Reducing risks and building resilience at the local level: A global review of local DRR strategies

Prof. Dilanthi Amaratunga,

Global Disaster Resilience Centre, University of Huddersfield, UK

Dr Pournima Sridarran,

Global Disaster Resilience Centre, University of Huddersfield, UK

Prof. Richard Haigh,

Global Disaster Resilience Centre, University of Huddersfield, UK

Sanjaya Bhatia,

Head of UNISDR's Incheon Office and Global Education and Training Institute for Disaster Risk Reduction, UNISDR, Incheon, Republic of Korea

Mutarika (Mai) Pruksapong,

Programme Officer, Office for Northeast Asia (ONEA) and Global Education and Training Institute (GETI), UNISDR, Incheon, Republic of Korea

1. Introduction

Lack of economic prospects in rural areas is the principal reason for the urban population increase in developing countries. This rapid urban population increase is contributing to many urban management issues including pressure on land and services, unplanned and unauthorised settlements, settlements in hazard-prone areas, lack of capacities and unclear mandates for DRR, weak local governance and lack of regulatory frameworks, decline of ecosystems, decaying infrastructure, unsafe building stocks, uncoordinated emergency services, and adverse effects of climate change (Amaratunga, Malalgoda, Haigh, Panda, & Rahayu, 2017). Thus, there is widespread recognition of urban disaster risk reduction and integration of that into urban management tools (Adpc, 2013). Hence, disaster resilience cannot be achieved in isolation by the government, NGOs, or communities, and thus, collaboration among all the stakeholders is essential. Accordingly, current international discussions on disaster resilience emphasise localising the global governance to the ground level stakeholders. Subsequently, many countries are carrying out disaster risk reduction activities in the context of decentralised governance structure (Bae, Joo, & Won, 2016).

Approaches for building resilience may range from highly technical and resource-intensive, to simple and inexpensive practices. “Making Cities Resilient” (MCR) Campaign by United Nations Office for Disaster Risk Reduction (UNISDR) is a simple tool to promote disaster resilience-building in cities through raising awareness among local governments through providing tools, technical assistance, city-to-city support networks, and learning opportunities. In 2018, a local government survey was developed and administered by UNISDR, not only with MCR Campaign cities but also with other cities, to capture the progress in disaster risk reduction and the implementation of the Sendai Framework for Disaster Risk Reduction around the world. This paper attempts to report the results of the survey.

The results show that flood is the most recurrent and frequent disaster in a majority of the cities. According to the percentage of responses, flood and landslide show a significant increase in frequency, intensity, people’s exposure and vulnerability. Local governments have shown good progress in conducting DRR actions and publicising the disaster information according to the survey results. Around half of the local governments have their own local DRR strategy. However, most of them are lacking in implementation. As mentioned by the respondents, financial incapability is the popular reason for the inefficient implementation. Though there is a lack of enforcement, DRR is needed in most of the local governments, as it is compulsory by national law.

Interestingly, majority of the DRR plans are developed with the participation of the citizens in some form. Local governments also receive external support mainly from the national government. However, inhouse-technical

capacity, citizen engagement, and equipment and materials are mentioned as the critical factors that are needed for successful implementation of DRR actions at local level. Detailed analysis is presented in the following sections of this paper.

2. Urban resilience and risk trends

Today, more than half of the world population live in urban cities. Disaster trends show that many urban areas sustained after heavy losses due to disasters. Haiti earthquake in 2010, Cyclone Nargis in 2008, and the South Asian tsunami in 2004 are some of the popular examples that created a massive loss to the human population. Comparatively, urban areas concentrate disaster risk owing to urban expansion, increasing population, infrastructure and assets, and inadequate management. Hence, building resilience became an essential need for all urban cities.

Resilience of a city to an external shock depends upon various networked resources such as economic development, social capital, community competence, and information and communication (Sherrieb, Norris, & Galea, 2010). Economy is among major systems that undergo severe consequences after disaster and/or displacement. In-depth studies on economic resilience mostly concern ecological economics (Perrings, 2006). Attempts have been made to extend studies on ecological economics to general socioeconomic domain, though several scholars argue that it does not provide any additional insight (Rose, 2009).

Scholars demonstrated the link between the institutional effectiveness and disaster mortality. Gencer (2013) highlighted several examples in her study showing this link. For example, the death toll from earthquakes is higher in countries with higher public sector corruption. On the other hand, countries with better performing institutions are better at mitigating disasters. Though several institutional frameworks exist, Malalgoda, Amaratunga and Haigh (2016) suggest that local government is the most appropriate body to handle disaster risk reduction (DRR) of cities. The reasons are, the local government is the first line of response and defence for disasters, and they are the closest government body to the local population. Thus, they are in a better position to engage the local community in DRR activities.

Approaches for building resilience may range from highly technical and resource-intensive, to simple and inexpensive practices. The “Making Cities Resilient” (MCR) Campaign initiated by the United Nations Office for Disaster Risk Reduction is one of the examples. It helps to promote disaster resilience building in cities through raising awareness and providing simple tools, technical assistance, city-to-city support networks, and learning opportunities for local governments.

The Making Cities Resilient (MCR) Campaign was launched in May 2010 with the aim to advocate and raise awareness among local authorities and cities on disaster risk governance, urban risk, and resilience (Phase 1). It was recognized as a powerful tool to engage local political leaders and cities' commitment toward disaster resilience building. Following the Local and Sub-National Governments Declaration at the 2015 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 at the Local Level in Florence, Italy in June 2016, the Campaign was extended into a new phase (Phase 2), with a focus not only on advocacy but also to implementation support, partner engagement, investment-cooperation opportunities, local action planning and monitoring of progress.

3. Research method

. In 2018, a local government survey was developed and administered online by the UN Office for Disaster Risk Reduction to capture the progress in DRR and the implementation of the Sendai Framework for Disaster Risk Reduction at the local level around the world, including both the cities participating in the MCR Campaign and those that are not. The survey includes 58 questions about the local governments, local risks and understanding of risk, risk communication, local DRR strategy, strategy implementation, and DRR actions and experience. Taking part in this survey is an opportunity for cities to showcase their good practices and contribution to the advancement of the global framework such as the Sendai Framework for Disaster Risk Reduction and the Sustainable Development Goals.

On the closing date of the survey in July 2018, 159 valid responses were collected from the local government representatives. Among them, 95 responses are from Latin America, 24 from Asia, 17 from Africa, 16 from Europe, and 7 from Arab states. 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 the good practices, based on the comments given by the respondents.

