

Indicators Of Urban Immunity In The Built Environment

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Abstract. Review this research on what urban immunity is and what is similar to immunity in other sciences such as natural immunity, legal immunity, . . . The research then touched on how to exploit these immunities in urban designs through mechanisms and strategies addressed, and the research relied on the analytical approach through a number of studies that touched on this subject, the research problem is: insufficient knowledge about urban immune indicators that contribute to the protection of the urban environment of various types of risks. The research assumed (the urban immunity of the city contributes to resisting and adapting to various types of risks and returning to normal) while the goal is to reach a number of indicators that contribute to increasing the immune capacity of the city. Down to drawing a number of indicators that determine that urban designs have the ability to resist and adapt to various types of risks, the research reached a number of conclusions and recommendations, the most important of which is, building a number of factors: economy, environment, infrastructure, social systems, leadership and strategy (good governance). Contributes to building urban resilience and assessing urban resilience under the epidemic scenario in different geographical areas.

1 Keywords: Immunity, Urban Design, Built Environment ,Covid-19

1.1 Introduction

Cities are exposed from time to time throughout history to a number of risks and epidemics that hit most cities of the world and cause significant losses and the degree of impact varies from city to city, due to a variety of environmental, social and economic reasons in addition to the urban aspect, which is the main part of the city's physical structure.

The significant increase in the rates of infectious and non-communicable diseases in recent years, particularly the COVID-19 pandemic and associated hazards, as well as the effects of climate change and other global environmental problems, have severe health damage to humanity, which in turn has had a negative impact on social and economic development. Because planned and designed health cities in accordance with the principles of ecology achieve a building consistent with the environmental realities surrounding them, thereby preserving human health and natural ecosystems because they provide many lessons for the association of natural forms, patterns and processes, the need has become urgent and necessary to plan and design cities to meet global health challenges in the twenty-first century, with the aim of creating impregnable cities and a health court that promotes the health of their inhabitants and facilitates their daily activities in movement, movement, production and production. and the preservation of natural resources.

The preparation of cities for disasters has been constantly present in urban planning, war shelters have been built, and drainage facilities have been set up to prevent floods. However, health disasters are rarely brought into planning strategy and urbanization designs.

For example, how to design street trends to suit wind trends to walk wind in the streets as air sewers interspersed and do not collide with them, as well as the design of rain drainage networks and drainage networks, to design the paths of cars and pedestrians and separate them as much as possible and give the Egyptian experience in building the new administrative capital a model to follow in taking the idea of city immunity especially in the field of health, which is the model to be followed in the projects of building other new residential cities.

1.2 What is immunity

This research includes clarifying what urban immunity and immunity are, as well as addressing a number of indicators that contribute to increasing the ability of the urban system to resist and adapt to various types of risks (health risks).

1.2.1 Definition of immunity:

The word immunity in English, which means support or resistance and is derived from the act of Immunity, which has its origins in the Latin language *immunis*, which means exemption or emancipation, as the care is concerned with the comprehensive briefing of something to protect its essence and prevent dangers from it, it is like a shield for that essence, it is not possible to reach what is inside it, and the prevention is two directions: the first direction, in the fact that it is the mechanisms for briefing and isolation to achieve safety and protection. The second trend is that it is a characteristic that means impregnable or armored.

1. Oxford Dictionary

Immunity: The ability of the organism to resist a particular infection or toxins due to certain antibodies or sensitive white blood cells.

- Immunity (for something): If you are not affected by something, especially something that you might expect to be harmful. <https://www.oxfordlearnersdictionaries.com/definition/english/immunity>

2- In the British Dictionary.

Status of immunity or vulnerability to a particular disease or the like.

A condition that allows for natural or acquired resistance to diseases.

- The cell's ability to interact immunely in the presence of an antigen.

Exemption from any natural or normal liability.

Exemption from obligation, service, duty, liability to taxes or jurisdiction.

Exemption from criminal prosecution, legal liability or punishment under certain conditions. <https://www.dictionary.com/browse/immunity>

3-Merriam-Webster Dictionaries.

Immunity: The state of the ability to resist a particular disease, especially by preventing the development of pathogenic microorganisms or by countering the effects of their products. <https://www.merriam-webster.com/dictionary/immunity>

4. Cambridge Dictionary

Protection from a particular disease by certain substances in the blood. <https://www.dictionary.com/browse/immunity>

5-Medical Dictionary of Health Terms

- Immunity: The body's ability to resist infection and diseases.

- Immunity: The body's ability to learn to fight a particular infection after exposure to the bacteria causing it.

