

A Systematic Review of the Fragile City Concept

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ABSTRACT: Today, cities have become one of the most complicated systems, which may become fragile when not managed appropriately. In order to prevent fragility, cities should respond more quickly and effectively to complicated threats, which requires an accurate understanding of the concept of fragility. In this regard, a systematic review was conducted based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) to understand the concept of urban fragility by electronic search using keywords combined with Boolean OR and AND operators in Google Scholar, ISI Web of Science, and Scopus. Based on the reviewed articles, the dimensions of urban fragility, including the economic, social, governmental, environmental, international relations, and economic, social, and political conditions of individuals, were identified for each component and indicator. Given the definition of fragility and its dimensions, the present study can provide an opportunity for identifying the causes of fragility in cities and providing some solutions.

Keywords: *Fragility; fragile state; fragile city; Fragility dimensions; fragility indicators; fragility elimination solutions.*

INTRODUCTION

Cities, like any complicated adaptive system, can become increasingly fragile if not managed appropriately. Defining a fragile city as an urban planning problem is a fundamental step in conceptualizing a new word that can be fully understood. This movement would be impossible without the discourse and conceptual use of fragility as an analytical tool for explaining why and how it is formed in cities. Understanding the fragility conditions is highly critical for developing effective response strategies. Cities, especially large ones, are one of humanity's most complex and interconnected systems. The governance of cities is nested within a broader governing structure in regional and national governments. Cities must manage threats due to governments' actions beyond their control (Selby & Desouza, 2019). Over half of the world's population lives in urban areas, and this figure is projected to increase to two-thirds in the next fifty years. The concentration of people, power, and wealth in cities creates many possibilities for tackling some of the world's most pressing problems (De Boer et al., 2016). Cities are on the frontline of key global challenges shaping the 21st century. From climate change to migration, inequality to pandemics,

and criminal violence to war and terrorism. Given demographic trends, cities are likely to come under increasing pressure. Only very few of them are adequately equipped with the tools to deal with the threats they will almost certainly encounter (De Boer et al., 2016). Security to remain alive. Without the attainment of these basic requirements, cities can rapidly disintegrate (Bryceson, 2006). Rapid urbanization and growing megacities point to a need for smarter and more resilient cities that possess the capacity to withstand the shocks of population growth, world economic crises, rapid demographic shifts in population, and environmental catastrophes (Muggah, 2015b); (Desouza & Flanery, 2013). Future population growth will concentrate primarily in lower- and middle-income countries, especially in large and mid-sized fragile cities. This expansion is giving rise to sprawling cities and slums (Muggah, 2014b). Contrary to previous historical processes that enhanced opportunities, welfare, and security for new city dwellers, current urbanization in developing countries exposes the poor to a plethora of hazards, forcing them to live under permanent conditions of high risk and vulnerability (Nogueira, 2017). As the world continues to urbanize, natural disasters, economic

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shocks, and outbreaks of violence will increasingly affect populations in cities, potentially making cities more fragile. Sitting on the frontline of global emergencies, cities are actively searching for ways to cope, adapt, and bounce back (Bosetti et al., 2016). Urban centers are transforming interactions in the nearest communities throughout the world. They create new opportunities but have new challenges. Despite the unprecedented rate of urbanization, cities are becoming the center of global poverty, conflict, and vulnerability to global disasters, especially when they are located in a fragile state (Harroff-Tavel, 2010). As the UN High Commissioners have stated on the Post-2015 Development Plan, "Cities are the places where they either win or lose the battle for development" (Panel, 2013). From "natural disasters" causing large-scale destruction, to slow-onset crises such as droughts, through to conflict and persecution, increasingly found in urban contexts (Archer & Dodman, 2017). Urbanization has also brought new challenges in conflict, violence, and urban governance – and citizen security in particular (Muggah & Savage, 2012). More than 1.5 billion people live in chronic fragility, and instability conditions and this number is increasing. However, the maximum fragility is concentrated in urban centers in developing countries. Such cities include half of the population in the world and are expected to attract almost all of the new population growth during the next 25 years (Habitat, 2011). Individual risks such as the unsustainable speed of unexpected urbanization, climate change, or conflict cannot be considered a risk because these hazards create many more risks and cause some challenges for national and local authorities (Muggah, 2016c). Fragility is a particular challenge as an obstacle to sustainable development, equitable growth and peace, regional instability, global security risks, uncontrolled migration flows, and so on. While the world's cities cover just 2% of the earth's surface, they account for 55% of its population. Notwithstanding rising expectations of our cities, a surprising number of them are fragile – posing a threat not just to their residents, but to nations and the global system itself (Muggah, 2017). By considering the above-mentioned issues, it is necessary to clearly define the concept of fragility and identify its dimensions so that effective solutions can be adopted for eliminating fragility. Accordingly, this study aimed to create a conceptual framework of fragility based on an extensive review in the current literature to fully understand the concept and prepare some strategies and programs for improving urban planning and management against the risks which can affect city performance leading to urban fragility. In addition, this study sought to find the dimensions and indicators of a fragile city, as well as identifying and describing the main features of fragility to provide some solutions and suggestions for eliminating and reducing fragility to improve the quality of life. The remainder of this paper is as follows: Section 2 briefly describes the method used in this study. Section 3 presents various definitions of fragile city, its dimensions, and

indicators; Then, many solutions are provided based on the analyzed articles to eliminate fragility. Finally, the conclusions and suggestions for future research are presented in Section 4.

