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Making Cities Resilient Report 2019:

A snapshot of how local governments progress in reducing disaster risks in alignment with the Sendai Framework for Disaster Risk Reduction

Contribution from the Action on "Making Cities Sustainable and Resilient:
Implementing the Sendai Framework for Disaster Risk Reduction 2015-2030 at the Local Level"

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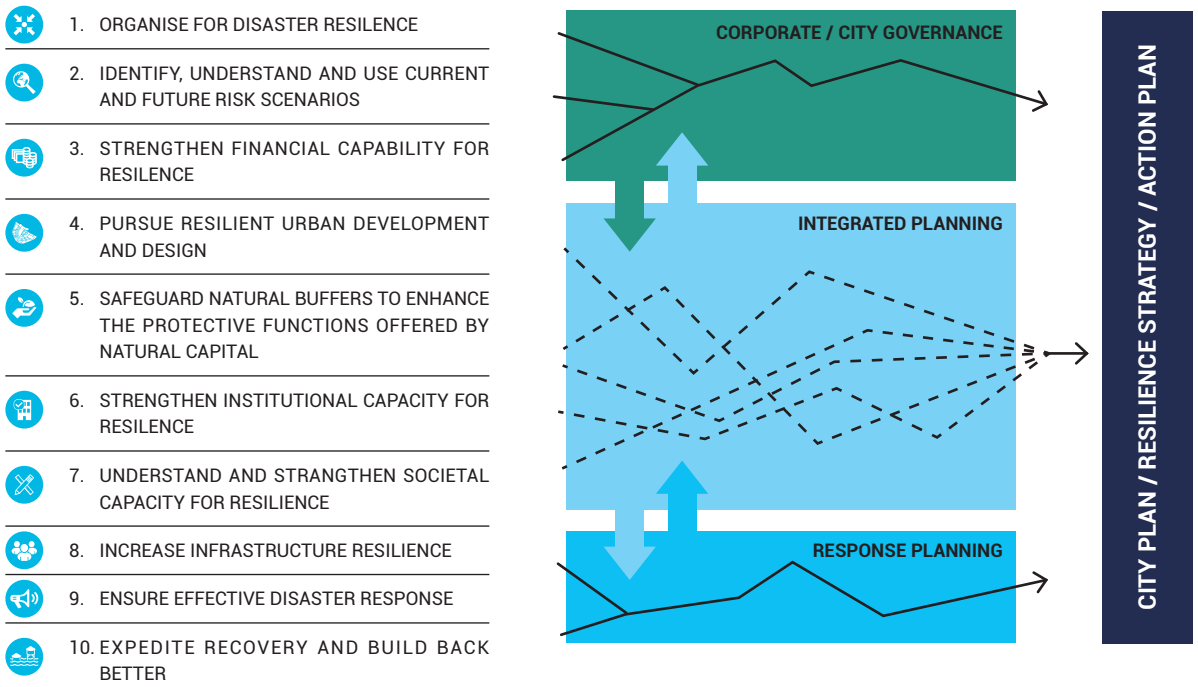
1 Introduction

More than 50% of the world's population now live in urban cities, which are complex in nature, and consist of many interrelated physical systems [1]. Simultaneously, urban disasters are escalating rapidly, resulting in increasing human and economic losses [2]. It is expected that nearly 70% of the population will live in cities by 2050 [3]. Thus, resilience cannot be achieved without significantly changing the way cities manage their urban spaces. Numerous efforts from various stakeholders, including local government decision makers, city officials, departments, central and provincial governments, the private sector, civil society, non-governmental organisations, community-based organisations, research institutions and institutions of higher learning, are required to create a resilient urban environment.

In order to address local risk governance, urban risk, and resilience, the United Nations Office for Disaster Risk Reduction has been working to raise awareness and commitment towards sustainable development practices that will reduce disaster risk and increase the wellbeing and safety of the society. The UN Office for Disaster Risk Reduction (UNDRR) and its partners launched the 'Making Cities Resilient' (MCR) Campaign in 2010. The Campaign was intended to raise awareness on urban risk reduction with city leaders and local governments to work along with local partners, grassroots networks, and national authorities. The "Ten Essentials for Making Cities Resilient" were developed to provide the basic building blocks for understanding disaster resilience at the local level, based on the Hyogo Framework for Action [1]. Following the Local and Sub-National Governments Declaration at the 2015 United Nations (UN) World Conference on Disaster Risk Reduction in Sendai, Japan, and "The Florence Way Forward" adopted at the High-Level Forum on Implementing the Sendai Framework for Disaster Risk Reduction[1] at the Local Level in Florence, Italy in June 2016, this Campaign has entered a new phase with augmented focus to support the local implementation of the Sendai Framework for Disaster Risk Reduction while the long-standing advocacy for disaster risk reduction also continues. The Ten Essentials for Making Cities Resilient were modified and aligned to the guidance provided by the Sendai Framework. Pilot tests for the new Ten Essentials were conducted in 20 cities, and the Essentials were revised based on the feedback. The Ten Essentials are grouped in three categories: the first three Essentials cover governance and financial capacity, Essential four to eight cover many dimensions of planning and disaster preparation, and the last two Essentials cover disaster response and post-disaster recovery. All Essentials are related to each other to achieve disaster resilient cities. (Figure 1).

1 • United Nations, "Sendai Framework for Disaster Risk Reduction 2015-2030," in Third United Nations World Conference on Disaster Risk Reduction, Sendai, Japan, 2015: https://www.preventionweb.net/files/43291_sendaiframeworkfordrren.pdf

Figure 1: The Ten Essentials for making cities resilient (Source: UNISDR 2017)



Subsequently, a self-assessment and monitoring tool for disaster risk reduction at the local level, known as the "Disaster Resilience Scorecard for Cities[2]", was developed. Local governments can use the Scorecard to engage multi-stakeholders and develop a common baseline understanding on the local progress towards disaster resilience building. Launched at the Global Platform for Disaster Risk Reduction in Cancun, Mexico in 2017, the Scorecard offers two levels of assessment: a preliminary assessment containing 47 indicators under the "Ten Essentials", each with a 0-3 score, and a detailed assessment containing 147 indicators under the scale of 0-5 score. The Scorecard allows the respondents to leave comments and means of verification regarding each indicator and identify actions they can take to further strengthen their capacities in that particular area.

During 2017-2018, 214 cities/municipalities from Asia (88), Americas (50), Sub-Saharan Africa (50), and Arab States (26) conducted the Scorecard assessment as part of the initiative "Making Cities Sustainable and Resilient: Implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030 at the Local Level", supported by the European Commission. The emphasis of this report is to articulate the results of these preliminary level assessments of the Disaster Resilience Scorecards for Cities into an analysis of the global trends of resilience actions, reflecting the progress in resilience building at the local level.

This analysis is an attempt to identify key challenges, opportunities, and recommendations for urban resilience, taking into consideration the elements within the Ten Essentials of the Making Cities Resilient Campaign including the aspects on local governance, financial and technical resources, policies and plans, and participation and engagement of citizens. Multiple descriptive statistical techniques were used to analyse the ordinal data, which were further processed using MS Excel software. Content analysis, a form of thematic analysis, was used to identify key challenges, opportunities, and recommendations, based on the comments given by the respondents.

2 • https://www.unisdr.org/campaign/resilientcities/toolkit/article/disaster-resilience-scorecard-for-cities

The results of this study reveal the state of being of local governments on disaster risk reduction, which permits an enhanced understanding of the progress towards achieving the targets of the Sendai Framework at the local level. This simultaneously reflects the progress made towards achieving the Sustainable Development Goals (SDG), particularly SDG 11 "Make cities and human settlements inclusive, safe, resilient and sustainable"[3] , which cannot be achieved without a substantive reduction of potential impact caused by disasters to population, society and economy.

The next section explains the resilience trends in local governments across the globe. Global challenges, opportunities, and recommendations for stronger local government resilience policies are reported in the following sections.

3 • https://sustainabledevelopment.un.org/sdg11

2 Resilience trends in local governments across the globe

The resilience trends in local government across the globe that are presented in this section are based on an analysis of the preliminary level assessment of the Disaster Resilience Scorecard for Cities within the regions of Asia, Americas, Sub-Saharan Africa, and Arab States. The preliminary scorecard was structured around the 'Ten Essentials for Making Cities Resilient', which offers a broad coverage of many issues that cities need to address, including governance and financial capacity, planning and disaster preparedness, and post-event recovery.

The overall performance across the regions according to the Ten Essentials for Making Cities Resilient is shown in Figure 2 and 3 (Scale of 0-3).

Figure 2: Overall progress of local governments in disaster resilience and risk reduction (all regions)

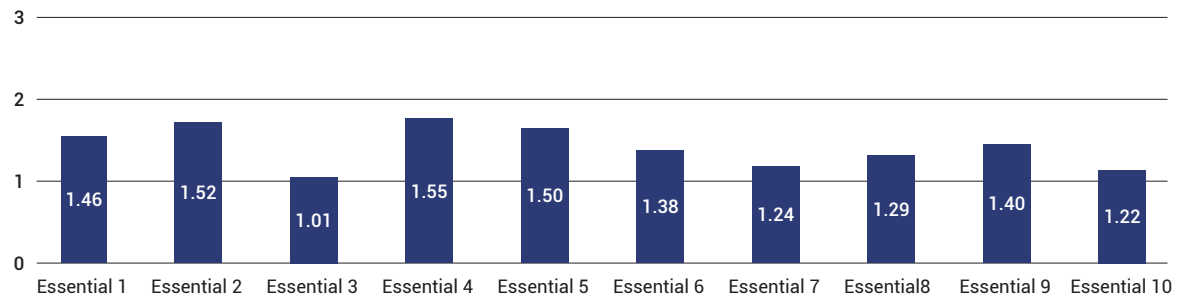
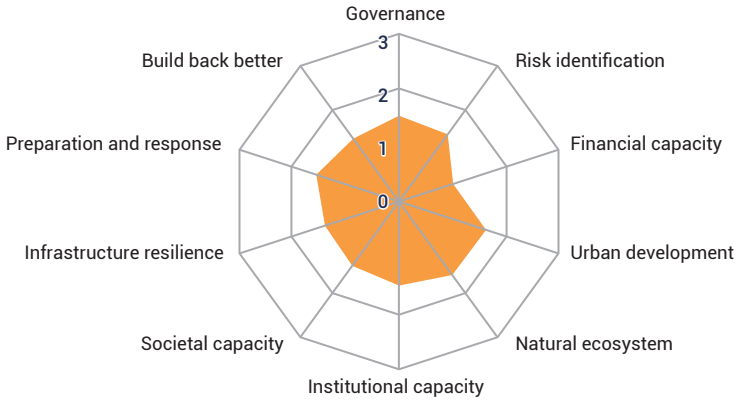
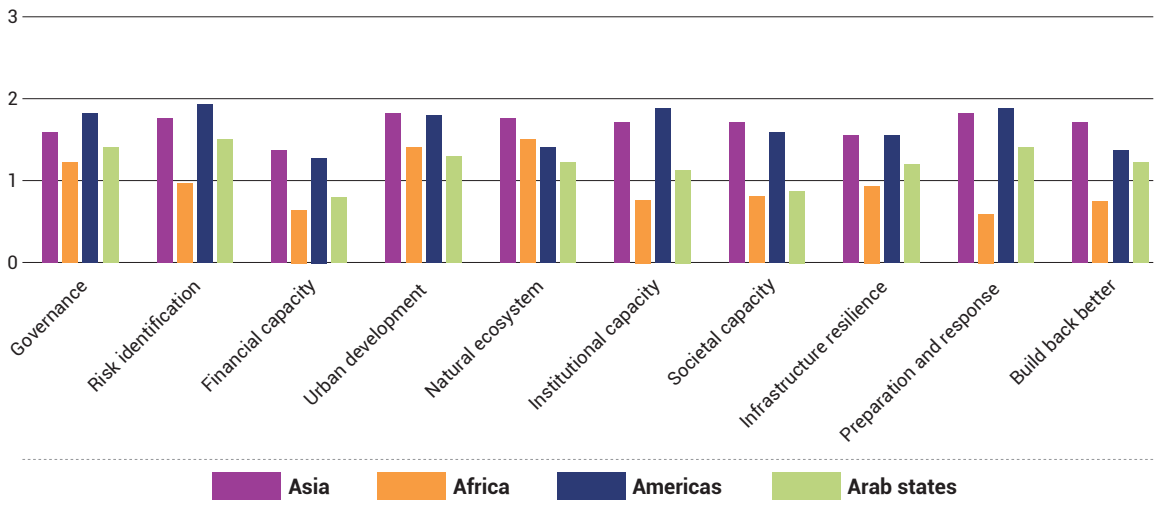


Figure 3: Overall performance of local governments in disaster resilience and risk reduction (all regions)



Overall, 'Essential 4: resilient urban development' is the area of highest progress (1.55), followed by 'Essential 2: risk identification' (1.52), 'Essential 5: enhancement of ecosystems' protective functions' (1.50) and 'Essential 1: disaster risk governance' (1.46), respectively. In contrast, 'Essential 3: financial capacity for resilience' (1.01) is the area that needs the most improvement.

Figure 4: Overall progress of local governments in disaster resilience and risk reduction (by regions)



The level of progress on financial capacity for disaster resilience (Essential 3) is quite modest in all regions. This shows that securing a substantial budget for disaster risk reduction is a challenge for most nations [4].

Figures 5-8 shows the web diagrams of region-wise overall performance.

Figure 5: Overall progress of local governments in disaster resilience and risk reduction: Asia

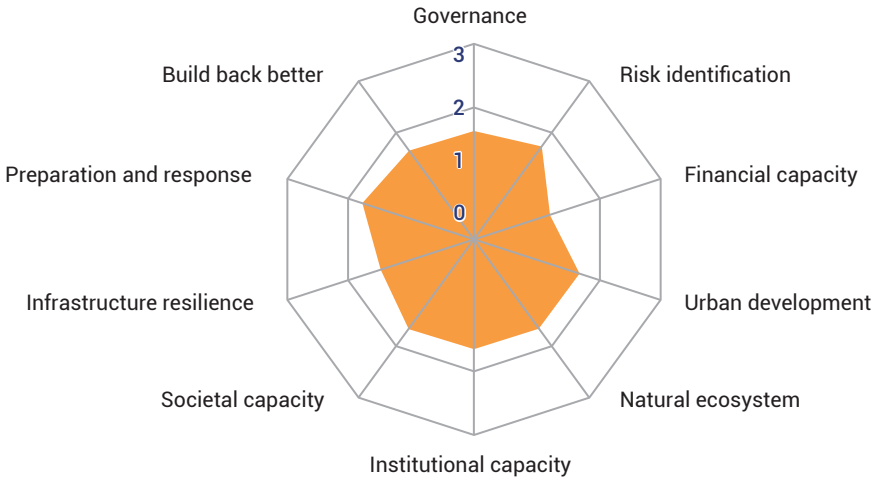


Figure 6: Overall progress of local governments in disaster resilience and risk reduction: Africa

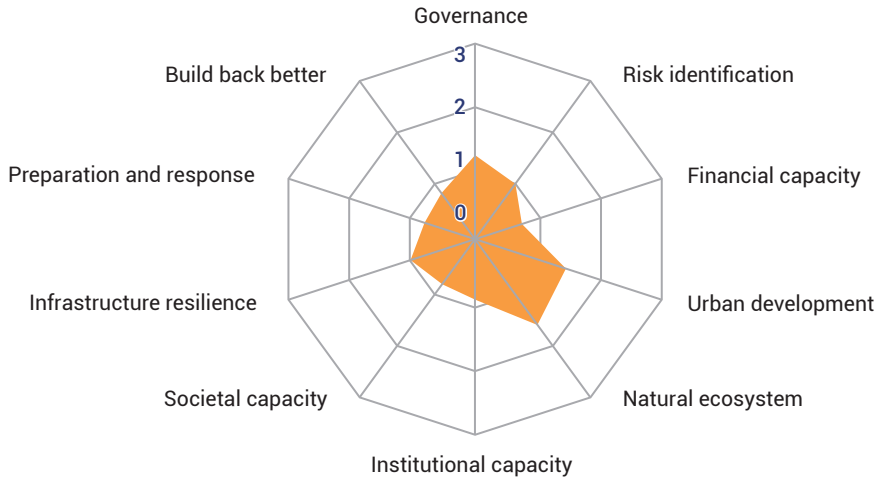


Figure 7: Overall progress of local governments in disaster resilience and risk reduction: Americas

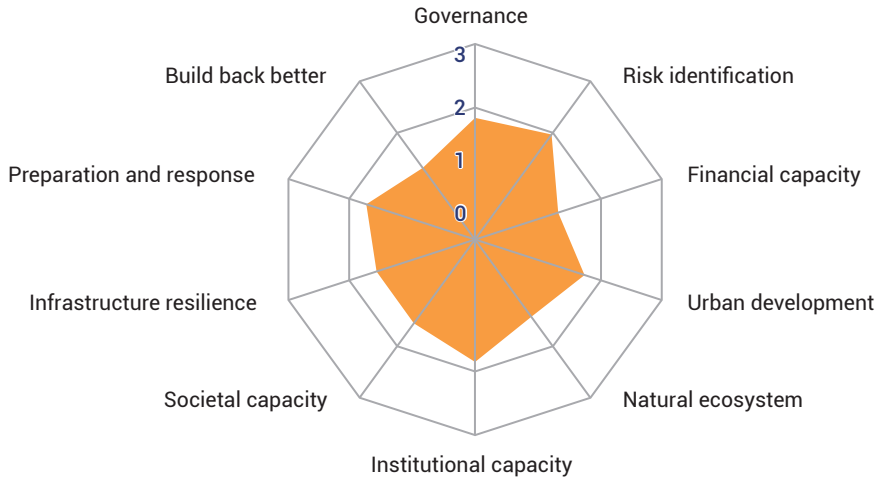
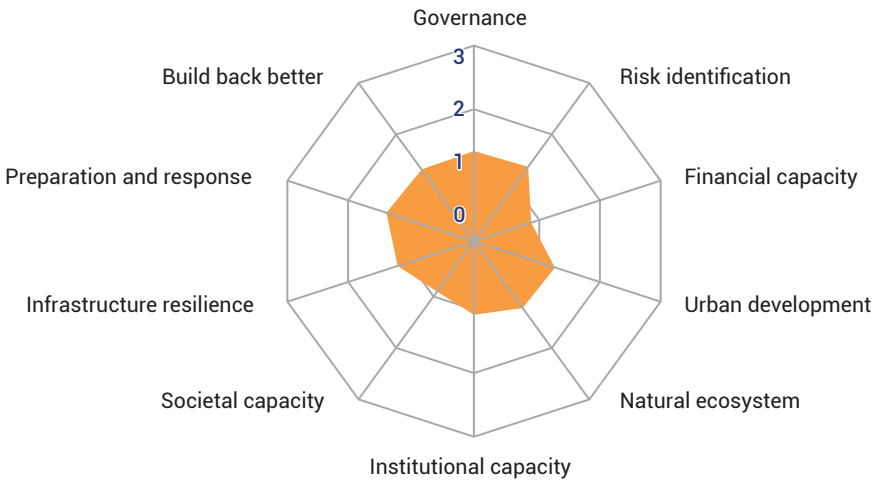


Figure 8: Overall progress of local governments in disaster resilience and risk reduction: Arab States

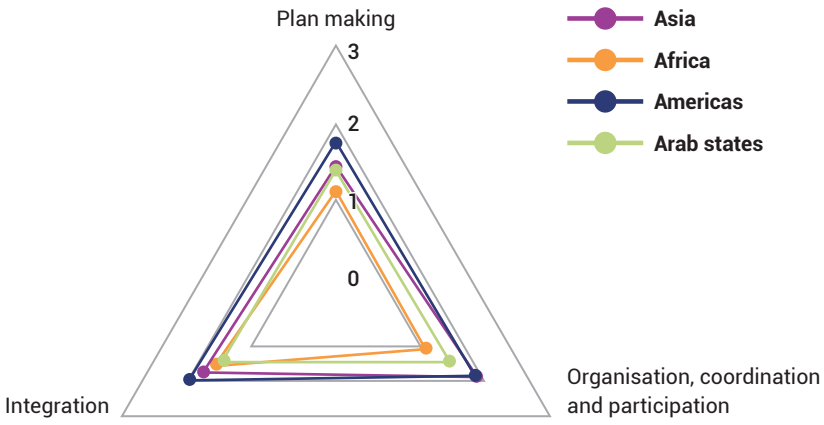


Based on the sub-indicators of the Essentials, Asian cities performed well in citizen engagement techniques, Sub-Saharan African and American cities performed well in data sharing, and Arab cities performed well in hazard assessment.

