address the tools for measuring the ability of cities to withstand disasters.

2.7 Resilience measurement frameworks and tools

In recent years, there has been a growing interest in developing frameworks and tools to measure and report on resilience. There are generally two areas of focus in this regard. The first area pertains to

cross-sectoral frameworks, which typically take a high-level view and seek to assess resilience across various domains such as planning, infrastructure, emergency response, economics, governance, and so on. Often, these frameworks are further broken down into more specific indicators that can be used to develop measurement tools (Lisa et al., 2015). The second area is represented by sector-specific resilience frameworks. These are generally more detailed assessments that focus on one specific sector such as infrastructure, ecosystems, economies, or organizations (Hughes & Healy, 2015). In this context, the research seeks to focus on the "ten essentials" to measure the city's resilience, which are included within the first area represented by the cross-sectoral frameworks developed by the United Nations Office for Disaster Reduction to promote an increased understanding of local governments and their commitment to reduce risks disasters and make cities resilient to disaster risks.

2.8 UNISDR 10 Essentials and Scorecard

In 2010, the UN Office for Disaster Risk Reduction (UNISDR) initiated the Making Cities Resilient campaign to address the increasing risks brought about by global urbanization and to promote the involvement of local governments in risk reduction efforts. The campaign is self-driven, collaborative, and led by cities, with the aim of showcasing the resilience and disaster risk reduction measures implemented by urban communities and local governments worldwide (Wannous & Velasquez, 2017). The Making Cities Resilient campaign was launched by the United Nations Office for Disaster Risk Reduction (UNISDR) in 2010 to address the increasing risks associated with urbanization and to promote the role of local governments in reducing these risks. The campaign is city-led and aims to encourage self-motivation and partnerships to build resilience and reduce disaster risks. Over 3,000 cities have pledged to implement the "10 Essentials" for making cities resilient, which is a checklist of ten key actions for good disaster risk management practices. In 2016, 20 cities piloted new essentials and indicators, and feedback was used to refine and develop final indicators and guidance for the "10 Essentials". The main objective of the new fundamentals is to provide practical and actionable guidance for building resilience (Zhou et al., 2020). The ten essentials serve as a guide for good disaster risk management and reduction practices. They define the elements or characteristics that must be present in a city to quickly absorb or recover from shocks and stresses. Indicators that support these essentials measure whether these characteristics exist and to what extent, providing decision-makers with an indication of the city's resilience. The ten essentials cover three main aspects of disaster risk reduction: increasing governance and financial capacity, integrated planning and disaster preparation, and post-disaster response and recovery. More than 3,000 cities have pledged to

implement these essentials since the launch of the Making Cities Resilient campaign in 2010. The goal of the new essentials is to be actionable, and they were finalized after consultation and pilot tests in 20 cities starting in January 2016. Feedback generated during the pilot studies was used to review the essentials and develop final indicators and guidance.

3 MATERIALS AND METHODS

The practical framework of this research focuses on the city of Baghdad as a case study to illustrate the impact of the COVID-19 pandemic. The study aims to determine the extent to which the city of Baghdad can withstand the pandemic and identify any weaknesses or gaps that could hinder its ability to absorb shocks and recover quickly. To assess the main indicators derived from the ten essentials, a questionnaire was distributed to a sample of specialists from relevant departments and institutions such as the Ministry of Planning, Ministry of Housing, Municipality of Baghdad, constituent municipalities of the city of Baghdad, Baghdad Governorate, and specialized academics. The questionnaire was distributed via Google Form, and the responses were obtained from 50 individuals working in these various government departments and institutions. The sample was categorized based on their respective agencies, as follows in Table (1)

Table 1 Distribution of the sample by employer

Sample employer	the number	The ratio
Baghdad Municipality	14	28%
Ministry of Construction, Housing and Public Municipalities	10	20%
The Ministry of Planning	9	18%
Ministry of Higher Education	10	20%
Baghdad Governorate	7	14%
Final total	50	100%

Source: own preparation based on Authors (2022).

As for the specialization of the questionnaire sample, it was distributed as follows: Table (2)

Table 2 Sample Specialization

Sample Specialization	the number	The ratio
Project Management	6	12%
City planning	20	40%
Civil Engineering	4	8%
Survey engineering	5	10%
Architectural Engineering	12	24%
Other	3	6%

total summation	100%
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Source: own preparation based on Authors (2022).