MATERIALS AND METHODS

The present study examined the recent literature on fragility based on Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) (Moher et al., 2015) (Moher et al., 2009). This method includes four steps: Searching based on online databases, Screening process, Accessing selected articles, summarizing the related articles. In the first step, three comprehensive databases were used as the primary sources of literature, including Google Scholar, Web of Science, and Scopus, to obtain the relevant articles for this study. In this regard, the keywords ("fragile city" OR "city fragile" OR "urban fragile" OR "fragile urban" OR "fragility") AND ("urban" OR "city" OR "state") were searched in the title and keywords sections in the above-mentioned scientific databases. In addition to the identified articles through database searches, the Google search engine was used as a source to define specific terms related to the subject for achieving the organizations working in this area. Furthermore, the gray literature related to this study was used as another source of information, including conference proceedings, reports, websites, and policy documents. Terms: (FFP The Fund for Peace; Fragility Association, New Deal, Asian Development Bank, G7 +, CPIA, IFAD) and (Fragile City; Fragile Status; Fragility) were used as search keywords to find a total of 722 articles. Although this study aimed to discuss the case studies of fragility at the city level, the examples are scarce at the city level. Thus, the studies conducted on a regional or national scale were added to this study provided that their information is in line with this study. In the second step and the article screening step, 320 articles were selected from the results of the most relevant articles containing the term "fragile city" and its derivatives to identify a manageable subset of such articles. A wide range of information indicates the need to define this term and identify its dimensions. In other words, fragile cities and the causes of fragility should be identified to eliminate the cases. By reviewing the term "fragility," a wide range of its dimensions and indicators were identified with the general goal of achieving strategies to deal with fragility. In addition, the resources which were classified in thematic areas other than the studied resources were excluded from this study. After obtaining the complete file of articles, the process continued by reading the keywords, summaries, and conclusions of each article and scanning the content to ensure whether they are relevant to the proposed study or not. A number of 115 articles, even though their titles include the words of this study, were excluded from the list of resources due to inconsistency in terms of content with other articles and belonging to other fields of science such as war and violence art, scholarship. Due to this process, 165 articles were selected on fragile cities and fragility, of which

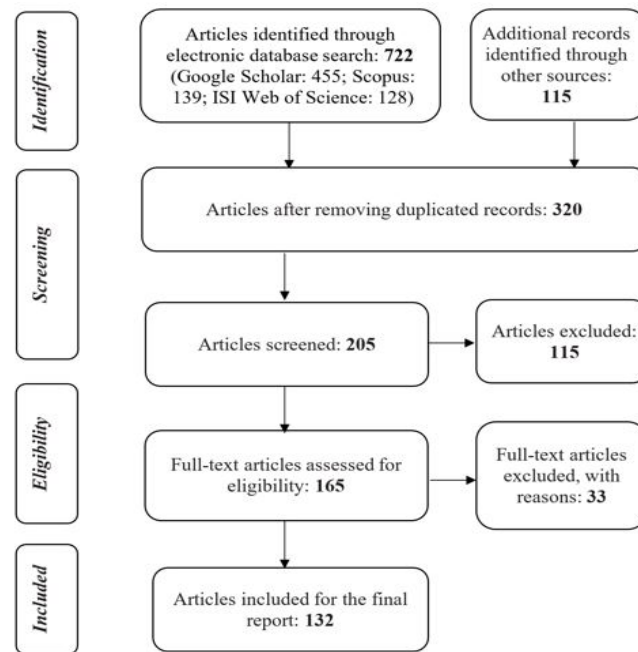


Fig. 1: Review selection process and results based on the PRISMA guidelines.

33 were excluded since studying their fragility was not in the scope of this study. Finally, 132 articles were analyzed by the meta-analysis method as the case studies of this study. Finally, the following items were analyzed to categorize the content for each article: (a) What kind of fragility is discussed? (b) Are the definitions and dimensions of fragility examined in the study? (c) What is the spatial unit and scale used in the study? Fig.1 displays the systematic process of selecting the studied articles.