2.1 Local Disaster Risk Governance, Policies, and Plans

Based on the sub-indicators of the Essentials, Asian cities performed well in citizen engagement techniques, Sub-Saharan African and American cities performed well in data sharing, and Arab cities performed well in hazard assessment.

Figure 9: Progress of local governments in Organising for disaster resilience



According to Figure 9, within the category of organising for disasters (Essential 1), the integration of disaster resilience with other key functions of the city, such as sustainability investment, code compliance, emergency

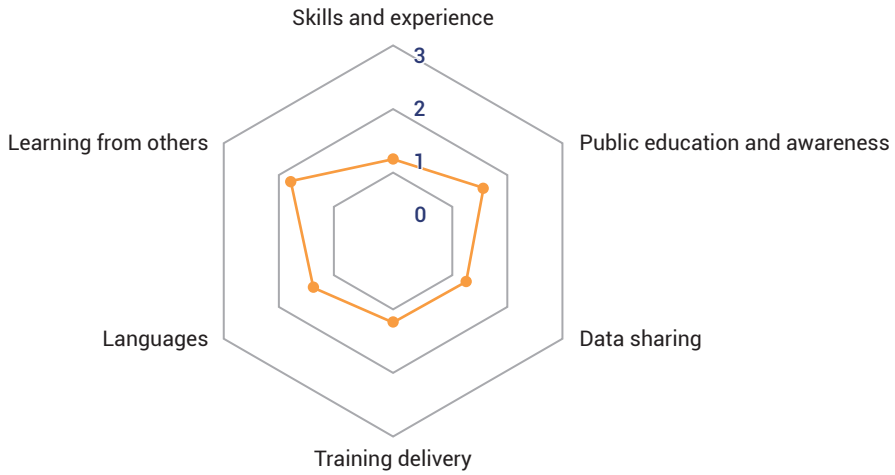
management, is the area in which all regions have reached a considerable level of progress.

According to respondents, an absence of DRR divisions in local authorities and a lack of coordination among different stakeholders are viewed as the primary issues regarding inadequate local governance. Results show that DRR is not under the purview of some local government services. Thus, local councils tend to avoid the responsibilities to initiate DRR activities, instead assuming that it will be dealt by other organisations [2]. For example, according to the South Africa Disaster Management Act 2002, provinces and municipalities are not necessarily obliged to form multi-agency coordinating committees, thus making it difficult for issues emanating from local communities to reach national and intergovernmental levels [5].

2.2 Local Institutional Capacities

Figure 10 reveals that the institutional capacity of local governments across the world on data sharing among relevant institutions, availability of training courses covering risk reduction and resilience issues for all sectors, and access to skills and experience to reduce risks and respond to identified disaster scenarios is relatively low. However, all regions are proactively seeking to enhance knowledge and learn from other local governments facing similar challenges.

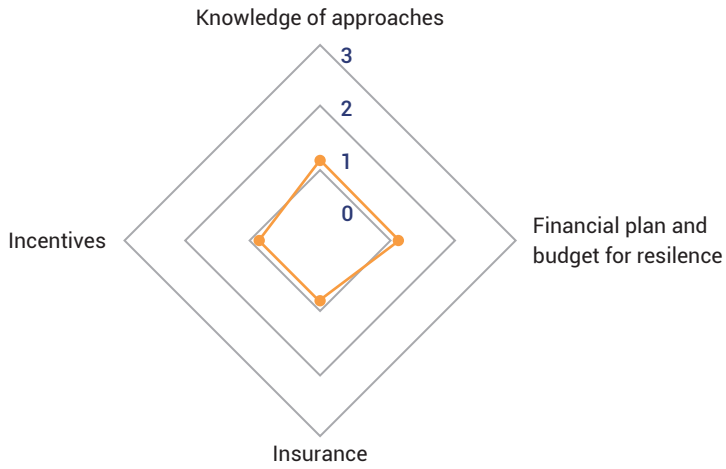
Figure 10: Overall progress of local governments in strengthening institutional capacities (all regions)



2.3 Resources

To implement DRR initiatives, substantial financial and human resource allocations, are required. However, the results show that local governments have limited knowledge of approaches for attracting funds for resilience investments (Figure 11). The results also reveal that incentives for different segments of business and society to support resilience building and the use of insurance as a risk transfer mechanism are notably low in almost all cities. While cities are progressing in terms of financial plans for disaster risk reduction, only 42% of local governments have a financial plan that allows for disaster risk reduction activities with ring-fenced budget. Studies highlight the disproportionate allocation of funds, where most of the disaster-related funds are allocated for relief and reconstruction work, while the allocation of funds for mitigation and risk reduction is comparatively low [2].

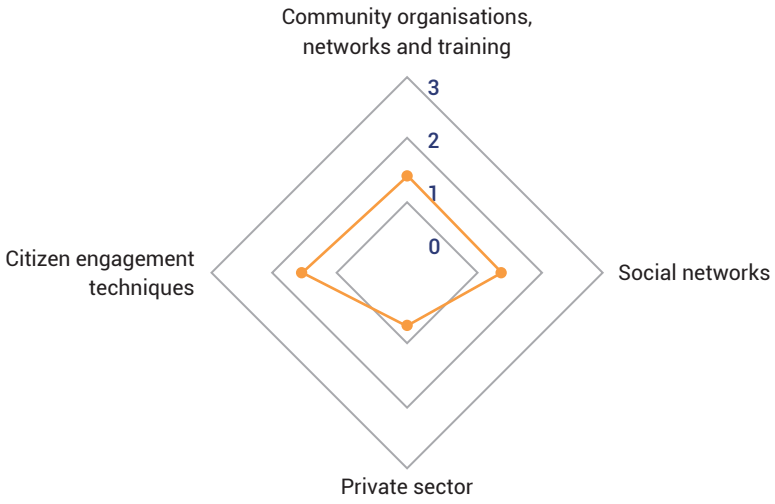
Figure 11: Overall progress of local governments in financing for disaster resilience (all regions)



2.4 Community participation

Local government needs support from communities to create communities that are resilient to disasters. However, some of them suffer from a lack of community engagement. As shown in Figure 12, most of the cities score low on engaging with private sector businesses and employers for disaster resilience. There is some progress in strengthening the capacities of vulnerable groups and social networks, reflecting more engagement of local governments to 'leave no one behind'.

Figure 12: Overall progress of local governments in strengthening societal capacity for resilience (all regions)



3 Analysis of local government progress on disaster resilience and risk reduction: Global and regional trends

This section explains the overall analysis of the state of the Ten Essentials at global and regional levels. This analysis is important for those regions of the world that have become systematically vulnerable to severe challenges of and exposure to natural and human-made hazards.

3.1 Governance and financial capacity

Governance and financial capacity are the foundation block to build and maintain resilience. The first three Essentials cover this aspect and are expected to be accomplished first, for which all the other Essentials can be acted upon.

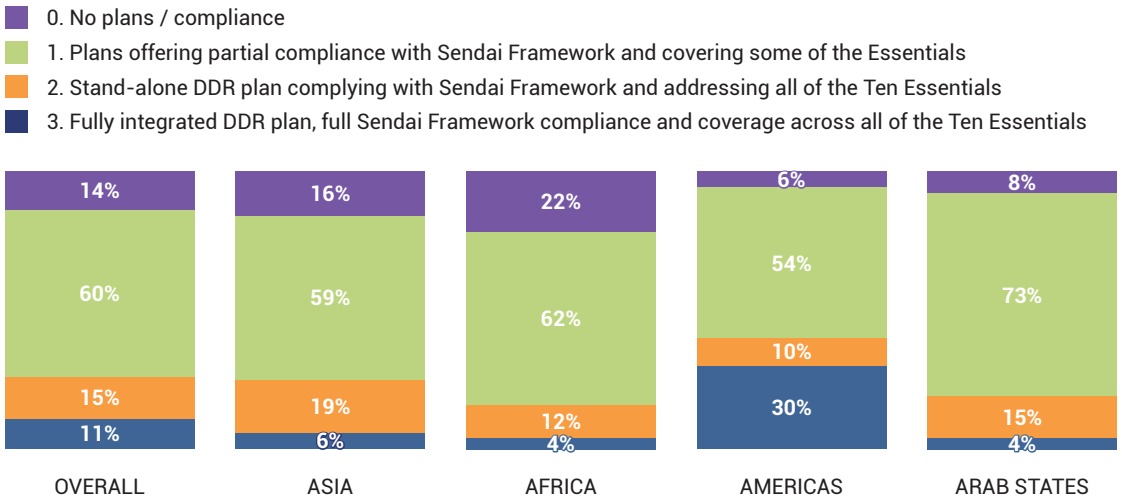
3.1.1 Essential 1: Organise for resilience

Defining an organisational structure and identifying the necessary processes to understand and act on reducing disaster risks are the focus of this Essential. This Essential consists of three sub-elements. They are plan making, organisation, coordination and participation, and integration. The global and regional trend of Essential 1 and its sub-elements are shown in Figures 13, 14, and 15.

P1.1 Plan Making

The preliminary scorecard assessment of Essential P1.1 shows that, 86% of the participating local governments have plans that offer full or partial compliance with the Sendai framework, and covering some of the Ten Essentials for making cities resilient. However, only 11% of the local governments implement a fully integrated DRR plan in accordance with the Sendai framework and all of the Ten Essentials. In contrast, 14% of the local governments do not have any plans in this regard.

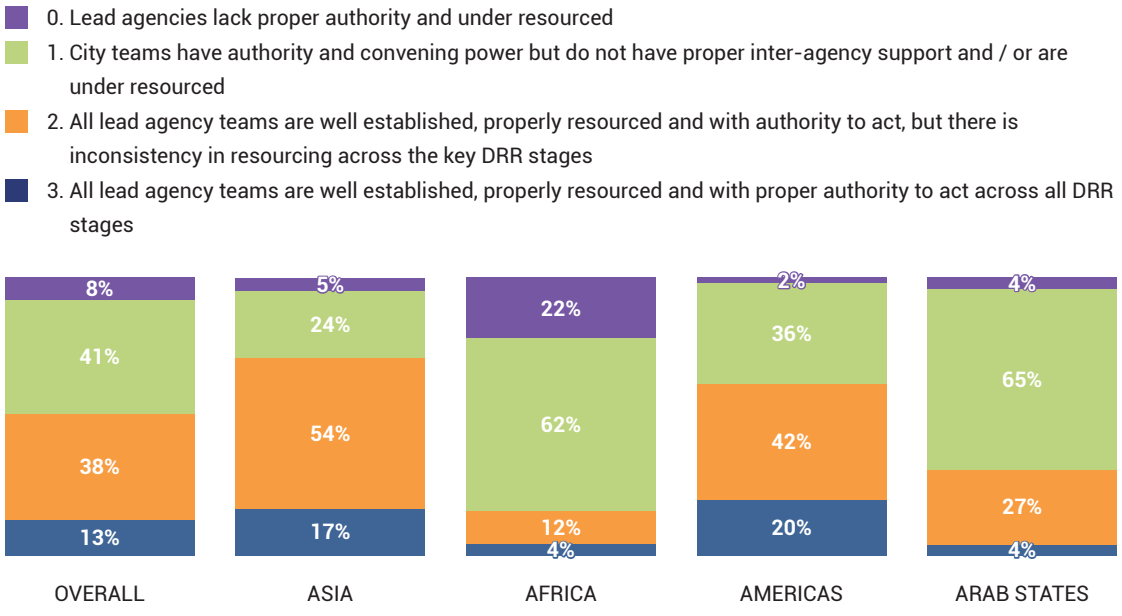
Figure 13: P1.1 Plan Making



P1.2 Organisation, Coordination and Participation

49% of the city teams do not have proper interagency support and are under-resourced to address DRR. Only 13% of the cities have well established team with appropriate authority and resources for DRR.

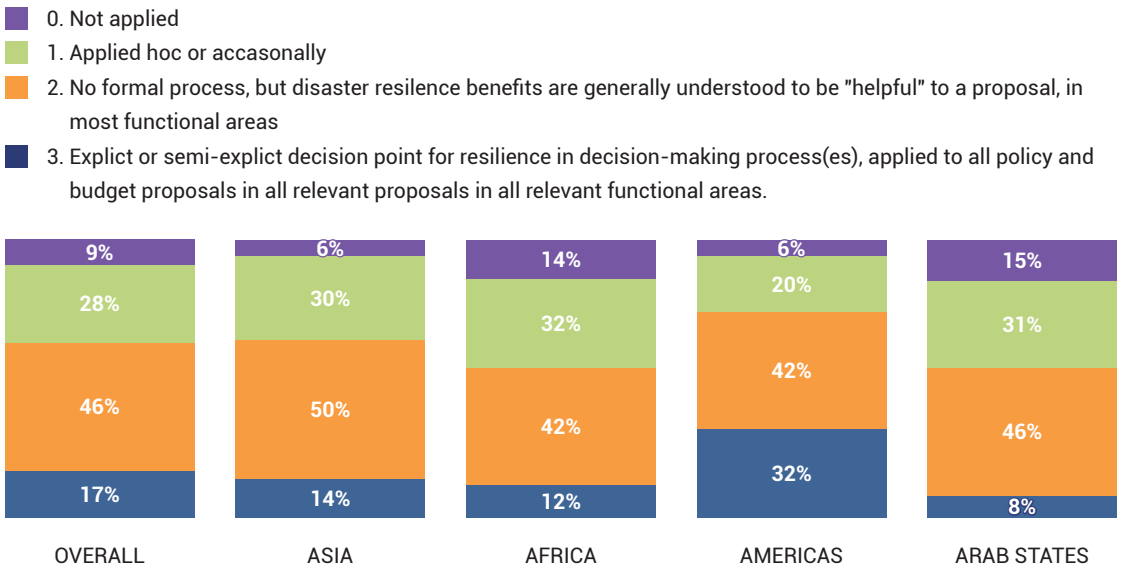
Figure 14: P1.2 Organisation, Coordination, and Participation



P1.3 Integration

Integrating resilience properly with city key functions such as sustainability, finance and compliance, and infrastructure management is one of the key influences of planning. In 28% of the cities, disaster resilience is applied in the city's key functions only occasionally, or on an ad hoc basis. The results show that benefits of integration are generally understood in most of the cities across the regions. Around 42-50% of the cities in all the regions are at Level 2 in this category.

Figure 15: P1.3 Integration



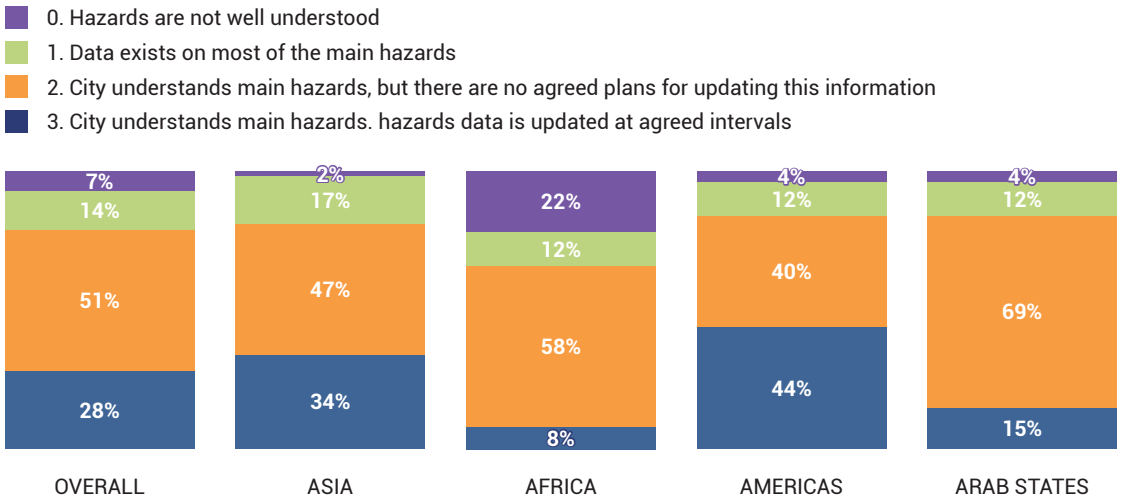
3.1.2 Essential 2: Identify, understand, and current and future risk scenarios

Knowledge of existing and potential risks and hazards are essential for effective disaster risk reduction. This Essential includes five sub-elements. They are hazard assessment, shared understanding of infrastructure risk, knowledge of exposure and vulnerability, cascading impacts, and presentation and update process for risk information. The trend of Essential 2 and its sub-elements are shown in Figures 16 to 20.

P2.1 Hazard assessment

This sub-category examines the knowledge of the cities on their key hazards and their likelihood of occurrences. The preliminary scorecard assessment shows that 79% of the cities understand their main hazards. However, among them, only 28% of the cities update their data at certain intervals, which is vital to ensure permanence. Most of the cities show good progress in this aspect and more than 50% of the cities in all the regions are at Level 2.