Immunity: The ability of an organism to change genetically in a way that allows it to better deal with its environmental conditions. <https://www.health.harvard.edu/a-through-c>

6- Collins Concise English Dictionary

The ability of the organism to resist the disease, either through specialized blood cell activities or antibodies produced in response to natural exposure or vaccination (active immunity) or through an antibody injection or the transfer of antibodies from the mother to her child through placenta or breast milk (negative immunity). <https://www.wordreference.com/definition/immunity>

1.2.2 Definition of immunity in other sciences:

1.2.2.1 Medical Immunity (Latin: Immunologia)

The body's ability to resist certain harmful substances such as bacteria and viruses that cause diseases. The body defends itself against diseases and harmful organisms through a complex structured device, consisting of a group of cells, molecules and tissues, called the immune system, which provides protection against a variety of harmful substances that invade the body. holt PG; Macaubas C; Cooper D; Nelson DJ; et al. (1997)

Medical sciences have divided immunity into two types.

1. Natural immunity:

All people are born with natural or innate immunity in English Innate Immunity: a general type of human protection, for example: the skin where it acts as a barrier preventing germs from entering the body, and the immune system helps to identify some objects that invade the body as strange and may be dangerous.

2. Acquired immunity:

It is the immunity that a person acquires and develops over time during his life and protects him from germs, where the immune system manufactures various types of antibodies to different germs when first exposed to them, and then the antibodies attack any of these bacteria if they enter the body again, in other words it can be said that the immune system remembers its former enemies and eliminates them through antibodies that recognize them.

1.2.2.2 Legal Immunity (immunity at law):

Exemption from penalties, payments or legal requirements granted by the authorities or laws. In general, there are three types of immunity in law:

1. The promise not to prosecute a crime in exchange for information or testimony in a criminal case, granted by prosecutors, judge, grand jury or legislative commission of inquiry.
2. Protect public officials from responsibility for their decisions (e.g. city manager or general hospital board member).
3. Government (or sovereign) immunity, which protects government agencies from lawsuits unless the government agrees to prosecute them; d) diplomatic immunity that exempts foreign ambassadors from most U.S. criminal, laws.<https://dictionary.law.com/Default.aspx?selected>

1.2.2.3 Intellectual Immunity:

It is an internal hypothesis system, which determines the way the individual deals with situations, and makes him employ his own resistance, his independent thinking, the stability of the way to deal, and the distant view of things and events, to produce a personal point of view or philosophy whose role is to prevent the individual from making mistakes, or to protect him from blind imitation in dealing with the various problems to which he or she is exposed.

"Our minds and culture are not walled by fences that are repelled by the strong winds of change," says Abdul Karim Bakkar (Bakkar, 2016), author of Intellectual Immunity.

Intellectual immunity is meant to be an immunity of thought and culture against false deviant ideas and cultures, which distract us, confuse our reactions, and we must be careful and vigilant in order to protect our proper thinking and culture.

Intellectual immunity, according to the division of researcher Sahib Assaad Weiss in the paper al-Musum (intellectual immunity and its relationship to some of the intelligences and habits of reason produced by university students) includes the following dimensions (Al-shimarri, 2019)

Dimension 1: Independent Thinking

The researcher defines him as thinking independently of others and in a way that moves away from the way individuals think.

others in the problem at hand or the positions he is going through, trying to do things in an unconventional way, or doing what others have been unable to do or ignoring.

Dimension 2: The Distant View of Things

The researcher defines it as looking at the far-reaching effects and beyond events, and careful judgment on things,

and the ability to anticipate it, or to realize what it's going to be like

Dimension 3: self-endoscopy

The researcher defines him as having an individual's own philosophy derived from his own experiences, including the way he sees it.

Individual, unaffected and relatively consistent, in dealing with life events and attitudes.

Dimension 4: resistance

The researcher defines him as the ability of the individual to distinguish between different ideas, not to accept ideas that include negative effects or new ideas that have not yet been subjected to scrutiny or testing, not to be influenced to the detriment of the deep-seated convictions of the individual to concepts, values, customs, etc., and not to be influenced by the status, status or status of the sender of the idea.

The above we can define immunity: Immunity possessed by humans through the ability to resist and the ability to change and adapt by the immune system through the antigen reaction process with the urban antibiotic (i.e. emergency response to pathogens) with the aim of rebalancing the body

1.3 Urban Immunity

How the city deals with shocks and pressures. By summarizing an initial set of capabilities to deal with trauma. These include building standards in the current built form, which dictate the magnitude of the risks that can be tolerated by minor damage - much like the physical barriers to the biological immune system. On the contrary, functional dependency risk management relates to the ability to reduce the spread of damage and damage effects similar to how the body's lymphatic system releases lymphocytes to stop the spread of infection. , can take several forms, such as repetition or dispersion. They are closely linked to standards and risk management of reliance on buffers, such as fuel stores for critical immune response, such as antibody store. (Chih-HungChenLin-FangHsu,2015)

- The ultimate immune capacity of risk is the ability to recover, without which there can be no healing of the city. These shock capabilities range from expanding assets to infrastructure systems and how they manage their operations in and after crises. The ability to ultimately shock, identify and develop risk management plans continues in this direction to a higher level of procedures and relates to regulatory processes and governance.