RESULTS AND DISCUSSION

Definitions of Fragile City

The concept of fragility began in global policy-making in the early millennium (Balthasar, 2019). It emerged as a tool to describe the government's vulnerability in the late 1990s and early 2000s in security policy and development (Muggah & Jutersonke, 2012). Over the past two decades, the concept of government fragility has evolved and become a pervasive concept. If we look at the different definitions available, limited institutional capacity and poor governance are evident as the leading causes of fragility (ICM, 2015). However, this concept was also criticized. Criticism of the concept of fragile governments first emerged in mid-2010 in response to the growing use of the term (Nay, 2013). Also, some writers, including Pourza, considered the lack of deep knowledge of local realities as a weakness of this concept (Pureza 2005). Accordingly, progress is needed in understanding local institutions and the causes of conflicts and how such processes are manifested at the local level. Today, writers are trying to understand urban fragility and its relationship with the fragility

of the state. It is important to note that a critique of a fragile state helps explain the emergence of the concept of a fragile city. A country that is effective in part of its territory may be unable to provide public services in other areas; Therefore, it is vital to study the fragility at the scale of cities or specific areas within cities. The concept of fragility can describe a broader range of different forms of fragility (Miklos & Paoliello, 2017). Now, due to the complexity of this concept, the authors have provided different definitions of fragile cities, which are presented separately in Table 1.

Dimensions and Indicators of Fragility

As mentioned in the previous discussions, fragility is defined as a combination of risk factors. All of these factors should be identified, and some measures should be taken to eliminate each of them. In this regard, six dimensions of fragility were identified after reviewing the selected articles as follows:

Economic Dimension. Economic fragility is vulnerability to risks stemming from economic foundations and human capital weaknesses, including macroeconomic shocks, unequal growth, and high youth unemployment (Abel et al., 2016). The economic dimension evaluates the government's overall performance in managing economic aspects, including economic management, opportunities, and structural policies. Failing in the economic dimension can compromise stability by undermining a country's income and long-term development prospects (Safran & Sugiyarto, 2014). Large and growing economic inequalities, economic capture of the state by a small group, or the inability of the society to provide jobs, particularly

Table 1: Definitions of Fragile City

Author(s)	Fragile City Definitions of
(ICM, 2015)	More recently, cities have emerged as a new category of fragility in the security and development landscape. With unprecedentedly fast urbanization rates, cities are becoming the focal point of global poverty, conflict, and vulnerability to disasters-particularly when situated within a fragile state. Urban fragility can be seen as how the urban systems are susceptible to damage incurred by shocks, including infrastructure and ecological systems and social, economic, and political systems.
(Muggah, 2014a)	The concept of fragile cities is relatively new, and much less effort has gone into developing an understanding of them. Etiologically, it emerges from thinking by scholars such as Zartman and others in the 1990s on collapsed, failing, and failed states. Leading cities continue to face a wide array of evolving issues that are fracturing social compacts. When these fractures are unresolved, they accumulate in the city, causing fragility. Also, fragility in leading cities can expose other cities to fragility. Not all fragile states give rise to fragile cities. Nor are fragile cities geographically confined to fragile and conflict-affected states. Indeed, many cities exhibit all the hallmarks of instability in what is considered in the vernacular as middle- and even high-income settings. The fragile city is a discrete metropolitan unit whose governance arrangements exhibit a declining ability and willingness to deliver on the social contract. In most cases, cities become fragile due to profound disequilibrium and ruptures in the social contracts that bind city governments and citizens.
(Muggah, 2015b)	A city experiences fragility when it cannot fulfill its core functions due to internal and external risks. Risks can be political, social, economic, and environmental. Political, social, economic, and environmental.
Okeke, Eziyi, Udeh.) (& Ezema, 2020)	The review of the existing literature indicates that there is no internationally agreed definition of fragility in an urban context or a fragile state. However, the concept has been evolving throughout the last two decades through research and practice with added factors and levels of analysis to become an all-encompassing and hyper-aggregated concept.
(Fassin, 2011)	The responses articulated by humanitarian organizations for the so-called fragile cities in Latin America constitute part of the broader phenomenon of the development of a 'humanitarian government.'
Miklos & Paoliello, (2017)	The concept of the fragile city unfolds from the notion of the fragile state. From this research concern, authors have sought to establish the nexus between state fragility and urban environments. Therefore, the notion of what constitutes urban fragility and the development of the concept of a fragile city should be understood from the starting point of the development of the idea of the fragile state. The concept of a 'fragile city' is a new and relevant analytical framework for understanding contemporary urban violence and inequality. The notion of a fragile city emerges to describe new emergencies more closely linked to urban contexts than national dynamics, as previously described in the literature on fragile states. One of the central points of the parallelism between urban fragility and state fragility revolves around the erosion of authority. The concept of the fragile city helps to reveal how poverty, inequality, and violence have profound and perverse human consequences in developing urban settings.
Selby & Desouza, (2019)	Urban fragility accumulates unresolved fractures to the social compact that strains a city's ability to function normally over time and especially under stress. Fractures are due to a failure of either the government or members of the city to uphold their part of a social compact. Fractures can range from crime between individuals to broad sweeping issues for a city. At any given time, cities will experience some fragility due to the inability to resolve all fractures. However, the level of fragility and its impacts on a city is a function of a government's policies and the performance of its administrative units. Fractures tend to be small at first, and even when they develop, they are often ignored. Minor fractures tend to accrue inside the city, and the cities' complexity hides fragility from policymakers. If fragility continues to grow, the city will eventually break. Without addressing fragility, attempts to improve resilience are akin to building a wall without a solid foundation.
(Muggah, 2016b)	City fragility occurs when municipal authorities and their institutions are unable or unwilling to deliver essential services to urban residents (Muggah, 2015a). It is triggered by the rupture of a municipal region's social contract. Cities become fragile when their institutions' legitimacy, authority, and capacity can no longer adequately fulfill core functions such as guaranteeing security and safety for citizens, property and infrastructure, access to water, electricity, and sanitation, and the preservation of fundamental norms and rights. Cities can no longer sustain public goods in such situations, and citizens resort to their own devices to satisfy their needs and preferences.
(Nogueira, 2017)	Fragile urban spaces lack effective governance, infrastructure, and services.
(Weforum, 2016b)	Urban fragility occurs at the intersection of poverty, weak governance, violence, and disaster. Whether national, sub-national, or municipal scale, the fragility results from an accumulation of risks. As a process, fragility occurs when local institutions are unable to cope with and adapt to stress. Fragility can occur rapidly in the wake of armed conflict or natural disaster. It can also emerge incrementally, expressed in the deterioration of governance, services, depletion of natural resources, and overall safety and security. Often these long-term stresses can aggravate the impact of a sudden shock.
Villanueva, Cobián, & (Rodríguez, 2018)	Fragility is also an urban condition that renders a city's population and infrastructure vulnerable to extreme weather events, speculative investment practices, and unstable global financial markets.
(Muggah, 2016c)	All cities are fragile. The intensity of their fragility, however, varies considerably across time and space. Some cities are affected by acute fragility and are close to collapse. Fragility occurs when city authorities are unable or unwilling to deliver essential services to citizens. It is triggered by a rupture of a city's social contract. An accumulation of risks conditions the intensity of fragility. City fragility also does not restrict to poor developing countries and countries wracked by armed conflict. It is not necessarily the largest cities that are most susceptible to fragility. Instead, it is smaller- and medium-sized cities that are most at risk. However, the fastest-growing cities are especially vulnerable to fragility.