By calculating the answers to the Likert scale, the following values will be relied upon to interpret the results of the questionnaire. Table (3)

Table 3 Likert scale

Severe	3.25 to 4
Moderate	2.50 to 3.24
Mild	1.75 to 2.49
None	1 to 1.74

Source: own preparation based on Authors (2022).

4 The results of the indicators

After distributing the questionnaires to the selected sample, the results showed the following, table (3) fig. (1)

Table 3. The questionnaire results

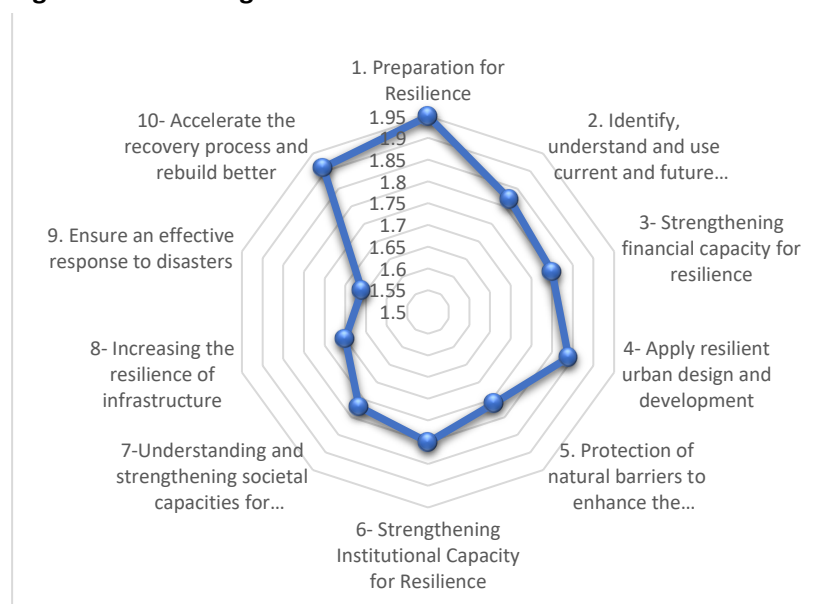
		Severe	Moderate	Mild	None	Average	Average	
Governance and financial capacity	1. Organize for Resilience	Plan Making	4	7	17	22	2.22	1.95
		Organization, coordination, and participation	1	9	22	18	1.86	
		integration	3	3	24	20	1.78	
	2- Identify, understand and use current and future risk scenarios	risks values	2	5	30	13	1.92	1.82
		A shared understanding of infrastructure risks	0	3	32	15	1.76	
		Knowledge of exposure and vulnerability	0	0	30	20	1.6	
		cascading effects	2	0	28	20	1.68	
	3- Strengthening financial capacity for resilience	The process of submitting and updating risk information	5	8	27	10	2.16	1.8
		Knowledge of methodologies to attract new investments to the city	3	6	16	25	1.74	
		Financial plan and budget for capacity	5	3	23	19	1.88	
		Insurance	0	2	38	10	1.84	
	The many	4- Applying	incentives	3	6	16	25	1.74
Zoning according to land			5	3	23	19	1.88	

dimensions of disaster planning and preparedness	resilient urban designs and development	use						
		new urban development	3	3	24	20	1.78	
		Codes and building standards	2	5	30	13	1.92	
		Apply zoning and building codes	0	3	32	15	1.76	
	5- Protecting natural barriers to enhance the protective functions of natural ecosystems	Awareness and understanding of the services and functions of ecosystems	0	0	30	20	1.6	
		Integration of green and blue infrastructure into the city's policy and projects	2	5	30	13	1.92	1.76
		transboundary environmental issues	0	3	32	15	1.76	
	6- Strengthening institutional capacities for resilience	Skills and experience	4	7	17	22	1.86	
		Public education and awareness	1	9	22	18	1.86	
		Share data	3	3	24	20	1.78	1.8
		Provide training	2	5	30	13	1.92	
		Languages	0	3	32	15	1.76	
	7- Understanding and strengthening societal capacities for resilience	Learning from others	0	3	32	15	1.76	
		“grassroots” groups or organizations, networks, and training	4	7	17	22	1.86	
		Social Networks						
		«Ensuring that no one is left behind	1	9	22	18	1.86	1.77
		Private sector/employers	0	3	32	15	1.76	
		Citizen Participation Technologies	0	0	30	20	1.6	
	-8Increasing the resilience of the infrastructure	Critical Infrastructure Overview	0	7	24	19	1.76	
		Protective infrastructure	1	1	18	30	1.46	
		Water - drinking water and sanitation	2	7	16	25	1.72	
		Power	3	4	25	18	1.84	1.7
		Transportation	1	1	18	30	1.46	
		Telecommunications	2	7	16	25	1.72	
		Healthcare	3	4	25	18	1.84	
		Education facilities	2	2	14	32	1.48	