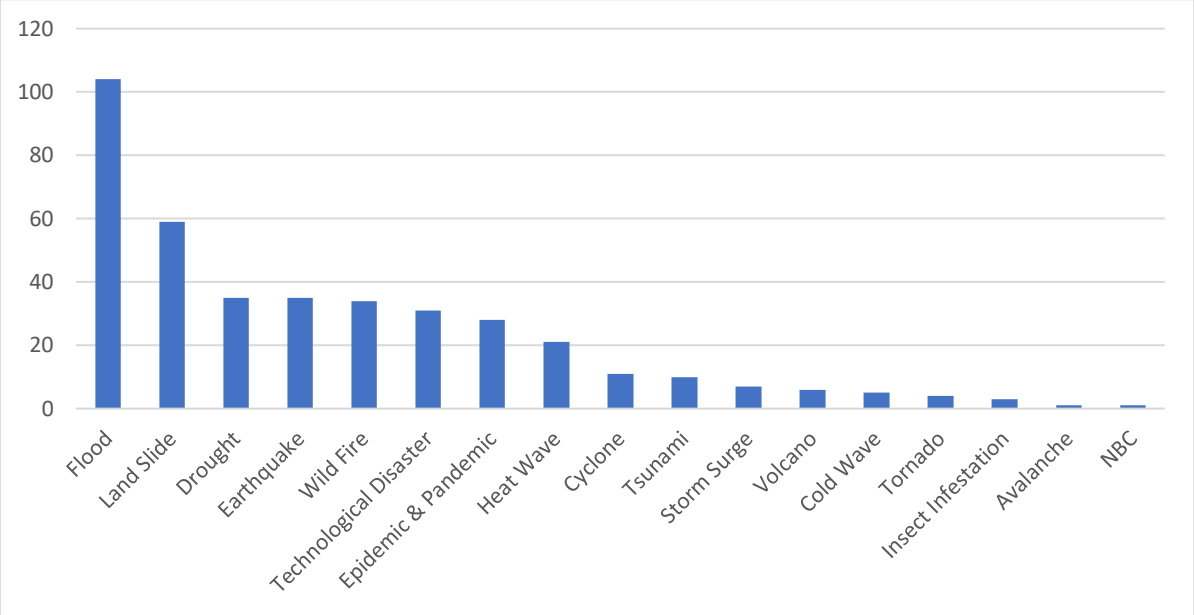
4. Findings and discussion

4.1 Global risk trends

Based on the 159 valid responses, most prominent risks for local level and the changes in their patterns are identified. Results show that flood including flash flood is the most common risk identified by the cities. 65% of the respondents mentioned floods as the prevailing risk in their territory. Landslide is the second leading risk (37%),

followed by drought (22%), earthquake (22%), wildfire (21%), technological disasters (19%), and epidemic & pandemic disasters (18%), as show in Figure 1.

Figure 1: Prominent risks around the globe



According to 54% of the respondents, there is a change in the pattern of these hazards. According to the results, with the increase of urban population the intensity, frequency, people's exposure, and vulnerability of most of the hazards have increased, whereas those of some other hazards have decreased. According to the percentage of responses, flood and landslide show a significant difference in the pattern. As shown in Table 1, in more than 35% of the cities, intensity, frequency, people's exposure, and vulnerability of floods have increased. According to the respondents, the plausible reason for this pattern is the sea-level rise and changes in water level patterns in rivers due to climate change. The intensity, frequency, people's exposure, and vulnerability of drought and heat wave also largely increased, reflecting the impact of changing climate patterns. On the other hand, with the advancement of medical services, epidemic and pandemic disasters have decreased in their intensity, frequency, and exposure. Table 1 shows the percentage of responses for changes in patterns of most prominent hazards.

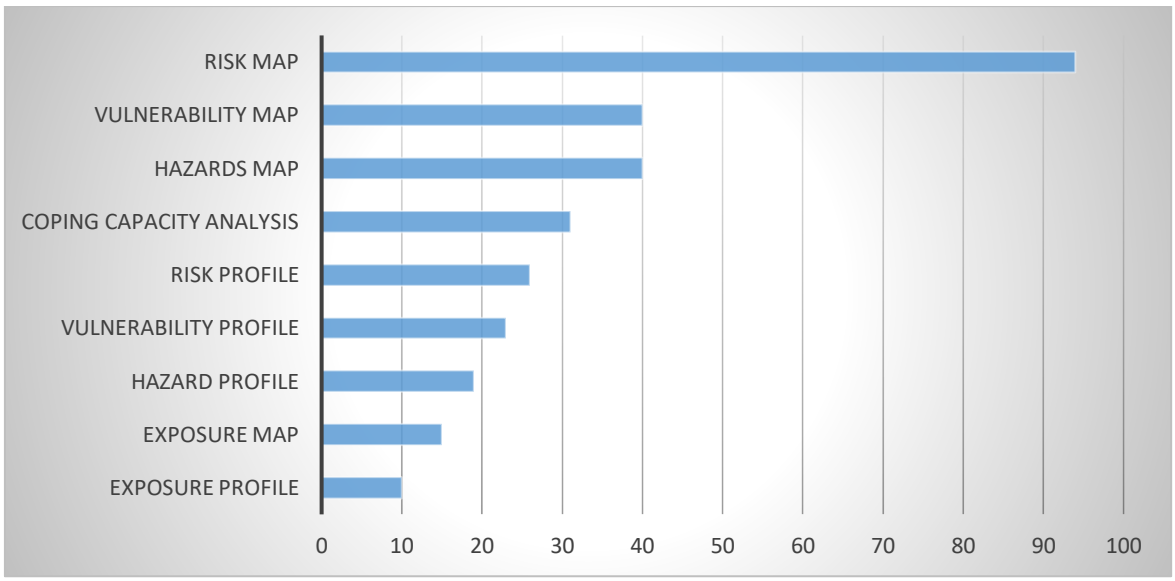
Table 1: Change in patterns of localised risks

Hazard	Intensity		Frequency		Exposure		Vulnerability	
	+	-	+	-	+	-	+	-
Drought	13%	2%	11%	5%	9%	0%	10%	0%
Earthquake	6%	2%	6%	2%	6%	2%	10%	5%
Epidemic & Pandemic	4%	10%	2%	9%	6%	9%	9%	6%
Flood	37%	22%	37%	23%	37%	16%	34%	21%
Heat Wave	9%	1%	7%	2%	6%	0%	6%	0%
Land Slide	16%	12%	15%	11%	22%	4%	21%	5%
Technological Disaster	7%	9%	7%	7%	5%	5%	6%	5%
Wild Fire	11%	5%	11%	4%	10%	4%	10%	5%

4.2 Understanding risks

The results show that 110 local governments participating in this survey conduct disaster risk assessments to understand the risks of their territory, while 27 local governments do not conduct risk assessment and 22 did not respond to this question. Most of the local governments produce risk maps as an output of the risk assessment (93 local government or 84.5%), followed by vulnerability maps (36.4%), hazard maps (35.5%), and coping capacity analysis (28.1%), as shown in Figure 2. Among these, only 11 local governments or 10% produce all risk, hazard, exposure, and vulnerability maps. More than half (55.5%) produce only 1-2 risk assessment outputs.