Continuie of Table 1: Definitions of Fragile City

Author(s)	Fragile City Definitions of
Pellegata & Memoli.) (2016)	The cause and impact of complex social and economic problems in developed cities are often hidden because of their complexity. Also, fragility in developed cities due to their interconnected nature can potentially cause fractures in surrounding cities.
(Muggah, 2013a)	The massive demographic shift is giving rise to the fragile city. Some of them, particularly those located in lower- and middle-income settings, are identified as prone to epidemic rates of violence. There is mounting evidence to back these claims. Fragility is no longer confined exclusively to nation-states but instead extends to their capitals and outlying metropolitan regions. The international security and development optics are scaling down to account for violent cities and neighborhoods in which public authorities and civic actors are unable or unwilling to deliver basic public services and cannot fulfill their essential function of providing security, welfare, and legitimate representation. cities facing rapid population growth are more predisposed to fragility.
(Norton, 2003)	The fragile city is the loss of the ability to maintain the rule of law.
(CHAWLA, 2017)	The fragile city is characterized by poor governance and limited capacity to provide residents with essential services and infrastructure.
Muggah & Savage.) (2012)	The fragile city is a concept that Savage and Muggah define as “discrete metropolitan units” whose governing arrangements can execute declining social contracts. The emergence of fragile cities as a category suggests that the referent of international attention is correspondingly expanding. That is, fragility is no longer confined exclusively to the domain of states but is extending to their capitals and outlying metropolitan regions. The international security and development optics are scaling outwards to account for chronically violent and ungovernable cities and neighborhoods in which public authorities and civic actors have lost control, are unable or unwilling to deliver basic public services, and cannot fulfill their essential function of providing security, welfare, and legitimate representation
(De Boer et al., 2016)	Fragility is the accumulation of risks combined with the lack of capacity to cope with these, often interlocking, risks. When governments and city authorities fail to deliver their core functions, urban institutions’ legitimacy erodes and is fragile.
Koonings & Kruijt.) (2007)	A fragile city is a Syndrome of Poverty, Inequality, and Urban Social Disruption.
Baker & Scheye.) (2007)	Cities in fragile states suffer from severe resource scarcity, while developed cities rarely experience such fragility. Even when sources of fragility affect both types of cities, the way fragility plays out is different in the context of a developed city.
(Muggah, 2014b)	Notwithstanding their many virtues, there are also a great many risks facing the world’s fastest-growing cities. These cities are, in the vernacular, “failing.” They fail to deliver services, ensure adequate governance or integrate into global finance, services, migration, or otherwise. While still not adequately defined, fragile cities bear many hallmarks of so-called “fragile” and “failed” states. They exhibit fatal ruptures in the social contract binding urban elites with city residents at the most general level. Urban authorities are either unable or unwilling to deliver essential services or consolidate a monopoly over the legitimate use of force in such settings.
(Raleigh, 2015)	“Fragile cities” are emerging as a new category of societal disorder.
(Muggah, 2013b)	The Fragile city could be identified as a source of local, national, regional, and global insecurity. Consequently, it could be an entity that arouses the interest of the international community. The logical consequence of such a process is that the city consolidates itself as a new frontier in the measures of international intervention.
Beall, Goodfellow, &) (Rodgers, 2013)	Although fragile cities appear to be in a separate category, some scholars also point toward continuity between state and urban fragility
(De Boer, 2015a)	The extent to which cities in fragile and conflict-affected contexts can be catalysts for sustainable development will depend on two key factors: (1) the degree of exposure and susceptibility to risks that can derail growth (major disasters, extreme violence, disease epidemics, political instability, and extreme poverty), combined with (2) the degree to which their governments, institutions, and residents develop coping and adaptive capacities to mitigate and reduce these risks.
(Mosaic, 2018)	As mentioned, rapid urbanization leads to fragile cities. However, most cities worldwide attempt to eliminate this problem, while many have not been successful. Such cities are enormous horizontal informal slums being grown on the outskirts. Fragile cities are the places that are growing very fast and have poor infrastructure, and often the government is inefficient in such cities.
Muggah & Juter-) (sonke, 2012)	The term “fragile cities” has been used for describing chronic violent cities where government officials have lost control and cannot provide public, security, or agency services.
(Commins, 2011)	An urban fragility is a form of state fragility—a context of deteriorating governance and prolonged political crisis or conflict—with a locus in urban areas. Fragile governments lack the will or capacity to deliver essential services and provide security for their citizens.
(Muggah, 2017)	Fragility occurs when the social contract – the pact between municipal rulers and ruled – breaks down. Frailty deepens when city institutions cannot provide minimum public goods – law and order, essential services, resilience to the sudden onset or long-term climate change. It is not a permanent condition – cities routinely enter and exit fragility – but when risks accumulate, cities and city networks can collapse altogether.