Disaster response and post-event recovery	9- Ensure effective response to disasters	Origins of first responders	6	5	18	20	1.9	1.66		
		early warning	4	2	17	27	1.66			
		Event management plans	3	4	25	18	1.84			
		Recruitment/Respondents Needs	1	1	18	30	1.46			
		Requirements for equipment and relief supplies	2	7	16	25	1.72			
		Food, shelter, essential goods, and supplies	3	4	25	18	1.84			
		Interoperability and work between entities	2	2	14	32	1.48			
		training	3	5	12	30	1.62			
		10- Accelerate the process of recovery and rebuilding better	Post-event recovery planning - before the event	1	4	24	21		1.7	1.91
		Lessons Learned - Learning episodes	7	3	27	13	2.08			

Source: own preparation based on Author (2022).

Fig. 1 Results of Baghdad's resilience



Source: own preparation based on Authors (2022).

5 Results:

The results are drawn from the governance and financial capacity of the city of Baghdad to face the pandemic disaster

The results of the questionnaire showed the following results at the level of the first level, represented by the governance and financial capacity of the city of Baghdad to confront the pandemic, as follows:

5.1 The first essential:

The preparation for the ability to withstand the city of Baghdad got an average of (1.95). It includes three indicators, the results showed that the first indicator is the development of the plan that the plans and visions partially include risk factors, but they are not clear and not activated. Stakeholder participation is taken into account, but partially and ineffectively. And the process of reviewing plans takes place, but over spaced periods of time, which negatively affects the plan. While the second indicator: is the organization, coordination, and participation of city teams that have authority and powers, the results indicate that there are no plans to coordinate pre-event planning activities, the leading agencies lack appropriate authority, their resources are insufficient, and contributions between sectors are limited. As for the third indicator: Inclusion, the results showed that the integration of resilience with initiatives is applied in an ad hoc manner or sometimes not implemented.

5.2 The second essential:

identifying, understanding, and using current and future risk scenarios, with an average of (1.82). It includes five indicators, as the results showed that the first indicator: is the assessment of risks and the extent to which recent estimates have been reviewed by experts of the probability of occurrence of known risks and their extent. The results indicated that there is only a general idea about the risks without systematic attempts to determine the extent of their probability of occurrence. As for the second indicator: knowledge of exposure and its consequences, there is only a general idea of exposure scenarios and vulnerability without systematic attempts to determine their effects. With regard to the third indicator: successive or interrelated effects, improvement equipment, and modernization to increase the capacity of the infrastructure to withstand disasters. The sample indicated that there are large gaps according to the region, or according to the infrastructure system. There is no prioritization strategy. The fourth indicator: the existence of hazard maps showed that work is being done to develop hazard maps and related guidelines that guide urban planning and development that take risks into account. It is currently being developed that it is the successive effects

of disasters that there is no clear understanding by the competent authorities of their successive effects on the city. As for the fifth indicator: the process of presenting and updating risk information, the results indicated that the processes are primitive at best, and a full risk assessment must be completed.