Similarly, the capabilities that deal with pressure management - adapting to changing risks or modifying risks in human decision-making and involving many actors, such as policy makers, engineers, owners and operators. In this way, urban immunity is a system that extends from the built environment through human decision-making and organizations. (Xiansheng Chen · Ruisong Quan,2021)

1.4 Architectural immune levels

Impacts are generally identified in at-risk areas, while other parts of the city can quickly return to pre-event situations, the most prominent example of which is addressing the risks associated with the Corona Epidemic (COVID-19) (David N. Bristow& Eugene A. Mohareb 2019).

1. At the building level: The Corona crisis has exposed the reality of housing and its poor position. We discovered that the majority of dwellings were designed to become sleeping places and human reservoirs, because the system of contemporary life is based on spending longer time outside.

It has also been discovered that the three conditions of adequate housing (sunning, lighting and ventilation)

2. Neighborhood level:

Components and elements that help to achieve social space should be taken into account in non-residential buildings. During the Corona crisis, it emerged that limited building space was the main obstacle to operating at full capacity, so the only solution was to reduce the number of users.

3. At the city level: During the Corona crisis, it was noted that the biggest obstacles to the pandemic were: slums and high population density; after the crisis, the strict fight against indiscriminate construction should be carried out, and slums should be transformed into organized areas, as well as density control through:

- Work on the multiplicity of city centers instead of the city having one center.
- Deployment of some facilities on the outskirts of cities such as sports vehicles, universities and large area markets... etc.
- Double the proportion of unbuilt and unpaved land to 20% and in various parts of the city, and be in the form of green areas, parks and fields for urban agriculture. This will contribute to natural disasters, particularly floods, as well as air quality.

4. At the urban network level: Within one country, urban policy should retreat from the choice of mega-cities and major cities. It is difficult to control the spread of the epidemic within them, unlike small and medium-sized villages and cities.

Examples of urban immunity across urban ranges (David N. Bristow, Eugene A. Mohareb,2019)

1.5 literature review

- 1- **The Pandemic City: Urban Issues in the Time of COVID-19**, Lina Martínez, and John Rennie Short , 2021

The study looked at the way cities are planned and formed throughout history as cities have evolved to solve sanitation, hygiene and access to health services while providing space and opportunities for urban residents. COVID-19 will have significant implications in the way cities are planned. This latest crisis highlights a number of issues. In four areas: transformations in the formation of public spaces, transportation, urban connectivity and urban economies. Rethinking the nature of urban space may be an opportunity to plan for safer and more sustainable cities <https://www.mdpi.com/journal/sustainability>

2- A spatiotemporal analysis of urban resilience to the COVID-19 pandemic in the Yangtze River Delta , Xiansheng Chen¹ · Ruisong Quan¹ , 2 January 2021 ,

This paper established a comprehensive evaluation index system for urban resilience under the COVID-19 pandemic scenario, taking into account four dimensions. Economy, environment, infrastructure, social systems - quantity conducted

Urban resilience assessment revealed <https://doi.org/10.1007/s11069-020-04493-9>

3- The COVID-19 pandemic: Impacts on cities and major lessons for urban

planning, design, and management, Ayyoob Sharifi, Amir Reza Khavarian-Garmsir, Elsevier 2020 .

In this study, it seeks to provide an overview of COVID-19 urban research by reviewing literature published during the first 1980s after the first confirmed case reported in Wuhan, China. Key objectives

Understand the effects of the epidemic on cities and highlight key lessons to be learned beyond-

COVID urban planning and design. The results show, in terms of thematic focus, early research on the effects of

COVID-19 around cities is mainly linked to four main themes: (1) environmental quality, (2) social and economic impacts, (3) management and governance (4) transport and urban design.

Covers issues related to air quality, meteorological standards, water quality are dominant, and others remain relatively unexplored. Improvements in air and water quality in cities during closures highlight the significant environmental impacts of anthropogenic activities and provide a wake-up call for the adoption of environmentally friendly development paths. The paper, too.

Makes other recommendations on social and economic factors, urban management and governance, transportation and urban design that can be used for planning and design after COVID. In general, the list shows knowledge that the COVID-19 crisis has an excellent opportunity for planners and policymakers to take transformative action towards creating fairer, more flexible and sustainable cities. <https://doi.org/10.1016/j.scitotenv.2020.142391>

4- Understanding the role of urban design in disease spreading

Noel G. Brizuela Nestor Garca-Chan, Humberto Gutierrez Pulido, Gerardo & Chowell , September 2019 .