Continuie of Table 1: Definitions of Fragile City

Author(s)	Fragile City Definitions of
(McLoughlin, 2016)	Cities are increasingly considered constitutive of state fragility and essential sites for state reconstruction and development. Historically the relationship between cities and states has been recognized as necessary. City development and the growth of urban systems have played significant roles in state formation and transformation. However, cities can develop relative autonomy from states, mainly when they are ignored or bypassed by state resources and processes, with risks for state stability. Ignoring the interests of the majority of urban citizens can increase the potential for urban conflict. Equally, state crisis and conflict can fuel urban conflict, further weakening state capacity and legitimacy.
(Okeke et al., 2020)	The fragile city is at the epicenter of vulnerability. The three vices of urban poverty, violence, and disaster within the city fabrics will play a dominant role in an unstable setting and impact fragility. Fragile cities represent some of the poorest, most violent, and most disaster-prone countries in the world.

for youth, are prominent economic drivers (Kaberuka, 2015). Economic indicators evaluate the ability of a country to provide a sustainable economic environment for its citizens, facilitating sustainable and fair growth (Grävingholt et al., 2012).

Social Dimension. Societal fragility is vulnerability to risks affecting societal cohesion stemming from vertical and horizontal inequalities, including inequality among culturally defined or constructed groups and social cleavages. Risk indicators include income inequalities (vertical) and social inequalities related to gender, growth in urbanization, and numbers of displaced people. Important societal coping-capacity variables include the robustness of civil society, the extent to which citizens have access to justice to address grievances and a voice, and state-society accountability (Abel et al., 2016). At the core of social drivers of fragility is a demand by individuals or groups for inclusion and access to services, resources, opportunities, rights, or identity that lead to grievances, social tensions, rebellions, and violence (Kaberuka, 2015). The indicators in the field of social welfare provide the

basic human needs of citizens, including nutrition, health, education, and access to clean water (Grävingholt et al., 2012). **State and Institutional Dimension.** State dimension reflects critical factors defining the state. In this context, state fragility is analyzed regarding the state’s authority, legitimacy, capacity, and effectiveness (ALC). The state dimension reflects challenges in the state’s legitimacy and authority and the government’s effectiveness and capacity to deliver essential services (Safran & Sugiyarto, 2014). Authority failures: the state lacks the authority to protect its citizens from violence of various kinds. Capacity failures: the state fails to ensure that all citizens have access to essential services. Legitimacy failures: the state lacks legitimacy, enjoys only limited support among the people, and is typically not democratic (Stewart & Brown, 2010).