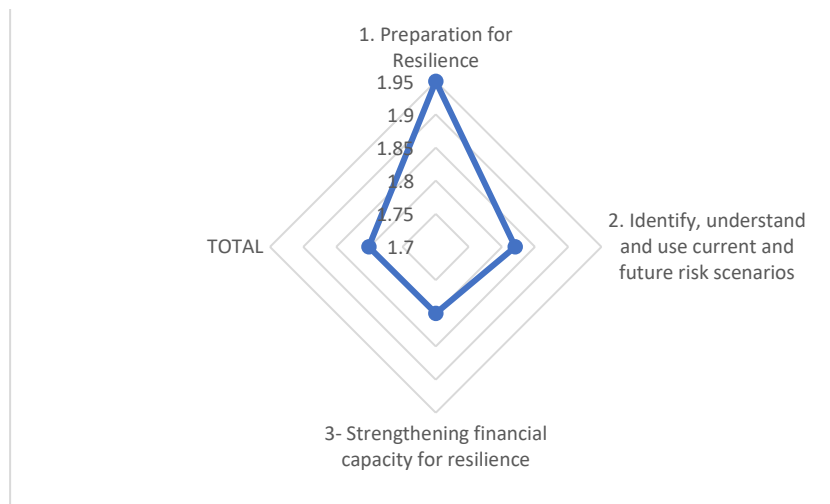
5.3 The third essential:

Enhancing financial capacity for resilience got an average of (1.8), which included four indicators. Poor or partial knowledge of funds available for response and recovery. The second indicator: is the resilience budget within the city's financial plan (including emergency financing funds). The results indicated that there are several financial plans from different parties, and they have not been coordinated, and there is no budget for financing operating expenses according to the estimated costs. The third indicator: insurance the sample indicated that there is no insurance coverage for residential homes or life, as well as property and infrastructure. The results of the fourth indicator: incentives and financing for businesses, community organizations, and citizens showed that the incentives are very weak to help business owners and non-profit organizations take steps to improve their ability to resilience.

Second: The results are drawn from planning and preparing for disasters for the ability of the city of Baghdad to face the pandemic disaster

The results of the questionnaire showed the following results at the second level, represented by the many dimensions of disaster planning and preparedness for the ability of the city of Baghdad to confront the pandemic, as follows: fig. (2)

Fig. 2 1st stage Governance and Financial Capability



Source: own preparation based on Authors (2022).

5.4 The fourth essential:

the application of resilient urban designs and development for the city of Baghdad obtained an average of (1.84), which includes four indicators. The results showed that the first indicator: the division of areas according to land use. Many areas during the pandemic have become uninhabitable due to standards that do not take into account the risks and spread of disease at the planning and architectural levels. In addition to the existence of random housing, which is increasing in several areas. As for jobs and businesses, it has been indicated that they have been exposed to danger. The continuation of the pandemic had a negative impact on jobs, and the business pattern changed during the pandemic and beyond through working from home, in addition to the businesses that suffered losses due to the pandemic, and the inability of individuals during the isolation and quarantine phase to practice commercial activity normally. It led to exposure to economic losses. As for the agricultural lands, they were relatively safe during the pandemic period as a result of the wide and natural areas (green spaces, sun, clean air, and avoiding pollution), which contributed to reducing the spread of infection. As for the results of the second indicator, represented by new urban development, the results indicated that there is a dispersed use of urban design solutions that take into account improving resilience by increasing the extent and advantages of environmental systems services within the city, but there is interest in expanding them.

The third indicator: building laws and standards, the results indicated that building laws exist but have not been reviewed at all, and work should be done to evaluate building laws, especially with regard to their ability to face dangers and crises. There is no use or interest in using sustainable building design standards (REDi, LEED, GreenStar, BREEAM) to improve resilience.

The results of the fourth indicator: the application of zoning and building codes and standards indicated that it is difficult for cities, especially those with random housing areas, to divide areas according to land use. Building codes are implemented by less than 50% of buildings and are not approved by others. This overlap between uses and the lack of enforcement of laws and standards negatively affected the city of Baghdad during the planning and pandemic preparedness phase.

5.5 The Fifth essential:

Protecting natural barriers to enhance the preventive functions of natural ecosystems. He scored an average of (1.76), and it includes three indicators. The results of the first indicator: the health of the natural environment and the current ecosystems showed that there is no monitoring of the services of the ecosystems concerned and

related to the pandemic, such as air pollution. In addition to encroaching on green areas and trees by urban sprawl, which contributes to the transmission of the disease. And that there are potential serious damages to some ecosystem services or many of the main systems. As for the results of the second indicator: the integration of green and blue infrastructure in the city's policy and projects, it indicated the absence of land use policies that led to the complete destruction of vital ecosystem services. In addition, green and blue infrastructure is routinely included in new urban development, architectural and infrastructure renovation projects, but not at the level required to preserve ecosystems. With regard to the third indicator: cross-border environmental issues, the results showed that the city of Baghdad is partially aware of the jobs provided by natural capital outside the city's judicial boundaries. There are agreements, but they are partial and ineffective.

