



## Scale, urban risk and adaptation capacity in neighborhoods of Latin American cities



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### A B S T R A C T

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 Informality  
 Latin America cities

While urbanites are vulnerable to a suite of risks that climate change might aggravate (e.g., mortality from extreme temperatures and property damages from floods), urban populations and decision makers may also be positioned to most effectively respond to such risks. Research is needed however, exploring both the multilevel factors and processes that determine urban risk and the complex pathways from hazards to impacts, and from perceptions and coping responses to adaptation. This paper analyzes whether and under what circumstances urban populations experience risk in selected Latin American neighborhoods of Bogotá, Buenos Aires, Mexico and Santiago; it assesses their adaptation capacity, i.e., ability to perceive and respond to hazards. It finds that urban risk depends on scale: hazards, adaptation capacities, responses and their underlying societal and physical drivers vary across urban households, neighborhoods and cities. Informality is a state of regulatory flux, where access to land and livelihood options cannot be fixed and mapped according to any prearranged sets of laws and planning mechanisms, that has a profound influence on risk and adaptation capacities across scales. For instance, informality becomes the site of considerable state power where some forms of growth in risk-prone areas enjoy state sanction while others are criminalized. The informal status becomes both a source of stigmatization that disempowers informal neighborhoods and a systemic determinant of lack of access to assets and options for adaptation capacity.

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### Introduction

In the current era of profound global environmental and demographic change urban populations may be more vulnerable to a suite of risks that climate change might aggravate such as mortality from extreme temperatures and property damages from floods. At the same time urban populations and decision makers may also be positioned to most effectively respond to such risks. Research is needed however, exploring both the multilevel factors and processes that determine urban risk and the complex pathways from

hazards to impacts, and from perceptions and coping responses to adaptation.

This paper addresses the gap by analyzing whether and under what circumstances urban populations experience risk in selected neighborhoods of Bogotá, Buenos Aires, Mexico and Santiago; and assessing their adaptation capacity, i.e., ability to perceive and respond to hazards. We first develop a framework to account for the multi- and cross-scale processes and determinants explaining patterns and variations in urban risk. We then describe the broader environmental and societal factors driving adaptation capacity – or conversely vulnerability – and risk in the study cities and neighborhoods and explore the risk perceptions of urban households and their capacity to respond to hazards. The paper closes with a discussion not only of how risk is created and perceived, but also of the opportunities and challenges to enhance adaptation capacity at the household, neighborhood and city scales.

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## Urban risk

### Key concepts

Although a risk-analysis framework has been widely used by scholars, risk is still characterized by inter-disciplinary differences in definition and scope as exemplified by the 25 definitions of risk (Thywissen, 2006). For example, risk can be defined as the likelihood of occurrence of a hazard; the possibility of loss, injury and other impacts; or the probability of the occurrence of an adverse event and the probable magnitude of its consequences (Shrader-Frechette, 1991). Although research on urban risk has grown notably in the last years, it is still dominated by narrow approaches, focusing for instance on how changes in one environmental hazard or combination of hazards (e.g., temperature extremes, air pollution, and precipitation extremes) relate to such outcomes (risk proxies) as mortality, morbidity and economic damage; and on how factors such as age and gender mediate the relationship between the hazard and the risk (O'Brien, Eriksen, et al., 2007; Romero Lankao, Qin, & Dickinson, 2012, Romero-Lankao, Qin, Hughes, Borbor-Cordova, & Haeffner, 2012). While physical hazards are important determinants of urban risk, it is critical that we begin to incorporate an understanding of how broader environmental processes – such as climate variability, climate change, and environmental change – contribute to the production of physical hazards. Social hazards can also contribute to the experience of urban risk. Previous research on urban risk has also often failed to account for the ways in which broader societal processes – such as economic growth, urbanization, and governance – help to shape differences in risk experienced by urban households and neighborhoods. Recently, some efforts have been undertaken to develop a more integrated and interdisciplinary understanding of how the dynamics and interactions between “environmental” and “societal” processes generate common patterns and differences in risk (Cardona et al., 2012; De Sherbinin, Schiller, & Pulsipher, 2007; Harlan et al., 2007; Romero-Lankao, Qin, & Borbor-Cordova, 2013). Risk is defined within these more integrated approaches as the possibility of loss, injury and other outcomes resulting from the combination of hazards and vulnerabilities or adaptation capacities of exposed populations; and incorporates an understanding of the broader societal and environmental processes that shape their experience of risk.