Environmental Dimensions. Environmental fragility is vulnerability to environmental, climatic, and health risks that affect citizens’ lives and livelihoods. Risk factors can be external or internal, including exposure to natural disasters,

Table 2: Dimensions, Factors, and Indicators of Fragility

Author(s)	Indicators	Factors	Dimensions
(Safran & Sugiyarto, 2014); (Abel et al., 2016); (Kaberuka, 2015); (Rice & Patrick, 2008); (Grävingholt et al., 2012); (Selby & Desouza, 2019); (Rocha De Siqueira, 2014); (Bosetti et al., 2016); (Bosetti et al., 2016); (Marshall & Cole, 2013); (Rice & Patrick, 2008); (Rotberg, 2010); (McLoughlin, 2016); (OECD, 2015); (OECD, 2010); Weforum, 2015; (De Boer, 2016); (DFID, 2005); (Muggah, 2016b); (ICM, 2015); (Grävingholt, Ziaja, & Kreibaum, 2015); (Ganson & Wennmann, 2018); (Selby & Desouza, 2019); (Bosetti et al., 2016); (CHAWLA, 2017); (De Boer et al., 2016); (Kruijt, 2007); (Laniran, 2018); (Arimah, 2010); (Raleigh, 2015); (Siegle, 2011) (Mosaic, 2018) (Weforum, 2016a) (FSI, 2017) (Ivleva, 2019) (Muggah, 2016a)	GDP (PPP) per capita (Measures a country’s wealth level considering economic development level and population size, as well as an approximation of per capita income); a 5-year average growth rate of real GDP per capita (Shows a country’s capability to grow to a higher income level); Trade as % of GDP (trade openness).	Severe economic downturn	Economic
	Percentage of male residents in full-time employment; Percentage of unemployment in cities	Unemployment	
	Gini coefficients	Income inequality	
	The proportion of population below the poverty line	Centralized urban poverty	
	Regulatory quality (Captures a perception of state ability to formulate and implement comprehensive policies and regulations to promote private sector (development	financial corruption	
		Large-scale investment	
	5-year average annual inflation rate (Shows how a country manages its overall price stability as part of overall stability); Price increase	Sudden economic shocks	

Continuie of Table 2: Dimensions, Factors, and Indicators of Fragility

Author(s)	Indicators	Factors	Dimensions
(Abel et al., 2016); (Kaberuka, 2015); (Rice & Patrick, 2008); (Selby & Desouza, 2019); (Bosetti et al., 2016); (Marshall & Cole, 2013); (Mcloughlin, 2016); (Ganson & Wennmann, 2018); (Muggah, 2014a); (Beall, Goodfellow, & Rodgers, 2011); (CHAWLA, 2017); (Beall et al., 2013); (Muggah, 2013a); (Nogueira, 2017); (Beall, 2007); (Muggah & Savage, 2012); (Miklos & Paoliello, 2017); (Abhyankar, Paliwal, Patwardhan, & Inamdar, 2013); (Muggah, 2012); (Muggah & Jutersonke, 2012); (Archer & Dodman, 2017); (Raleigh, 2015); (Raleigh, 2015); (OECD, 2012); (Rodgers, 2010); (Commins, 2011); (Safran & Sugiyarto, 2014); (Grävingsholt et al., 2015); (De Boer, 2015b); (McAuliffe & Ruhs, 2017); (Cattaneo & Peri, 2015); (FDFA, 2007); (UnitedNations, 2016); (Habitat, 2016); (Landry & Burke, 2014); (Toly & Tabory, 2016); (De Boer et al., 2016); (ICM, 2015); (Okeke et al., 2020); (Kaplan, 2014); (Kaberuka, 2015); (Rice & Patrick, 2008); (Abhyankar et al., 2013); (Ivleva, 2019); (Weforum, 2016b); (Vivekananda, 2020) (Muggah, 2016a); (FSI, 2017); (Muggah, 2017); (Demographia, 2020)	Ethnic or religious conflicts	Ethnic heterogeneity	Social
	Net migration rate (per 1,000 population)	Chronic and sustained migration	
	The extent of violent conflict; Rate of premeditated murder; Organized crime; Rebellion.	Urban violence	
	Size of informal settlements as a proportion (%) of the city area	informal settlements	
	Population growth (%) over ten years	Rapid and Unregulated Urbanization	
	class divisions	Social rupture	
(Safran & Sugiyarto, 2014) (Stewart & Brown, 2010) (Grävingsholt et al., 2012) (USAID, 2005) (Carment et al., 2010) (Grävingsholt et al., 2015) (Stewart & Brown, 2010) (Call, 2011) (Carment et al., 2015) (Bosetti et al., 2016) (Abel et al., 2016) (Kaberuka, 2015) (Rice & Patrick, 2008) (Selby & Desouza, 2019) (Rocha De Siqueira, 2014) (Marshall & Cole, 2013) (Rotberg, 2010) (Mcloughlin, 2016) (Ganson & Wennmann, 2018) (OECD, 2015) (Safran & Sugiyarto, 2014a) (Collier, 2019) (Muggah, 2014a) (Beall, 2007) (Commins, 2011) (De Boer et al., 2016) (Vivekananda, 2020) (FSI, 2017)	Violence; Murder; Organized crime; Riot; Horizontal political inequalities; Poor security device (Policing and judicial presence, Public confidence in local police forces and judicial systems Policing and Justice Deficits); Real and Perceived Insecurity (City homicide rates per 100,000 residents)	Authority: Includes items that the state lacks the authority to protect its citizens from violence of various kinds.	State and Institutional
	Access to health services; primary education; Basic transportation and energy infrastructure; General Hygiene; Lack of essential services; Road density as km of road per 100,000 populations (Measures access to the road as part of basic service); Life expectancy, at birth (year); Improved water source; the Mortality rate of children under age 5 per 1,000 live births;	Capacity: Includes items that the state fails to ensure that all citizens have access to essential services.	
	Suppression; Political assassination; Percentage of voters; The extent of military domination; Lack of democratic structures; Government press control (Freedom of the Press indicator); High rate of corruption; Arbitrary suspension or enforcement of the law; Widespread human rights violations; The rise of factional elites; Intervention of foreign political factors; Ethnic or religious competition; Corrupt local governments; Institutional failure and urban management; Existence of criminal institutions; Instability; Interregional or regional tensions; Voice and accountability.	Legitimacy: Includes items that the state lacks legitimacy, enjoys only limited support among the people, and is typically not democratic.	