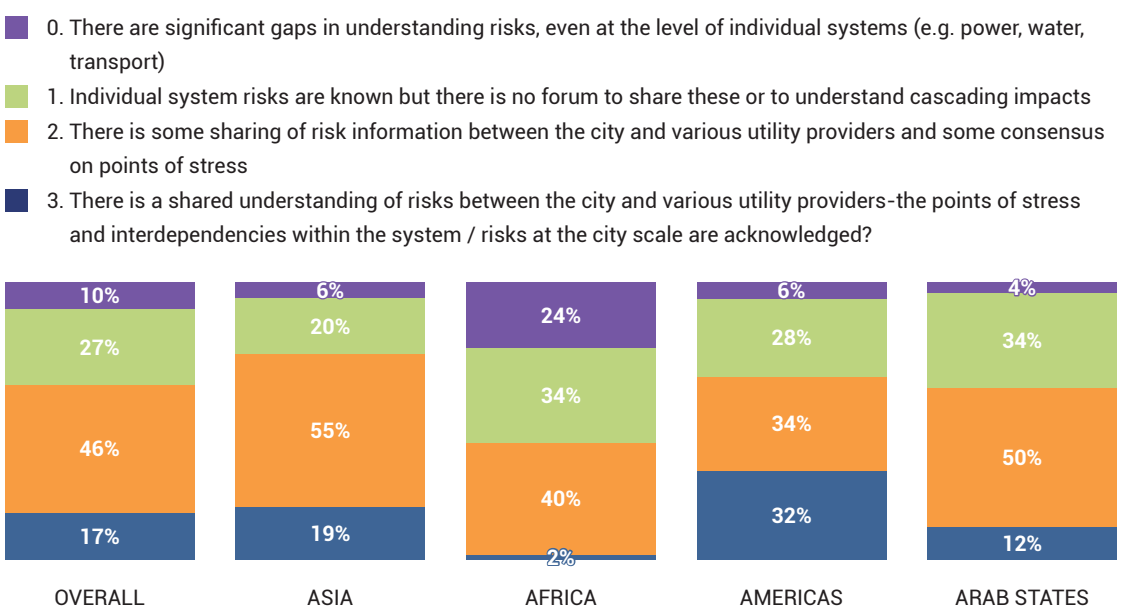
Figure 16: P2.1 Hazard Assessment



P2.2 Shared understanding of infrastructure risk

In addition to disaster risk identification, shared understanding of disaster risk between a city and its various utility providers are also equally important for disaster risk reduction. The results show that 63% of the cities share their risk information entirely or partially with multiple utility providers. On the other hand, in 27% of the cities, the individual system risks are known, but without a forum to share the cascading impacts, whereas, 10% of the cities face significant gaps in understanding risk at the individual system level.

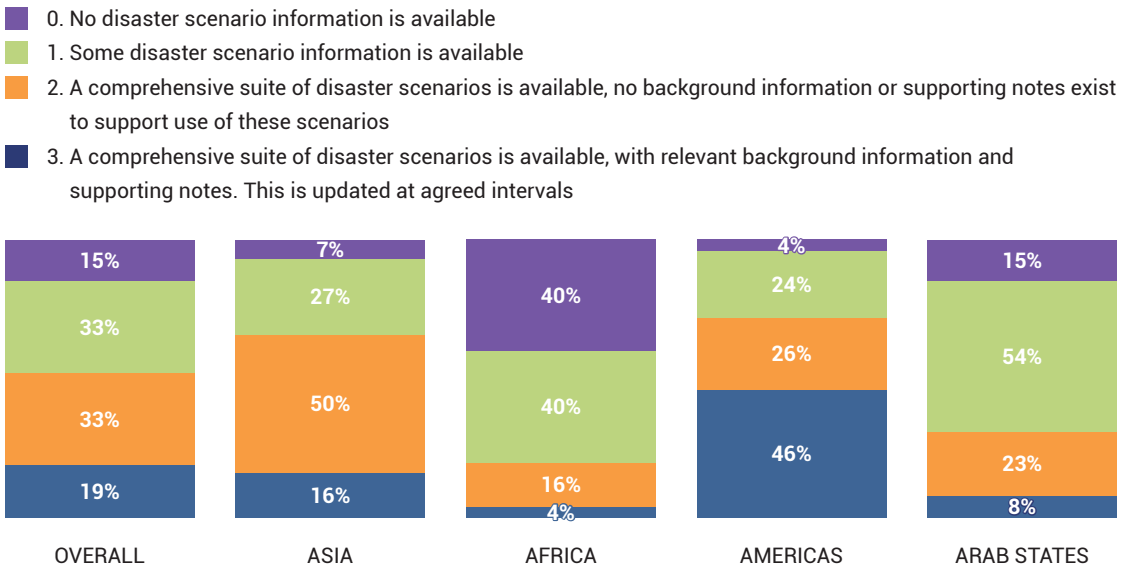
Figure 17: P2.2 Shared Understanding Of Infrastructure Risk



P2.3 Knowledge of exposure and vulnerability

On average, 19% of the cities possess a regularly updated and comprehensive suite of disaster scenarios with relevant background information and supporting notes. In contrast, in 15% of the cities, no disaster scenario information is available.

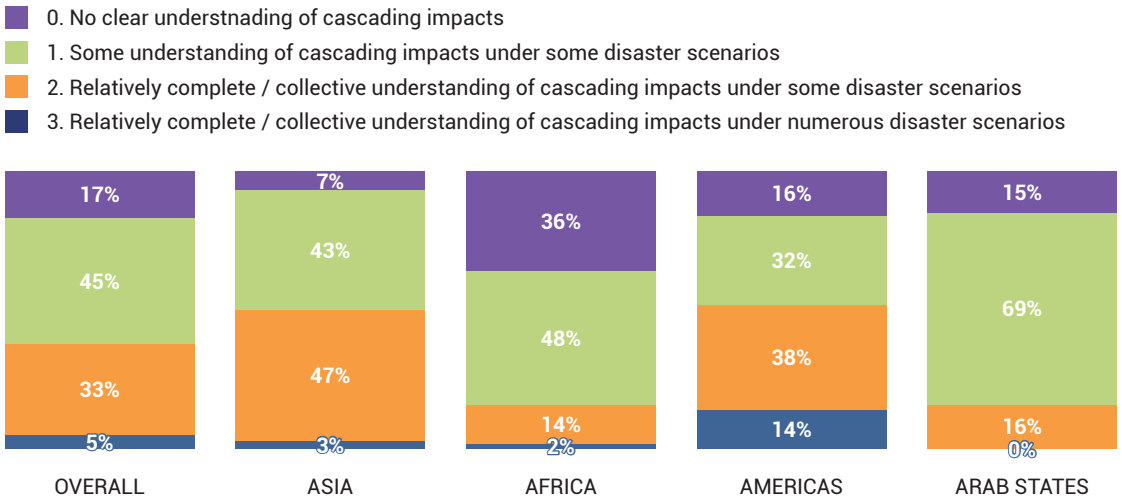
Figure 18: P2.3 Knowledge of Exposure and Vulnerability



P2.4 Cascading impacts

The failure chain between different elements of city infrastructure is a critical vulnerability to disasters. Surprisingly, only 5% of the cities have a relatively complete and collective understanding of cascading impacts under numerous disaster scenarios. While 78% of the cities have some knowledge of cascading effects under some disaster scenarios, most of the cities across the regions show low performance in this aspect.

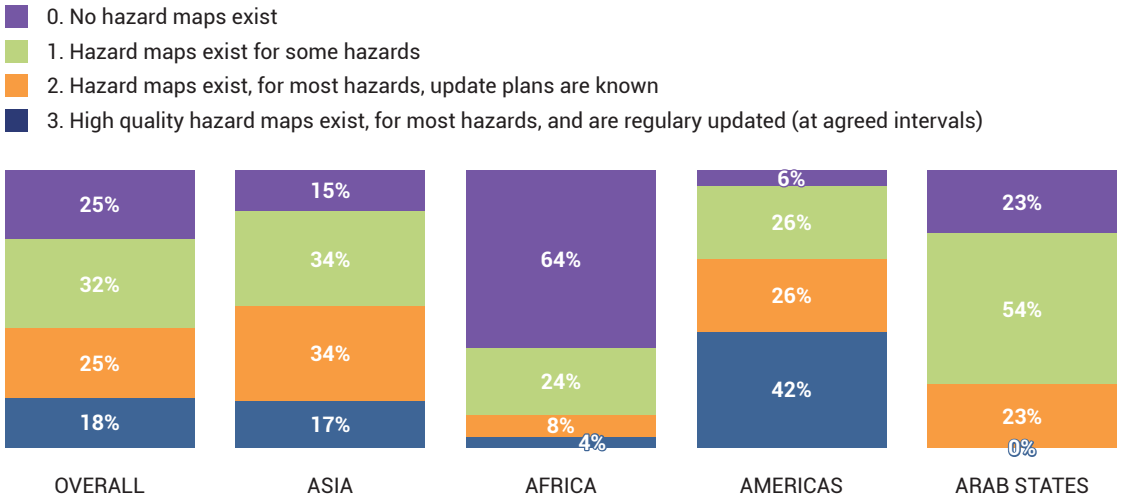
Figure 19: P2.4 Cascading Impacts



P2.5 Presentation and update process of risk information

No hazard maps are available in 25% of the cities. Among the other 75% of the cities that do have hazard maps, only 18% of the cities update their maps at agreed intervals. A lack of information systems, lack of awareness, and inadequate coordination among different institutions are mentioned as reasons for this state.

Figure 20: P2.5 Presentation and Update Process for Risk Information



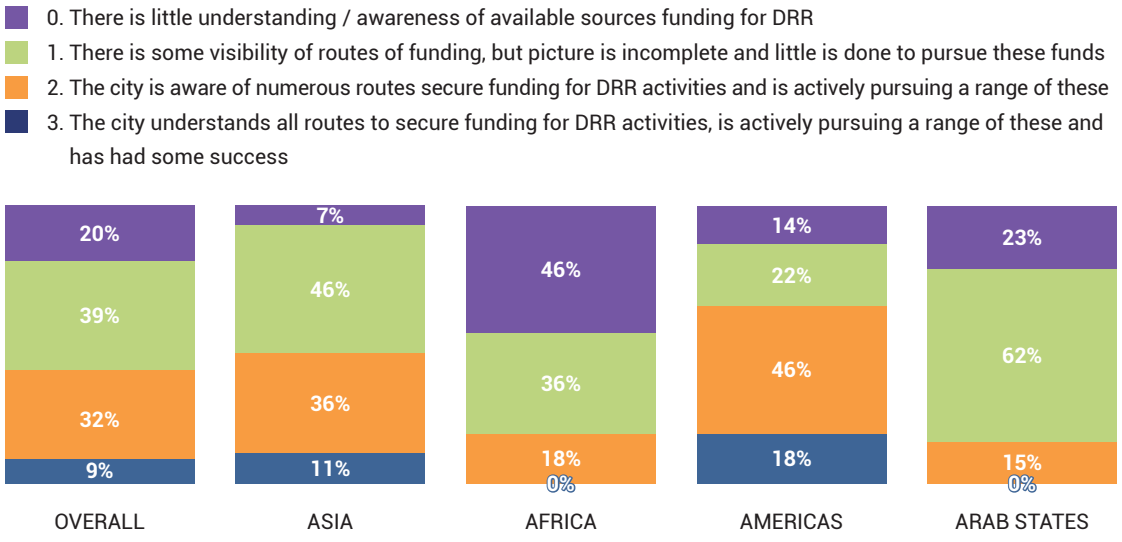
3.1.3 Essential 3: Strengthen Financial Capacity for Resilience

Understanding of the economic impact of disasters and the need for investments that can support resilience activities are foundation blocks for all disaster risk reduction activities. This Essential includes four sub-elements. They are: knowledge of approaches for attracting new investment to the city, financial plan and budget for resilience, insurance, and incentives. The trend of Essential 3 and its sub-elements are shown in Figures 21 to 24.

P3.1 Knowledge of approaches for attracting new investment to the city

Leasing, grants, private-public partnerships and taxes are among the forms of funding sources. 80% of the city have a complete or partial understanding of the sources of funding. However, only 9% of the authorities have succeeded in obtaining them. According to Figure 21, on average, most of the cities show low progress across the regions.

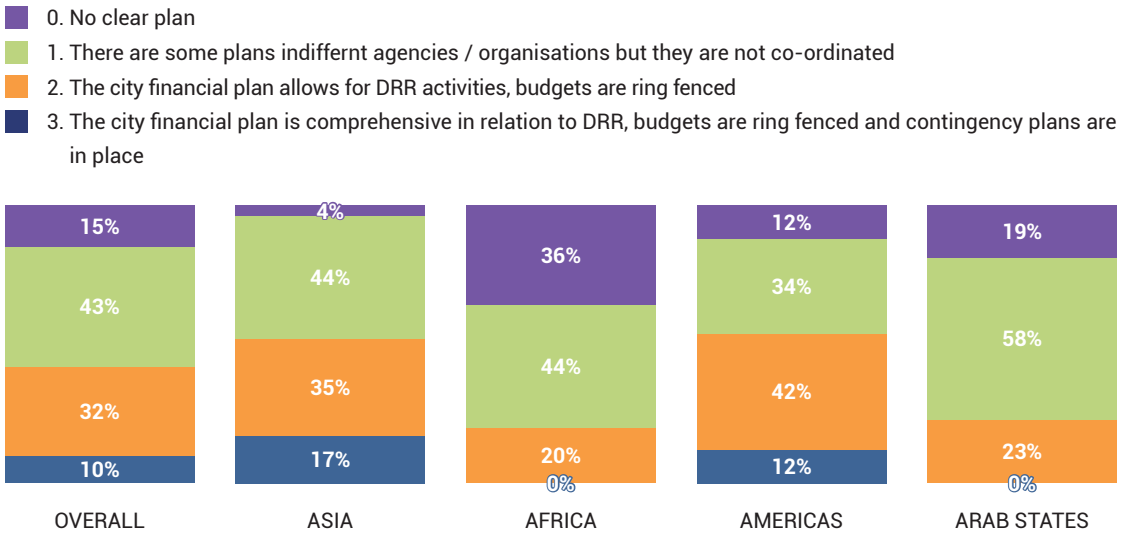
Figure 21: P3.1 Knowledge of Approaches for Attracting New Investment to the City



P3.2 Financial plan and budget for resilience including contingency funds

Having a specific ring-fenced budget, necessary resources, and contingency fund arrangements for local disaster risk reduction is the aspect that is assessed by this sub-section. While cities are progressing in terms of financial plans for disaster risk reduction, only 42% of the cities have a financial plan that allows for disaster risk reduction activities with ring-fenced budget. Figure 22 shows that, on average, most of the cities show low progress in this category.

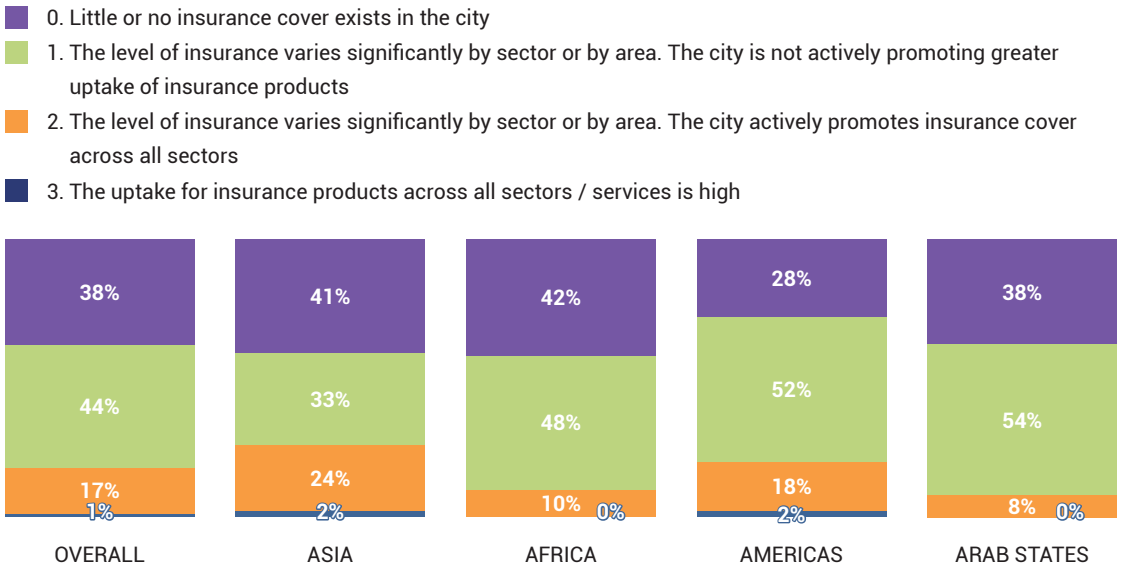
Figure 22: P3.2 Financial Plan and Budget for Resilience, Including Contingency Funds



P3.3 Insurance

Insurance is one of the risk transfer mechanisms for disaster risks. However, little or no insurance cover exists in 38% of the cities. Only 18% of the cities promote insurance cover across all sectors. Among them, only 1% of the cities have high service and uptake insurance products across all sectors. Figure 23 shows that overall progress across the regions are at a low level.

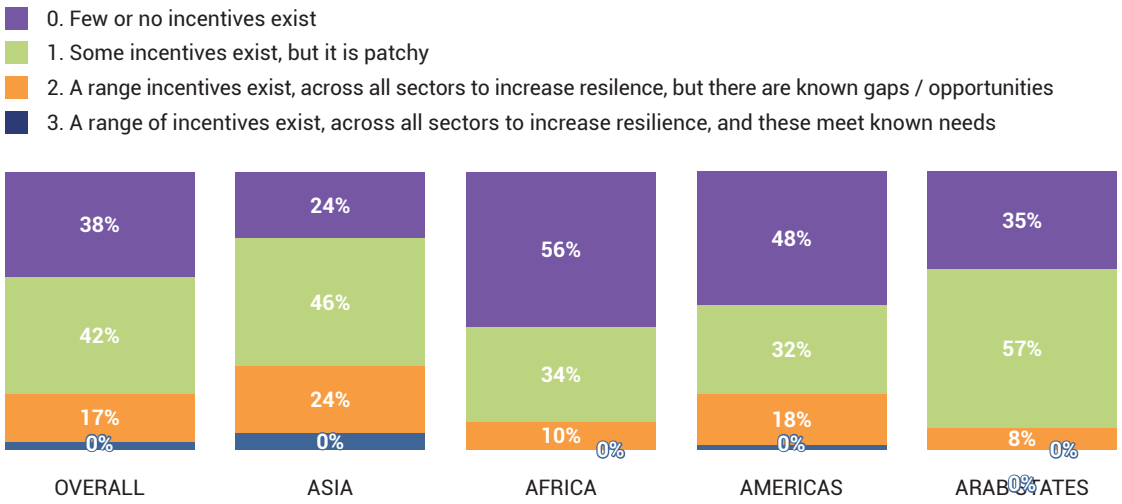
Figure 23: P3.3 Insurance



P3.4 Incentives

Providing incentives to support resilience building for various sectors strengthens DRR initiatives. However, few or no incentives are available in almost half of the cities across the region (38%). Only 3% of the cities receive a range of incentives across all the sectors to meet all their known needs. Further analysis shows that this is the least progressed area of all indicators in the preliminary scorecard assessment

Figure 24: P3.4 Incentives



3.2 DRR Operation

Essentials 4 to 8 cover many dimensions of disaster planning and preparations. These Essentials are not expected to be achieved in any specific order.

