Time to Future Proof

A blueprint for holistic urban resilience

Ideation Center Insight

WORLD GOVERNMENT SUMMIT 2021

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Executive Summary

The COVID-19 pandemic has been a severe test of the ability of cities to withstand unexpected shocks, and has strained economic, health, social, and urban infrastructures to the limit. Beyond the pandemic, exposure to natural and human-caused hazards is expected to increase in frequency and scale due to climate change and rapid urbanization. In the Middle East and North Africa (MENA) region, the number of natural disasters per year has tripled since the 1980s, affecting over 40 million people.[1] Cities are also exposed to violence and cyber-attacks. Building urban resilience is therefore an imperative.

Strategy& has developed an evidence-based urban resilience framework that enables cities to assess their: 1. exposure to hazards; 2. vulnerabilities; and 3. institutional capacities to respond, recover, and transform in the face of shocks. The framework is supported by 131 key performance indicators (KPIs) and a detailed qualitative checklist.

The framework has been employed to analyze the urban resilience of nine cities within the MENA region and 11 comparable cities in other regions. Cities in the MENA region display various degrees of vulnerabilities among their basic needs and social, economic, and environmental components. They are at risk of not being able to secure emergency care and affordable housing for their citizens. Most MENA cities have low levels of cohesion, inclusion, and social protection. Their public finances are weak, innovation is poorly developed, and consumption and production levels are unsustainable.

MENA cities should respond by developing “resilience blueprints” to build the institutional capacities that can help them reduce exposure to threats and minimize vulnerabilities. In particular, they should improve their recovery capacities — i.e. the ability to adapt and recover fast from a shock. They should also build transformative capacities which will allow them to innovate and advance economically and technologically, thus preventing or minimizing the effects of future crises.

The Resilience Imperative

Urbanization is a defining trend of the 21st century, a trend fraught with risk, as the COVID-19 pandemic has demonstrated. As the world continues to urbanize, considerable attention needs to be paid to cities' resilience as a critical enabler of sustainable urban growth.

The world's urban population is growing continuously. Some 55 percent of the global population lives in cities, and this is expected to reach 68 percent by 2050.[2] In the MENA region, the urban population quadrupled between 1970 and 2010.[3] Of course, cities are the heart of the economy. They generate economic development, innovation, and growth, accounting for almost 80 percent of global GDP. Cities also have the opportunity to enhance societal well-being.

However, fast-growing cities are particularly at risk when it comes to natural and human-caused threats, such as flooding, air pollution, and crime. Too often, such cities have highly concentrated poverty and unemployment, income disparity, overcrowding, water scarcity, and excess demand for public goods and services. Urban areas also produce 70 percent of greenhouse gas emissions and global waste, and account for over 60 percent of global energy consumption.

Growing Hazards

The world is becoming more prone to hazards. Between 2000 and 2019, there were around 7,344 natural disasters globally. These claimed 1.23 million lives and displaced about 235 million people.[4] Risk models estimate that the global average annual loss from earthquakes, tsunamis, cyclones, and floods is some US$314 billion.[5] In the MENA region, the number of natural disasters tripled by 2014 compared with 1980s levels, affecting over 40 million people and costing close to $20 billion.[6]

Climate change is expected to further increase the frequency and intensity of natural disasters that will affect cities. Most of the world's urban areas are situated on coastlines, increasing their exposure to rising sea levels caused by global warming and coastal storms, with serious implications for major cities in Egypt, Kuwait, and the United Arab Emirates (UAE). The MENA region is expected to record the largest impact on GDP growth due to climate-related events of anywhere in the world, with a one centigrade temperature rise leading to an average 8 percent drop in per capita GDP.[7]

Human-caused hazards, such as crime, cyber-crime, geopolitical conflicts, and industrial incidents, are also increasing. The global economic impact of violence related to wars, internal security, and crimes was estimated at $14.5 trillion in 2019, or 10.6 percent of global GDP.[8] The effect of violence was even higher in the MENA region, equivalent to 28 percent of the region's GDP.[9] Cybersecurity Ventures estimates that cyber-crimes, the world's fastest-growing crimes, will cost $6 trillion globally in 2021, up from $3 trillion in 2015.[10] The MENA region is particularly vulnerable to cyber-crime because of its limited local digital capabilities. According to a PwC survey conducted in 2015, some 18 percent of Middle East companies had suffered more than 5,000 attacks, double the global average of 9 percent.[11]

The COVID-19 Effect

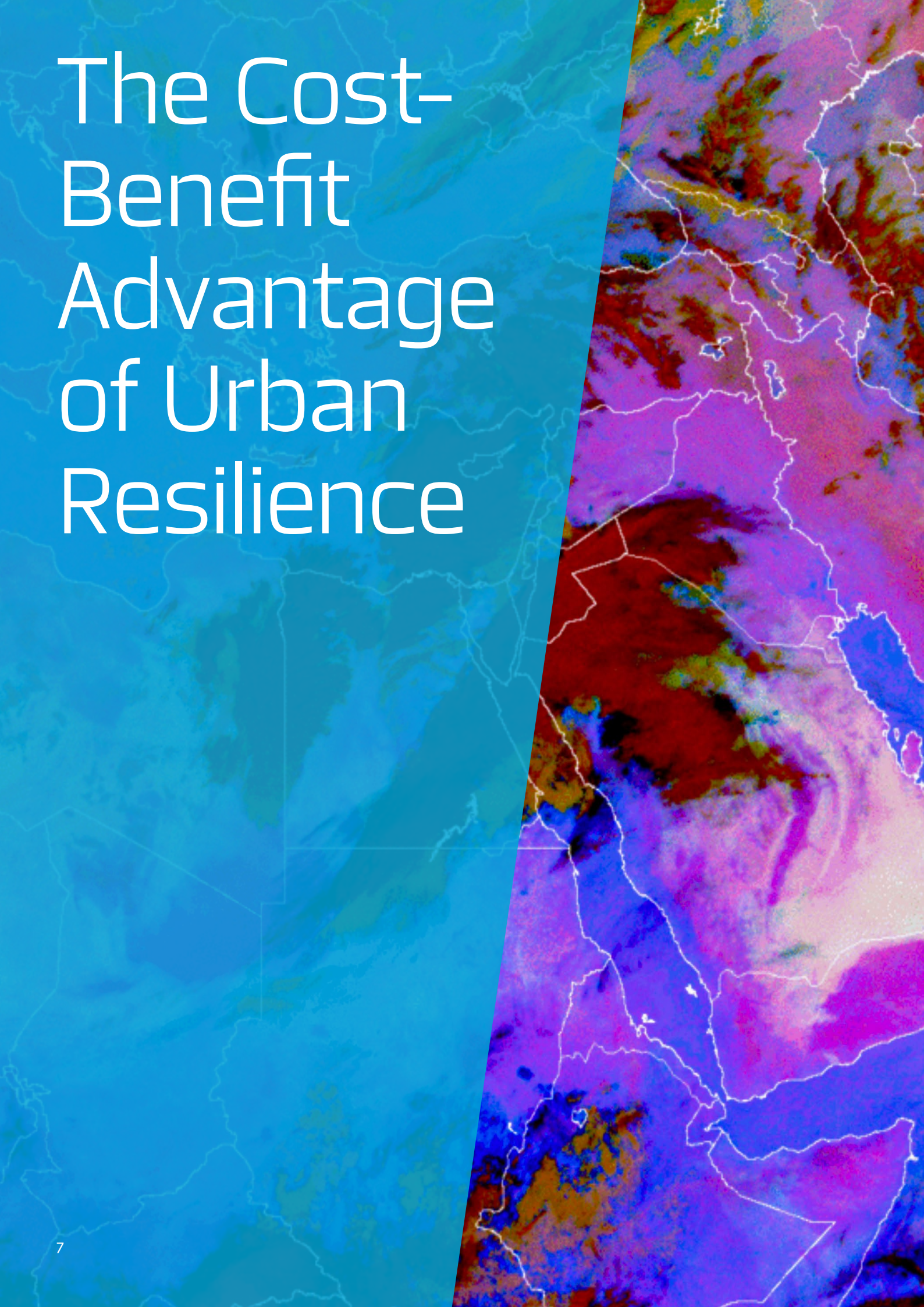
The COVID-19 pandemic has reinforced the sense of urban vulnerabilities worldwide, placing significant strain on healthcare systems, with an exacerbation in some places of poor water and sanitation provision. Some cities have even experienced a degree of urban flight, with people leaving for second homes and others moving to smaller urban areas where they feel less vulnerable.

However, some cities have demonstrated more resilience than others. Designated authorities in highly capable cities were more prepared, and hence were able to more quickly "flatten the curve" of new cases. This has built trust between residents and urban authorities. For instance, the Finnish government had mandated, even before the outbreak, to have a stockpile of three to 10 months of essential goods and emergency supplies, consisting of food, fuel, medical, and pharmaceutical supplies, thereby enabling the country to meet all its needs during the pandemic.

Asian countries such as China, Singapore, South Korea, and Taiwan had to learn that lesson the hard way after the outbreak of severe acute respiratory syndrome (SARS) in 2003. Through that experience, they built the capacity and readiness to develop and roll out tests, and to institute control measures over immigration. These countries have also been able to utilize their surveillance and contact tracing systems to monitor and track the movement of quarantined and infected people, while their investments in their e-government and data integration platforms paid off.

The pandemic has forced cities to think about how to become more resilient. City leaders understand that they need well developed, universal healthcare systems that can rapidly scale up to deal with emergencies. They need critical infrastructure that can withstand a shock, efficient and affordable transportation that is safe, ample stocks of medical supplies, and digital connectivity that can support people working and studying from home for months. In many cases, cities are reconsidering the global supply chains that they depend upon, with a focus on localizing critical supply chain elements. City leaders also understand the need for adequate social protection, along with flexible labor market regulations that encourage job creation and proper wages.

The Cost-Benefit Advantage of Urban Resilience



Resilience comes at a cost. Building resilience in the face of these challenges can appear to be a daunting and costly task. However, urban leaders need to understand that the benefits outweigh the cost of inaction.

The World Bank has found that every $1 invested in natural disaster-resilient infrastructure in developing countries — such as bridges or buildings that can resist stronger floods or earthquakes — is expected to yield $4 in returns.[12] Investment in resilience can also lead to greater efficiency. The EU has a Clean Air for Europe program, which aims to reduce the cost of working days lost to air pollution to €8.5 billion per year by 2030, down from the reference point of €18.5 billion in 2005. More resilience against cyber-threats would save businesses considerable sums. Despite the need to spend increasing amounts of their budgets on cybersecurity, the costs will reach only 9 to 26 percent of the potential cyber-attack losses.[13]

The Attributes and Measurement of Urban Resilience

The initial step in building urban resilience is to have a comprehensive and integrated understanding of its components. Urban leaders should analyze their city's strengths and weaknesses in terms of these components, which will allow them then to identify areas for capability building and investment.

Defining Urban Resilience

Strategy& defines urban resilience as the ability of cities to respond to a shock, recover quickly, and transform themselves innovatively in the face of adversities, disasters, and stresses. Developing resilience requires an understanding of a city's exposure to natural and human-caused threats. This is followed by eliminating any structural vulnerabilities that might intensify the impact of a disaster, through developing all required institutional capacities to respond, recover, and transform in the face of a disaster (**see Exhibit 1**).

Respond. The ability to anticipate, cope with, and protect against shocks and stresses, manage livelihoods, meet urban society's basic needs, and maintain a baseline of economic activity.

Recover. The ability to mitigate the impact from a shock and adapt to changing conditions in a flexible and agile manner.

Transform. The ability to advance economically, socially, and technologically with new systems, structures, and reconfigurations through innovation.

Urban Resilience Assessment Framework

To assess a city's resilience level and identify where it falls short of achieving these objectives, urban leaders should use a comprehensive and integrated assessment framework. This will enable them to examine their city's exposure to hazards; their vulnerabilities in terms of basic, social, economic, and urban environment needs; and their institutional capacity to respond, recover, and transform based on their available strategies, governance, capabilities, data and systems, delivery of services, and financing. This framework will allow city leaders to identify which areas require their attention.

Our urban resilience assessment framework provides a composite index based on 131 key performance indicators (KPIs), that all use publicly available information, and that cover 36 dimensions and an institutional readiness checklist (**see Exhibit 2; the Appendix provides a more detailed view**).

We applied this framework to assess the urban resilience of nine MENA cities and 11 comparators from around the world. In the MENA region we applied our urban resilience framework to Abu Dhabi, Amman, Cairo, Casablanca, Dubai, Jeddah, Kuwait City, Muscat, and Riyadh. We selected these cities based on their high levels of urbanization and population growth, their considerable contributions to their respective national economies, and their appeal to domestic or international companies, investors, and tourists. We compared these MENA cities with Cape Town, Houston, London, Nairobi, São Paulo, Seoul, Singapore, Sydney, Tokyo, Toronto, and Zurich to ensure a wide geographic coverage, and because of their urbanization, resilience, strategies, and governance, and in some cases their COVID-19 response.