5.6 The Sixth Essential:

Strengthening Institutional Capacities for Resilience got an average of (1.8), which includes five indicators. The results of the first indicator: skills and experience showed that the city of Baghdad has the skills and experience it will need to respond to pandemic scenarios. But you need to coordinate and share with the specialists. More capacities of volunteers and civil society organizations are needed. As for the second indicator: education and public awareness, the results showed that some programs / channels are available to disseminate information on hazards, risks and disasters. However, the scope is partially available, as 25% of the population has been reached. The results of the third indicator showed: Some important information about preparedness and risks are withheld, missing and/or fragmented and cannot be shared. Information about preparedness and risks is provided to other community organizations and citizens at best. With regard to the results of the fourth indicator: providing training, the sample indicated that training courses are not developed for professionals, and there is no real training for residents in residential neighborhoods to enable them to attend and commit. As for the frequency of training times for refresher courses and emergency training, they are not organized. And it takes place over long periods of time, which leads to its uselessness. And the fifth indicator: languages has indicated that all education and training materials are not available in all languages, and that learning took place through the sharing of knowledge between specialists and practitioners, but it tends to be ad hoc and on specific categories, such as seminars and scientific workshops.

5.7 The Seventh Essential:

Understanding and Enhancing Societal Resilience Resilience, got an average of (1.77), which includes five indicators. The results of the

Baghdad city study showed that grassroots groups or organizations, networks and training have the importance of disaster risk reduction. And she supports it by raising awareness. But they are not actively involved in response or planning. As for the maps of the most socially vulnerable population, they are available to the authorities in the city of Baghdad. Citizen participation techniques for disaster risk reduction were weak or non-existent.

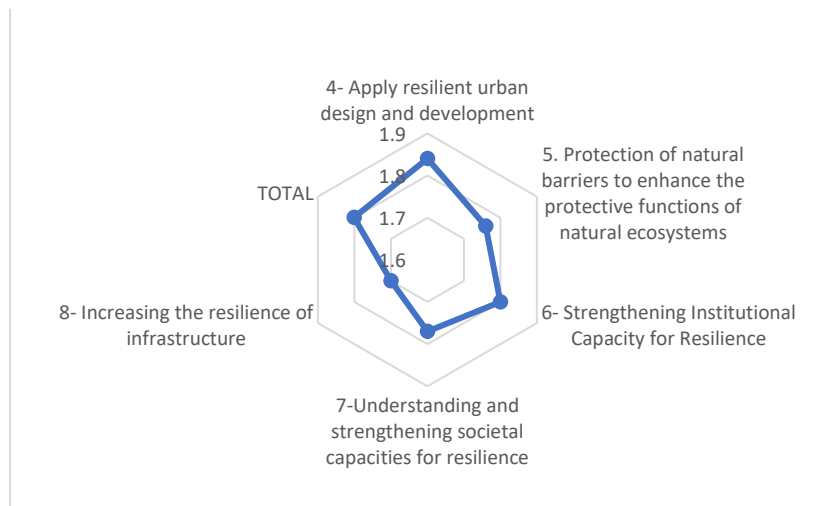
5.8 The eighth essential:

Increasing the ability of the infrastructure to withstand the pandemic got an average of (1.7) and it includes nine indicators. The results of the Baghdad city study showed that an overview of the critical infrastructure to face the challenges of the pandemic was insufficient. The protective infrastructure of a large part of the city is not protected from known dangers/risks. At the level of water - drinking water and sewage, a significant loss of service may occur in the most likely scenario and that of energy, some loss of service may occur. As for the transmission, a significant loss of service may occur in the most likely scenario, while at the communications level, some loss of service may occur in the most likely scenario. At the healthcare level, more than 90 percent of major injuries in the most severe scenario can be treated within 36 hours. As for educational facilities, more than 15% of educational facilities are at risk in the “most probable” scenario.