Figure 2: Types of risk assessment outputs

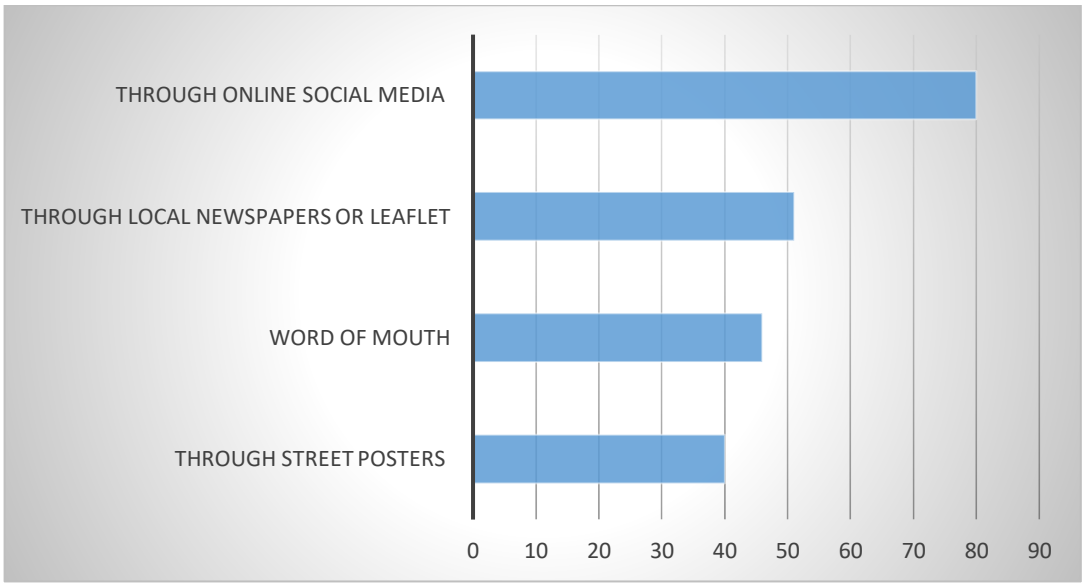


45% of these risk assessments are based on expert opinions, 30% of those are based on scientific modelling, while 3.6% use both. Multiple statistical data, local expertise, and previous experiences are also used as a basis for disaster risk assessment in some local government.

97% of the local governments have conducted a risk assessment from 2005 to 2018. Among them, 37% update their risk assessment every year, and 35% update every 2 to 4 years. According to the risk assessments, 54% of the respondents mentioned that they are exposed to a mixture of new and recurrent risks. The other 41% of the cities are exposed to only recurrent risks.

Communicating the localised risks to the stakeholders is equally essential to understanding risks. The results show that 70% of the local governments publicised information on disaster risk to increase public awareness of risk reduction. Following the trend, the most popular way of advertising risk information, which is adopted by the local governments, is online social media such as Facebook, Twitter, and Instagram. The second most popular way is the local newspapers and leaflets. Figure 3 shows different forms of advertising risk information.

Figure 3: Different forms of advertising risk information



4.3 Local DRR strategies

Having local DRR strategies is essential for local governments to handle the disaster risks practically, as reflected in the Target E of the Sendai framework and the indicator SDG11b of the Sustainable Development Goals (SDG). The development and implementation of DRR strategies contribute to decreasing the direct economic losses caused by disasters and protecting the poor and people in vulnerable situations. Thus, local governments' commitment is essential and expected by the global communities. According to the survey, 52% local governments already have local DRR strategy in place, whereas, 30% local governments are in the process of developing the local DRR strategies.

15% of the local DRR strategies include measures to reduce existing risks. Measures that enhance disaster preparedness for effective response and to "Build Back Better" in recovery, rehabilitation and reconstruction, measures that enhance the local government´s understanding of disaster risk, and measures that strengthen disaster risk governance are some of other prevailing contents of the local DRR strategies, as mentioned by the respondents. Figure 4 shows key elements of DRR strategies use by the local governments.