Continuie of Table 2: Dimensions, Factors, and Indicators of Fragility

Author(s)	Indicators	Factors	Dimensions
(De Boer et al., 2016) (Nogueira, 2017) (Abel et al., 2016) (Kaberuka, 2015) (Collier, 2019) (CHAWLA, 2017) (De Boer, 2015b) (Habitat, 2016) (Cattaneo & Peri, 2015) (Rüttinger, Smith, Stang, Tänzler, & Vivekananda, 2015) (OECD, 2015) (Vivekananda, 2020) (Muggah, 2016c)	The proportion of city population living in coastal flood plains; Proportion of city population affected by weather-related disasters; Economic losses as a percentage of city GDP and mortality losses from disasters as a percentage of the city population	Exposure to natural hazards	environmental
	Annual mean concentrations of air quality (particulate matter of fewer than 2.5 microns; CO2 emissions in metric tons per capita)	Air quality	
	Improved water source (% of the population with access to water)	healthy water	
		Proper hygiene	
		Epidemic	
	The total size of protected natural areas, including marine area, as a percentage of the national territory	The proportion of terrestrial and marine areas protected	
	Ozone depletion, annual pollution, toxic waste, acid rain, deforestation	Climate change	
(Okeke et al., 2020) (Mcloughlin, 2016) (ICT, 2020)		Inadequate distribution of security, development, and governance capacities	Economic, Social, and Political Conditions of Society
	Percentage of informal settlements concerning the total area of the city	Informal settlements	
	Mean years of schooling (of people aged 25 and over)	Education and school-age	
	Internet access rate, internet speed, and quality	Digital gap	
(Mcloughlin, 2016)	The extent of foreign interference in the internal affairs	Legacy of colonialism	International Relations
	International trade, the existence of multinational corporations	international political economy	
	Ozone depletion, annual pollution, toxic waste, acid rain, deforestation	climate change	
	food prices, Sanctions	global economic shocks	

air, water, sanitation quality, infectious disease prevalence, the number of uprooted people, and the vulnerability of household livelihoods. Climate change increases vulnerability to environmental risks in many fragile contexts. Risks are mitigated by coping capacities in a robust civil society, the strict rule of law and governance, and food security (Abel et al., 2016).

The Dimension of Economic, Social, and Political Conditions of Society. Urban fragility can be seen as how the urban systems are susceptible to damage incurred by shocks, including infrastructure and ecological systems and social, economic, and political systems. While some shocks, such as floods, can affect whole metropolitan areas, regardless of the affluence of its inhabitants, others, such as criminal violence or lack of public services, may impact more the poor and disadvantaged populations. Security, development, and governance capacity may not be uniformly distributed across urban areas. Therefore, there is a spatial dimension of urban fragility, as socio-economic and political conditions determine the degree of fragility experienced by each urban resident (Okeke et al., 2020).

The Dimension of International Relations. Although fragility is accepted as multi-causal and multi-dimensional in any given context, some analysts emphasize certain causal factors than others. International factors are one of these dimensions, including the legacy of colonialism, international political economy, climate change, and global economic shocks (including food prices) (Mcloughlin, 2016). Fragile areas sometimes suffer from fragility in several dimensions and different degrees, based on which the level of fragility in different areas is different. After reviewing the selected articles and identifying the dimensions, factors, and fragility indicators, Table 2 was adjusted

CONCLUSION

Today, the cities which invest in addressing key risks will grow more in the future. The cities which create plenty of public space invest in concentrated poverty areas, expand more predictable public transportation, strengthen the trustworthy police services and vulnerability mitigation programs, and reinforce the social networks are more resistant to shocks and stresses. The investments which reduce resilience, improve

security, and increase the capacity of officials and citizens to prepare and respond to disasters and violence make a city more resilient. Qualitative and quantitative studies should accompany any attempt to measure fragility among cities at the city level to understand better which city is vulnerable to what danger. In addition, comparable metrics and data sets for social cohesion, social networks, and government collaboration are required significantly.