EXHIBIT 1: TO BE RESILIENT IN THE FACE OF SHOCKS, CITIES NEED TO ACHIEVE A SET OF OBJECTIVES ACROSS THREE AREAS

Urban Resilience Assessment Rationale

1 Assess & Mitigate Exposures to Hazards

NATURAL	HUMAN-CAUSED
Assess the exposure to different types of natural hazards	Assess the different types of human-caused hazards
Assess the potential likelihood, frequency, intensity, & impact of each natural hazard	Assess the potential likelihood, frequency, intensity, & impact of each human-caused hazard

2 Minimize Structural Weaknesses to Limit the Impact of a Disaster

BASIC NEEDS	SOCIETY	ECONOMY	URBAN ENVIRONMENT
Maintain critical medical supplies during an emergency	Safeguard vulnerable population	Ensure sustainable economic growth/ prosperity	Develop robust & flexible built environment & amenities
Achieve security of food supply	Provide social protection for vulnerable populations	Expand export base & reduce strategic imports	Develop smart urban infrastructure
Provide access to, continuity, & quality of water supply	Provide access to quality healthcare for all	Implement robust monetary policies & strengthen local financial markets	Ensure prudent space management & mixed-use zoning
Provide access to, continuity, & quality of energy supply	Provide access to quality education across all ages	Support increased business activity & continuity	Enhance urban integration
Ensure availability of safe & affordable housing	Empower vulnerable population to secure their livelihoods	Enhance economic productivity & competitiveness	Provide reliable & safe mobility & connectivity
Have localized & adaptive supply chains	Promote social equity, diversity, & inclusiveness	Provide open, flexible, & protective labor markets	Ensure protection of natural & cultural heritage
Ensure social stability, justice, & trust	Promote social cohesion, engagement, & belonging	Foster innovation & entrepreneurship	Promote sustainable consumption & recycling

3 Institute the Required Capacities to Respond, Recover, & Transform from a Disaster/Shock

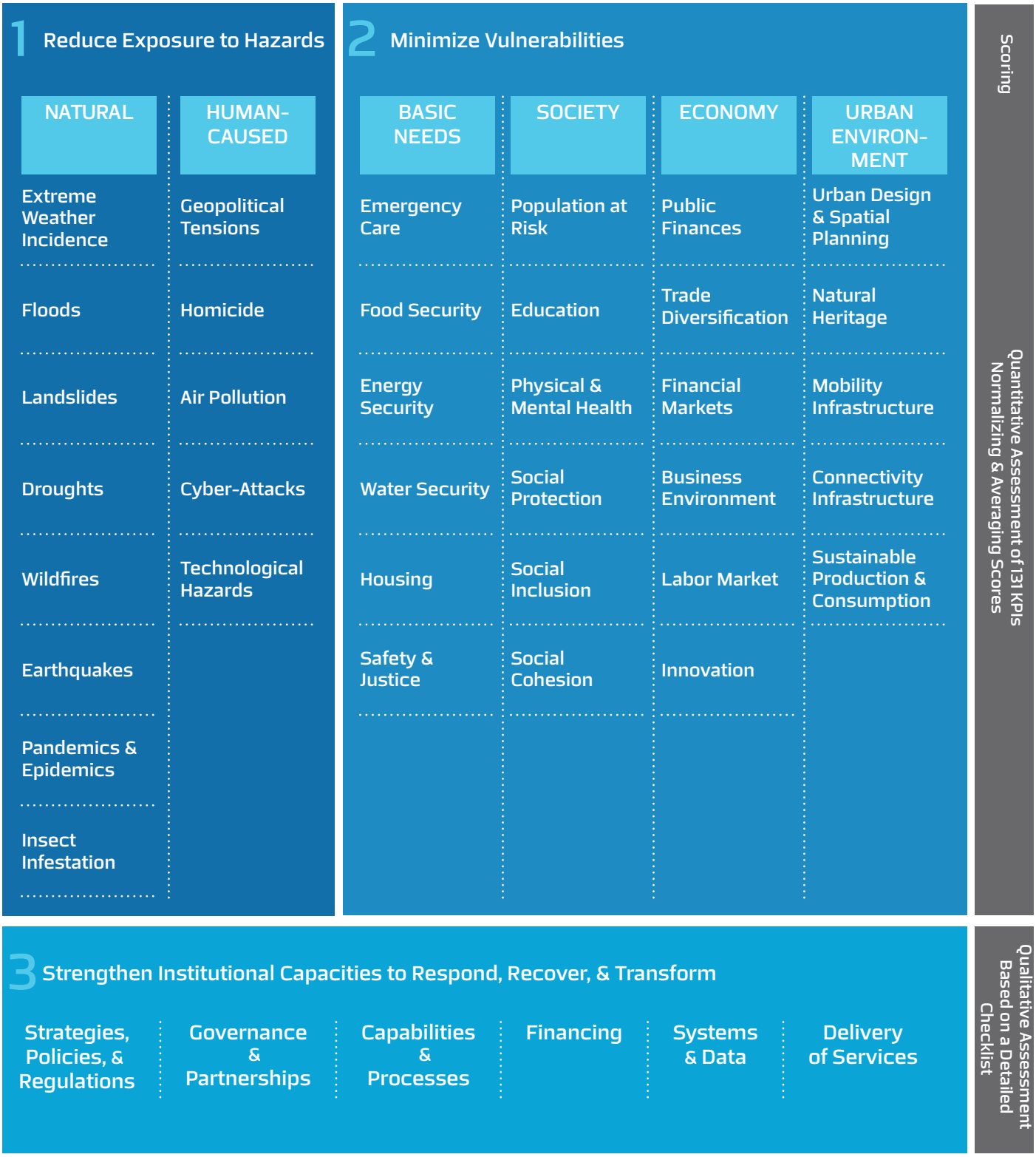
CAPACITY TO RESPOND	CAPACITY TO RECOVER	CAPACITY TO TRANSFORM
Anticipate the emergence of a threat/disaster & be prepared to survive & respond to it, in a timely & efficient manner	Adjust to a shock in a timely & efficient manner in order to minimize disruptions	Innovate continuously & mobilize new systems/tools/structures to rebound following a disaster
Secure the essential needs during & shortly after a disaster, & ensure continuity of services & economic activity	Mitigate the impact of the disaster & lead all sectors toward a quick recovery	Revive sectors & advance socioeconomic growth

Note: Additional hazards have also been considered but not assessed as part of this framework due to their dynamic & unpredictable nature.

Source: Strategy&

EXHIBIT 2: STRATEGY&'S CITY-LEVEL FRAMEWORK ANALYZES HAZARDS, VULNERABILITIES, & INSTITUTIONAL CAPACITIES

Strategy& Urban Resilience Assessment Framework



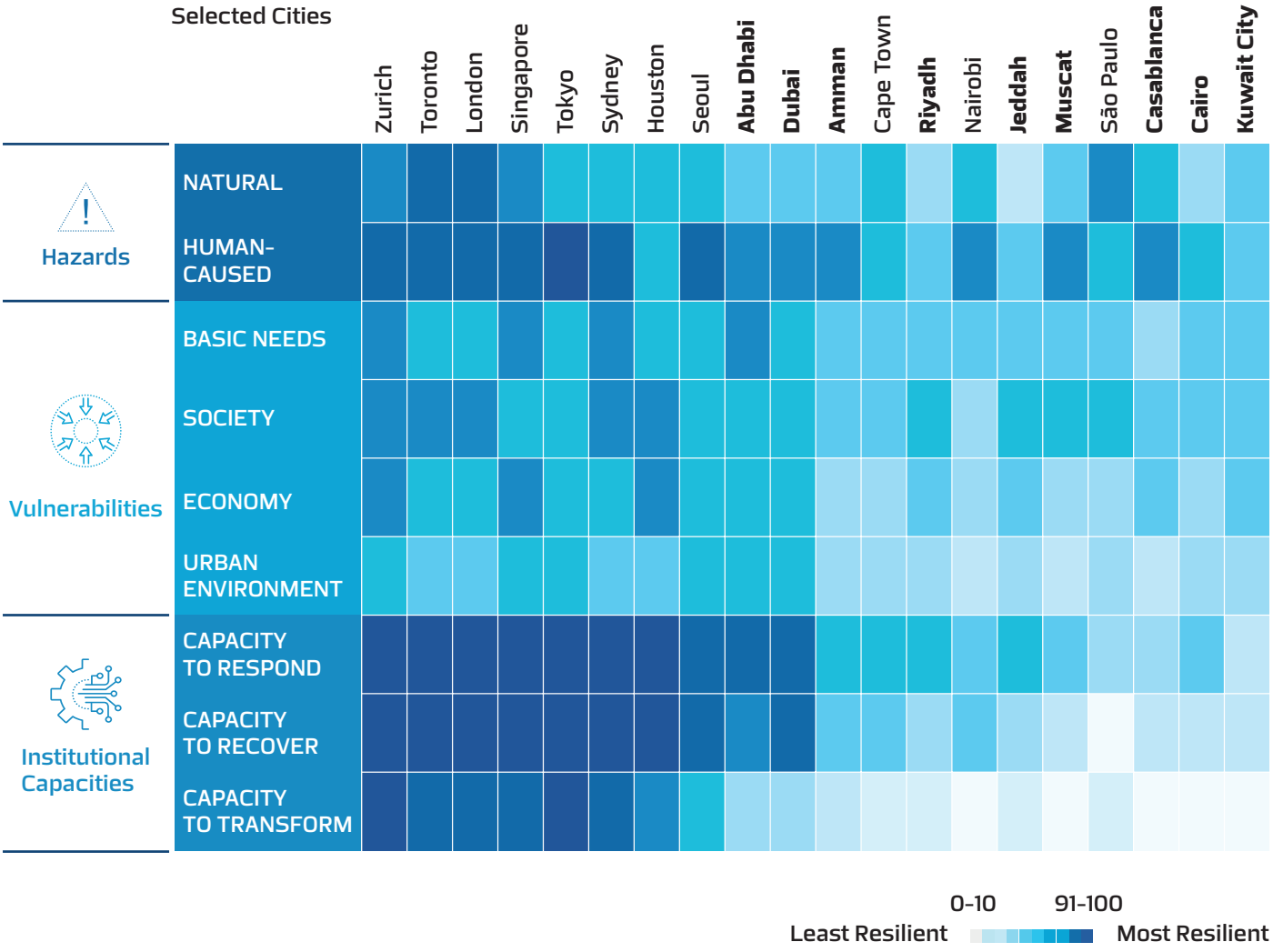
Note: Additional hazards have also been considered but not assessed as part of this framework due to their dynamic & unpredictable nature.
KPIs = key performance indicators.
Source: Strategy&

Hazards, Vulnerabilities, and Institutional Gaps in MENA Cities

The results of the urban resilience assessment reveal that the MENA region is highly exposed to natural threats. MENA cities have different degrees of weakness. With the exception of UAE cities, most of them lag behind advanced economies across all vulnerabilities' dimensions. Also, although MENA cities score well on their capacity to respond, most of them lack the ability to recover and transform when facing shocks (**see Exhibit 3**).

EXHIBIT 3: MENA CITIES DISPLAY DIFFERENT LEVELS OF RESILIENCE, & LAG BEHIND ADVANCED ECONOMIES ACROSS MOST COMPONENTS

Urban Resilience Assessment Results



Note: Hazards & vulnerabilities scores were calculated for each city based on a quantitative assessment of 131 KPIs that were then normalized based on the minimum & maximum methodology to obtain a score over 100; institutional capacities scores were determined based on a qualitative assessment over 100 for each of the three capacities in terms of strategies, policies, & regulations; governance & partnerships; capabilities & processes; delivery of public services; financing; data & systems.

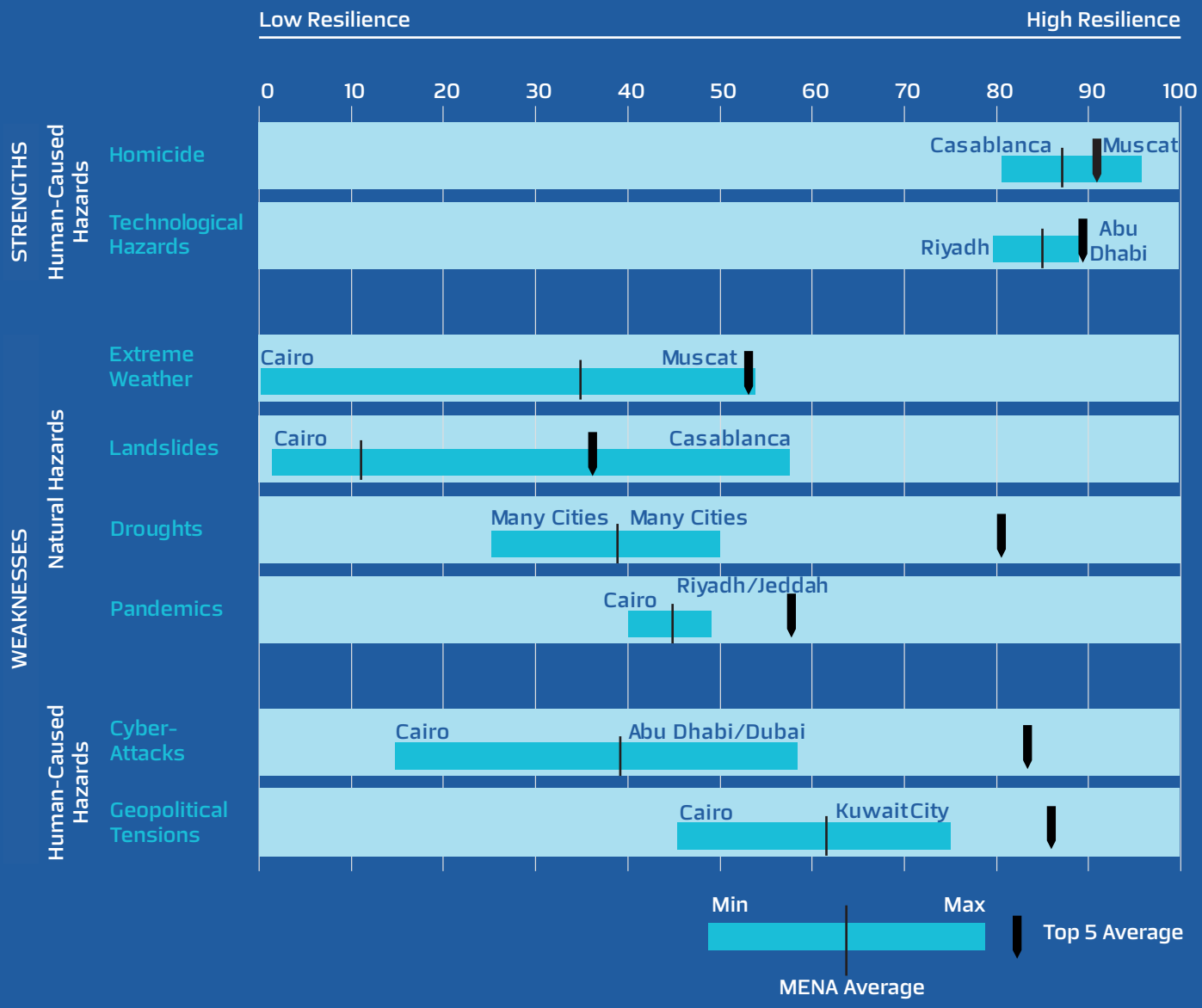
Source: Strategy&

Natural and Human-Caused Hazards

Natural hazards include exposure to extreme weather incidence, floods, landslides, droughts, wildfire, earthquakes, pandemics and epidemics, and insect infestation. Natural hazards are a notable problem across the region (**see Exhibit 4**). MENA cities suffer extreme weather conditions, and some are at high risk of facing droughts. Most MENA cities, with the exception of Casablanca, are at a greater risk than comparable cities for landslides because of soil erosion. Over 60 percent of the MENA region's population lives in areas with high surface water stress. In contrast, only 35 percent of the global population lives in similar conditions. Jeddah and Riyadh are also more prone to insect infestation.