Figure 4: Key elements of DRR strategies

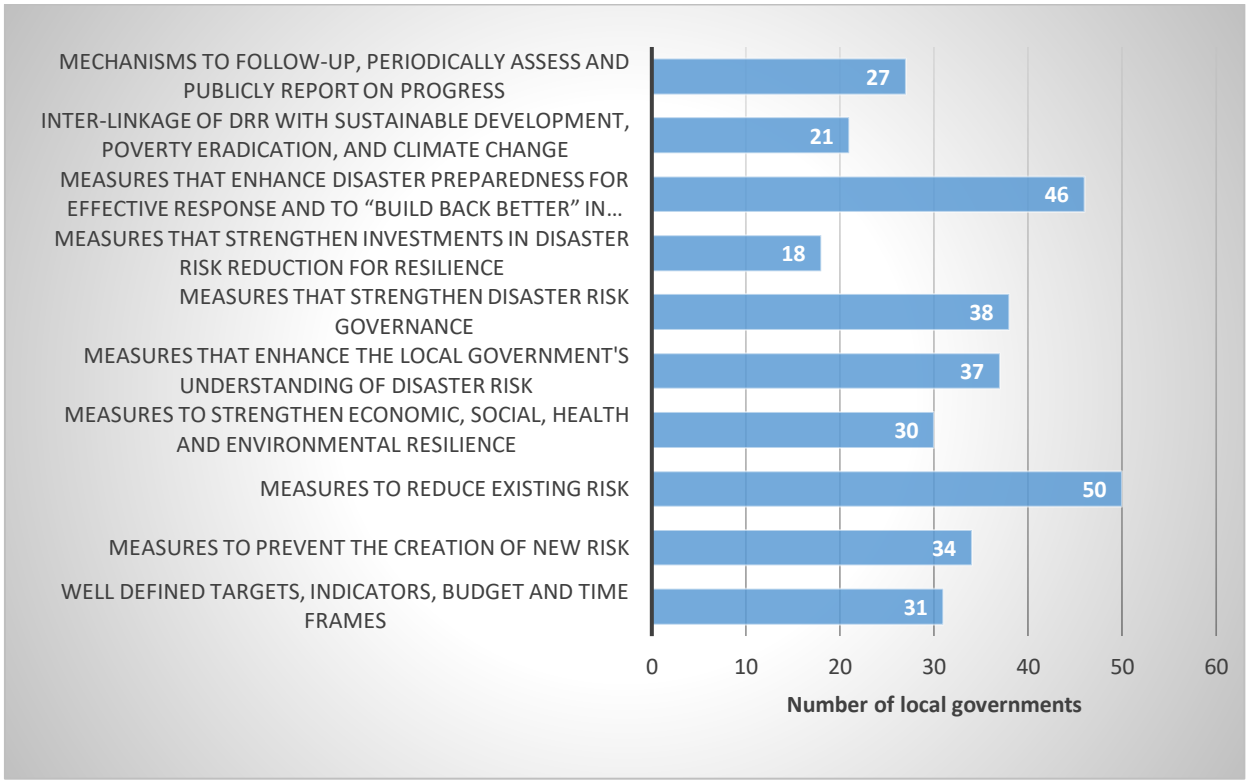
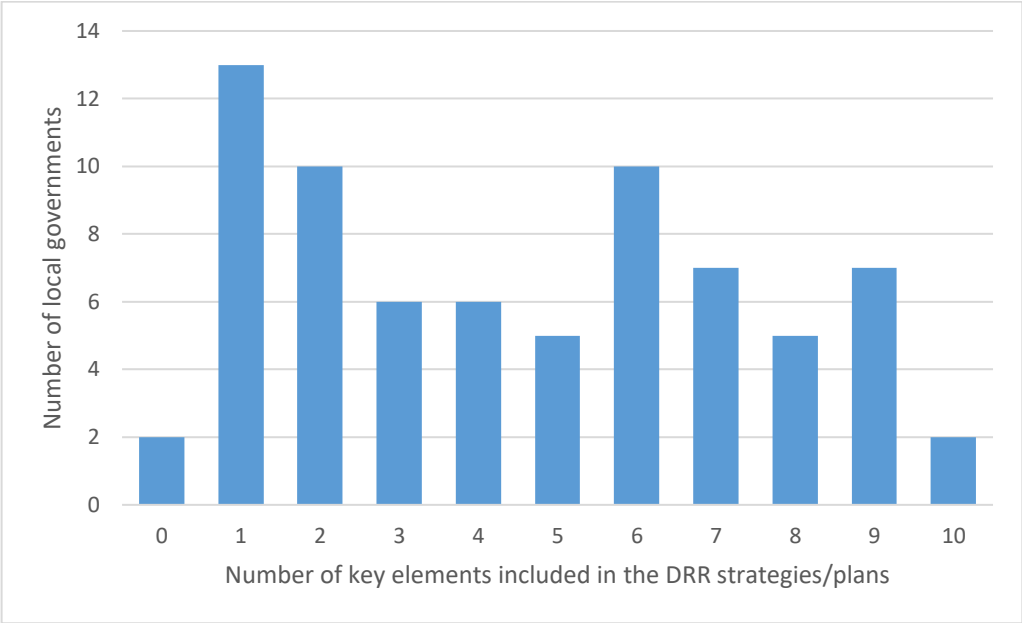


Figure 4 shows that measures to reduce existing risk are the most captured element and measures to strengthen investments in DRR are the least captured element in the strategies. According to the technical guidance note on Target E, all the 10 key elements shown in Figure 4 should be included in the DRR strategies to be considered as fully aligned with the Sendai Framework. Only 2 local governments among the participants comply with this requirement. 7 local governments' DRR strategies include 9 key elements. Most of the local governments include 1-2 key elements in the DRR strategies. Figure 5 shows the number of key elements included in the DRR strategies.

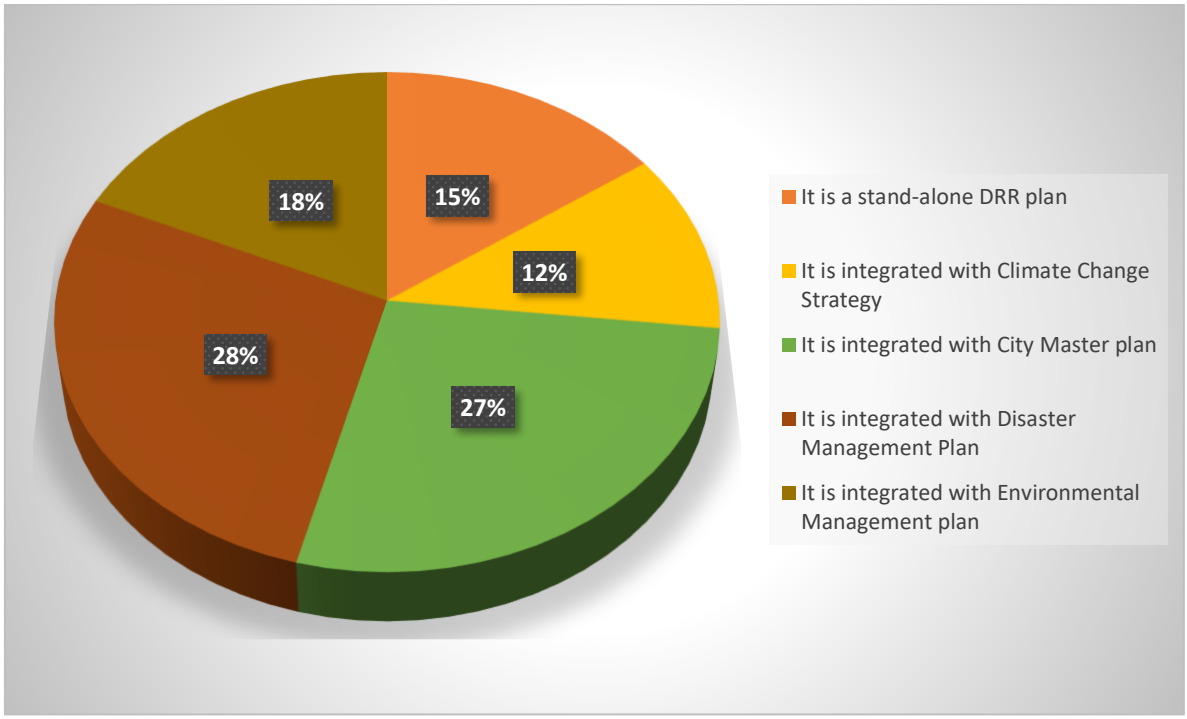
Figure 5: Alignment with the Sendai Framework for DRR



The survey responses also reveal that DRR is needed in most of the local governments as it is compulsory by national law (33%). In 31% of the cities, it is the self-initiative of the local authorities. Further, citizen's request to reduce vulnerability is mentioned as a special reason by some of the cities. Aside from this, 86% of the participating local governments stated that their countries have a national policy or strategy on DRR. Among them, 94 cities' (64%) local DRR strategies are aligned with their national DRR policy of the country.