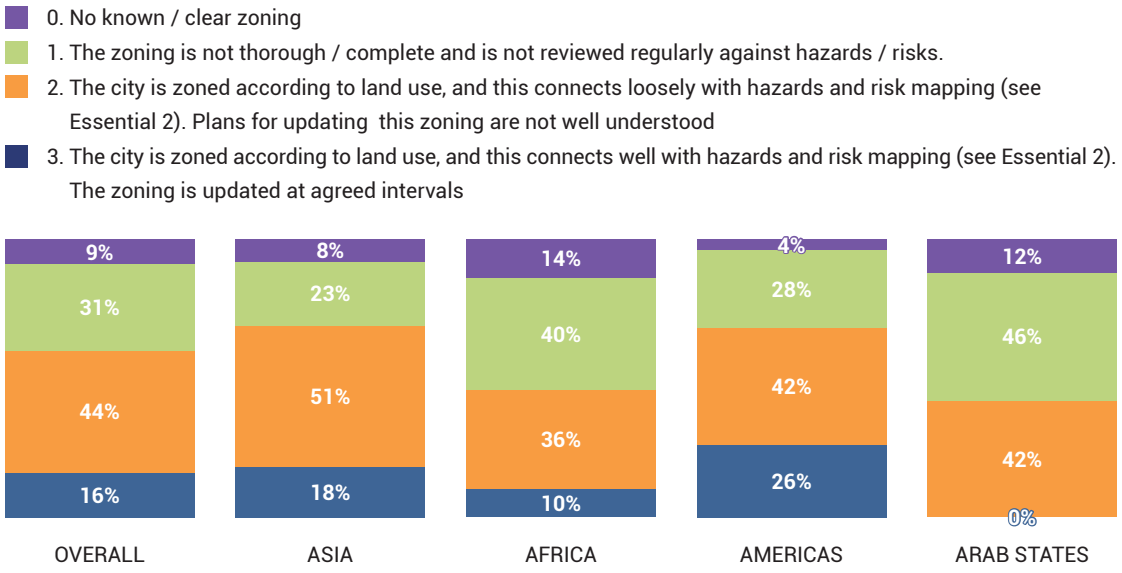
3.2.1 Essential 4: Pursue Resilient Urban Development

The built environment needs to be made resilient according to building regulations and context related scenarios. This Essential includes land zoning and management, risk-aware planning, design and implementation of new buildings, neighbourhoods and infrastructure, and availability and application of building codes. The trend of Essential 4 and its sub-elements are shown in Figures 25 to 28.

P4.1 Land use zoning

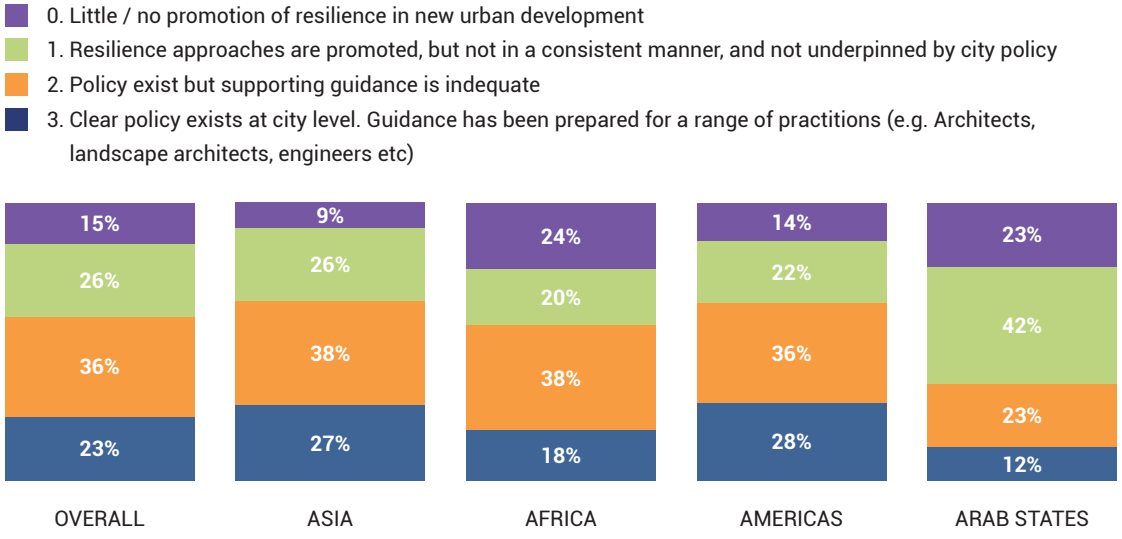
60% of the cities are zoned according to land use that connects to hazard and risk mapping, as specified in Essential 2. Among them, only 16% of cities regularly update the zoning on agreed intervals, whereas, 9% of the cities have no known or clear zoning.

Figure 25: P4.1 Land Use Zoning



P4.2 New Urban Development

Figure 26: P4.2 New Urban Development

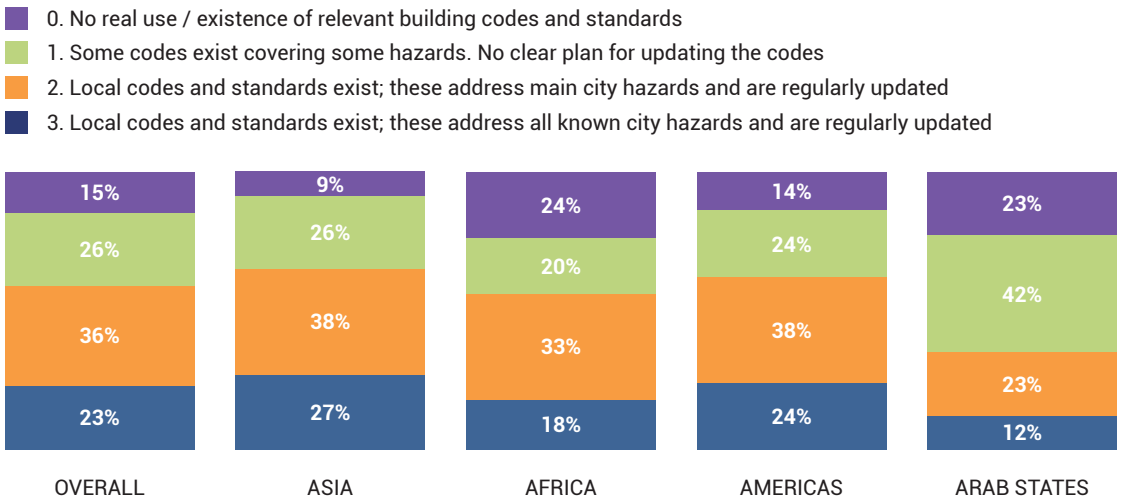


New developments require clear policies and guidelines for practitioners to promote a more resilient urban development. This preliminary assessment shows that 59% of the cities have clear city-level policies. Among them, 23% of the cities have a guideline for a range of built environment practitioners to help support effective implementation. On the other hand, 15% of the cities only minimally or do not promote resilience in the new elements of their built environment.

P4.3 Building codes and standards

Availability and application of building codes for new constructions and developments are one of the key strategies to incorporate disaster resilience in an urban environment. 85% of the cities have some building codes for urban developments. Among them, 23% of cities regularly update building codes for all known city hazards.

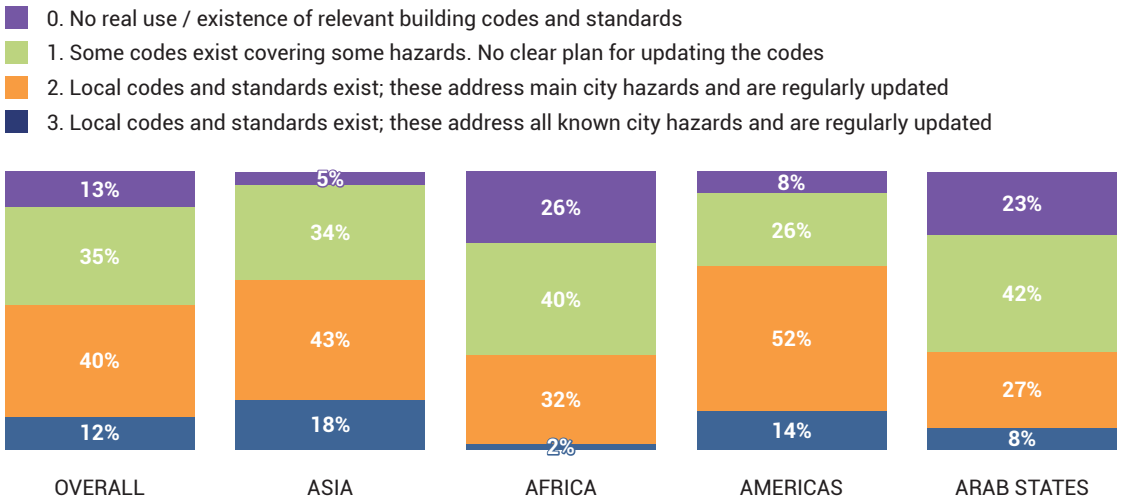
Figure 27: P4.3 Building Codes and Standards



P4.4 Application of zoning, building codes and standards

Although building codes are often available, application of them is equally important. 52% of the cities apply, enforce and verify more than half of their zones and building code standards. However, among them, only 12% apply 100% of the zones and building code standards.

Figure 28: P4.4 Application of Zoning, Building Codes and Standards



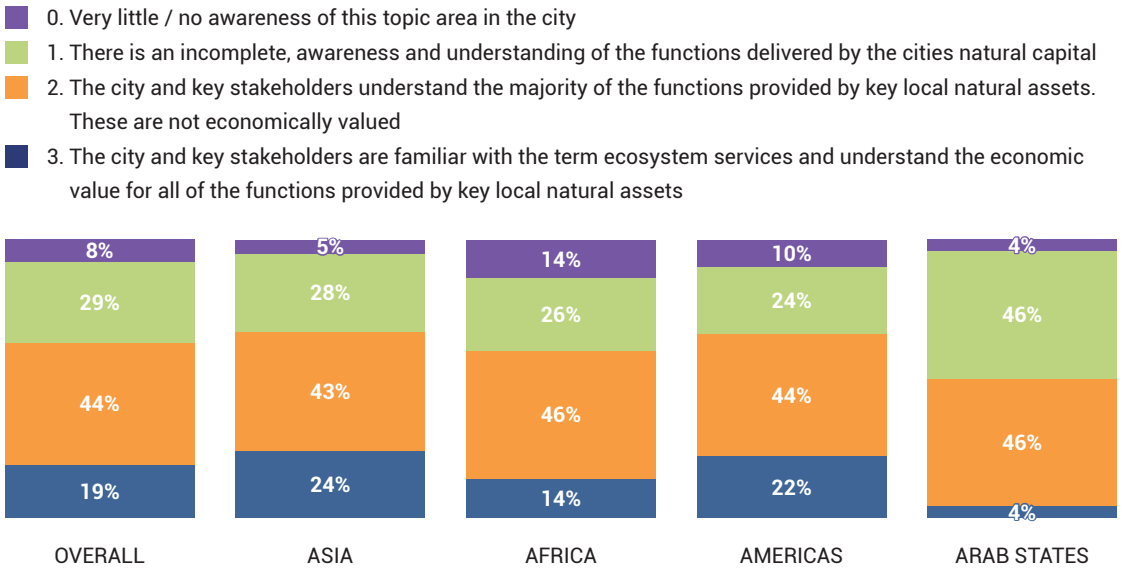
3.2.2 Essential 5: Safeguard Natural Buffers to Enhance the Protective Functions Offered by Natural Ecosystems

Recognising value and benefits of the natural ecosystem for disaster prevention and protection is essential for formulating disaster risk reduction strategies. This mainly includes awareness of ecosystem functions, integration of green and blue infrastructure, and knowledge of transboundary environmental issues. The regional trend of Essential 5 and its sub-elements are shown in Figures 29 to 31.

P5.1 Awareness and understanding of ecosystem services

63% of the cities and key stakeholders are aware of the term ecosystem and understand most of the functions provided by key local natural assets, including water attenuation, food growing, fuel, carbon sequestration, air filtration, and aesthetic value. Among them, 19% of the cities understand the economic value of these functions as well.

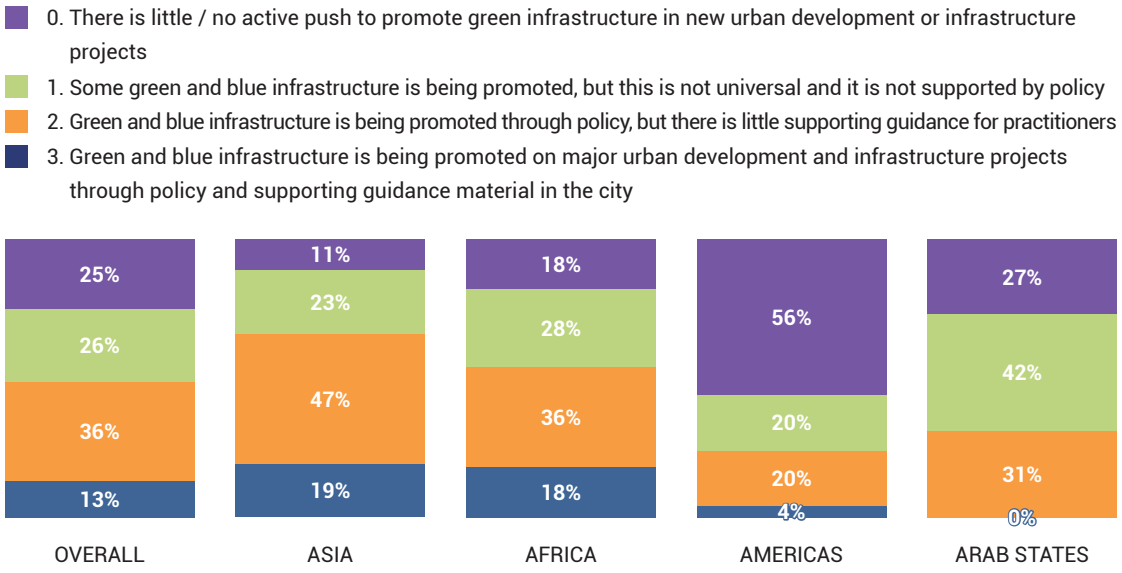
Figure 29: P5.1 Awareness and Understanding of Ecosystem Services/Function



P5.2 Integration of green and blue infrastructure into city policy and projects

75% of the cities promote green infrastructure (e.g. greening streets, roadsides, and roofs, restoring embankments, creating urban corridors, etc.) and blue infrastructure (e.g. river corridors, wetlands, waterways, etc.). Among them, however, 25% do not have supporting policies.

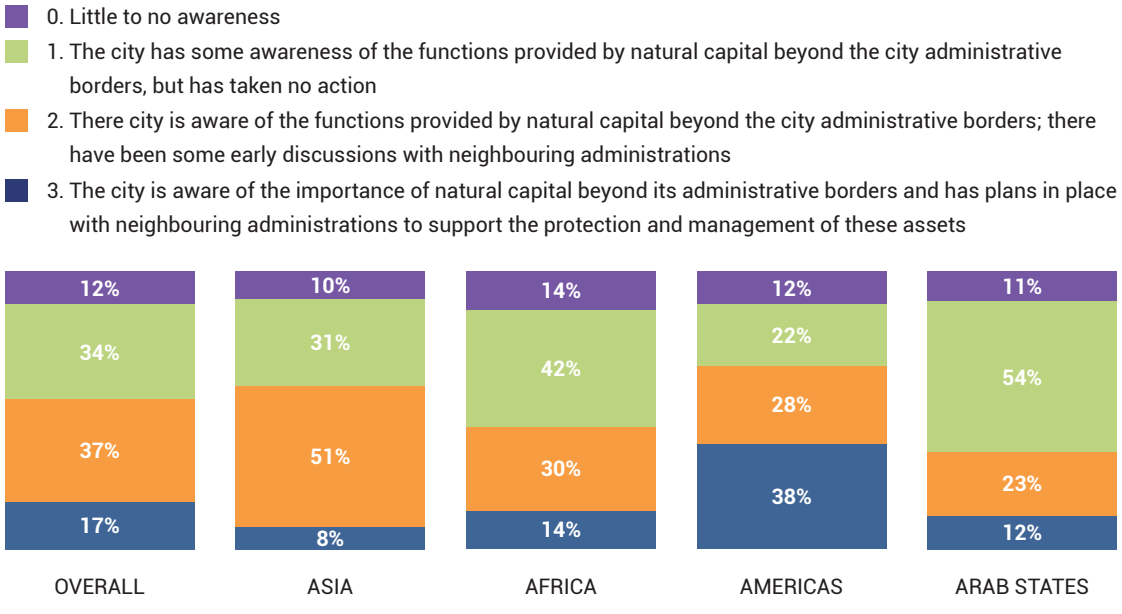
Figure 30: P5.2 Integration of Green and Blue Infrastructure into City Policy and Projects



P5.3 Transboundary environmental issues

In addition to protecting natural ecosystem within their administrative boundary, expanding such protection with neighbouring administrations through agreements is equally essential. 88% of the city administrations are aware of the functions provided by natural capital beyond their administrative borders. Among them, only 17% of the city administrations have plans in place with neighbouring administrations to support management of these assets.

Figure 31: P5.3 Transboundary Environmental Issues



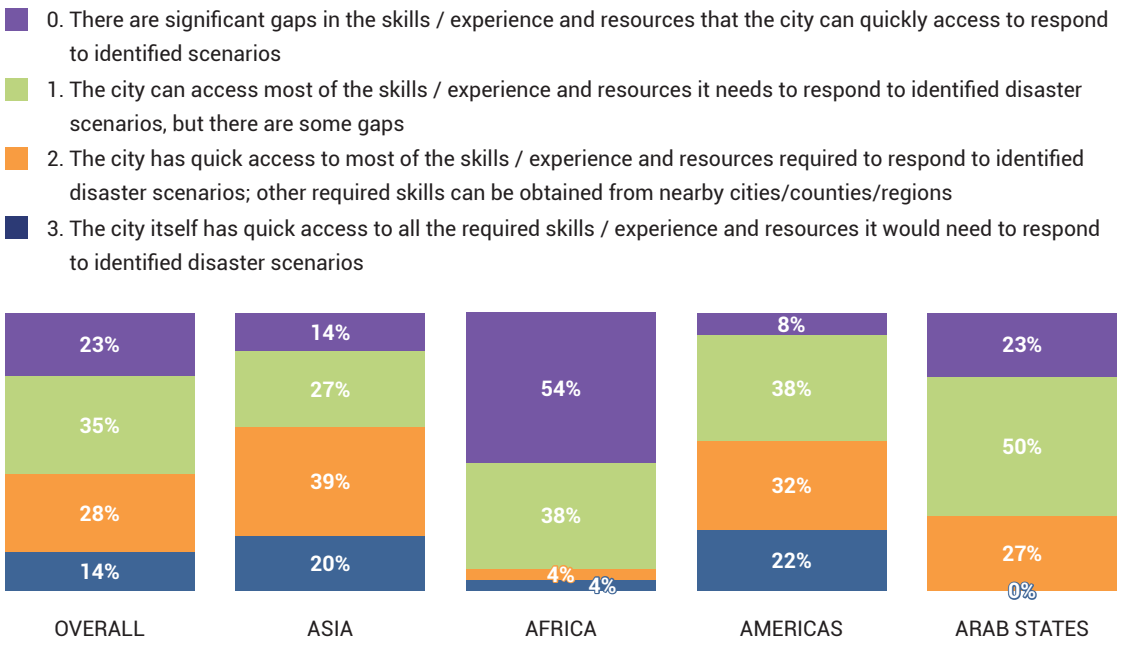
3.2.3 Essential 6: Strengthen Institutional Capacity for Resilience

Essential 6 emphasises the importance of ensuring that all institutions relevant to a city's resilience have the capabilities to discharge their roles. This Essential includes skills and experience, public education and awareness, data sharing, training delivery, languages, and learning from others. The trend of Essential 6 and its sub-elements are shown in Figures 32 to 37.