EXHIBIT 4: MENA CITIES ARE MOSTLY EXPOSED TO EXTREME WEATHER, LANDSLIDES, DROUGHTS, & CYBER-ATTACKS

MENA Cities' Exposure to Hazards



Note: The five top ranked cities are: Zurich, Toronto, London, Singapore, & Tokyo.

Source: World Bank; UNESCO; FAO; WEF; WHO; The World Factbook; UNDP; Gallup; CIA; UNCTAD; ILOSTAT; ARCADIS; SDG Index; GHS Index; WGI; TomTom; Strategy& analysis

Human-caused hazards include geopolitical tensions, homicide, air pollution, cyber-attacks, and technological hazards. MENA cities face fewer human-caused hazards related to crime, in particular, homicide. Pollution is a threat for some MENA cities. Jeddah, Riyadh, and, in particular, Kuwait City, have high nitrogen oxide emissions, the highest levels in all assessed cities. They also have low incidence of such technological hazards as factory explosions and oil spills. The most worrying human-caused hazard is cyber-attacks, with most MENA cities scoring lower in the index than comparative cities. Egypt and Saudi Arabia experienced almost 220,000 and 160,000 attacks, respectively, on mobile users from January to June 2020.[14] In recent years, hackers have targeted critical infrastructure in the region.

The Burden of Vulnerabilities

Vulnerabilities will intensify the impact of a natural or human-caused disaster. As such, each city needs to understand where its vulnerabilities lie to mitigate them. Urban resilience should minimize vulnerabilities along the four key sustainable development components: basic needs, the economy, society, and the urban environment. Although each city is different, the MENA region exhibits some commonalities.

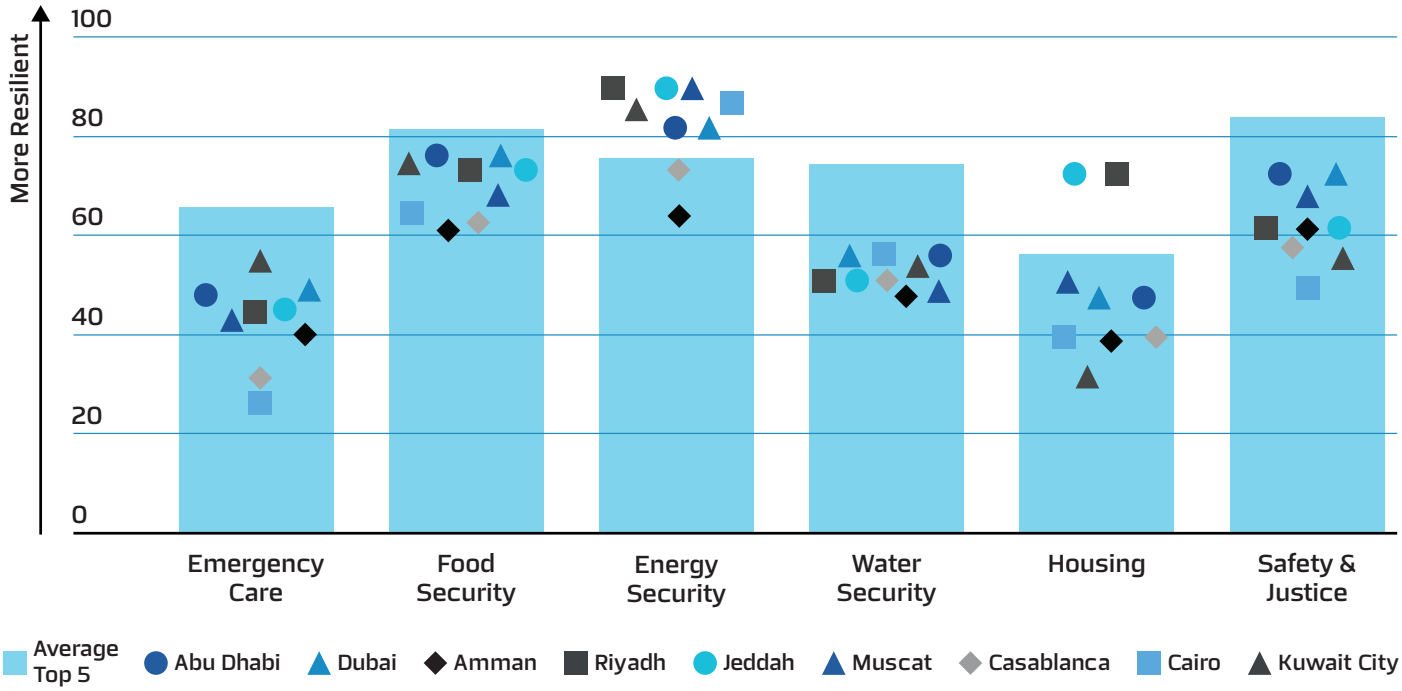
Basic Needs

MENA cities are at risk of failing to secure their populations' basic needs during a crisis (**see Exhibit 5**). Basic needs include emergency care, food security, energy security, water security, housing, and safety and justice. Most MENA cities would fare poorly during an emergency as they possess limited emergency care. In addition, cities such as Cairo and Casablanca also have an insufficient number of hospitals and intensive-care unit beds per 1,000 people, which will create a burden on healthcare institutions in the event of a health crisis. UAE cities, however, have an abundant supply of advanced life support equipment and an efficient emergency response time and operations.

Most MENA cities have high levels of energy resilience due to the localization of energy resources, yet the region still has low rates of renewable energy adoption. In particular, they have not sufficiently prepared for a decarbonized future. For instance, in Saudi and UAE cities, Kuwait City, and Muscat, less than 0.14 percent of total energy consumption is covered by renewable energy, compared to more than 20 percent in Toronto and Zurich. Amman and Muscat face a water security challenge due to baseline water stress. MENA cities also suffer from limited availability of affordable quality housing.

EXHIBIT 5: MENA CITIES NEED TO ENHANCE THEIR EMERGENCY CARE

MENA Cities' Vulnerabilities Assessment – Basic Needs (Index maximum of 100)



Source: Strategy&

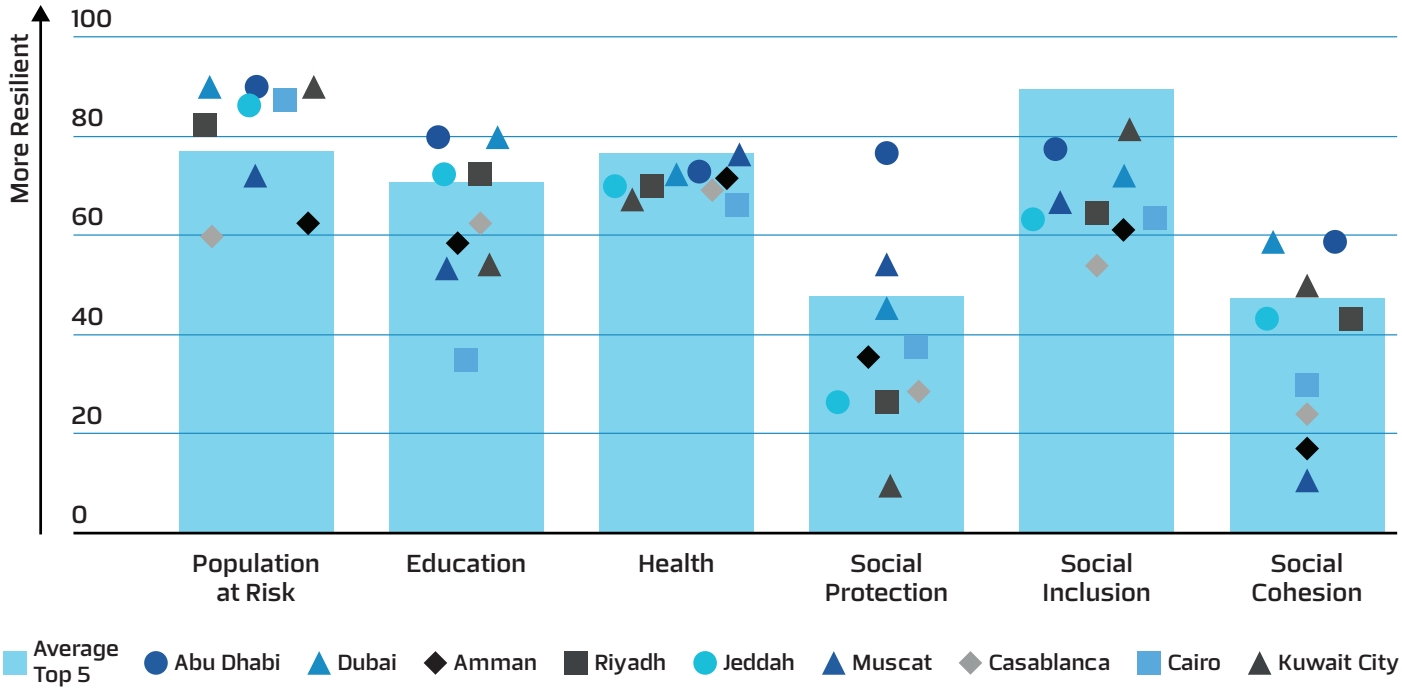
Society

MENA countries vary in their social vulnerabilities (**see Exhibit 6**). These indicators cover measures of cohesion, education, inclusion, physical and mental health, population at risk, and social protection. On an optimistic note, people across the MENA region enjoy positive indicators when it comes to "population at risk," due to relatively low population densities, and on their health indicators, especially those measured by life expectancy at birth, low mortality rates, and high vaccination coverage. Suicide rates, which reflect the mental health of the population, are below six people per 100,000, compared to more than nine per 100,000 for benchmark cities. Literacy rates are high, exceeding 90 percent for all cities except Cairo, Casablanca, and other African cities.

Abu Dhabi, followed by Dubai, has cohesion, inclusion, and social protection. Other cities, however, face some severe societal vulnerabilities. They have weak cohesion, inclusion, and social protection. The lack of cohesion is a symptom of income inequality. The wealthiest 10 percent of Middle East individuals earn an aggregate income that exceeds six times that of the poorest 50 percent of the population.[15] As for the lack of social inclusion, it particularly affects women. Female labor force participation ranges between 12 and 29 percent in the region, compared with an average of 47 percent for comparable cities. Social inclusion challenges are most critical for the Saudi cities Jeddah and Riyadh, as they have the lowest levels of female participation in the workforce, being 12.1 percent and 13.8 percent, respectively, in 2019. They also have some of the highest youth unemployment rates globally, reaching 28 percent in 2020.[16] Kuwait, on the other hand, leads the region on female inclusion in the workforce, yet faces an increasing social protection challenge.