Building on these more integrated approaches, we conceive of urban risk as the outcome of exposure to hazards and the capacity to perceive and respond to these hazards (adaptation capacity). Hazards are probable or possible physical and social perturbations

and stresses to which urban populations are in contact with, or experience (i.e., *exposed to*). Hazards can be one-off extreme events of short duration (no more than a few minutes, hours or days), often striking with little warning. They can also be slow-onset events (e.g., increasing temperatures) as well as a range of subtle, ‘everyday threats’ that are the product of a variety of factors (e.g., urban heat-island). Hazards can result from physical processes (e.g., climate variability), from environmental degradation (e.g., landslides resulting from land use changes induced by urbanization), and from societal changes (e.g., unemployment due to economic turmoil) that affect the wellbeing, wealth, and feasibility of households’ livelihoods (Fig. 1). We define *adaptation capacity*, the second component of urban risk, as a population’s ability to perceive risk and to avoid or lessen the negative consequences of the multiple hazards they are exposed to, based on individual characteristics that can make household members sensitive (e.g., age), and household and neighborhood level access to resources, assets, and options such as education, income, house quality, infrastructure and services, and social capital (e.g., individual levels of social trust, participation in networks and family support) (Romero-Lankao et al., 2013). Risk is socially constructed and affects not only populations’ response capacity but also the hazards they are exposed to (Fig. 1).

While broader environmental processes such as climate variability, climate change, and environmental change are having (and will continue to have) an effect on the extent and location of physical hazards for urban areas, societal processes such as economic growth, urbanization, and governance have both direct and indirect effects on the extent to which urban households are able to effectively perceive and respond to hazards. This effect is mediated by neighborhood-scale factors such as informality, land use and territorial planning, employment options and access to infrastructure and services. The assets, options and actions at the household level are critical determinants of the capacity to perceive and respond to hazards, and can be affected by economic growth. For example, a family with a two level house may only have enough economic resources to move their belongings to the upper part of the house when faced with a flood (as happens in study neighborhoods in Buenos Aires), but this action is not as effective of a long-term response as flood protection infrastructure or urban policies strengthening the asset base of low-income groups can be.

The city-scale housing stock, urban form, condition of infrastructures and buildings and changes in urban and ecological services – all outcomes of political decision making and urbanization – also affect the capacity of populations to perceive and respond to hazards. The governance arrangements of a city, i.e., the

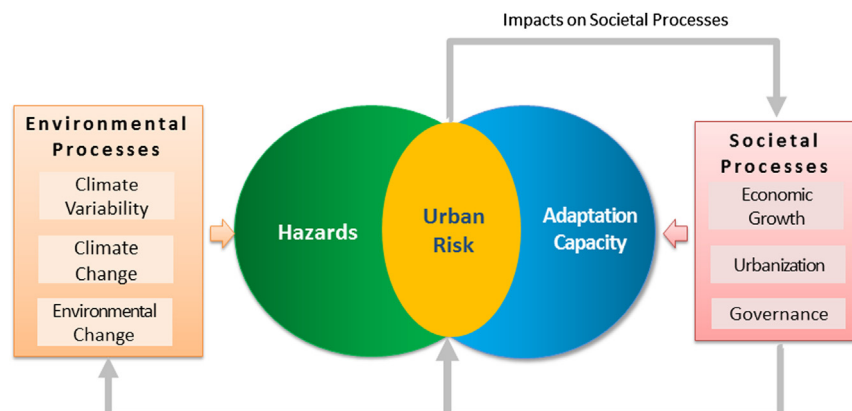


Fig. 1. Urban risk and adaptation capacity. Source: own based on (Field et al., 2012, pp. 65–108)

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