P6.1 Skills and experience

Access to skills and experience relating to pre-event planning, and response, is one of the indicators of institutional capacity. 77% of the cities have access to all or most of the skills and resources to respond to identified disaster scenarios. Among them, 14% of the cities have all required resources within the city, and 28% of them may need to obtain some resources from nearby cities/countries/regions.

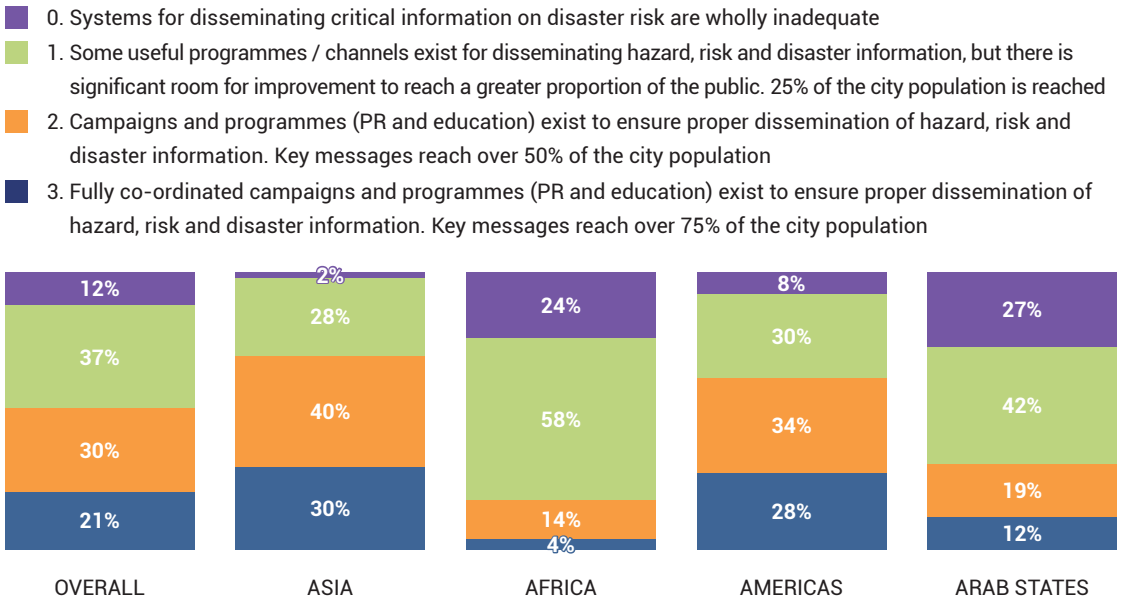
Figure 32: P6.1 Skills and Experience



P6.2 Public education and awareness

A city's ability to communicate with the public in a structured way, to educate and inform disaster risk information, is also crucial for risk reduction. 88% of the cities have campaigns, public relation and education programmes to disseminate critical information of which at least 25% of the city population is reached. Among them, 21% of the cities organise fully coordinated campaigns and programmes to ensure that the dissemination of information reach more than 75% of the population (Figure 36).

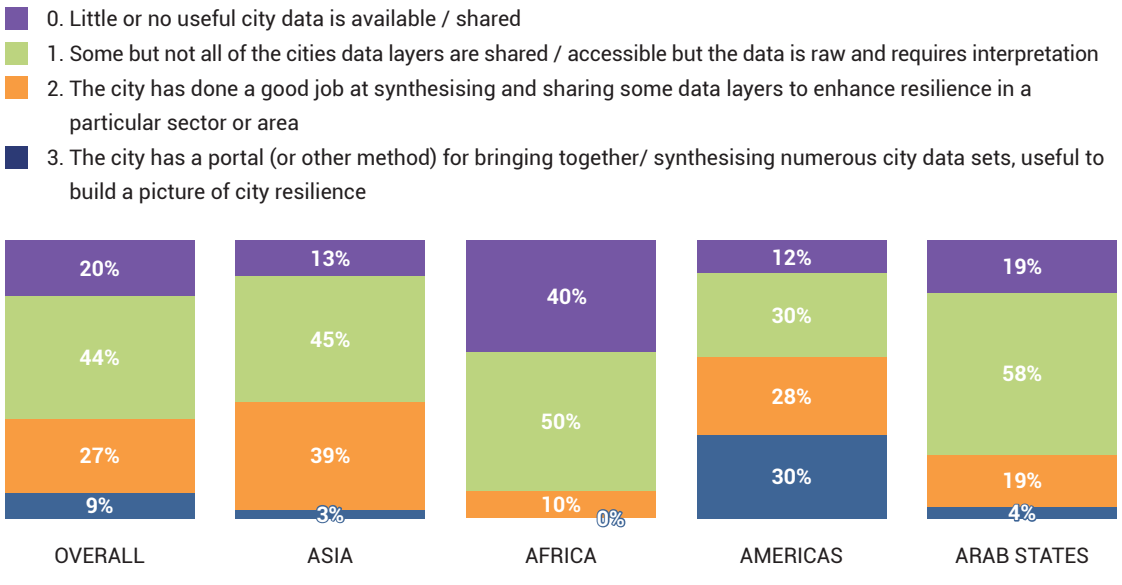
Figure 33: P6.2 Public Education and Awareness



P6.3 Data sharing

On average, 80% of the cities share at least some data that are useful for city resilience. However, only 9% of the cities have a portal for bringing together multiple city data sets that can be used to build a picture of city resilience.

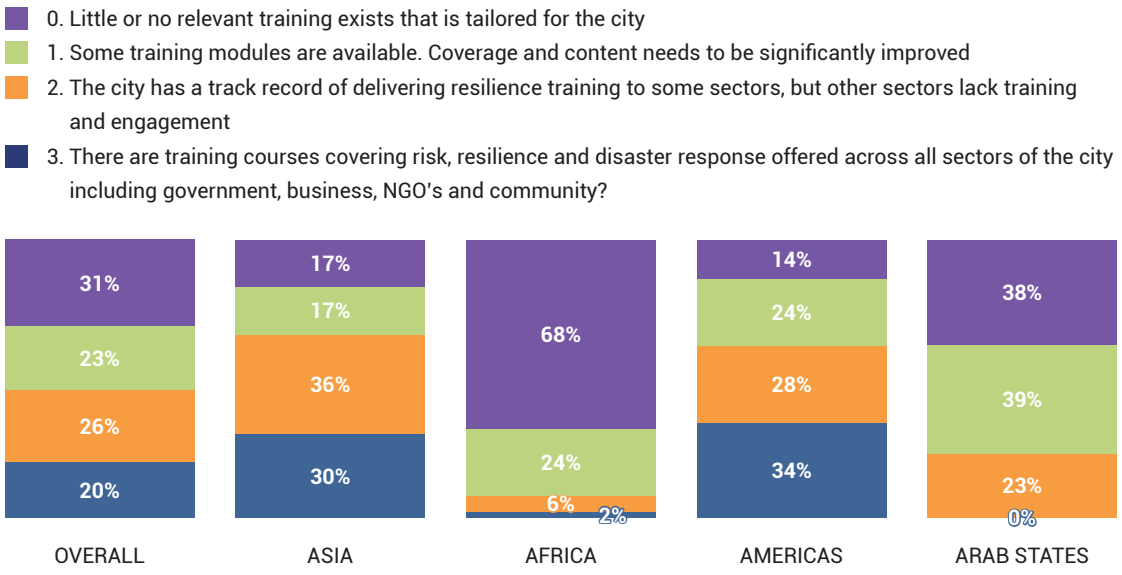
Figure 34: P6.3 Data Sharing



P6.4 Training delivery

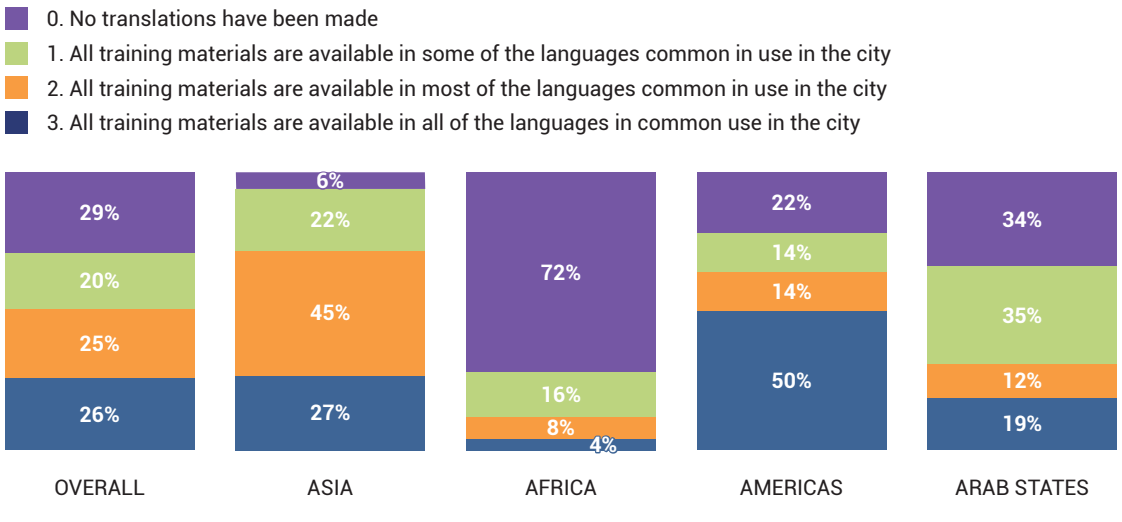
69% of the city authorities conduct training courses to cover some city disaster risks. Among them, 20% offer training courses covering risk, resilience and disaster response across all sectors of the city, including government, business, non-governmental organisations and community.

Figure 35: P6.4 Training Delivery



P6.5 Languages

Figure 36: P6.5 Languages

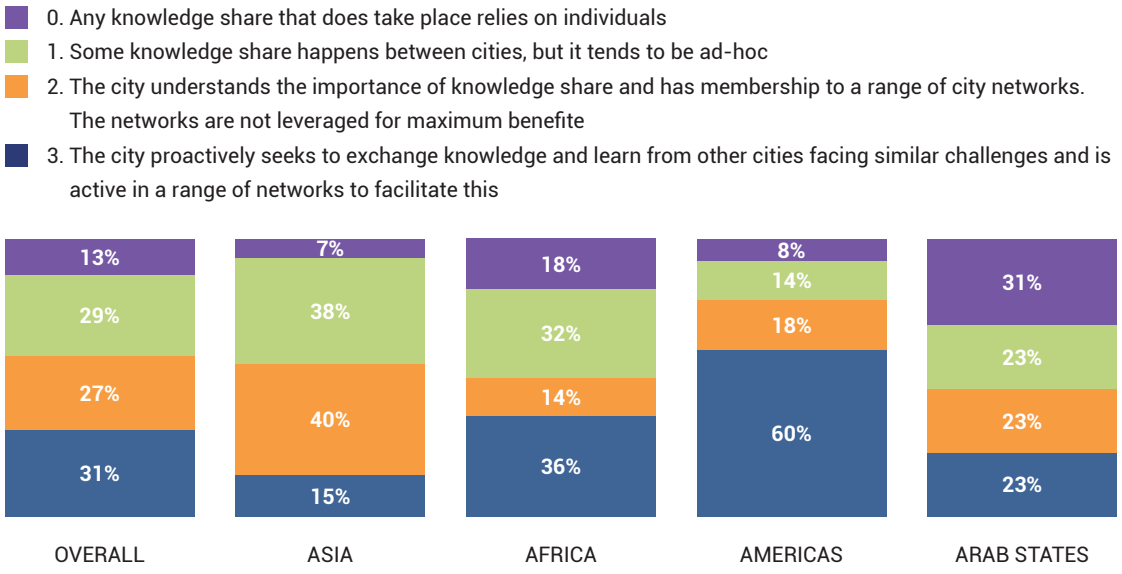


In 26% of the cities, all training materials are available in all languages commonly used within the city. This is particularly important for cities with diverse populations. Figure 36 shows that, in contrary, no translation of training materials have been made in 29% of the cities.

P6.6 Learning from others

This sub-section assesses the involvement of cities in exchanging knowledge and learning from other cities facing similar challenges. 87% of the cities share at least some knowledge of other cities facing similar challenges. Among them, 31% of the cities are proactively engaged in a range of networks to facilitate this.

Figure 37: P6.6 Learning from Others



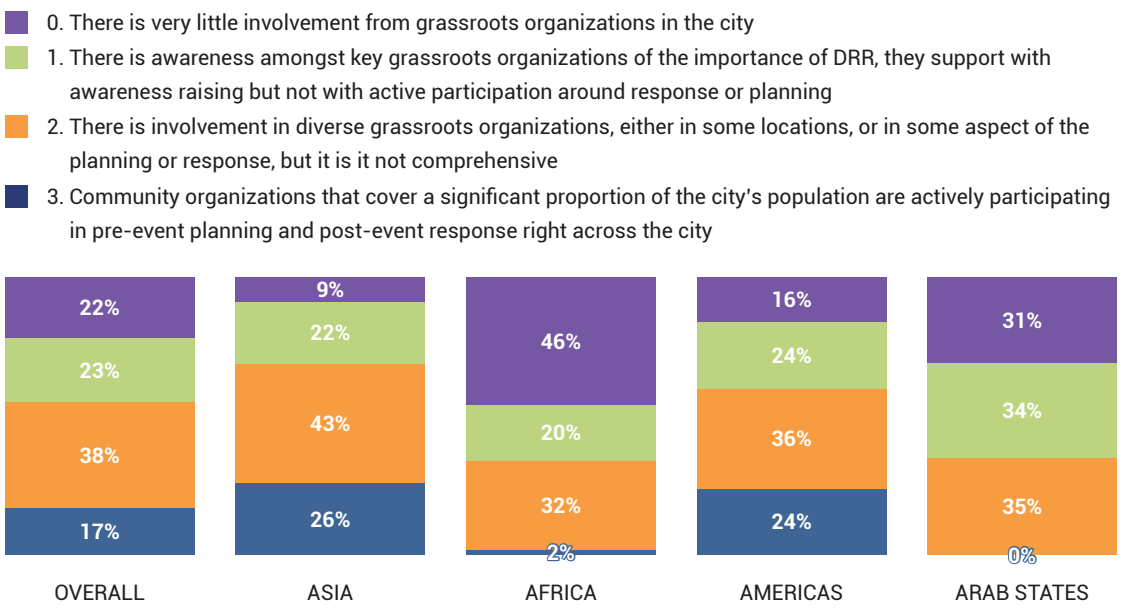
3.2.4 Essential 7: Understand and Strengthen Social Capacity for Resilience

Cultural heritage and education in disaster risk reduction have an important role in promoting social connectedness and a culture of mutual help that can improve societal capacity for resilience. This Essential includes community organisations, networks and training, social networks, private sector employers, and citizen engagement techniques. The regional trend of Essential 7 and its sub-elements are shown in Figures 38 to 41.

P7.1 Community organisations, networks and training

The involvement of community or grassroots organisations, such as youth groups, in disaster risk reduction, is one of the strategies to improve social capacity. In 17% of the cities, community organisations which cover a sizable proportion of the city's population are actively participating in the pre-event planning and post-event response across the city. While 61% of the cities reveals that key grassroots organisations are involved in the planning and response or at least have some awareness in this regard, 22% of the cities show very little involvement from grassroots organisations in the city.

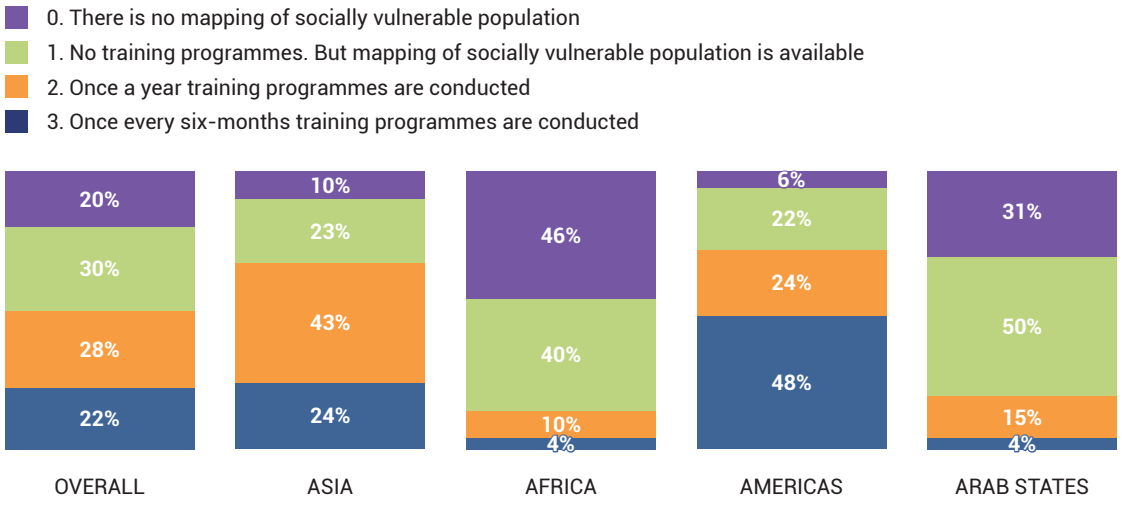
Figure 38: P7.1 Community or "Grassroots" Organisations, Networks and Training



P7.2 Social networks

This sub-section assesses the frequency of training programmes provided to the most vulnerable and at need populations in the city. 80% of the cities developed a mapping of the socially vulnerable population associated with age, gender, race, disability, and literacy. Among them, 50% of the cities conduct training programmes for the most vulnerable and at need populations of the city.