A supportive/ enabling environment is essential for active development and implementation of local DRR strategies and plans. The results show that most local governments' (53) DRR plans are integrated with disaster management plans, city's master plans, climate change strategy or environmental management plans. The proportion of a complete stand-alone DRR plan is comparatively less (14). Aside from this, 6 cities have stand-alone plans, but some components are integrated with other plans/strategies. Figure 6 shows the percentages of different integration of DRR plans.

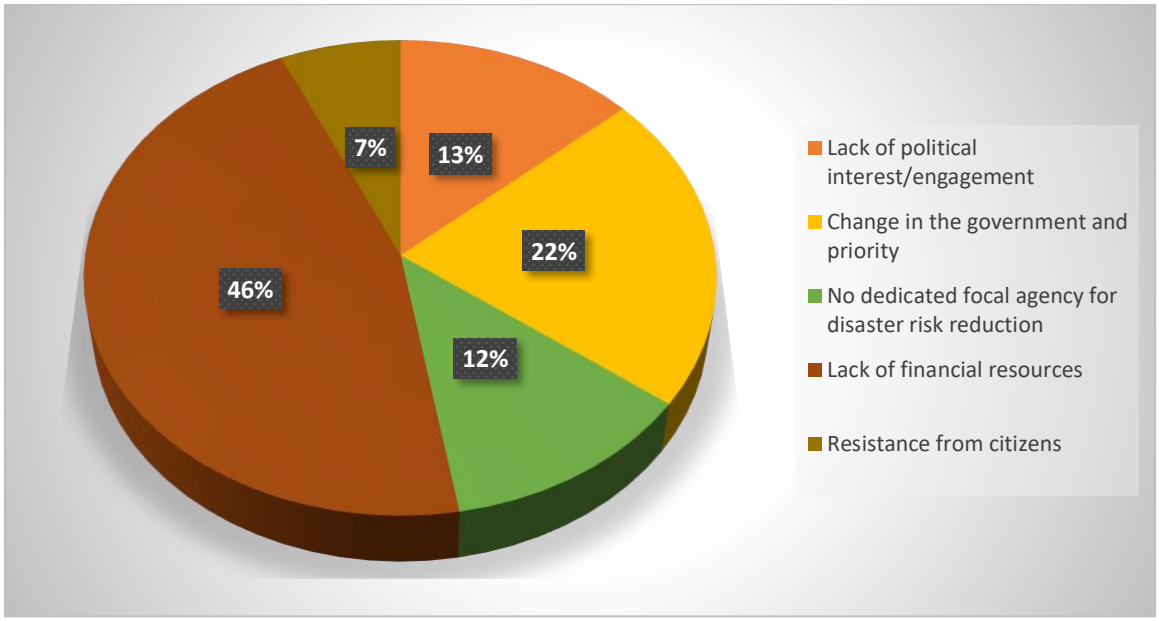
Figure 6: Integration of DRR plans



4.4 Implementation of DRR strategies

Implementing local DRR strategy is more important than having the strategy. The results show that among the local governments having DRR strategies, 27.4% has fully implemented the DRR strategies, while the majority of the cities (53.4%) only partially implement the strategy and 19.2% have not yet started the implementation. The reason mentioned by most of the respondents for incomplete implementation of the strategy is the lack of financial resources (46%). Change in the government and its priorities (22%) are also one of the frequently mentioned reasons for lack of implementation. Figure 7 shows the reasons for partial implementation.

Figure 7: Reasons for partial implementation



4.5 Local Disaster Risk Reduction Measures

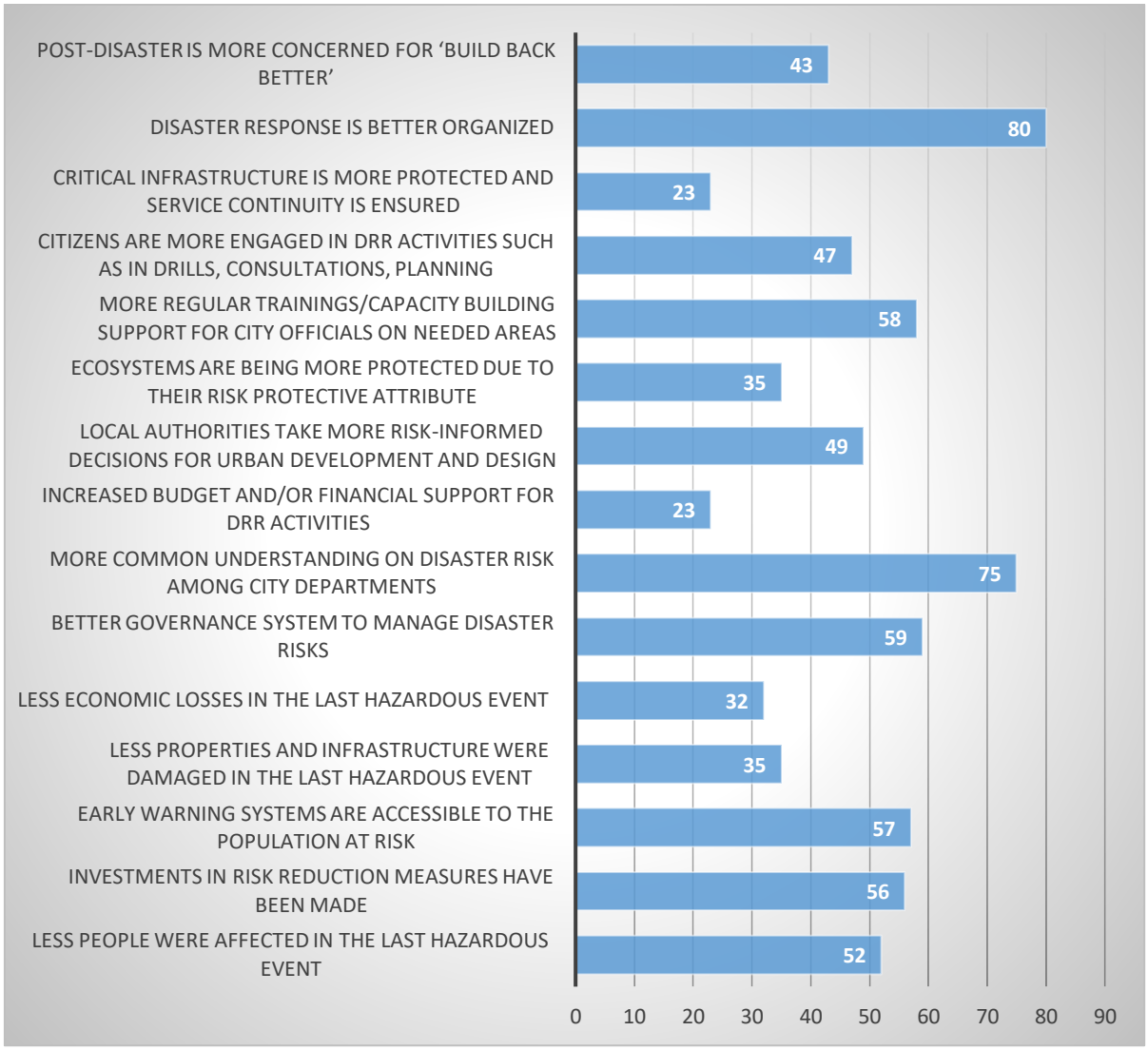
Regardless of whether the local governments have DRR strategies in place or not, some DRR activities are on-going in various forms. Based on the survey results, risk assessment (60.4%), capacity building on DRR for government officials (54.1%), and training on emergency response (52.2%) are the most implemented DRR actions by the local governments. Table 2 shows the list of DRR actions and number of local governments that implements them. Respondents further mentioned that domestic financial incentives (83), in-house technical capacity (79), and citizen engagement (74) are the most crucial factors for successful implementation of DRR actions.