EXHIBIT 6: MENA CITIES HAVE RESILIENT SOCIETIES, YET HAVE ROOM TO IMPROVE SOCIAL PROTECTION & COHESION

MENA Cities' Vulnerabilities Assessment – Society (Index maximum of 100)



Source: Strategy&

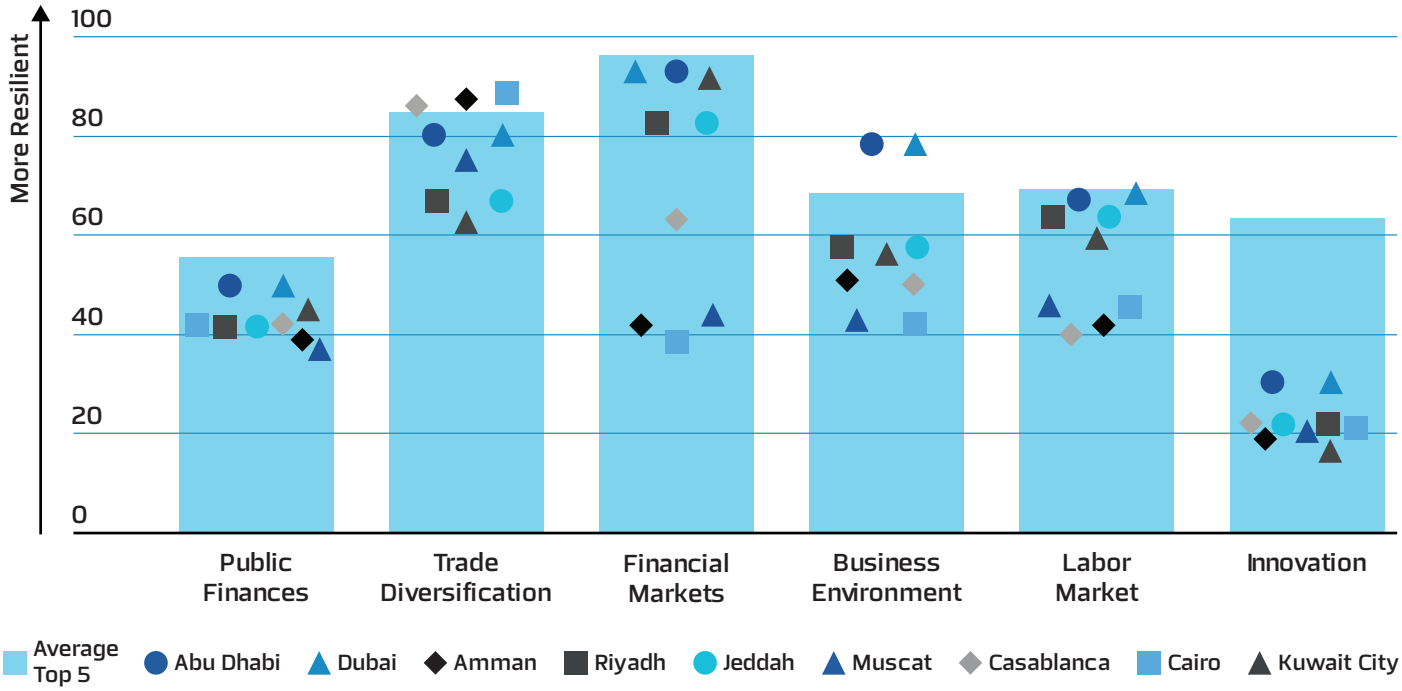
Economy

In terms of economic performance, the framework considers cities' public finances, trade diversification, financial markets, business environment, labor market, and innovation (**see Exhibit 7**). MENA cities' increased vulnerability emanates from the inefficient use of financial resources, which strains their abilities to allocate emergency funds or fiscal stimulus during a crisis. All MENA cities have a large budget deficit as a percentage of urban GDP. With the exception of Kuwaiti, Saudi, and UAE cities, credit ratings are below what they should be. Amman, Cairo, and Muscat also have a propensity to pay debt scores that are below 40 over 100.

Lower oil prices in recent years and limited innovation potential have exacerbated matters. Abu Dhabi and Dubai outperform others across the MENA region when it comes to their strong business and financial environments. Others, especially Cairo and Casablanca, have underdeveloped financial markets, business environments, and labor markets. Their insufficient innovation is due in part to minimal investment in research and development (R&D). Spending on R&D reached an average of 0.6 percent of GDP in the nine MENA cities, compared with 2.1 percent for comparison cities. Also, patent application numbers do not exceed 6.4 per million population across assessed MENA cities, compared to an average of around 165 per million for benchmark cities and exceeding 400 in Seoul and Tokyo.

EXHIBIT 7: MENA CITIES NEED TO IMPROVE THEIR INNOVATION CAPABILITIES

MENA Cities' Vulnerabilities Assessment – Economy (Index maximum of 100)



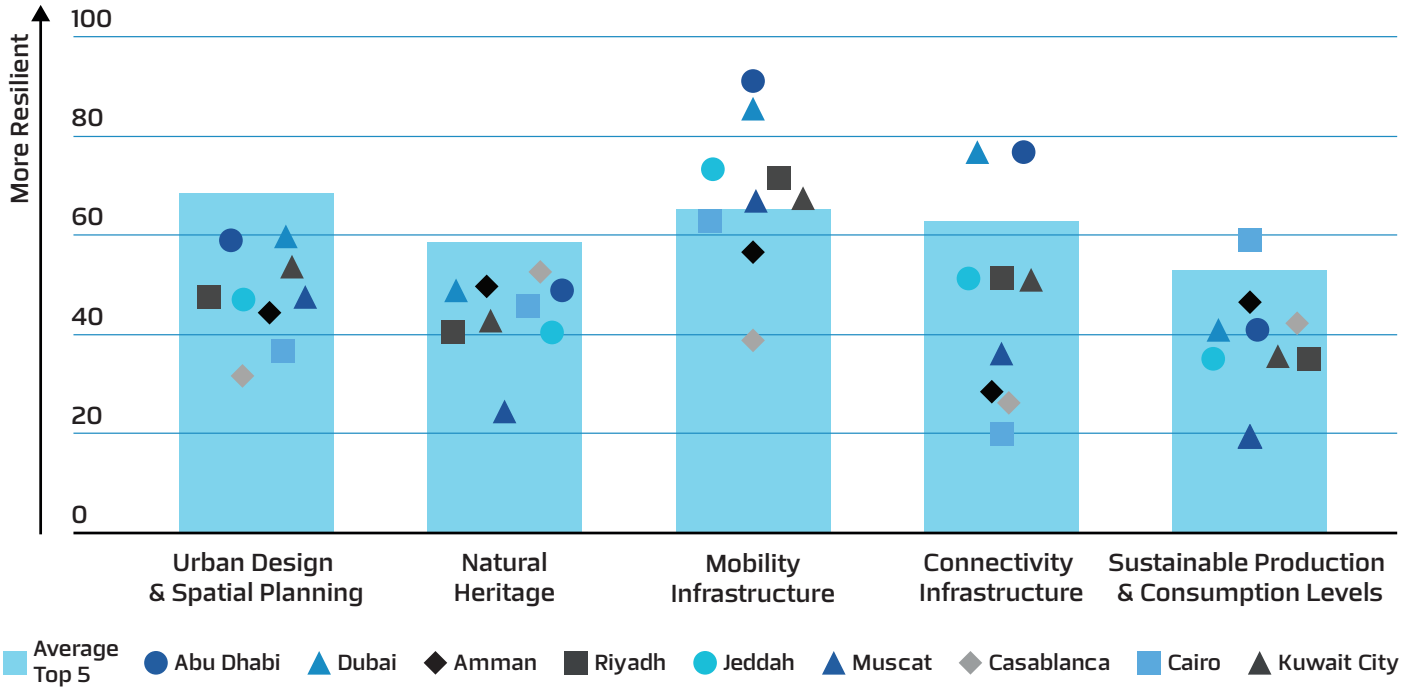
Source: Strategy&

Urban Environment

When it comes to the urban environment, the Strategy& urban resilience framework assesses cities' urban design and spatial planning, natural heritage, mobility and connectivity infrastructures, and sustainable consumption and production (**see Exhibit 8**). With the exception of Amman, Cairo, and Casablanca, MENA cities have high internet and mobile penetration rates when compared to benchmark cities. UAE cities have well developed mobility infrastructure as measured by their logistics performance index, exceeding the scores of advanced cities such as Seoul, Toronto, and Zurich. However, the sustainability of production and consumption is a particular problem for the region because of insufficient stress on circular economy models.[17] MENA cities also have low recycling rates and relatively high greenhouse gas emissions, especially in Gulf Cooperation Council (GCC)[18] cities, reaching an average of 20.6 percent, compared to 42.7 percent as an average of comparable cities. Cairo and Casablanca have an underdeveloped urban and connectivity infrastructure.

EXHIBIT 8: MENA CITIES NEED TO IMPROVE THEIR NATURAL HERITAGE & SUSTAINABLE PRODUCTION & CONSUMPTION LEVELS

MENA Cities' Vulnerabilities Assessment – Urban Environment (Index maximum of 100)



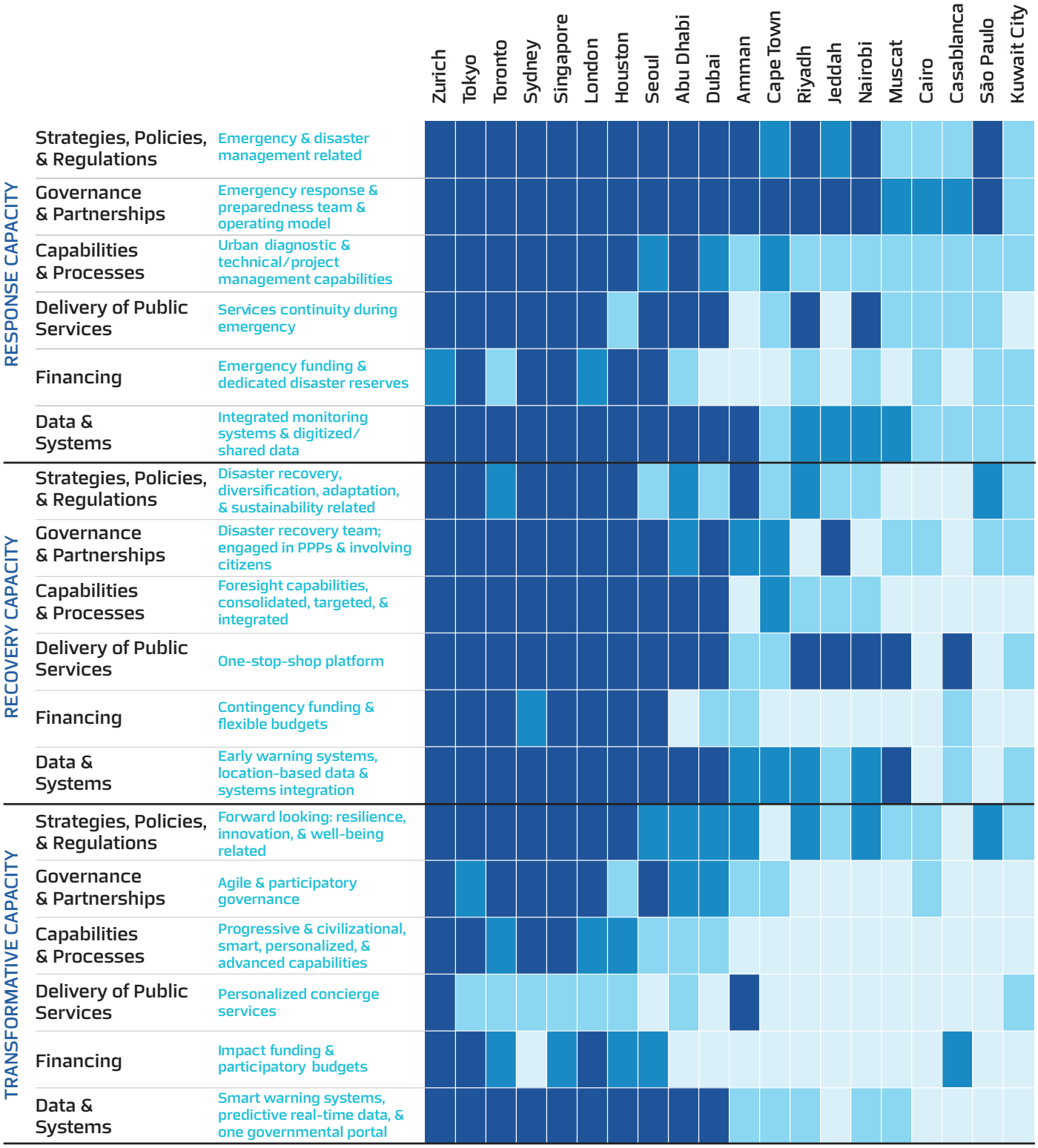
Source: Strategy&

Institutional Capacities Assessment

Institutional capacities should enable cities to respond to hazards and vulnerabilities. These enablers are in the form of strategies, policies, and regulations; governance and partnerships; capabilities and processes; delivery of public services; financing; and data and systems. MENA cities' institutional capacities are mixed. Most cities have reasonable response capacities, but are weaker in terms of recovery and transformative capacities (**see Exhibit 9**), all of which contribute to their broader lack of resilience preparedness.

EXHIBIT 9: MENA CITIES HAVE LIMITED TO MODERATE INSTITUTIONAL CAPACITIES

Institutional Capacities Assessment



Note: PPPs = public–private partnerships.

Source: Strategy&

Response Capacity

Response capacities measure the ability of cities' institutional enablers to anticipate and absorb shocks. This is done through emergency response strategies, governance structures and funding, private-sector engagement, shared procurement models, along with access to and continuity of public services in times of crises. Most MENA cities have well-developed national strategies for emergency responses, backed up by emergency laws. Also, they have developed sectoral strategies to reduce their vulnerabilities. These include, for example, Egypt's Energy Strategy 2035, Saudi Arabia's National Information Security Strategy, and the UAE's National Food Security Strategy and its Cybersecurity Strategy.

Some, such as Abu Dhabi and Dubai, have institutionalized specific governance structures at the city level. The UAE National Emergency Crisis and Disaster Management Authority is the lead entity at the national level and works closely with crisis and disaster management committees at the local level. These committees will change structure, with specific lead and support representations (such as health authority, civil defense, and the police) depending on the nature of the crisis at hand.

Other cities across the MENA region still have a highly centralized emergency response capability at the national level. Saudi Arabia, for example, covers emergency response through the General Directorate of Civil Defense. In terms of delivering public services, most cities have embarked on integrating services through e-government portals and open data platforms. Saudi Arabia has over 600 government services delivered through its eGovernment portal.

The Abu Dhabi Digital Authority and Smart Dubai are also integrating both government services and their open data through Bayanat.ae and Dubai Pulse, respectively.

Most cities have not proactively earmarked emergency funding but have relied on responsive stimulus packages. For comparison, most benchmark countries have dedicated emergency disaster assistance funds to invest in emergency support organizations in case of disasters.