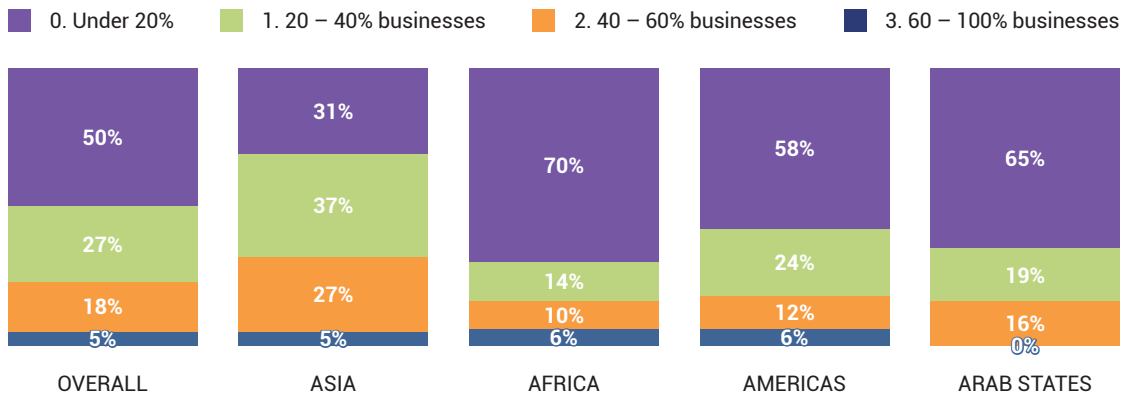
Figure 39: P7.2 Social Networks "Leave No One Behind"



P7.3 Private sector

Assessing business continuity plans is an efficient way to evaluate social capacity. This is one of the areas where most of the cities show weak progress. Only 5% of the cities have business continuity plans for 60-100% of the businesses running in the city, while more than half of the cities (50%) have plans for less than 20% of the businesses.

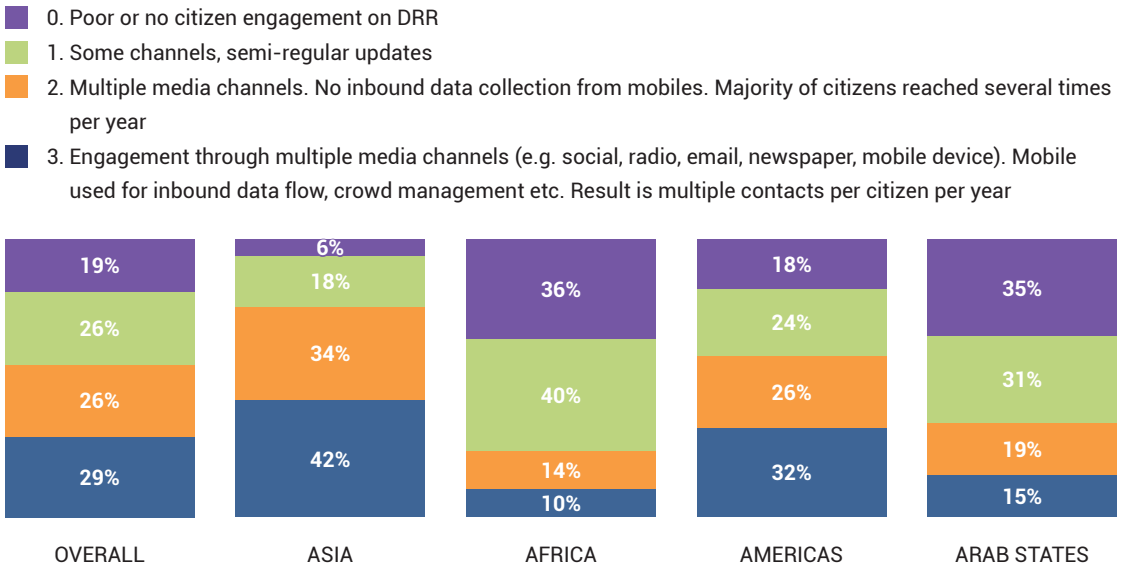
Figure 40: P7.3 Private Sector Employers



P7.4 Citizen engagement techniques

Citizen engagement is one of the essentials in relation to disaster risk reduction. In 55% of the cities, citizen engagement programmes through multiple media channels related to DRR are conducted and majority of citizens are reached several times per year. Among them, 29% of the cities use inbound data collection from mobiles for data flow and crowd management. On the other hand, nearly one quarter of the cities (19%) have poor or no citizen engagement in disaster risk reduction.

Figure 41: P7.4 Citizen Engagement Techniques



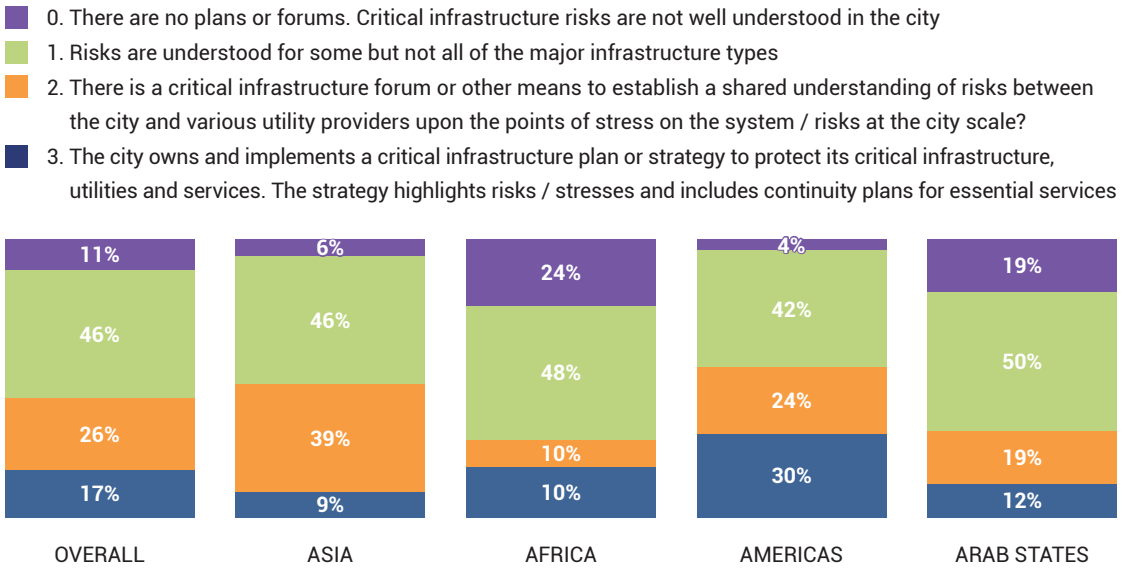
3.2.5 Essential 8: Increase Infrastructure Resilience

The adequacy and capacity of critical infrastructure to cope with disasters the cities might experience, and development of contingencies to manage risk, are addressed by this Essential. This includes critical infrastructure review, protective infrastructure, physical infrastructure, health care, education facilities, and first responder assets. The regional trend of Essential 8 and its sub-elements are shown in Figures 42 to 47.

P8.1 Critical infrastructure review

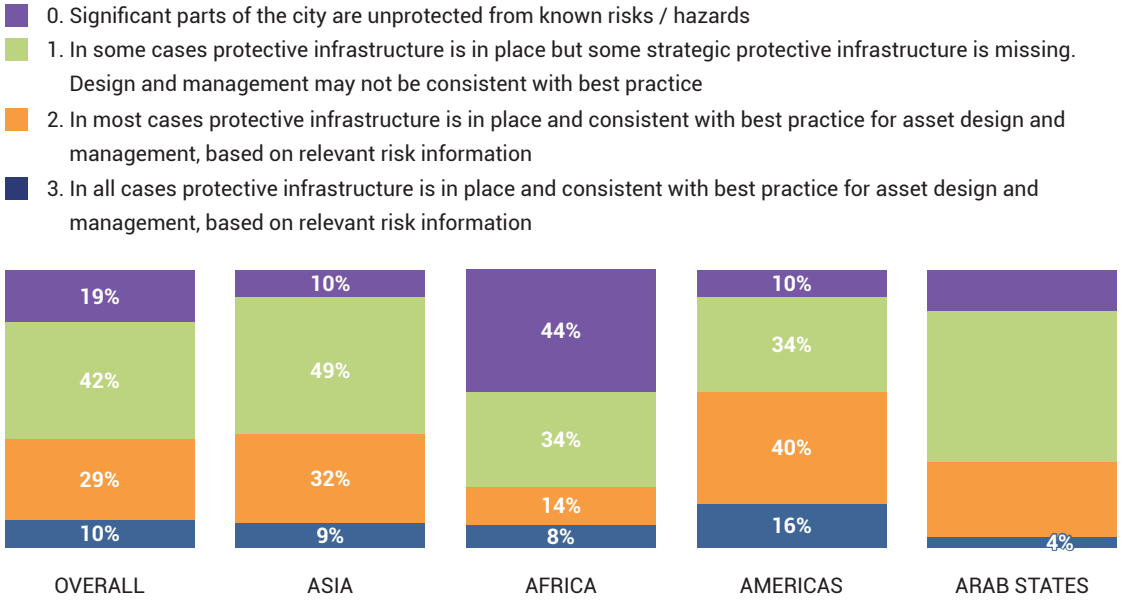
Although 89% of cities understood the risks associated with infrastructure, only 17% own and implement a critical infrastructure plan highlighting risks and continuity plans for essential infrastructure, services, and utilities. 26% of the cities have a forum to establish a shared understanding of risks between the city and various utility providers, while 11% of the cities have no plans or forum and that critical infrastructure risks are not well understood in the city (Figure 42).

Figure 42: P8.1 Critical Infrastructure Overview



P8.2 Protective infrastructure

Figure 43: P8.2 Protective Infrastructure



Protective infrastructure that is well-designed and well-built based on risk information, plays a key role in disaster risk reduction. In 81% of the cities, protective infrastructures, such as levees and flood barriers, flood basins, sea walls, etc., are constructed in at least some locations. Among them, in 39% of the cities, protective infrastructure is in place and consistent with best practice for asset design and management, based on relevant risk information, in all or most cases.

P8.3-8.6 Physical infrastructure

Potable water and sanitation, energy, transport, and communication are some of the critical physical infrastructures. The level of resilience of these infrastructures in the assessed cities is shown in Table 1.

Table 1: Level of physical infrastructure resilience

	No loss of service even from "most severe" scenario	Some loss of service would be experienced from the "most severe" scenario	Some loss of service would be experienced from the "most probable" scenario	Significant loss of service would be experienced from the "most probable" scenario
Potable water and sanitation	8%	38%	35%	19%
Energy	3%	40%	43%	14%
Transport	6%	44%	34%	16%
Communication	11%	44%	32%	13%

The table shows that communication infrastructure is comparatively more resilient than other infrastructure as 11% of the cities reveal no loss of service even from the most severe scenario. On average, 40% of the cities are expecting some loss of services in all physical infrastructures in the most severe and probable scenarios.

Figure 44: Regional trends: Physical Infrastructure resilience

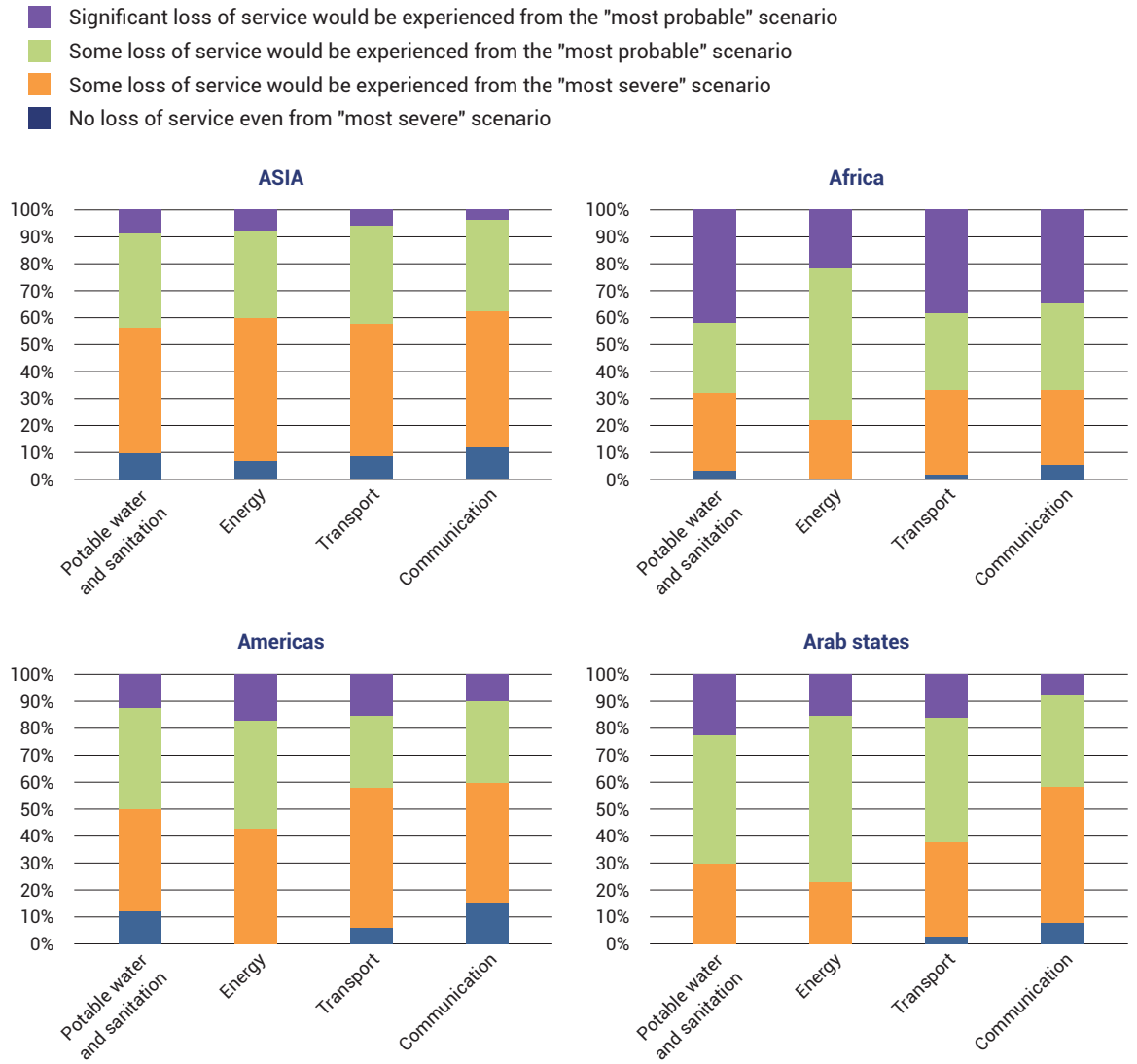
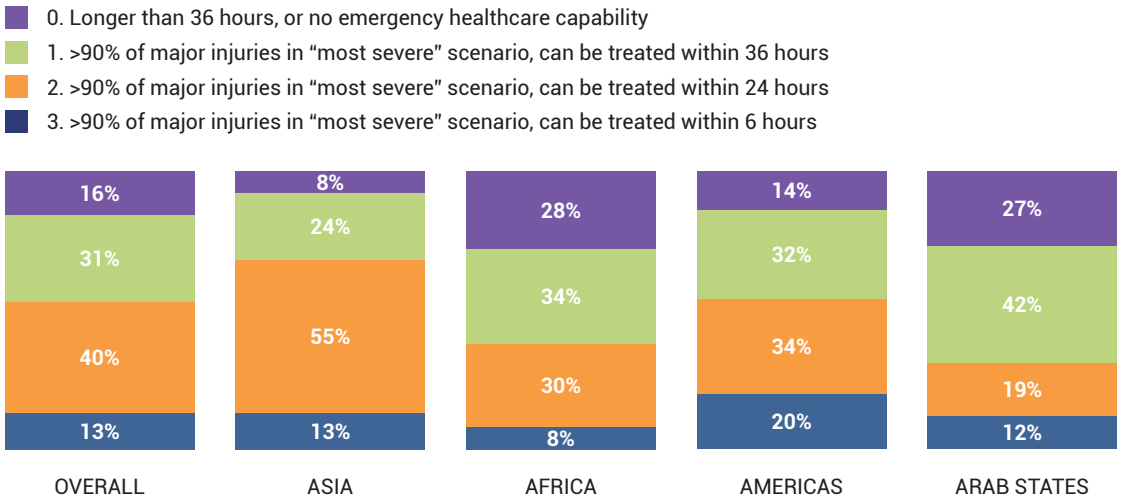


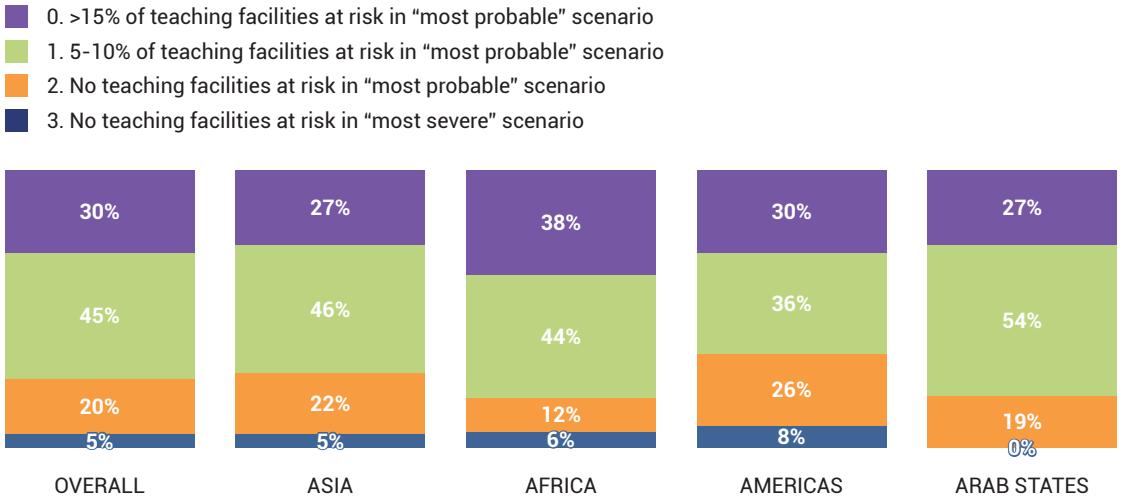
Figure 45: P8.7 Healthcare



P8.8 Education facilities

This subsection attempts to identify the proportion of education structures at risk of damage from "most probable" and "most severe" scenarios. In 25% of the cities, no teaching facilities are at risk in the most severe or probable scenarios. In 45% of the cities, 5-10% of teaching facilities are at risk in the most probable scenario.