Table 2: DRR actions implemented by local governments (N=159)

DRR Actions	No. of local governments
Risk assessment	96
Capacity building/training on DRR for government officials	86
Training on emergency response	83
Establishment of dedicated department or unit for DRR	68
Risk-informed land use planning	64
Educational programs and training on disaster risk reduction in schools and local communities	64
Post-disaster damage and loss assessment	63
Mainstreaming DRR with other development sectors	61
Risk communication policies	57
Assignment of dedicated DRR officials	55
Establishment of multi-stakeholder coordination mechanism	54
Early warning system	54
Capacity building/training on DRR for non-government stakeholders	50
Citizen participation mechanisms in all phases of disaster management (Prevention, Preparedness, Response, Recovery)	49
Construction of protective infrastructure (e.g. sea wall, levees, storm drains, slope stabilization, etc.)	48
Media program to increase awareness of citizen	48
Relocation of population from risk areas	40
Disaster-proof building regulation	34
Risk-informed informal settlements upgrading	34
Local DRR fund & budgeting	31
Reconstruction of damaged assets taking into account of DRR measures (Build Back Better)	31
Ecosystem restoration for DRR purposes	25
Retrofitting of critical infrastructure	20

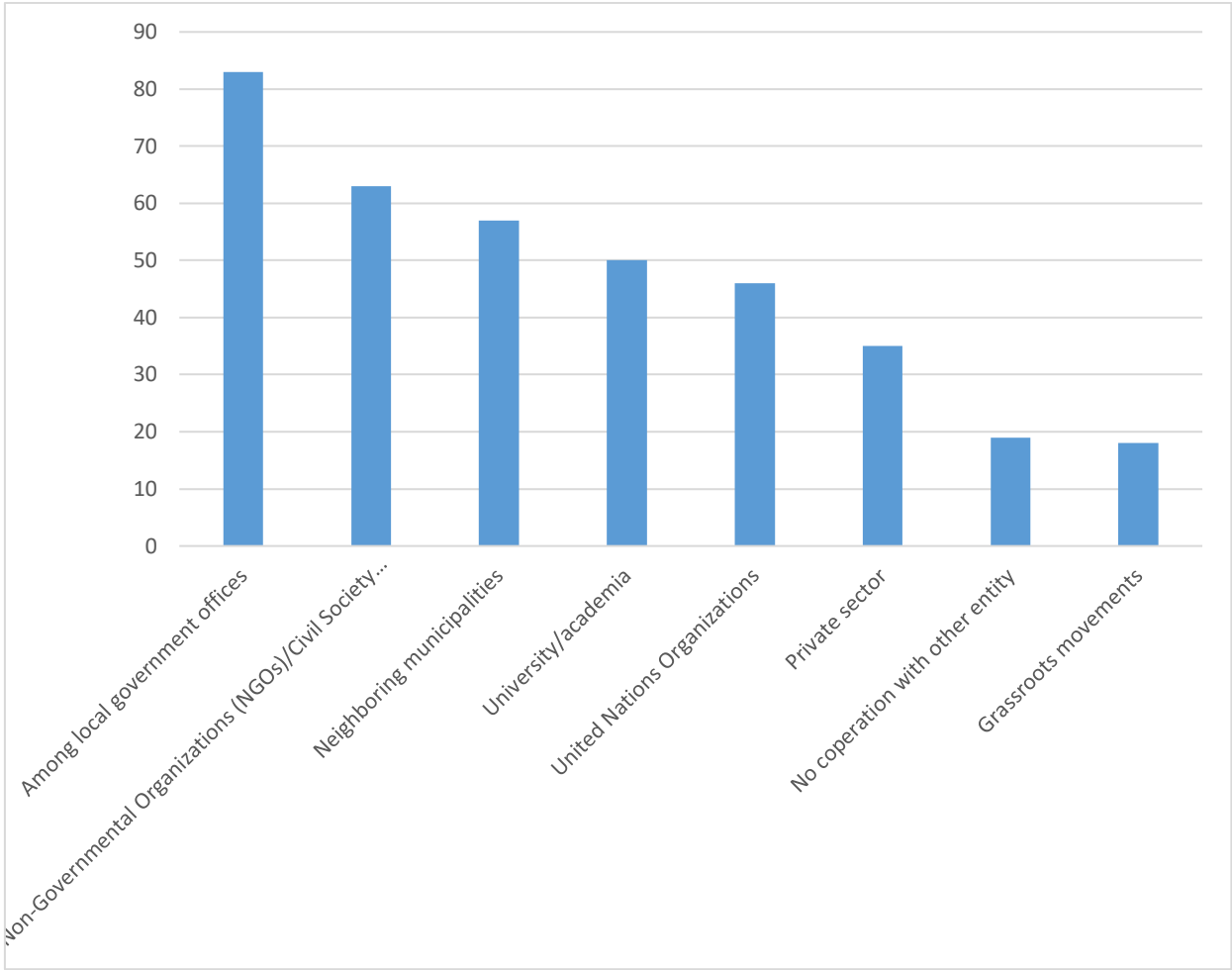
Regarding improvements, 80% of the respondents mentioned that the capacity to cope with disasters has improved since local governments become interested and involved in disaster risk reduction. These improvements include better-organised disaster response (73%), improved common understanding on disaster risk among city departments (69%), and more regular training/capacity building support for city officials in needed areas (53%). Figure 8 shows those improvements.