Recovery Capacity

Recovery capacities measure the ability of cities' institutional enablers to adjust to and mitigate a shock. They achieve this through disaster recovery and multisectoral adaptation strategies and laws, diversification and sustainability plans, formalized governance structures with public–private partnerships (PPPs) and risk-sharing models, foresight and horizon-scanning capabilities, along with access to and continuity of digital services within a one-stop-shop platform. Most MENA cities have weak recovery capacities, which make it difficult for them to deal with the shock of an emergency. However, some cities — such as Amman and those in the UAE — have developed disaster risk reduction strategies, with the aim of mitigating hazards and preventing disaster incidence. Saudi cities have benefited from Hajj-related recovery strategies. Amman has a comprehensive disaster risk management master plan informed by the Hyogo Framework for Action.[19] Others, such as Cairo, have relied on sector-specific strategies for such issues as climate change adaptation, sustainability, and diversification. Cairo has also developed a National Strategy for Adaptation to Climate Change, and contingency plans for specific disasters. Many GCC cities have development diversification and privatization strategies, although some have not yet yielded the intended results.

When it comes to governance, only a few MENA cities, mainly UAE cities, have institutionalized structures for disaster recovery. The UAE National Emergency Crisis and Disaster Management authority and the federal committees have, as part of their mandate, the responsibility to manage recovery from a disaster. Horizontal and vertical coordination remains limited across the various governance structures, hindering agility and integrated responsiveness. Some MENA cities have formalized PPP models. However, their implementation has been limited to sectors such as healthcare and utilities in Saudi cities, and education in UAE cities.

Most MENA cities have not earmarked contingency funding or automatic economic stabilization mechanisms with which to deal with shocks. Abu Dhabi, for example, relies on its sovereign wealth fund, which manages the excess oil reserves and invests surpluses across different assets. The fund constituted a source of financing for areas of need during the COVID-19 crisis.

Some cities are trying to centralize government procurement and the use of data and standardize related processes. Two examples are Saudi Arabia's Etimad, launched by the Ministry of Finance, and Dubai's Tejari, an e-supply platform to promote local purchasing. Despite these efforts, procurement is too often inefficient. Most MENA cities do not take advantage sufficiently of geo-spatial data to inform decision making, in particular as inputs for early warning and surveillance systems.

Transformative Capacity

Transformative capacities measure a city's institutional ability to innovate, regenerate, and rebound from a shock. This requires multisectoral resilience, innovation, and well-being strategies; regulatory sandboxes (testing environments); agile and participatory governance structures and decision-making processes; PPPs supported by impact-funding models; well-being budgets; and advanced predictive capabilities through big and real-time data. MENA cities need to improve the transformative capacities that would allow them to regenerate after a shock. Some cities, such as Jeddah and Riyadh, have devised urban regeneration plans. Others, such as the UAE cities, have crafted innovation, well-being, and artificial intelligence (AI) strategies. All MENA cities still have room to invest further in R&D and emerging technologies to advance their innovation, diversification, and localization of their economies.

In addition, MENA cities lack streamlined, coordinated, organizational, and participatory governance structures that can make decisions swiftly and effectively. They also lack an institutionalized means of engaging with residents and the private sector. Finally, their decision making could be further enhanced through the utilization of real-time predictive, big, open, and geo-tagged data.

The Dubai Government's Role during the COVID-19 Pandemic

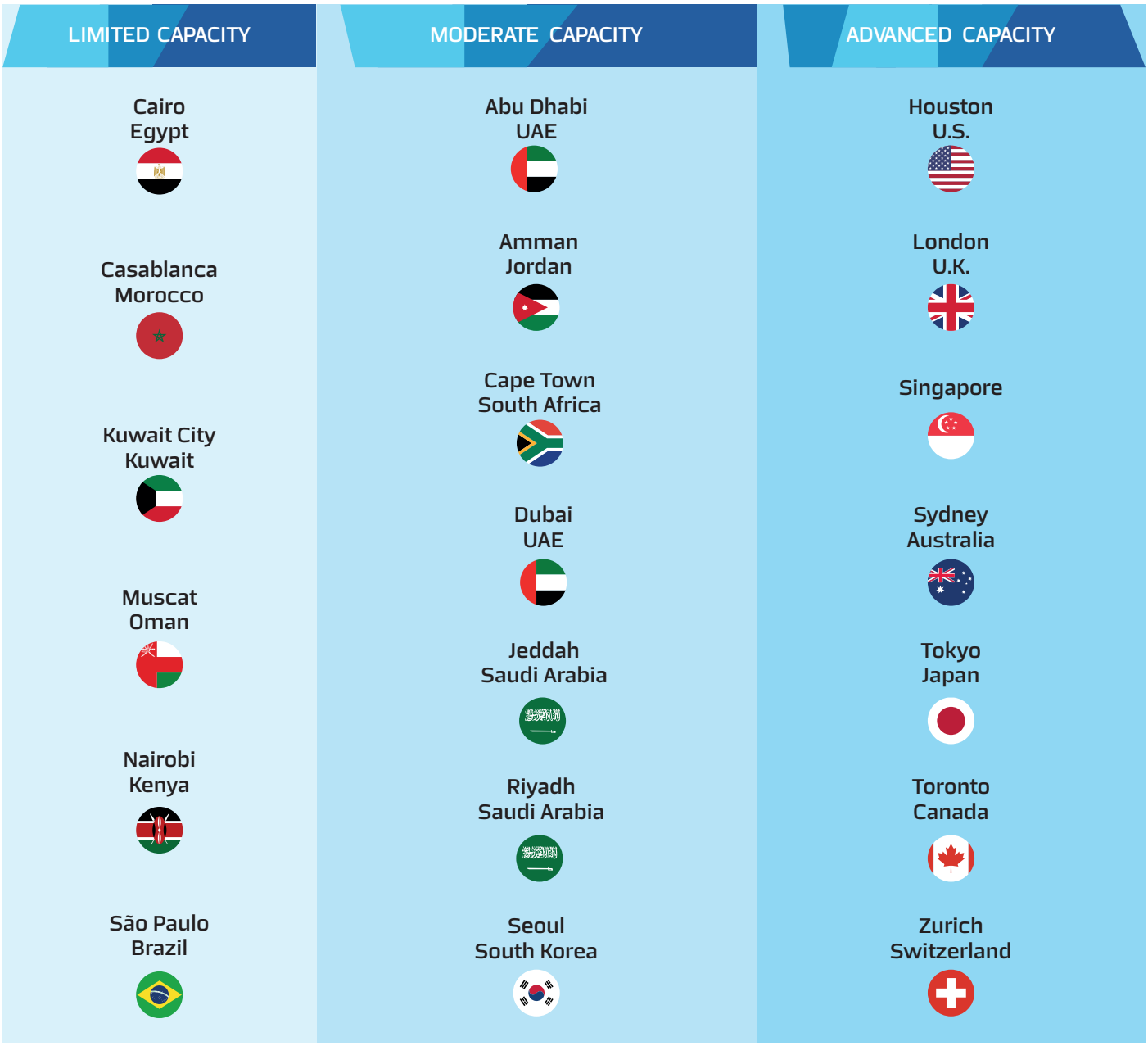
The Dubai government has sought to mitigate the COVID-19 pandemic and its impact on residents and the economy. It launched a number of institutional initiatives to deal with this difficult and unpredictable situation. Dubai adopted a hybrid and collaborative governance model, based on coordination among levels of government, and up and down reporting lines. It has coupled these with formalized and inclusive decision-making processes. Dubai's Supreme Committee of Crisis and Disaster Management is autonomous when dealing with the COVID-19 response. However, the entity still coordinates with leadership, the National Emergency Crisis and Disaster Management Authority, and the central bank (in areas such as stimulus packages, loan extensions, and other forms of financial support). In parallel, the Supreme Committee of Crisis and Disaster Management has the authority and autonomy to adapt complementary regulations at the federal level, coordinating with other governmental departments to optimize the response. The private sector has also been involved, with the support of other local authorities such as police, healthcare institutions, and transportation companies.
Dubai put in place policies and regulations to ease the impact of the pandemic that align with the national strategy's objectives. The city has relaxed regulations related to transfer of employees between employers, extended residency visas, set new hygiene protocols, enforced lockdowns and testing, and developed strict guidelines for the opening of schools and other businesses and services, among other measures. Finally, the government announced stimulus packages. The central bank provided AED70 billion ($19 billion) in stimulus packages, around 20 percent of GDP, to support the reduction in interest rates and provide grace periods for loan repayments. In parallel, Dubai offered five economic stimulus packages. It offered AED500 million ($136 million) in October 2020 in the form of rent breaks and elimination of government fees and fines, complementing it with a package of AED315 million ($86 million) announced on January 6, 2021, to extend the support another six months; bringing the total Dubai support to AED7.1 billion ($2 billion).[20]

Building Resilient Cities

MENA cities have limited or moderate institutional resilience capacities (**see Exhibit 10**). Cities will not be able to tackle all of their challenges simultaneously. It is recommended that they prioritize initiatives that will address the more pressing issues or that have a spillover effect on other challenges as well, taking into account their starting point.

EXHIBIT 10: MENA CITIES HAVE LIMITED TO MODERATE RESILIENCE CAPACITIES

Cluster Mapping According to Institutional Capacities



Note: Countries are listed alphabetically in each cluster.

Source: Strategy& analysis

Building from Limited Capacities

Cities with limited capacities, such as Casablanca, Cairo, Kuwait City, and Muscat, need to prioritize and steadily develop their response and recovery capacities. Urban resilience is not something that can be acquired easily. As such, these cities will need to devise emergency response and disaster recovery strategies, policies, laws, and regulations; institutionalize successful governance structures; and build coordination and collaboration mechanisms, along with internal capabilities (such as foresight and early warning) to better prepare for hazards (e.g. extreme weather conditions). They should reform their public spending and secure emergency funding and economic stabilizers and mobilize private-sector support through PPPs and risk-sharing models. They should also devise sector-specific strategies and initiatives to address their pressing vulnerabilities (e.g. emergency care, housing, social protection, and cohesion). They should formally engage the private sector in the implementation of priorities, policies, and initiatives through PPPs and risk-sharing models.

For instance, Cairo ranks low on housing, justice, and safety, in addition to public safety. The city would benefit from developing housing and public safety strategies. Casablanca, on the other hand, has weak emergency care preparedness, resulting from the lack of medical staff per capita and hospital capacities. That should incentivize students to seek medical-related careers, spur government to amend labor policies to make it easier for health institutions to hire expatriates where needed, and ideally engage the private sector in the expansion of medical institutions.

Building from Moderate Capacities

For cities with moderate capacities, they need to further enhance their recovery capacities to institutionalize recovery management from a disaster. In parallel, they should start developing their transformative capacities, i.e. their ability to be more agile, dynamic, and innovative in facing a disaster. This is the case for Saudi and UAE cities in the GCC, and Amman in the MENA region.

Cities with moderate capacities need to enhance their recovery capacities and start building transformative capabilities by developing strategies and plans that address their shortcomings in diversification, innovation, sustainability, and localization. Cities also need to modernize the financing and delivery of public services, continuing to enhance their one-stop-shop governmental portals and deploying more innovative budgeting approaches, such as well-being and participatory budgets. They will have to secure funding for R&D and commercialization and put in place regulatory sandboxes that encourage experimentation.

Ultimately, they should adopt more innovative impact-driven and financial-risk-sharing models with the private sector and global tech players. These can include social impact bonds and other approaches that reward service providers for improving social indicators. They should also formalize citizen engagement structures through instituting participatory governance approaches, such as establishing urban labs.

Developing transformative capacities involves crafting strategies and plans that are focused on eliminating remaining vulnerabilities at hand and enhancing the holistic well-being of city residents through ensuring social, economic, and urban inclusion and innovation. Addressing the root causes of these vulnerabilities in normal times will insulate basic needs, the economy, society, and the urban environment from future risks, thereby preventing unexpected consequences during future disasters.

Maintaining an Advanced Resilience Capacity

Even when cities have built advanced capacities, there is no room for complacency. Instead, to maintain their urban resilience these cities need to strengthen their transformative capacities continuously. They need to formalize agile and integrated governance structures, ensuring decision making and processes can be easily adapted to ensure optimal response capacities, no matter the type and scale of shocks. They also need to take advantage of emerging technologies to keep enhancing their capabilities (e.g. in behavioral science, data analytics, and design thinking). For example, Singapore has partnered with Hitachi to develop an innovative digital solution for building management, using the Internet of Things (the network of connected devices) and AI. The aim is to develop a human-centric automated model that controls multiple sub-systems and adjusts them based on space, activities of occupants, and the comfort of residents. It will allow for buildings to save energy without compromising any requirement or comfort of the residents; ultimately making it possible to construct high-rise super-low-energy buildings.[21]

A Blueprint for Urban Resilience

Ultimately, a resilient city is one that puts in place strong institutional capabilities across response, recovery, and transformative capacities, ticking all the boxes of the resilience checklist (**see Exhibit 11**).