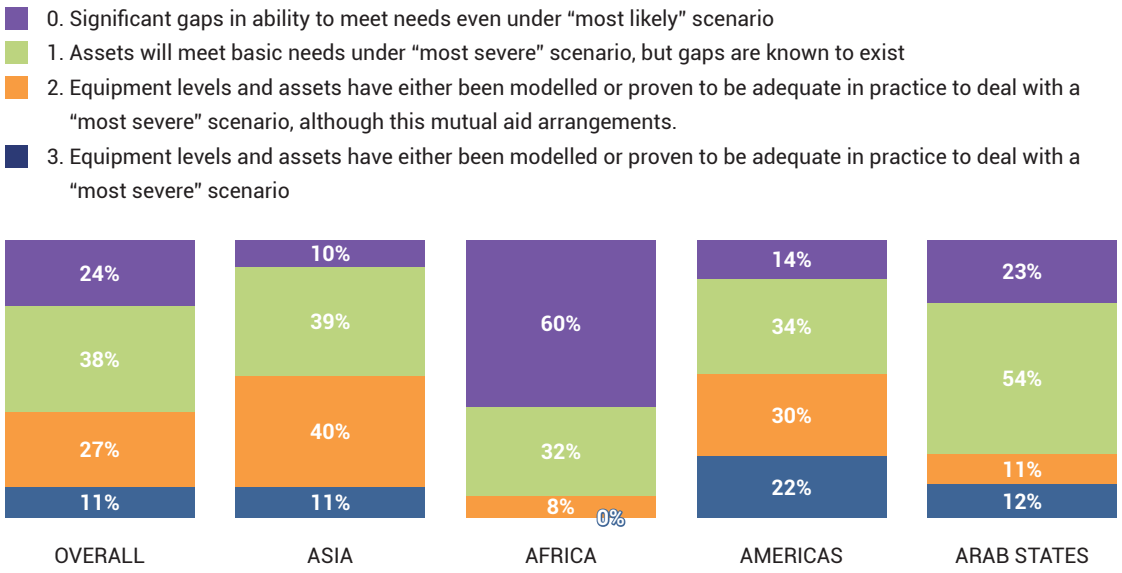
Figure 46: P8.8 Education Facilities



P8.9 First responder assets

The sufficiency of first responder assets, including fire-fighting vehicles, ambulances, police vehicles, helicopters, emergency food, and backup generators, is also essential for infrastructure resilience. 76% of the cities possess these assets to meet basic needs under the most severe scenario. Among them, only 11% of the cities have assets which have been proved to be adequate in practice to deal with the most severe scenario.

Figure 47: P8.9 First Responder Assests



3.3 Response planning

Essentials 9 and 10 cover disaster response and post-event recovery. These Essentials are not expected to be achieved in any specific order.

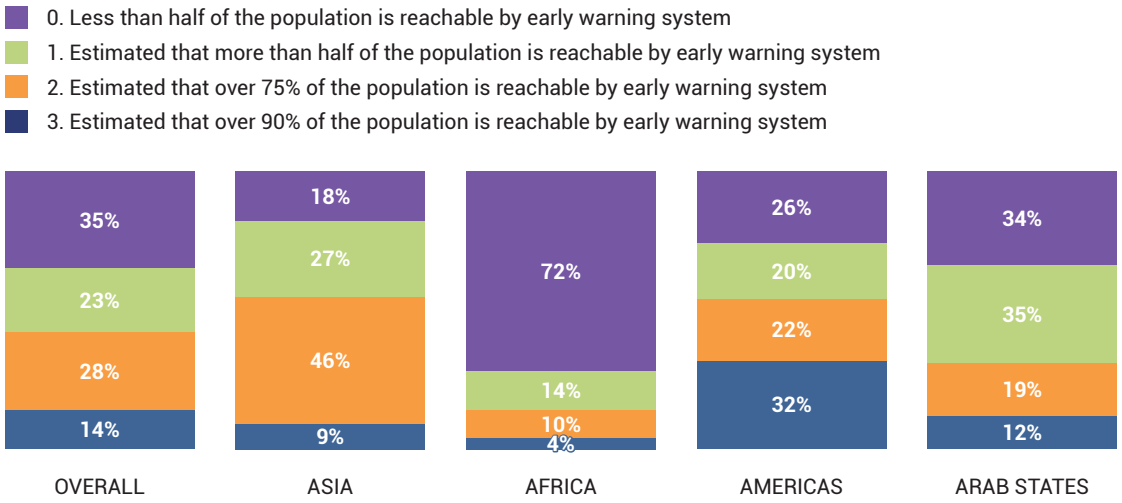
3.3.1 Essential 9: Ensure Effective Disaster Response

Availability of detection and monitoring equipment to act on early warnings and forecasts is one of the prerequisites for effective disaster response. This Essential includes early warning, event management plans, staffing/responder needs, equipment and relief supply needs, food, shelter, staple goods and fuel supply, interoperability and inter-agency working, and drills. The trend of Essential 9 and its sub-elements are shown in Figures 48 to 54.

P9.1 Early warning

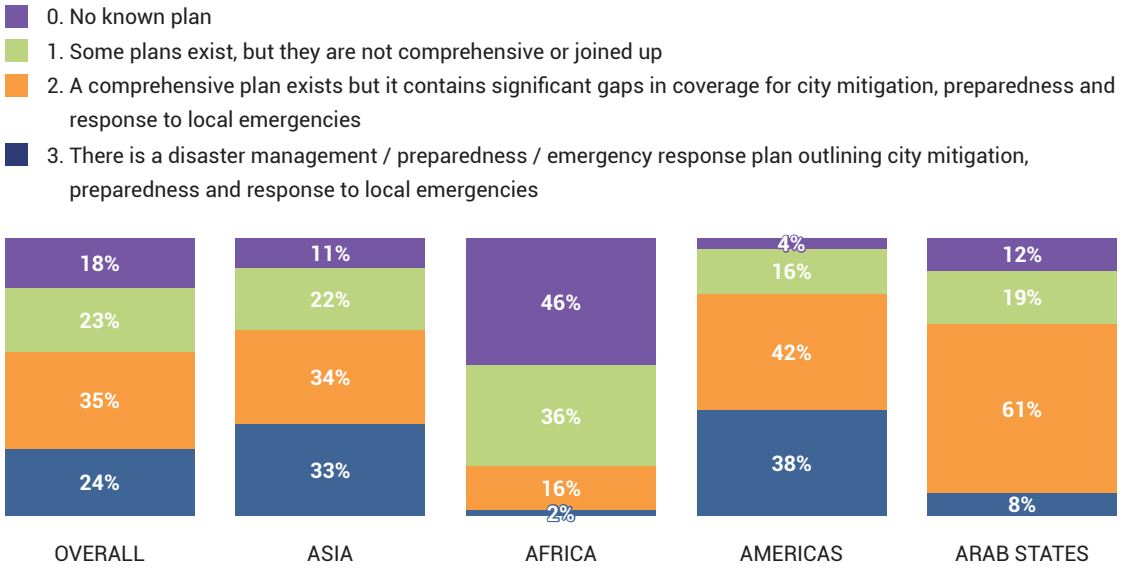
The preliminary scorecard assessment shows that, in 65% of the cities, more than half of the population is reachable by early warning systems. Among them, in 14% of the cities, more than 90% of the population is reachable by early warning systems. On the other hand, 35% of the cities are incapable of issuing the early warning that reaches more than half of the population.

Figure 48: P9.1 Early Warning



P9.2 Event management plan

Figure 49: P9.2 Event Management Plan

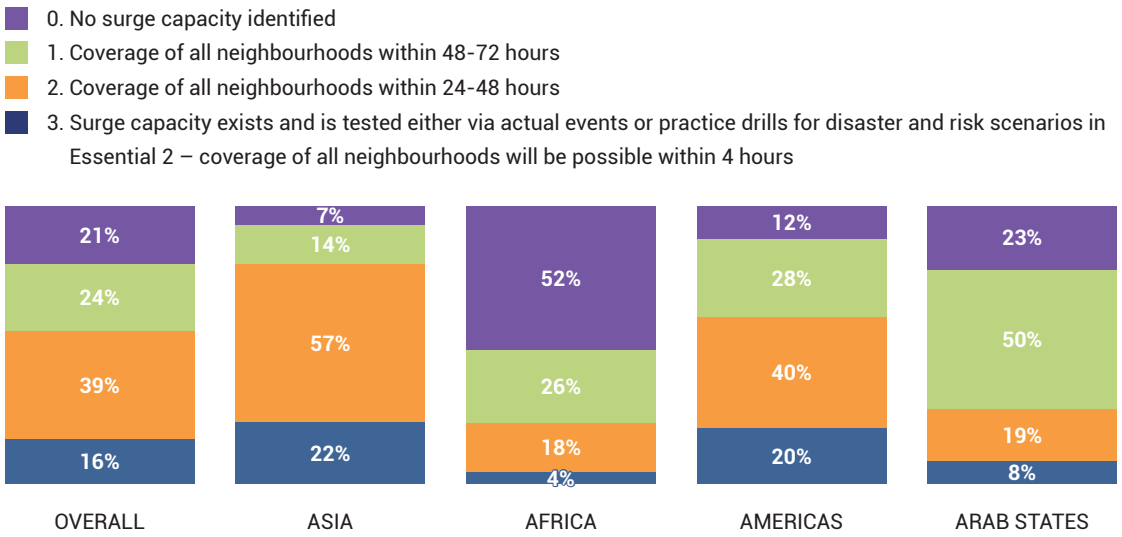


Having an emergency response plan outlining city mitigation, preparedness and response to local emergencies is one of the key requisites for disaster risk reduction. 59% of the cities have comprehensive disaster management plans. However, 35% of those plans contain significant gaps in the coverage for city mitigation, preparedness and response to local emergencies.

P9.3 Staffing/ responder needs

Sufficient staffing capacity to support first responder assets, as explained in Essential 8, is one of the necessities for disaster response. In 79% of the cities, surge capacity exists to cover all neighbourhoods in less than 72 hours. However, only 16% of the cities have the capacity, which is tested either via actual events or practice drills, to cover the entire neighbourhood within 4 hours. In contrary, in 21% of the cities, no surge capacity has been identified.

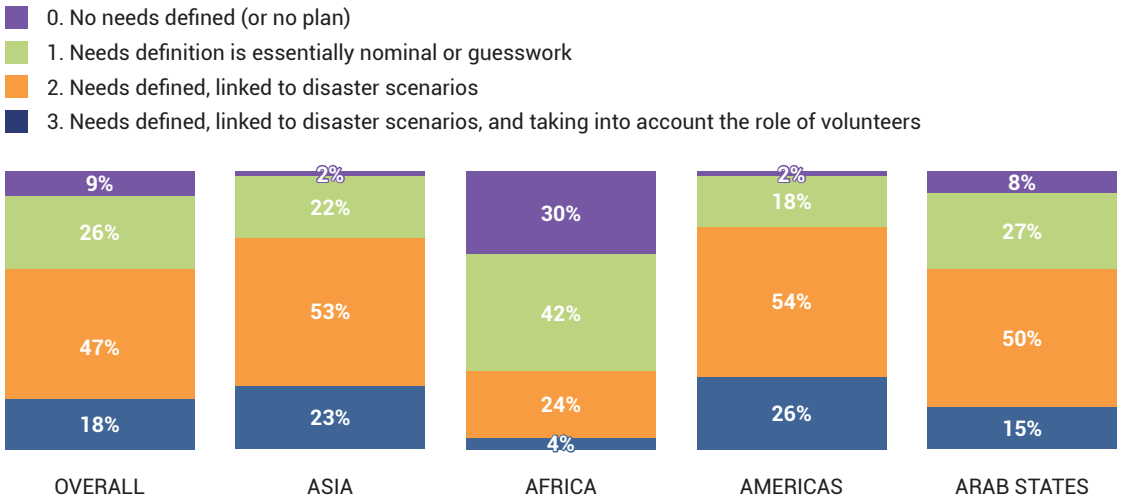
Figure 50: 9.3 Staffing/ Responder Needs



P9.4 Equipment and relief supply needs

Identifying equipment and supply needs, and the availability of equipment, is necessary to respond to emergency situations. 91% of the cities have defined the needs for equipment and relief supply. Among them, however, 26% of the cities' need definitions are essentially nominal or guesswork.

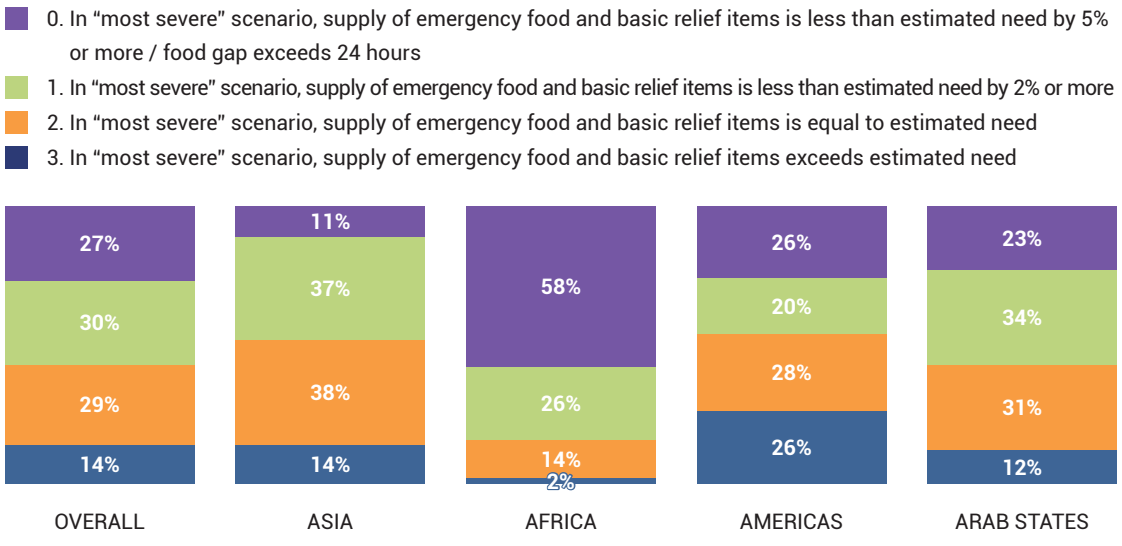
Figure 51: 9.4 Equipment and Relief Supply Needs



P9.5 Food, shelter, staple goods and fuel supply

The ability of the cities to continue to feed and shelter their population in post-disaster is among the measures of emergency response. 43% of the cities can supply emergency food and necessary relief items at least at the estimated need in the most severe scenario. However, in 27% of the cities, the food gap exceeds 24 hours.

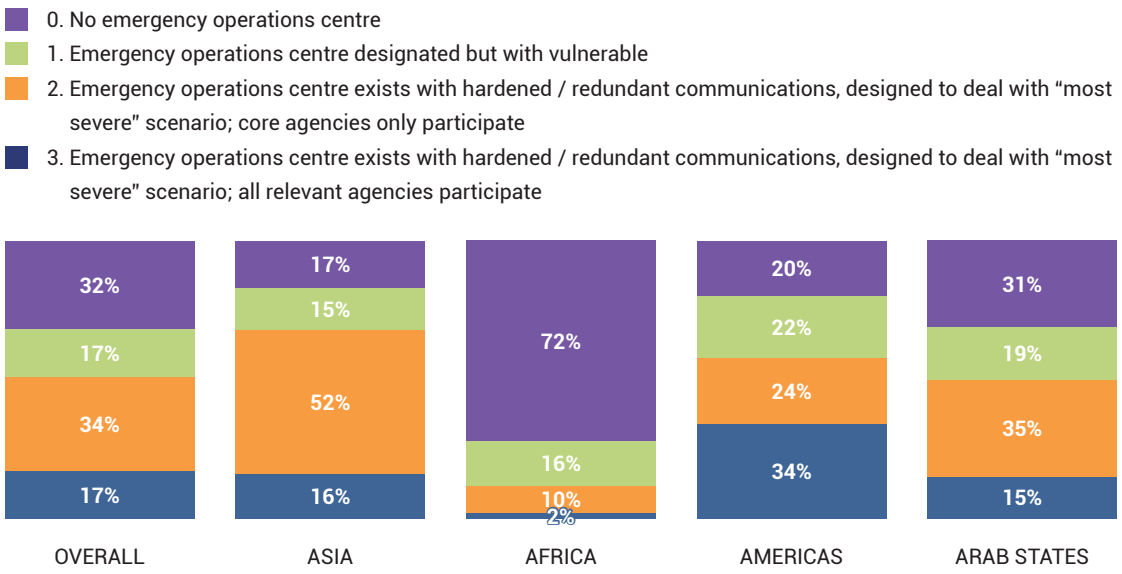
Figure 52: P9.5 Food, Shelter, Staple Goods and Fuel Supply



P9.6 Interoperability and inter-agency working

This sub-section intends to evaluate the availability of emergency operations centre, with participation from all agencies, and automating standard operating procedures specifically designed to deal with "most probable" and "most severe" scenarios. 68% of cities have established an emergency operation centre that is designed to deal with the most severe scenario. However, only 17% of these emergency centres obtain participation from all relevant agencies.

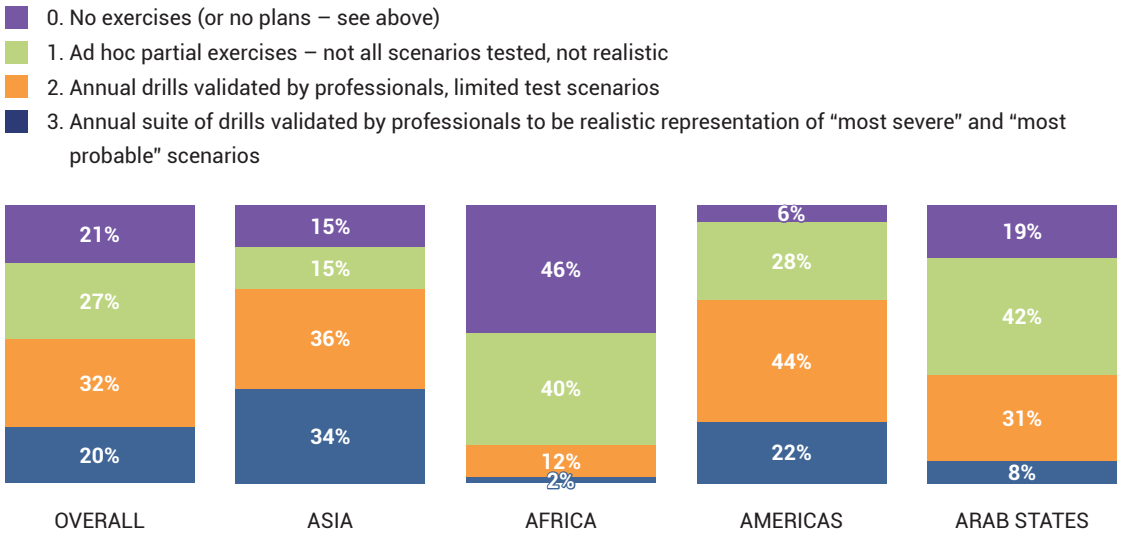
Figure 53: P9.6 Interoperability and Interagency Working



P9.7 Drills

Regarding practice drills, 52% of the cities conduct realistic exercises that are validated by professionals. Among them, only 20% of the cities perform an annual drill that is realistic to the "most severe" and "most probable" scenarios.