Researchers should reexamine fragility to create fair, habitable, sustainable, and resilient cities. Cities can identify fragility and eliminate it based on priority. While continuing the urbanization process, the intervention in the fragility of social

contracts becomes more necessary. Cities continue to grow, and their complexity increases. Such complexity makes the city fragile and can lead to the potential loss of life and economic prosperity. The risk of fragility is severe due to unfulfilled obligations. While the increased level of violence, crime, fear, and insecurity in urban centers have drawn attention to the need for addressing urban fragility, it should be noted that these are the signs of fundamental problems. Accordingly, governments should include policies to reduce urban fragility in development planning and broader efforts to strengthen weak infrastructure and expand livelihoods. In addition, the effectiveness of initiatives for addressing urban fragility over time is highly

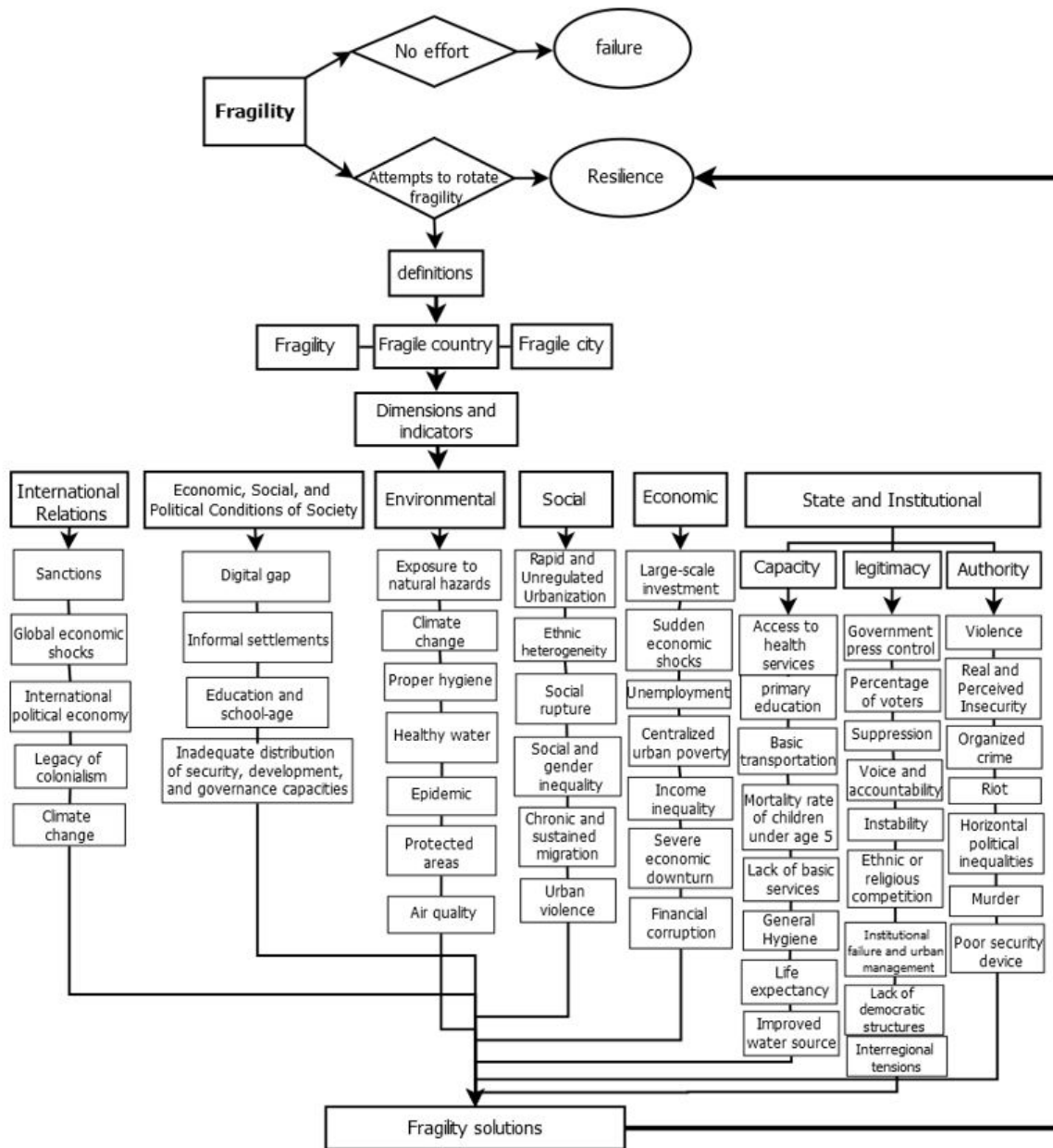


Fig. 2: Fragility Conceptual Framework.

essential. Approaching urban fragility as a security problem alone often leads to short-term tools, the major causes of insecurity and fragility. Significant shortcomings exist for addressing fragility in cities. This framework and related data visualization is a step in this direction. It is hoped that this source enables city officials and researchers to understand which city is more vulnerable to what risk and how to reduce critical risks and support protective measures (Fig. 2).

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