EXHIBIT 11: CITIES NEED TO FOLLOW THIS BLUEPRINT & COMPLETE THE CHECKLIST TO DEVELOP AN ADVANCED RESILIENCE

	CAPACITY TO RESPOND	CAPACITY TO RECOVER	CAPACITY TO TRANSFORM
Strategies, Policies, & Regulations	- Emergency response strategy that addresses city-specific threats & vulnerabilities; backed up by tactical KPIs - Sectoral strategies or plans for each of the identified vulnerabilities - Acts & laws that facilitate the delivery of the emergency response strategy	- Disaster recovery plan & multisectoral adaptation strategy; backed by outcome-based KPIs that track disaster recovery - Diversification &/or sustainability strategy, or related targets embedded within national vision - Adaptive & flexible laws to facilitate & enable disaster recovery across sectors	- Comprehensive resilience strategy that addresses city-specific threats & vulnerabilities; & innovation-related strategies, backed by outcome- & impact-based KPIs - Urban regeneration strategy & a quality of life/well-being related strategy - Sandboxes across different regulatory areas
Governance & Partnerships	- Formalized emergency response governance structure including decision-making processes & leadership involvement - Localized horizontal & vertical coordination mechanisms at the design & implementation stages of emergency response - Dedicated emergency response entity - Institutionalized cross-functional working groups or committees for emergency response - Regular private-sector engagement in the delivery of projects - Regular communication to citizens of strategies, plans, & implementation progress	- Formalized disaster recovery governance structure including decision-making processes & leadership involvement - Localized horizontal & vertical coordination mechanisms at the design & implementation stages of disaster recovery - Dedicated disaster recovery entity - Institutionalized cross-functional working groups or committees for disaster recovery - Adoption of PPPs & risk-sharing models to engage the private sector - Formalized feedback channels for citizens' engagement	- Inclusive & agile decision-making process - Flexible & agile governance structure & operating model - Dedicated command & control center - Formalized citizens' engagement channels - Outcome- & impact-based PPP models, such as pay for success - Citizens' engagement in the design, implementation, & evaluation of initiatives
Capabilities & Processes	- Urban diagnostic & risk assessment capabilities - Consistent & regular communication to citizens - Shared procurement model & collaborative sourcing strategy across government agencies - Standardized & documented processes - Advanced technical & project management capabilities	- Foresight, horizon scanning, & integrated planning capabilities - Communication strategies aimed at citizens - One portal for government procurement across agencies, enabling consolidated purchasing - Flexible solutions across processes - Advanced leadership, interpersonal, communication, & networking capabilities	- Progressive & civilizational foresight including social capacity for foresight capabilities - Communication strategies personalized for citizens - Cloud-based & circular procurement practices across government agencies - Agile solutions across processes - Advanced behavioral economics, design thinking, & data analytics capabilities
Delivery of Public Services	- Access to & continuity of government services in times of emergency	- One-stop-shop platform for government services - Formalized feedback channels for citizens' engagement	- Personalized public concierge services
Financing	- Emergency funding to support disaster response & arising vulnerabilities - Dedicated reserves within the budget for disasters & shocks	- Contingency funding sources &/or recovery insurance - Diversified & flexible budget sources & automatic economic stabilizers	- Impact funding & disaster risk financing options - Participatory & well-being budget approach
Data & Systems	- Integrated & comprehensive systems for monitoring & reporting on all relevant natural & human-caused threats - Structured & digitized prescriptive administrative data - Data-sharing agreements between government entities & the private sector	- Surveillance & early warning systems for identified natural & human-caused threats - Location-based data - Integrated & interoperable whole of e-government system	- AI-augmented & machine-learning warning systems for identified natural & human-caused threats - Centralized database for predictive real time, big & open, & geo-tagged data - One portal across government entities – government as a platform

Note: AI = artificial intelligence. KPIs = key performance indicators.

Source: Strategy&

Choosing the Governance Design

A critical aspect of urban resilience is choosing an appropriate governance model. Governments globally adopt different governance models when it comes to emergency response and recovery. Some have a centralized model in which emergency planning and implementation takes place at the national level. Others use a decentralized model where decisions are made at the city or local level. Some have a hybrid model in which the different roles are divided between both the national and the local levels.

How can governments determine what is the optimal model to adopt? Strategy& proposes a decision-making framework to guide this process (**see Exhibit 12**). The process is dependent on country-specific features such as the political and governance structure, geographical features, and emergency governance structure, in addition to assessment of present hazards or threats, the available capabilities, and funding. By answering a list of simple questions, leaders will be able to decide what model is most appropriate to their own countries. For example, the U.S. adopts a decentralized model for natural threat management, given its federal system, size of the country, extensive differences among the challenges faced in each state, and advanced capabilities available in most states.

EXHIBIT 12: A SET OF DETERMINING FACTORS WILL HELP GOVERNMENT LEADERS IDENTIFY WHICH GOVERNANCE MODEL IS PREFERABLE

Decision-Making Framework

Political & Governance Structure	Geographical Features	Current Emergency Governance	Present Hazard	Available Capabilities	Funding
Is the country's power structure a unitary state?	Is it a small country? Is it geographically concentrated?	Is emergency response a national mandate?	Is this hazard or shock likely to hit the entire country?	Do local-level entities lack the technical capacity to do the planning?	Is the country in a healthy fiscal situation?
OR	OR	OR		OR	OR
	Are the country's various cities exposed to similar hazards?	Is centralization required for agile response & adaptation?	OR	Do cities lack the required infrastructure/ capacities to deliver services?	Do cities lack fiscal autonomy?
	OR	OR		OR	OR
Are the country's various cities exposed to similar vulnerabilities (social, economic, etc.)?	Are the country's various cities exposed to similar vulnerabilities (social, economic, etc.)?	Is centralization required for economies of scale?	Is uniformity of response required to address this hazard or shock (e.g. military assistance to the civil authority)?	Is the monitoring & data collection done at the national level?	Are private investments insufficient at the local level?

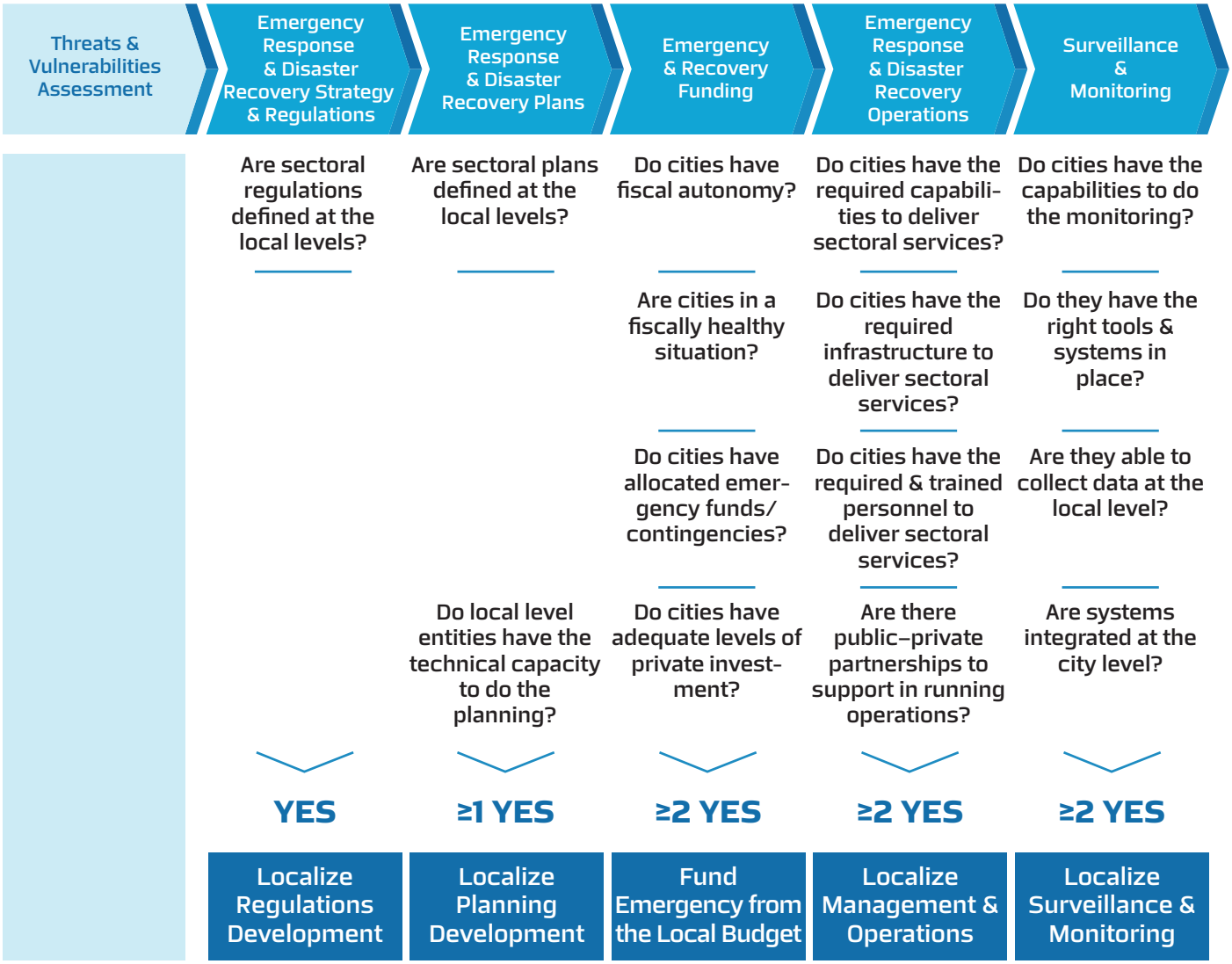
Answered "yes" to most questions	Answered "yes" to half the questions	Answered "yes" to one or no questions
CENTRALIZED MODEL	HYBRID MODEL	DECENTRALIZED MODEL

Source: Strategy&

With a hybrid model, leaders can go through a subsequent set of questions to identify which areas to centralize and which to localize (**see Exhibit 13**). In the case of the UAE, strategies and overarching plans are developed at the national level. The different emirates have the freedom to adapt their own emergency plans, lead monitoring operations, and allocate emergency and recovery funding as they see fit.

EXHIBIT 13: WITH A HYBRID MODEL, LEADERS COULD GO THROUGH ANOTHER DECISION-MAKING FRAMEWORK AT THE ACTIVITY LEVEL

Decision-Making Framework for Activities in a Hybrid Governance Model



Source: Strategy&

A Planned and Collaborative Effort to Achieve Resilience in Tokyo

Tokyo is located close to the junction of three tectonic plates, and hosts a busy river system, making it subject to extreme weather and at high risk of other natural threats such as earthquakes. The city has been gradually preparing and building resilience against these types of disasters. Today, Tokyo is recognized for its ability to respond and recover quickly after a shock, attributed in short to two main elements: preparedness and collaboration.

Tokyo started by developing its threat assessment; and has designed and implemented several initiatives to prepare for identified hazards and minimize its vulnerabilities. Although efforts to overcome the specific threats faced by Tokyo are localized, they are complemented by other efforts at the national level for disasters of a broader or national scale. Tokyo examined the following elements:

Basic needs: Japan has established a framework to deal with emergency requirements and secure the essential needs of the population in affected areas. A network of trucking routes adapts its operations to prioritize the distribution of relief goods to the area in need. A coalition of private-sector players comes together to ensure essential needs reach people, freeing government officials and employees to deal with other aspects of a crisis. Japan's National Institute of Infectious Diseases is also proactive in ensuring the right expertise, laboratories, and capabilities are in place to fight any epidemiology or pandemic. Tokyo also uses several advanced capabilities, such as the world's fastest versatile supercomputer, bringing into play AI, big data, and application performance, which proved helpful in speeding COVID-19 research and identifying the most effective drugs to treat the disease.[22] Tokyo has also a zero emissions strategy for 2050, ensuring efficiency of critical resources such as energy, water, and food.

Society: The government puts citizens at the core of its policy decisions, as reflected by Japan's Society 5.0 strategy. This strategy aims to achieve a human-centered society that balances economic advancement with the resolution of social problems through a system that integrates cyber-space and physical space. Tokyo is proactive in educating its citizens about potential threats and guidelines to follow in case of a disaster, turning them into active contributors in the response plan. The Tokyo Metropolitan

government disseminates the booklets, “Disaster Preparedness Tokyo” and “Disaster Readiness Guide,” in different languages, to increase awareness of warning signals and what citizens should do in case of a disaster.[23] The city also offers the Disaster Preparedness Tokyo App to provide insights to both citizens and foreigners on how to self-help and cooperate among their broader community during a disaster.

Economy: Japan builds on its private sector and innovation potential to expedite enhancing resilience across the board. To begin with, the country reformed and streamlined its business regulations, such as decreasing approval periods and promoting special zones, giving more room for agility and innovation for businesses. The New Energy and Industrial Technology Development Organization,[24] a national research and development agency, acts as an innovation accelerator and brings together a combination of its stakeholders, whether from the private sector, academia, or elsewhere, to co-create technological research alliances. In Tokyo, projects such as the vision for the 2020 Olympic Games or 2020 Robot project aim to promote the most innovative solutions and widespread adoption. Japan’s stable financial markets, coupled with large investments in R&D — reaching 3.26 percent of national GDP in 2018, compared to the 2.27 percent global average — contributed to enhancing the country’s innovation potential. Japan is also working on strengthening its trade base.

Urban environment: The city is investing in protecting its urban infrastructure, including critical assets, cultural heritage, and the transportation network. As such, it has devised large-scale urban redevelopment plans and adopted new building codes to enable the infrastructure to withstand earthquakes. It is home to Tokyo Skytree, the world’s tallest radio-tower that has a core column vibration control system that reduces the impact on the structure of an earthquake. The city has installed anti-flooding mechanisms on underground transportation systems, able to withstand six meters of water pressure. Tokyo Metro is using advanced space technology to predict and measure rain precipitation in 3D, which makes it possible to identify the optimal moment to shut transportation services, ensuring that citizens can use the service during evacuation, yet avoid getting caught in a flood.

Cities' Resilience Features

Implementing resilience-enhancing measures puts cities in a position to withstand the shocks of the future, the events that are by their nature unpredictable. They will be able to do so as they will have built the eight critical features of urban resilience: anticipatory, future-proof, resourceful, agile, participatory, citizen-centric, innovative, and holistic (**see Exhibit 14**).