Figure 8: Improvements after local governments' involvement



The Sendai Framework highlights the role of local governments in taking the lead in disaster risk reduction and emphasizes the shared responsibility among all stakeholders. Various stakeholder groups must be included in DRR to enhance local disaster resilience building. According to the survey, most of the local governments coordinate among various local government offices in disaster risk reduction (83). Non-governmental organizations (NGOs) and civil society organisations (CSOs) are also the key partners for local governments on DRR (63), followed by and neighbouring municipalities (57), university and academia (50) United Nations Organizations (46), and private sector (35). The result show that there is a relatively minimal involvement of grassroots organizations (18) in local DRR. Surprisingly, 19 local governments reveal no cooperation with other entity. Figure 9 shows the local cooperation for disaster risk reduction.

Figure 9: Local cooperation for disaster risk reduction



5. Conducive and hindering factors in the development and implementation of local disaster risk reduction strategies

An effective DRR plan is the one that is developed with the involvement of the citizens. According to the respondents, 70% of the DRR plans are developed with the participation of the citizens in some form. 25% of the respondents mentioned that the most common citizen engagement method is via open workshops to increase awareness and demonstrative actions and campaigns. Further 59% of the DRR plans are developed with external support. Most of the support is provided by the national government followed by the private sector. According to the respondents, financial support, human resources and capacity building is mainly received from the national government, and technical support from academia and the private sector. Table 3 shows the different type of support received from various organisations.

Table 3: External support

Type of support	National government	UNOs	Development bank	NGOs	Sister city	Academia	Private sector	Others
Financial resources	40%	17%	0%	13%	3%	3%	13%	10%
Human resources	21%	6%	0%	15%	9%	15%	11%	23%
Technical advise	16%	11%	0%	12%	8%	19%	18%	17%
Capacity building	23%	13%	0%	15%	10%	16%	3%	21%
Others	32%	18%	0%	18%	0%	5%	5%	23%

Another supportive factor is by national law that emphasises local governments to have a local disaster risk reduction strategy. Further, in-house-technical capacity, citizen engagement, and equipment and materials are mentioned as the critical factors that are needed for successful implementation of DRR actions at local level.

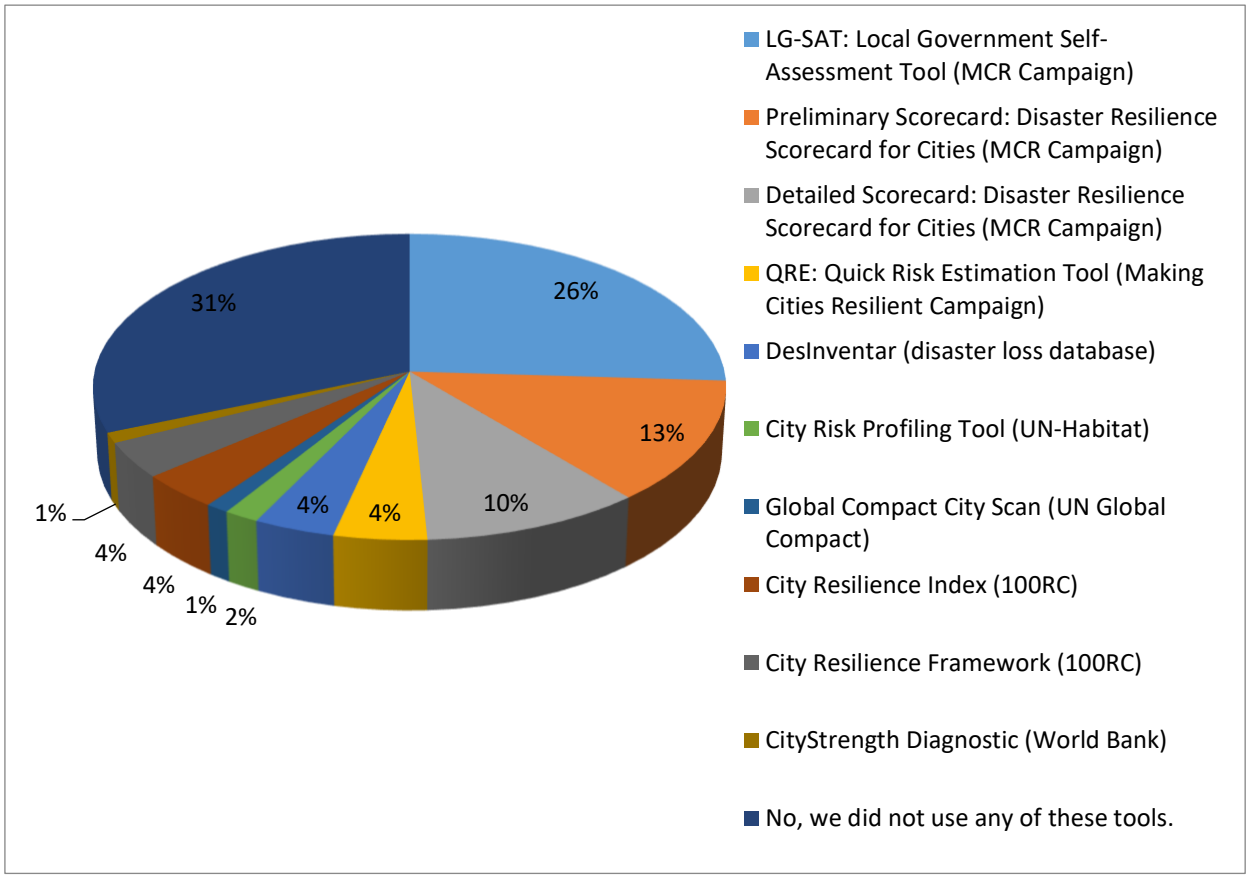
Results show that 64% of the cities do not have a dedicated budget for DRR actions, which is one of the foremost reasons for lack of implementation. Further, majority of the respondents reveal that no incentives for home owners, public sector, businesses, marginalised communities, and low-income families to reduce the risks they face are available in the local governments. Table 4 shows the summary of availability of various incentives for disaster risk reduction.