Cities are complex systems whose characteristics affect the health of the people who live there, so urban determinants of health often vary within smaller spatial ranges and so, as cities expand and disparities grow, a methodology that uses census data to introduce urban geography as a predictive lead in the spread of pathogens such as flu. A/H1N1 for 2009 shows that daily mobility patterns where the research was conducted

Simulation in virtual cities with the same population, region, schools and companies down to results: the cluster of daily activities can greatly affect the growth rate, size and timing of urban epidemics. In general, these findings support the view that cities can be redesigned to reduce the geographical range of influenza-like outbreaks <https://www.researchgate.net/publication/335793768>

5- A Study of Immunity-based Urban System: A Morphological Approach , Chih-Hung Chen Lin-Fang Hsu , 2015.

This research seeks to uncover the mystery of urban composition, clarify the role of the urban physical environment in this immune-based system that follows a morphological approach to examining the urban landscape by different measures and defines immunity as a balanced urban system disrupted by an important event, the physical urban form will be directly affected, thus turning to responding to change and after a series of transformations, the urban system can be restored again. This process can be regarded as an immune-based procedure, which can help the urban system develop and thus survive. <https://doi.org/10.1016/j.procs.2015.08.201>

1.6 Urban immunology indicators extracted

By looking at the recent studies and literature that have spoken about this subject, we can show a number of levels of dimensions that represent our theoretical framework, which start from the larger circle (the city) to the smaller circle (building) as follows:

The research focuses on extracting the main and secondary vocabulary associated with the health aspect for the purpose of extracting the most important indicators that enable cities to absorb and adapt to health risks:

1- Economic aspect
• Annual GDP
• Budgeted expenditures by local governments
• Third proportion of industry in GDP
• Scientific operating expenses
• Total regional tax revenues
• Actual foreign investment
• Year-end savings balance for urban and rural resilience
2-The social aspect
• Population density
• Number of unemployed (registered) in urban areas
• Number of practitioners of public administration
• Number of college students
• Number of doctors in the public health service
• Average number of staff in the post
• Number of persons covered by basic medical insurance
3-The environmental aspect
• Green Zone
• Green coverage of urban areas
• General green area
• Land area
• Industrial wastewater discharge
• Industrial sulphur dioxide emissions
4- Infrastructure
• Number of beds in hospitals and health centres
• Actual road area
• Volume of freight on highways
• Total annual energy supply
• Total annual water supply
• Transport
• Electricity grid
• Communication network
5- leadership and strategy (good governance).
• Prioritization
• Risk sensing
• Exploitation of resources and energies
• Guiding scientific research to control risks
• Sound thinking

1.7 Conclusions

The results can provide a quantity of indicators to assess urban resilience under the pandemic scenario to provide a reference to help cities in different regions improve urban resilience in the future. Based on the above research, the following five dimensions of the new CORONA virus epidemic

The scenario is built: economy, environment, infrastructure, social systems, leadership and strategy (good governance).

The factors led to the following conclusions: by building urban resilience and assessing urban resilience under the epidemic scenario. This study provides lessons to improve the resilience of cities in different geographical areas based on the above-mentioned research, the five dimensions of economic, environmental, infrastructure, social, leadership and strategy.

- Use systems to build a new scenario for the coronary virus pandemic.
- Creation of the Urban Resilience Assessment Index System
- Quantising urban resilience and revealing total urban flexibility by time and place.

1.8 Recommendations

- Securing the macroeconomics of the urban area
- Addressing the industries most directly affected
- Investment in HIV prevention and control by scientific research departments
- Conservation of urban financial resources
- Government control of population during epidemic
- Efficient implementation of the country's policy
- Access to academic policies in the event of the epidemic
- Number of doctors trained in accordance with government policy in the public health system
- Emphasizing social divergence
- Quarantine application
- Culture of society
- Impact of social policies on medical treatment during the pandemic
- The ability of the urban area to self-reform
- Quality of living space for residents
- Urban general living environment
- Scope of urban resilience activities
- Water pollution
- Air pollution
- Number of hospitals in the public health system
- Patient tolerance for hospitals in the public health system
- Easy road travel in the face of the epidemic
- Capacity for material support under the epidemic
- Power supply capacity under the epidemic
- National transport and its efficiency
- Performance and streamlining of electrical services
- Internal Communications System

1.9 Future research

- The research recommends studying different sites around the world that are at the risk of a particular risk for the purpose of obtaining more accurate results.
- Study the cause of the difference in the effect of a particular type of risk between one city and another where there are cities that are highly affected and others that have less impact.
- Discover the positive and negative impact of risks on the city's urban structure, reflected in reducing carbon dioxide emissions in some cities of the world during corona's quarantine
- Study of future immune cities

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