EXHIBIT 14: RESILIENT CITIES EXHIBIT A NUMBER OF COMMON FEATURES

Urban Resilience Key Features

ANTICIPATORY

Utilizing proactive foresight, risk assessments, & monitoring to anticipate & prepare for potential shocks

FUTURE-PROOF

Designing for the future while ensuring cities can withstand & minimize shock impacts & bounce back

RESOURCEFUL

Ensuring the availability of diversified & sustainable resources, & mobilizing them to highest use value

AGILE

Enacting adaptive responses in a manner that is efficient & flexible to changing circumstances

PARTICIPATORY

Utilizing collaboration between public & private sectors to pool resources, capacities, & expertise

CITIZEN-CENTRIC

Prioritizing citizens' needs & well-being, & ensuring their inclusion, engagement, & empowerment

INNOVATIVE

Developing urban innovation & experimentation to enable a rebound

HOLISTIC

Delivering solutions based on holistic wider system impacts, & ensuring their measurability

Source: vv& analysis

Conclusion

MENA cities will benefit from steering their next wave of investments toward resilience-building initiatives. This will help their economies and societies recover in the event of a disaster, while enhancing readiness for future shocks. To make these investments count, cities need to assess their exposure to natural and human-caused hazards and identify their vulnerabilities across basic needs, society, economy, and the urban environment. This will allow them to bolster the institutional capacity that is needed to achieve the ultimate objective. For instance, this could entail expanding domestic production of basic goods needed to ensure enough provisions during emergencies, providing universal healthcare coverage and social safety nets, and addressing fiscal and budget inefficiencies. Some countries would also benefit from increasing decentralization, given the scale of their country and the differences in exposures and vulnerabilities faced by the main cities.

Through proper investment and building of their institutional capacities, MENA cities can anticipate and prepare to respond, recover, and transform — creating the urban resilience they will need for any disruption ahead.

Appendix

Strategy& developed a city-level comprehensive resilience framework to assess preparedness in the event of potential future shocks.

The framework was translated into a composite index, divided into two sections:

- An assessment of cities' exposure to threats and vulnerabilities, based on 131 key performance indicators (KPIs) that cover 36 dimensions
- A qualitative assessment of the institutional capacity readiness of the cities, based on a detailed checklist

The main sources of information are: World Bank, World Development Indicators, Worldwide Governance Indicators, and other databases; UN Food and Agriculture Organization; Statista; Global Health Security Index; Global Food Security Index; SDG Index; United Nations Educational Scientific and Cultural Organization; World Health Organization; World Economic Forum, Global Competitiveness Index; Our World in Data; United Nations Development Programme, **Human Development Report**; United Nations Sustainable Development Solutions Network, **The World Happiness Report**; Gallup; United Nations Conference on Trade and Development; European Commission, Emission Database for Global Atmospheric Research; Global Residence index; International Labour Organization, ILOSTAT; World Intellectual Property Organization; Arcadis; Global Footprint Network; Institute for Economics & Peace; Weather Base; World Resources Institute; national statistics; Strategy& analysis.

Pillar 1: Exposure to Hazards

Sub-Pillar	Dimension	Rationale
Natural Hazards	Extreme Weather Incidence	Change in temperature compared to average in the last 30 years; or the moving average of the last 30 years (1990–2020) compared to the average of the 30 years before (1980–2010) – measured in Celsius
	Floods	Impact of floods on GDP; coupled with percentage of population living under flood threat
		Landslides
	Droughts	Drought severity score, accounting for length of a drought and intensity of dryness
	Wildfires	Fire count per km^2 of country
	Earthquakes	Seismic hazard segment in terms of peak ground acceleration
	Pandemics & Epidemics	Global health security score, assessing capabilities to respond
	Insect Infestation	Desert locust risk level
Human-Caused Hazards	Geopolitical Tensions	Global peace index
	Homicide	Homicide rates and share of prison population
	Air Pollution	Level of NOX and SO_2 emissions
	Cyber-Attacks	Mobiles infected with malware, financial malware attacks, computers infected with malware, telnet attacks by originating country, attacks by crypto miners
	Technological Hazards	Number of technological incidents in recent years, including oil spills, airplane crashes, road traffic deaths, and building fires

Under each dimension, a number of indicators were analyzed. Scores were normalized for each indicator, across all cities, using a minimum/maximum approach and removing outliers where applicable. The result is a score over 100 for each city, for each indicator.

Indicator level scores were then aggregated based on the allocated weight for each.

Pillar 2: Exposure to Vulnerabilities

Sub-Pillar	Dimension	Rationale
Basic Needs	Emergency Care	Accounts for a city's emergency response strategies and time, capacity of healthcare institutions (number of hospital beds, infection control, laboratories), as well as availability of basic and specialized medical personnel (physicians, specialist surgical doctors, nurses, epidemiologists)
	Food Security	Accounts for the availability, accessibility, and affordability of food during a crisis
	Energy Security	Accounts for the level of diversity of energy sources and sustainability of sources (i.e. adoption of renewable energy sources); as well as the localization level of energy generation
	Water Security	Accounts for availability, diversity, and reliability of water sources, adoption of water renewable practices, as well as percent of population with no access to clean water
	Housing	Accounts for the availability, accessibility, and affordability of housing options
	Safety & Justice	Accounts for the existence of protective laws and policies in place to protect intellectual property rights, judicial independence, corruption, and suboptimal corruption levels
Society	Population at Risk	Accounts for the share of population at risk, expected to increase based on higher population density and growth; it also assesses percent of people who are vulnerable; i.e. refugees or the disabled
	Education	Accounts for literacy rates and level of education attained by the population, coupled with percent of government expenditures on the sector
	Physical & Mental Health	Assesses the health of the population overall, accounting for life expectancy, mortality rate, immunization policies, as well as the prevalence of a number of critical diseases (obesity, diabetes, etc.); adoption of a healthy lifestyle (not smoking and/or exercising regularly); and level of mental health
	Social Protection	Accounts for disparate income levels and other differences among citizens
	Social Inclusion	Accounts for gender equality and provision of opportunities for vulnerable population
	Social Cohesion	Accounts for the sense of community within the city, by looking at the percentage of people who donate or volunteer, availability of civic organizations, social capital, and importance of religion

Sub-Pillar	Dimension	Rationale
Economy	Public Finances	Accounts for the strength of public finances, by assessing GDP level, budget deficit (or surplus), and trade balance in terms of exports and imports
	Trade Diversification	Accounts for the level of diversification of product imports and exports
	Financial Markets	Accounts for credit rating assigned to the country, based on internationally recognized organizations; coupled with propensity to settle debts
	Business Environment	Assesses the attractiveness of the business environment, by providing streamlined processes, corporate tax havens, and access to venture capital and private equity
	Labor Market	Assesses the attractiveness of the labor market, accounting for unemployment, workforce diversity, recruitment practices, productivity levels, and availability of skilled workers
	Innovation	Accounts for government's focus on R&D investments, availability of researchers, as well as published articles/available trademarks and patents
Urban Environment	Urban Design & Spatial Planning	Assesses how well the city is planned, accounting for enforcement of green building codes, application of sustainability practices, prioritization of green spaces, and planning of roads and supporting infrastructure
	Natural Heritage	Assesses the level of protection of forests, biodiversity, natural resources, and other terrestrial and marine areas worth preserving
	Mobility Infrastructure	Assesses the quality, affordability, and accessibility of transportation
	Connectivity Infrastructure	Assesses accessibility, quality, and adoption level of mobile and fixed broadband bandwidth
	Sustainable Consumption & Production	Accounts for the ecological footprint and the adoption of sustainable practices, such as recycling, renewables, and smart grids

Under each dimension, a number of indicators were analyzed. Scores were normalized for each indicator, across all cities, using a minimum/maximum approach and removing outliers where applicable. The result is a score over 100 for each city, for each indicator.

Indicator level scores were then aggregated based on the allocated weight for each.

In-depth research and experts' interviews supported in scoring cities across the different sub-dimensions, using a detailed scoring checklist:

Pillar 3: Institutional Capacities

	Response	Recovery	Transformative
Strategies, Policies, & Regulations	**Score 0:** No emergency response strategy or plan available **Score 0.5:** Emergency strategy or plan available **Score 1:** Emergency strategy and plan available and updated regularly	**Score 0:** No long-term disaster recovery plan or adaptation strategies **Score 0.5:** Limited number of sector adaptation strategies **Score 1:** Long-term disaster recovery plan and multisectoral adaptation strategies available	**Score 0:** No resilience and/or innovation strategies or plans **Score 0.5:** Resilience and/or innovation strategies for some sectors **Score 1:** Comprehensive multi-sectoral resilience and innovation strategies available, e.g. AI strategy, knowledge-based economy strategy, digital economy strategy, future of skills strategy
	Score 0: No sectoral plans **Score 0.5:** 3 to 5 sectoral plans **Score 1:** More than 5 sectoral plans (e.g. healthcare, financial resilience, social cohesion, food security, water security, energy security, cybersecurity, etc.)	**Score 0:** No diversification or sustainability plan **Score 0.5:** Either a diversification or a sustainability plan **Score 1:** Both a diversification and a sustainability plan	**Score 0:** No urban regeneration and/or quality of life or well-being strategy **Score 0.5:** Either an urban regeneration and/or quality of life or well-being strategy **Score 1:** Both an urban regeneration and quality of life/ well-being strategy available
	Score 0: No acts or laws covering disaster and crisis management **Score 0.5:** One disaster and crisis management act or law **Score 1:** More than one act or law (e.g. epidemic act, act on ensuring emergency supply)	**Score 0:** No acts or laws covering disaster recovery **Score 0.5:** Mixed approach to disaster recovery regulation that is variable by sector or area **Score 1:** Adaptive and flexible disaster recovery laws and regulations across sectors or areas (e.g. self-regulation)	**Score 0:** No sandboxes **Score 0.5:** Sandboxes in one regulatory area (e.g. blockchain) **Score 1:** Sandboxes in more than one regulatory area
	Score 0: No KPIs for emergency responsiveness **Score 0.5:** Select KPIs for measuring emergency responsiveness **Score 1:** Comprehensive list of tactical output KPIs that track different facets of emergency responsiveness	**Score 0:** No KPIs for disaster recovery **Score 0.5:** Select output KPIs for measuring disaster recovery **Score 1:** Comprehensive list of output and outcome KPIs that track different facets of disaster recovery	**Score 0:** No forward-looking KPIs for resilience **Score 0.5:** Select output and outcome KPIs for measuring resilience that are forward-looking and are aspirational **Score 1:** Comprehensive list of output, outcome, and impact KPIs that track different facets of resilience and are forward-looking and aspirational

	Response	Recovery	Transformative
Governance & Partnerships	**Score 0:** Lack of formal emergency preparedness decision-making processes and/or low leadership involvement **Score 0.5:** Fragmented emergency preparedness decision-making processes and/or medium leadership involvement **Score 1:** Formalized and centralized emergency preparedness decision-making processes and tangible leadership involvement	**Score 0:** Lack of formal disaster recovery decision-making processes and/or low hierarchal leadership involvement **Score 0.5:** Fragmented disaster recovery decision-making processes and/or medium leadership involvement **Score 1:** Formalized and centralized disaster recovery decision-making processes and tangible leadership involvement	**Score 0:** Lack of agile and inclusive decision-making processes and leadership **Score 0.5:** Limited agile and inclusive decision-making processes and leadership **Score 1:** Formalized agile and inclusive decision-making processes and visionary leadership
	Score 0: No horizontal or vertical coordination for emergency response design or implementation **Score 0.5:** Limited horizontal or vertical coordination at the design or implementation steps **Score 1:** Horizontal and vertical coordination at both design and implementation steps	**Score 0:** No localization and/or horizontal or vertical coordination for disaster recovery **Score 0.5:** Limited localization and horizontal and vertical coordination for disaster recovery **Score 1:** Localization and horizontal and vertical coordination are institutionalized and applied for disaster recovery	**Score 0:** Limited to no instances of flexibility or agility in governance **Score 0.5:** Limited agility in governance (e.g. formation of temporary cross-functional teams) **Score 1:** Flexibility and agility in governance
	Score 0: No Emergency Response structure/entity **Score 1:** Emergency Response structure/entity	**Score 0:** No Disaster Recovery structure/entity **Score 1:** Disaster Recovery structure/entity	**Score 0:** No Command and Control Centers **Score 1:** Command and Control Centers
	Score 0: No formal working groups/committees for addressing emergency response **Score 0.5:** Limited working groups/committees in place for select emergency response facets **Score 1:** Institutionalized working groups/ committees for emergency response	**Score 0:** No formal working groups/committees for addressing disaster recovery **Score 0.5:** Limited working groups/committees in place for select disaster recovery facets **Score 1:** Institutionalized and cross-functional working groups/ committees for disaster recovery	**Score 0:** No institutionalized citizen engagement **Score 0.5:** Citizen engagement on an ad hoc basis **Score 1:** Formal structures for formal and regular citizen engagement (e.g. living labs)

	Response	Recovery	Transformative
Governance & Partnerships	**Score 0:** No private-sector engagement for public works and delivery of government services **Score 0.5:** Ad hoc private-sector engagement on a project-by-project basis **Score 1:** Private-sector engagements are considered for the delivery of significant number of projects depending on the inherent benefits involved, and agreements are formalized	**Score 0:** No or limited PPP and risk-sharing models **Score 0.5:** PPPs and risk-sharing models applied to specific sectors only **Score 1:** PPPs and risk-sharing models are formalized and incentives are in place to encourage private-sector participation	**Score 0:** PPP and risk-sharing models are output driven **Score 0.5:** PPPs and risk-sharing models are outcome and impact driven **Score 1:** PPPs are outcome and impact driven and new PPP models such as pay-for-success are piloted
	Score 0: Limited one-way communication to citizens **Score 0.5:** Moderate communication to citizens utilizing a few communication channels **Score 1:** Strategies, plans, and implementation progress are communicated regularly to citizens	**Score 0:** Citizens are not consulted for feedback on resilience measures **Score 0.5**: Citizens are consulted on an ad hoc basis to give feedback **Score 1:** Citizens are consulted formally through consistent feedback forms/ channels	**Score 0:** Citizens are not consulted in the co-design and implementation of transformative initiatives **Score 0.5:** Citizens are engaged on an ad hoc basis in the co-design and implementation of transformative initiatives **Score 1:** Citizens are engaged formally in the co-design, implementation, and evaluation of transformative initiatives
Capabilities & Processes	**Score 0:** No urban diagnostic and risk assessment capabilities **Score 0.5:** Limited urban diagnostic and risk assessment capabilities **Score 1:** Urban diagnostic and risk assessment capabilities	**Score 0:** No foresight, horizon scanning, and integrated planning capabilities **Score 0.5:** Limited foresight, horizon scanning, and integrated planning capabilities **Score 1:** Foresight, horizon scanning, and integrated planning capabilities	**Score 0:** No progressive and civilizational foresight including social capacity for foresight capabilities **Score 0.5:** Limited progressive and civilizational foresight including social capacity for foresight capabilities **Score 1:** Progressive and civilizational foresight including social capacity for foresight capabilities
	Score 0: No or limited communication to citizens **Score 0.5:** Limited communication to citizens **Score 1:** Consistent and regular communication to citizens	**Score 0:** No targeted communication to citizens **Score 0.5:** Limited targeted communication to citizens **Score 1:** Consistent use of targeted communication when applicable	**Score 0:** No personalized communication to citizens **Score 0.5:** Little use of personalized communication when applicable **Score 1:** Consistent use of personalized communication when applicable (e.g. pregnancy, medicine-dependent)