Table 4: Availability of various incentives

Type of incentive	Yes	No	Not known
For home owners to reduce the risks they face (e.g. lower property tax, reduced insurance premiums, tax-write off for home improvement)	10%	75%	15%
For public sector to invest in reducing the risks they face (e.g. fast track of budget approval, access to funds, subsidized loans)	17%	56%	27%
For businesses to reduce the risks they face (e.g. tax credits, faster approval process, lower interest rates on loans, reduced insurance premiums, award & recognition)	8%	60%	32%
For marginalized communities to reduce the risks they face (e.g. micro-financing, subsidies, free access to services)	21%	54%	25%
For low-income families to reduce the risks they face (e.g. micro-financing, conditional cash transfers, free access to services)	29%	48%	23%

Respondents mentioned the tools that the local governments use to support DRR planning and implementation. Among them, the Local Government Self-Assessment Tool (MCR Campaign) is the frequently mentioned tool, followed by Preliminary and Detailed Disaster Resilience Scorecards for Cities. Majority of the local government did not use any tool for support DRR plan development. Figure 10 shows different tools used by the local governments.

Figure 10: Different tools used by the local governments to support DRR strategies



6. Conclusion and recommendations

The survey assessed the local governments' capacities to organise for disaster resilience concerning plan making to comply with Sendai Framework, coordination and participation with appropriate authority and resources to address disaster risk reduction, and integration of resilience with other vital functions of the cities. The assessment on abovementioned shows the prospects of achieving Target E. The results further show that majority of the participating local governments (134) have already signed up for the MCR campaign, and comparatively they perform better than

non-MCR Campaign cities on many aspects of disaster risk reduction at the local level. They are better in organising for disaster response, understanding disaster risks, establishing disaster risk governance, and cooperating with other stakeholders especially among local government officers.

Moreover, the newly joint MCR cities are more active in developing DRR strategies as more than half of the local governments which are in the process of developing their local DRR strategies have joint the MCR campaign after 2015 (Phase 2). Among cities completing risk assessments, the MCR Campaign cities produce risk maps, coping capacity analysis, vulnerability maps, hazard maps and risk profile relatively more than cities that are not part of the MCR Campaign.

Following the trend, the most popular way of advertising risk information, which is adopted by the local governments, is online social media such as Facebook, Twitter, and Instagram. The second most popular way is the local newspapers and leaflets, the effort for advertising can be observed more among MCR cities compared to Non-MCR cities. Further, among local governments which already have local DRR strategy in place, nearly 80% of are the members of the MCR Campaign. Most of the MCR cities in the countries with national disaster policy joined the campaign during 2013 to 2017 period. 80% of the respondents mentioned that the capacity to cope with disasters has improved since local governments become interested and involved in disaster risk reduction. These improvements are well recognised in the cities which have signed up for MCR campaign within the period of 2011-2013 (Phase 1).

Improvements observed in the cities after local governments became interested and involved in disaster risk reduction. The results reveal that the improvements are highly visible among cities participating in MCR Campaign, particularly in the cities that have signed up to the Campaign in Phase I before 2015. The results further reveal that MCR Campaign cities have high engagement with other stakeholders and create partnership with these stakeholders for local disaster resilience building.

According to the results, comparatively MCR cities perform better than non-MCR cities on many aspects of disaster risk reduction at the local level. The MCR campaign could be further promoted by conducting regular meetings, including sector incentives, implementing collaborative agreements, establishing coordination among transboundary organisations and regular monitoring.

Further, current international discussions on disaster resilience emphasise localising the local governance to the ground level stakeholders. Subsequently, many countries are carrying out disaster risk reduction activities in the context of decentralised governance structure. Thus, involving communities in the disaster risk reduction initiations from identification of disaster vulnerabilities to disaster response is recommended. Lack of financial capacity and inconsistency of resources is the most highlighted issue by the local governments. The discussions on the methods of

financing such as embedded and stand-alone funding are widely recognised under international frameworks for the effective reduction of disaster risk. However, this will vary depending on the level of development, exposure and risk for disasters. Results show that the identification of all possible funding sources for disaster risk reduction is the first step to solve this issue. Establishing government grants, allocating inclusive funding for disaster resilience, increasing viable insurance opportunities and alternative financing are some of the recommendations to address this issue.

The survey was conducted mostly among low and middle-income countries, and their technical strength is comparatively small. This is one of the drawbacks that restrict these cities from achieving resilience. Increasing the coverage of early warning systems, installing protective infrastructure based on the risk information, establishing an information system on hazards, and encouraging the use of modern equipment are some of the recommendations that can be practised to enhance disaster resilience. Ultimately, the capacity of the local governments needs to improve more to respond to the growing need for urban resilience and to achieve sustainable development goals.

7. References

Adpc. (2013). *Integrating Disaster Risk Management into Urban Management: Disaster Risk Management Practitioner's Handbook Series*. Bangkok: ADPC.

Amaratunga, D., Malalgoda, C., Haigh, R., Panda, A., & Rahayu, H. (2017, 2018). *Sound Practices of Disaster Risk Reduction at Local Level*.

Bae, Y., Joo, Y.-M., & Won, S.-Y. (2016). Decentralization and collaborative disaster governance: Evidence from South Korea. *Habitat International, 52*, 50-56. doi:10.1016/j.habitatint.2015.08.027

Gencer, E., A. (2013). The Impact of Globalization on Disaster Risk Trends : A Macro- and Urban Scale Analysis. In *Global Assessment Report on Disaster Risk Reduction 2013*. Geneva, Switzerland: UNISDR.

Johnson, C., & Blackburn, S. (2014). Advocacy for urban resilience: UNISDR's Making Cities Resilient Campaign. *Environment and Urbanization, 26*(1), 29-52. doi:10.1177/0956247813518684

Malalgoda, C., Amaratunga, D., & Haigh, R. (2016). Overcoming challenges faced by local governments in creating a resilient built environment in cities. *Disaster Prevention and Management: An International Journal, 25*(5), 628-648. doi:10.1108/DPM-11-2015-0260

Nirupama, N., Popper, T., & Quirke, A. (2015). Role of social resilience in mitigating disasters. *International Journal of Disaster Resilience in the Built Environment, 6*(3), 363-377. doi:10.1108/IJDRBE-09-2013-0039

Park, J., Cho, J., & Rose, A. (2011). Modeling a major source of economic resilience to disasters: recapturing lost production. *Natural Hazards, 58*(1), 163-182. doi:10.1007/s11069-010-9656-9

Perrings, C. (2006). Resilience and sustainable development. *Environment and Development Economics, 11*(4), 417-427.

Rose, A. Z. (2009). *Economic resilience to disasters*. Retrieved from https://research.create.usc.edu/cgi/viewcontent.cgi?referer=https://scholar.google.co.uk&httpsredir=1&article=1015&context=published_papers

Sherrieb, K., Norris, F. H., & Galea, S. (2010). Measuring Capacities for Community Resilience. *Social Indicators Research, 99*(2), 227-247. doi:10.1007/s11205-010-9576-9