Third: The results obtained Post-disaster response and recovery of the ability of the city of Baghdad to face the pandemic disaster

The results of the questionnaire showed the following results at the level of the third phase of the capacity of the city of Baghdad to face disasters: fig. (3)

Fig. 3 2nd stage Disaster planning and preparedness



Source: own preparation based on Authors (2022).

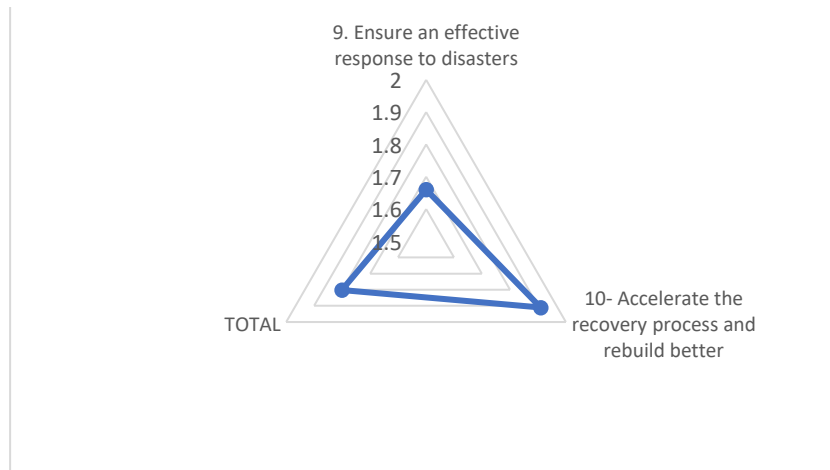
5.9 The Ninth essential:

Ensuring Effective Response to Disasters obtained an average of (1.66), which includes seven indicators. The results of the Baghdad city resilience study showed that more than half of the population is expected to be reached by the early warning system. While event management plans do exist, they are not comprehensive. As for the need for equipment and relief supplies, the needs have not been identified and there is no clear plan for treatment. In addition to food, shelter, basic commodities, and supplies, in the "most severe" scenario, emergency supplies of food and basic relief items were less than the estimated need by 2% or more.

5.10 The Tenth essential:

Accelerating the process of recovery and rebuilding in a better way, with an average of (1.91). It includes two indicators. The results of the Baghdad City Resilience Study showed that post-event recovery planning - before the event does not include any known plan. And that the lessons learned - the learning circles were not sufficient and were not in an in-depth or systematic way. Fig. (4)

Fig. 4 3rd stage Post-disaster response and recovery



Source: own preparation based on Authors (2022).

6 Recommendations

6.1 the level of governance and financial capacity

Develop a fully integrated plan for disaster risk reduction, which is in line with the Sendai Framework and has coverage of all ten essentials. As well as establishing all lead agency teams, providing them with appropriate resources and authority to operate through all phases of disaster risk reduction. The establishment of a decision-making center is clear or half-clear in terms of resilience in the decision-making

process, and is applied to all policy and budget proposals in all relevant operational areas.

The city's financial plan is comprehensive in terms of disaster risk reduction, budgets are protected and precautionary plans are in place. and providing a range of incentives across all sectors to increase resilience

6.2 the level of planning and preparedness for disasters

Educate the city and key stakeholders on the concept of ecosystem services and the economic value of all the functions provided by local natural assets.

Mainstream green and blue infrastructure on major urban development and infrastructure projects through policy and city guideline publications.

Providing fully coordinated public relations and education campaigns and programs to ensure the appropriate dissemination of information on hazards, risks and disasters, and the delivery of key messages to more than 75% of the city's population.

Conducting training courses covering risks, resilience, and disaster response, to be provided to all sectors of the city, including government, companies, non-governmental organizations, and society.

6.3 The level of post-disaster response and recovery

Developing a plan for disaster management, preparedness for it, or emergency response that determines the city's ability to mitigate, prepare for, and respond to local emergencies.

Providing backup capabilities that have been hidden either through realistic event or practice exercises for disaster scenarios and risks in the basic work and that it is possible to cover all neighborhoods within 4 hours.

Determining needs, linking them to disaster scenarios and taking into account the role of volunteers.

Develop an operational strategy in place, which is solid and understood by relevant stakeholders.

Drawing lessons from failure after the disaster. and establishing effective and clear mechanisms and processes to feed these lessons into the design and implementation of reconstruction projects.

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