	Response	Recovery	Transformative
Capabilities & Processes	**Score 0:** Procurement model is variable across agencies **Score 0.5:** Shared procurement model and collaborative sourcing across some government agencies **Score 1:** Shared procurement model and collaborative sourcing across all government agencies	**Score 0:** Procurement is decentralized **Score 0.5:** Consolidated purchasing for some government entities **Score 1:** One portal for government procurement across agencies and for consolidated purchasing	**Score 0:** No application of cross-public-services, cloud-based, and smart and circular procurement **Score 0.5:** Limited application of cross-public-services, cloud-based, and smart and circular procurement **Score 1:** Consistent application of cross-public-services, cloud-based, and smart and circular procurement
	Score 0: Most processes are not documented or standardized **Score 0.5:** Some processes are documented or standardized **Score 1:** Most or all processes are documented or standardized	**Score 0:** Most processes are not flexible or ready for upgrade **Score 0.5:** Some processes are flexible or ready for upgrade **Score 1:** Most or all processes are flexible or ready for upgrade	**Score 0:** Most processes are not agile **Score 0.5:** Some processes are agile **Score 1:** Most or all processes are agile
	Score 0: Limited technical and project management capabilities **Score 0.5:** Proficient technical and project management capabilities **Score 1:** Expert technical and project management capabilities	**Score 0:** Limited leadership, interpersonal, communication, networking capabilities **Score 0.5:** Proficient leadership, interpersonal, communication, networking capabilities **Score 1:** Expert leadership, interpersonal, communication, networking capabilities	**Score 0:** Limited behavioral economics, design thinking, data analytics, agile, etc. capabilities **Score 0.5:** Proficient behavioral economics, design thinking, data analytics, agile, etc. capabilities **Score 1:** Expert behavioral economics, design thinking, data analytics, agile, etc. capabilities
Delivery of Public Services	**Score 0:** No or limited continuity of government services in times of emergency **Score 0.5:** Continuity of some government services in times of emergency **Score 1:** Access and continuity of government services in times of emergency	**Score 0:** Limited continuity of government services across different platforms, no one-stop shop **Score 0.5:** Continuity of some government services across different platforms, no one-stop shop **Score 1:** Access and continuity of digital services within a one-stop-shop platform	**Score 0:** Limited personalization in prompts, messaging, and platform for government services **Score 0.5:** Moderate personalization in prompts, messaging, and platform for government services **Score 1:** Personalized concierge services

	Response	Recovery	Transformative
Financing	**Score 0:** No dedicated emergency funding **Score 0.5:** Moderate but insufficient emergency funding **Score 1:** Sufficient emergency funding	**Score 0:** No contingency funding or insurance **Score 0.5:** Moderate but insufficient contingency funding or recovery insurance **Score 1:** Sufficient and well-planned contingency funding or recovery insurance	**Score 0:** Limited use of impact funding (e.g. impact bonds) and disaster-risk financing options **Score 0.5:** Moderate but insufficient use of impact funding and disaster-risk financing options **Score 1:** Multiple instances of impact funding (e.g. impact bonds) and disaster-risk financing options when applicable
	Score 0: No financial reserves in budget for disaster and shocks **Score 0.5:** Moderate but insufficient financial reserves in budget for disaster and shocks **Score 1:** Dedicated reserves in budget for disaster and shocks	**Score 0:** Limited diversity in budget sources and no automatic economic stabilizers **Score 0.5:** Moderate but insufficient diversity in budget sources and/or economic stabilizers **Score 1:** Flexibility and diversity of budget sources and automatic economic stabilizers	**Score 0:** Lack of participatory and well-being budgets **Score 0.5:** Moderate application of participatory and well-being budgets **Score 1:** Advanced application of participatory and well-being budgets
Data & Systems	**Score 0:** No systems related to monitoring and reporting on disaster indicators **Score 0.5:** Limited and ad hoc systems used to monitor and report on disaster indicators **Score 1:** Integrated and comprehensive systems for monitoring and reporting on disaster indicators	**Score 0:** No surveillance and early warning systems **Score 0.5:** Limited surveillance systems **Score 1:** Surveillance and early warning systems	**Score 0:** Limited use of emerging tech in warning systems **Score 0.5:** Internet of Things-augmented warning systems **Score 1:** AI-augmented and machine learning warning systems
	Score 0: No, to few, digitized records of prescriptive administrative data (e.g. pdf only) **Score 0.5:** Moderate availability of prescriptive administrative data **Score 1:** Digitized availability of structured prescriptive administrative data	**Score 0:** No form of location-based data collection **Score 0.5:** One form of location-based data collection **Score 1:** One or more forms of location-based data collection	**Score 0:** No availability of predictive real time, big and open, and geo-tagged data **Score 0.5:** Limited availability of predictive real time, big and open, and geo-tagged data across multiple platforms **Score 1:** Advanced availability of predictive real time, big and open, and geo-tagged data in a centralized database (e.g. citizens e-ID microchipped, location tracing app, and condition sensing)

	Response	Recovery	Transformative
Data & Systems	**Score 0:** No data sharing agreements between different government entities or private sector **Score 0.5:** Limited data sharing agreements between different government entities **Score 1:** Advanced data sharing agreements between different government entities and with private sector (e.g. Uber and Dubai's Roads and Transport Authority)	**Score 0:** No e-government systems integration and interoperability **Score 0.5:** Limited e-government platform integration and interoperability **Score 1:** Whole of e-government systems integration and interoperability	**Score 0:** No use of government cloud and no single face of government **Score 0.5:** Limited utilization of government cloud and transition to single face of government **Score 1:** Same portal across all government entities with different levels of access for different entities/employees; government as a platform

Endnotes

1. Sécurité et Défense magazine, “Middle East to Focus on Emergency Response Services as Region Prepares for Rise in Natural Disasters,” October 31, 2015 (https://sd-magazine.com/risques-majeurs/middle-east-to-focus-on-emergency-response-services-as-region-prepares-for-rise-in-natural-disasters).

2. Hannah Ritchie and Max Roser, “Urbanization,” Our World in Data, November 2019 (https://ourworldindata.org/urbanization#:~:text=UN%20estimates%20therefore%20report%20that,and%20cited%20on%20global%20urbanization).

3. Mona Serageldin, François Vigier, Maren Larsen, Study Team: Barbara Summers and Sheelah Gobar, “World Migration Report 2015: Urban Migration Trends in the Middle East and North Africa Region and the Challenge of Conflict-Induced Displacement,” International Organization for Migration (IOM) Background paper, December 2014 (https://www.iom.int/sites/default/files/our_work/ICP/MPR/WMR-2015-Background-Paper-MSerageldin-FVigier-MLarsen.pdf).

4. “Number of recorded natural disaster events, All natural disasters, 1900 to 2019,” Our World in Data (https://ourworldindata.org/grapher/number-of-natural-disaster-events?time=earliest..2019).

5. World Meteorological Organization, “Natural hazards and disaster risk reduction” (https://public.wmo.int/en/our-mandate/focus-areas/natural-hazards-and-disaster-risk-reduction); Matteo Coronese, Francesco Lamperti, Klaus Keller, Francesca Chiaromonte, and Andrea Roventini, “Evidence for sharp increase in the economic damages of extreme natural disasters,” PNAS, October 22, 2019; 116 (43) 21450-21455 (https://www.pnas.org/content/116/43/21450); “Global Increase in Climate-Related Disasters,” Independent Evaluation, Asian Development Bank, November 2015 (https://reliefweb.int/sites/reliefweb.int/files/resources/global-increase-climate-related-disasters.pdf).

6. Franck Bousquet, “Natural disasters in the Arab World: Today’s plan is a shelter for tomorrow’s storm,” Arab Voices, World Bank Blogs, May 6, 2013 (https://blogs.worldbank.org/arabvoices/natural-disasters-arab-world-today%E2%80%99s-plan-shelter-tomorrow%E2%80%99s-storm).

7. Nicolas Péridy, Marc Brunetto, and Ahmed Ghoneim, “The Economic Costs of Climate Change in MENA countries: A Micro-Spatial Quantitative Assessment and a Survey of Policies,” Research n° FEM34-03, Femise - Forum EuroMéditerranéen des Instituts de Sciences Economiques, June 2012 (https://www.femise.org/en/studies-and-research/environment-energy-climate-change/the-economic-costs-of-climate-change-in-mena-countriesa-micro-spatial-quantitative-assessment-and-a-survey-of-adaptation-policies/#:~:text=c)%20The%20impact%20of%20climate,Tunisia%20and%20some%20Mashrek%20countries).

8. Institute for Economics & Peace, "Global Peace Index 2019: Measuring Peace in a Complex World," Sydney, June 2019 (https://www.visionofhumanity.org/wp-content/uploads/2020/10/GPI-2019web.pdf).

9. Institute for Economics & Peace, "The Economic Value of Peace 2018: Measuring the Global Economic Impact of Violence and Conflict," Sydney, October 2018 (https://www.economicsandpeace.org/wp-content/uploads/2020/08/Economic-Value-of-Peace-2018.pdf).

10. Steve Morgan, "2017 Cybercrime Report: Cybercrime damages will cost the world $6 trillion annually by 2021," Cybersecurity Ventures Herjavec Group, 2017 (https://1c7fab3im83f5gqiow2qqs2k-wpengine.netdna-ssl.com/2015-wp/wp-content/uploads/2017/10/2017-Cybercrime-Report.pdf).

11. Mike Maddison, Wasseem Khokhar, Nick Robinson, and Taha Khedro, "A false sense of security? Cybersecurity in the Middle East," Global State of Information Security® Survey, PwC, March 2016 (https://www.pwc.com/m1/en/publications/documents/middle-east-cyber-security-survey.pdf).

12. Stephane Hallegatte, Jun Rentschler, and Julie Rozenberg, "Lifelines: The Resilient Infrastructure Opportunity," World Bank, 2019 (https://openknowledge.worldbank.org/handle/10986/31805).

13. "Study: Preventing Cyberattack Penetration Can Save Enterprises Up To $1.4 Million Per Incident," businesswire, April 7, 2020 (https://www.businesswire.com/news/home/20200407005031/en/Study-Preventing-Cyberattack-Penetration-Save-Enterprises-1.4).

14. "Saudi Arabia saw almost 160,000 cyberattacks on smartphones," **Saudi Gazette**, June 16, 2020 (https://saudigazette.com.sa/article/594321).

15. Lydia Assouad, "Inequality and Its Discontents in the Middle East," Malcolm H. Kerr Carnegie Middle East Center March 12, 2020 (https://carnegie-mec.org/2020/03/12/inequality-and-its-discontents-in-middle-east-pub-81266).

16. The World Bank, World Development Indicators.

17. Dr. Yahya Anouti, Frederic Ozeir, Saed Shonnar, and Jana Batal, "Circular economy: A new source of competitive advantage in the chemicals industry," Strategy& 2019 (https://www.strategyand.pwc.com/m1/en/ideation-center/research/2019/circular-economy/circular-economy.pdf).

18. The GCC countries are Bahrain, Kuwait, Oman, Qatar, Saudi Arabia, and the United Arab Emirates.

19. United Nations Office for Disaster Risk Reduction, "Hyogo Framework for Action 2005-2015: Building the resilience of nations and communities to disasters - full text," 2007 (https://www.undrr.org/publication/hyogo-framework-action-2005-2015-building-resilience-nations-and-communities-disasters).

20. Emirates News Agency, "Dubai increases economic stimulus package to AED7.1 billion," January 6, 2021 (https://wam.ae/en/details/1395302899900).

21. Akiko Sato; Shigeyuki Tani, Ph.D.; Koji Sasaki, Ph.D.; Wujuan Lin, Ph.D.; Jun Furuya; Chiaki Hirai, Ph.D; "People-Centric City Enabled by Digital Platforms," Hitachi Review, 2019 (https://www.hitachi.com/rev/archive/2019/r2019_04/04a05/index.html).

22. "The World's Fastest Computer Leading COVID-19 Research," Tomodachi, Japan.gov, Autumn 2020 (https://www.japan.go.jp/tomodachi/2020/autumn2020/worlds_fastest_computer.html).

23. "Disaster Prevention Information," Tokyo Metropolitan Government (https://www.metro.tokyo.lg.jp/english/guide/bosai/index.html); "Tokyo Metropolitan Government spearheading disaster preparedness efforts," **The Japan Times**, August 7, 2019 (https://www.japantimes.co.jp/2019/08/07/special-supplements/tokyo-metropolitan-government-spearheading-disaster-preparedness-efforts/).

24. "About NEDO," New Energy and Industrial Technology Development Organization (https://www.nedo.go.jp/english/introducing/introducing_index.html).

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