Figure 54: P9.7 Drills



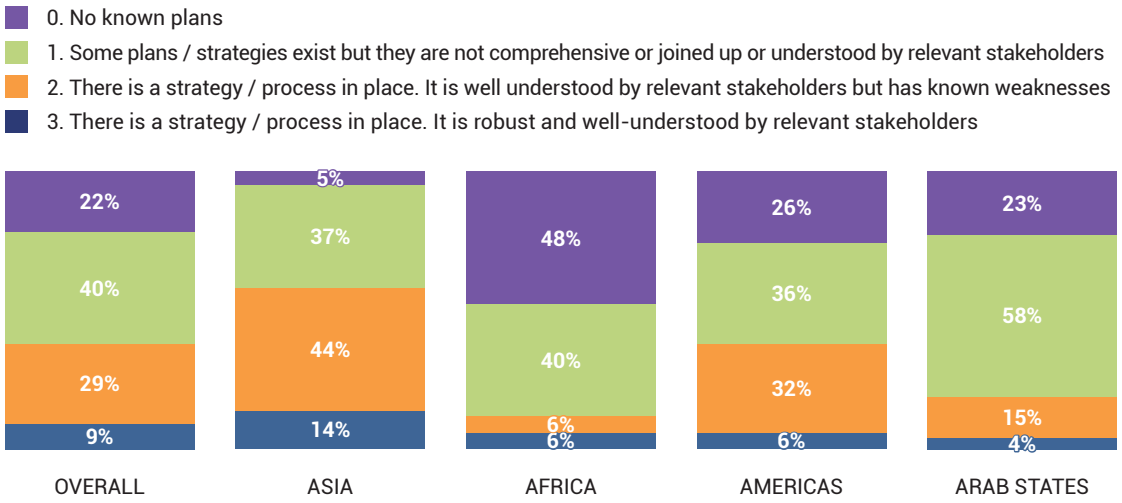
3.3.2 Essential 10: Expedite Recovery and Build Back Better

Build back better is a critical element of the Sendai framework and the Ten Essentials. Thus, effective pre-disaster plans according to the risks identified, and captured lessons learnt, are essential to support design and rebuilding. The trend of Essential 10 and its sub-elements are shown in Figures 55 and 56.

P10.1 Post-event recovery planning – pre-event

Comprehensive post-event recovery plans, such as the interim arrangement for damaged facilities, locations and sources for temporary housing, and economic reboot arrangements, are necessary for building back better. 78% of the cities have some plans in place for post-event recovery and reconstruction, including economic reboot and societal aspects. However, among them, only 9% of the cities' plans are robust and well understood by relevant stakeholders.

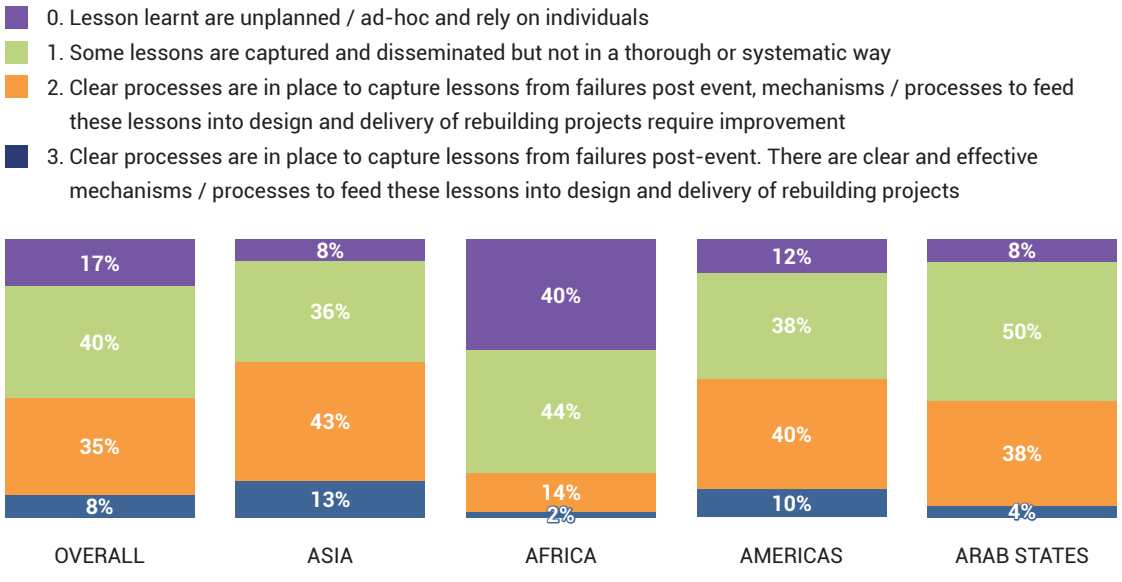
Figure 55: P10.1 Post Event Recovery Planning - Pre Event



P10.2 Lessons learnt/ learning loops

In addition to pre-disaster plans, post-disaster assessments to capture lessons learnt are equally critical in helping a city understand how it can 'build back better' and also in improving comprehension of risks. 43% of the cities have clear processes to capture lessons from failure post-event. Among them, only 8% of the cities have explicit mechanisms to feed these lessons into the design and delivery of rebuilding projects. Lessons learnt are ad-hoc and rely on individuals in 17% of the cities.

Figure 56: P10.2 Lessons Learnt/ Learning Loops



4 Global challenges and Opportunities for more resilient cities

4.1 Challenges

Based on the results of the Scorecard assessment and evidence provided during the assessment processes, the local governments encountered the following challenges in adhering to the Ten Essentials across all regions.

No	Category	Challenge	Related Essential
1	Local disaster risk governance	Inactive disaster risk management committees	1
		Lack of coordination and communication among disaster management agencies	1,5,6,9
		Undefined roles for inter-agency coordination	1
		No shared understanding of infrastructure risk among various institutions	2
		Lack of authority for local governments	2
		Practical barriers in implementing zoning and development plans	4
		Limited on ground promotion of green and blue infrastructure	5
		Unavailability of disaster management sub-divisions in the municipality	6
		No knowledge about private sector/employers	7
2	Stakeholders	Traditions and habits of the communities restrict DRR implementations	1
		Lack of stakeholder awareness	3,5
		Lack of stakeholder understanding on natural assets	5
		No regular training for communities	7
		Illegal and unplanned settlements	8
		Lack of commitment and capacity	8
3	Resources	Limited budget and inconsistency of resources	1,4,9
		Insufficient information	1,2,3,7,8
		Lack of funding sources for incentives	3,6
		Limited knowledge of staff to deal with cascading impacts	2,3
		Limited skilled human resources	4,5,6,8,9

No	Category	Challenge	Related Essential
3	Resources	Limited data sharing among institutions	1
		Limited number of provisional shelters for evacuated people	1,5,6,9
4	Policy and plans	City master plans do not include DRR	1
		Available insurance policies are expensive	3
		Outdated zoning plans, building codes and development plans	4,6
		Unavailability of hazard mapping	3
		Delays in approving policies and plans	4
		Lack of consideration of ecosystem service in city development activities	5
		Lack of integrated comprehensive responsive plan for recovery and reconstruction	7
		No standards for evacuation buildings	8
		No early warning systems	9
		Old buildings are still in use without protective measures	8
5	Technology	Unavailability of technical instruments	5
		Unavailability of water distribution systems	8

4.2 Opportunities

Based on the content analysis of the results of the Scorecard assessment and evidence provided, the following opportunities were identified that would enable the local governments to adhere to the Ten Essentials.

No	Category	Opportunity	Related Essential
1	Local disaster risk governance	Policies to form district level disaster management committees	1,4
		Insurance offers for government buildings such as schools and hospitals	3
		Some cities have networks of knowledge sharing with other cities	6
2	Stakeholders	Communities understand the value of natural assets	5
		In some cities green infrastructure are well preserved as a cultural practice	5
		Young people volunteer their skills for DRR	6
		Communities & volunteers participate in DRR activities	7
		Supportive media	6,9
		Supportive military	8
		Supportive local NGOs	9
3	Resources	Well established and resourced teams	1,6
		Availability of funding bodies	2
		Availability of data	2

No	Category	Challenge	Related Essential
3	Resources	Inclusive disaster relief funds	3
		Incentive programmes run by governments for DRR	3
		Availability of natural resources	8
4	Policy and plans	Supportive regulations	2,4
		Well established insurance practices	3
		Availability of building codes, by laws and regulations	4
		Clearly defined roles and responsibilities of stakeholders	9
5	Technology	Availability of new technologies	8

4.3 Good Practices from the Role Model Cities of the Making Cities Resilient Campaign

The preliminary scorecard analysis shows that cities are exposed to natural hazards and the local governments are promoted to be involved more in disaster risk reduction initiatives. Financial capacity remains difficult for most of the local governments. Further, the challenges faced by local governments are similar among regions, apart from the contextual differences. The following sections discuss good practices from the role model cities of the Making Cities Resilient Campaign and that can be followed by other cities to enhance urban resilience.

Case 1: Amadora, Portugal

Amadora Municipality is one of Portugal's smallest municipalities, which is prone to flash floods, urban fires, industrial fires, landslides, storms and road accidents. As a highly urbanised territory with a population insufficiently aware and sensitised about the risks and hazards, Amadora faces many challenges:

- Growing urban population and increased density, which put pressure on land and services;
- Weak local governance and insufficient participation by stakeholders in planning and urban management;
- The decline of ecosystems, due to human activities;
- Adverse effects of climate change that will likely increase or decrease extreme temperatures and precipitation.

These challenges formed a need to build capacity, identify, assess, monitor and reduce risks to build a culture of safety and resilience. Further, the inclusion of risk, disaster risk reduction and resilience on the municipality agenda also became mandatory. In August 2010 the Municipality of Amadora joined the Making Cities Resilient Campaign (MCR) to face these challenges and to implement the MCR Campaign's Ten Essentials. Amadora's Mayor created a multidisciplinary team with personnel from different municipal departments. All stakeholders were allocated responsibilities as follows:

- Academic-scientific entities: have developed a set of studies about risk and vulnerability assessment;
- Local councils: promotes contacts with local associations and citizens' groups in order to increase their awareness;
- Municipal services: gives cooperation and collaboration to the campaign team (facilitate contacts and disseminate information for all municipality: education, environment, urban services);

- Rescue and emergency team: provides data about disaster losses and support stakeholders' training and awareness for first aid and drills;
- Public-private entities and private social solidarity institutions: receive technical support (by the local campaign team) to improve their emergency plan and to provide social and cultural activities about disaster risk reduction to their clientele;
- NGOs: support public awareness initiatives, provide free training (first aid; risk, disaster risk reduction and resilience frameworks) to campaign stakeholders;
- School community: organise training activities and awareness about risk and disaster. Some schools have created civil protection centres for students to develop skills and facilitate a culture of safety.

These decentralised responsibilities have resulted in an increased interest from stakeholders in seeking information on risks and disasters and improved the municipality's resilience.

Case 2: Greater Manchester, UK

Greater Manchester joined the Making Cities Resilient campaign in 2014 and has taken an active role in planning and implementing resilience actions. One of the first steps for the city in developing a resilience strategy was to conduct an assessment of the city's state of resilience, serving as a baseline for setting priorities and targets for the creation of a resilience strategy and implementation plan. Developing this assessment required a cross-sector, multi-stakeholder approach that included the actors that prepare for and respond to disasters such as first responders, together with a wide range of stakeholders that address the longer-term pressures affecting the city-region.

This preliminary assessment reflected the understanding to the officials that resilience is not only about the capacity to navigate one-time shocks, but also how to address the chronic stresses that weaken a city's fabric, and which can undermine attempts to respond to crises. Long-term pressures such as income and health inequality, ageing infrastructure and the effects of climate change can slowly reduce living standards and quality for life for everyone, creating a disaster in their own right.

By looking at the complex challenges, Greater Manchester found opportunities for:

- Understanding cascading impacts of risks
- Closer collaboration in exploring the development of innovative adaptive programmes which can give stakeholders and communities the opportunity to think differently about the way in which Greater Manchester should and could work

In preparing a preliminary assessment, the city looked at each of the key strategic city-region plans and analysed them against the drivers of resilience as defined within the City Resilience Framework[4], helping to give a unique mosaic of the current resilience focus across Greater Manchester. This analysis helped them to understand where the resilience strategy can best align with and leverage current initiatives to strengthen our overall city-region resilience. Subsequently, they ensured that Greater Manchester has a solid foundation on which to refresh its resilience strategy. The process has encouraged conversations between a wide variety of stakeholders, improving awareness of resilience issues, strengthening understanding of how our shocks and stresses interlink and building system-wide linkages to deliver resilience solutions that offer co-benefits and efficiencies.

4 • https://www.100resilientcities.org/resources/

Case 3: Lisbon, Portugal

Based on the commitments assumed by Lisbon's municipality with the Sendai Framework for Disaster Risk Reduction, and Making Cities Resilient campaign, the resilience strategy has prioritised investment on implementing strategies for disaster risk reduction. Joining the MCR Campaign in 2010, Lisbon adopted the predecessor of the Disaster Resilience Scorecard for Cities to identify the gaps under the 10 Essentials for Making Cities Resilient and evaluate which gaps need improvement to enhance the city's resilience. List of actions were identified for each Essential and as some actions are similar or complementary, they were grouped, prioritized and converted into 'projects' with specific timeline, responsible agency and estimated budget. Conversion of the actions into projects helps to identify sources of funds.

This ongoing process focused on citizens, their quality of life, guaranteed basic services, heritage preservation, environment resilience and focus on sustainable development, making Lisbon more competitive, innovative and resilient.

Today, Lisbon is a complex system with a population of more than one million citizens during the day who live, work, study, and visit the city, representing a variety of age groups, cultures, religions, ethnicities, education levels, knowledge and languages. To face expected shocks and stresses, the goals are defined as follows:

- Manage the municipality as a "complex vulnerable critical infrastructure";
- Manage the jurisdiction of municipal territory (aerial, surface and underground), where critical infrastructures provider of basic services is implemented;
- Manage the interdependencies between citizens, services, first responders, volunteers and other key actors;
- Invest and implement urban resilience strategies;
- Invest in education and training, setting a 'Resilience' curriculum in schools and reinforce the continuous process of 'Growing Up in Safety' dedicated by public targets;
- Increase the capability to act, resist, adapt and to recover quickly and in an efficient way from unexpected adverse events;
- Strengthen partnerships, protocols and cooperation's based on a top-down and bottom-up approach;
- Share knowledge and procedures;
- Integrate contributions from politicians, first responders, NGOs, volunteers, experts of crucial areas: water supply, wastewater, solid waste, energy, food, health, financial, public lighting, transport and infrastructure, civil protection, legal order, safety, public administration, environment, urban planning, heritage, public relations, research and ICT;
- Develop an intelligent platform including a real time warning system for monitor the city in normal conditions and in case of disasters

To measure the city's resilience performance, Civil Protection implemented a web dashboard with a GIS approach, as a complement of the Resilience Action Plan. This platform allows Lisbon to make a diagnosis of the city: identification of its partnerships & public involved in daily activities, understanding of society in terms of disaster risks, the messages communicated, the channels used, and the territories involved. It also identifies the strong and weak points of the strategy adopted and allows the municipality to centralise data, promote the reuse of these data, and reduce dependence.

Based on the characteristics of Lisbon city, the Sendai Framework and an understanding of the resilience process (before, during and after), the municipality invested in educational resources to teach and disseminate the concept of resilience to disaster risks. The four (4) films designed under RESILENS[5], including illustrations and pictograms as a universal language, describes the urban resilience process of Lisbon. The social networks and the websites are used to disseminate these messages, and they have already achieved a high visibility.

All these approaches allow Lisbon to monitor and review its resilience process, highlighting the investment made to offer a better city for people to live in the present, and in the future, and to involve them in the resilience process.

5 • https://vimeopro.com/cmlisboa/what-is-resilience

5 Recommendations for strengthening local government resilience for disaster

Based on the preliminary assessment of the Disaster Resilience Scorecard for Cities of the 'Making Cities Resilient' Campaign, the following were identified by local governments as potential actions to help further strengthen disaster resilience at the local level.

No	Category	Challenge	Related Essential
1	Local disaster risk governance	Establish coordination among different levels of DRR committees (e.g. national-regional-local-community)	1,4
		Conduct regular meetings among disaster related agencies	2
		Update past risk scenarios regularly	2,10
		Incentives have to be promoted at household and community level	3
		Exemplary fines should be imposed on violators	4
		At construction level, monitoring should be increased to implement the zoning rules, building codes, etc.	4
		Establish coordination among transboundary institutions and organize awareness program	5
		Collaborative agreements should be effectively implemented	5
2	Stakeholders	Conduct capacity building training and more precise distribution of roles and responsibilities among employees	1,5,6, 7,9,10
		Educate communities and related agencies	1,5,6
		Involve communities in the assessment to identify vulnerabilities	2,4
		Educate the communities about risk transfer through insurance	3
		Include disaster risk management in the curriculum	6
		Conduct frequent drills and train young people	6,9
		Engage communities through multiple media	7
		Increase number of private sector being reviewed on business continuity every year	7
		Encourage media participations on publication and data collection on DRR issue	7
		Provide adequate training for healthcare and teaching staff	8

No	Category	Challenge	Related Essential
3	Resources	Collect information of all possible funding sources	3
		Establish government grant and funding from development bank and aid organisations	3
		Allocate inclusive funding for disaster resilience in annual funding	3
		Increase viable insurance opportunities	3
		Identify alternative funding	10
4	Policy and plans	Revise and update plans and regulations	1,4,8
		Integrate climate resilience with city functions	1
		Enforce disaster related by-laws	1,2,4,8
		Establish mechanisms to inform public about the main hazards	2,6
		Develop comprehensive disaster risk management plan and relevant information system	1,2,8,10
		Develop and revise contingency plans	2,3
		Develop and update hazard maps	2
		Include zone plan within city regulations	4
		Formulate and implement policies to promote green and blue infrastructure	5
		Translate training materials in multiple languages of the city	6
		Identify the demand for all types of infrastructure to enhance response planning	8,9
		Standardise school and hospital buildings	8
5	Technology	Encourage use of modern equipment	1,2,9
		Establish information system on hazards and set up a mechanism to update	2,6
		Enhance intuitional capacity, training program for concerned personnel, technology and equipment support (Spatial mapping and GIS)	4,6
		Install protective infrastructure based on risk information	8
		Strengthen existing infrastructure service provisions	8
		Increase the coverage of early warning systems	9

6 Concluding note

The need for urban resilience is steadily increasing, and the local governments across the regions showed some progress at the local level on disaster resilience building. Despite its importance, lack of financial capacity and inconsistency of resources are the most highlighted issue. Results show that the identification of all possible funding sources for disaster risk reduction is the first step to solve this challenge.

The preliminary scorecard assessment provides an analysis and common understanding for local governments on DRR in the cities. If cities are the frontier in the endeavour to reduce disaster and climate risks, and achieve sustainable development, the results show a significant gap in achieving resilience. Cities should take initiatives to improve by incorporating identified actions for reducing disaster risks into related plans and take proactive steps to implement DRR actions to ensure the resilience and thereby reduce the loss imposed by disasters. A very significant effort is required globally to respond to the challenges for achieving urban resilience and the sustainable development goals. A business as usual approach will not suffice.

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Annexure 1: Useful readings

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