



# LINKAGES BETWEEN POPULATION DYNAMICS, URBANIZATION PROCESSES AND DISASTER RISKS: A REGIONAL VISION OF LATIN AMERICA



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## FOREWORD

Last year, the world population reached 7 billion people, more than 590 million of which live in our region. The population is expected to grow moderately over the next few years in Latin America and the Caribbean, amid tensions between economic growth, poverty reduction, and efforts to reduce existing inequalities between upper- and lower-income population groups. This moderate population growth will occur in the most urbanized region among developing regions, and its urbanization process will continue in the coming years.

Estimates suggest that urbanization will increase and that 90 million more people will be living in cities and 4 million fewer people in rural areas by 2025.

These changes in the population's spatial distribution will present a policy challenge as it will be necessary to plan adequate services for this growing urban population over the next 15 years, seeking to guide growth within a framework of sustainable development while minimizing environmental impacts.

Moreover, the impact of disasters caused by natural events has increased in recent years resulting in high costs in terms of human lives, infrastructure, people affected and economic, social and environmental losses. Regarding the risk of disasters, Latin America and the Caribbean exhibits a growing incidence of disasters over the past four decades and has the second highest annual average number of disasters after Asia.

Recognizing this reality, three United Nations agencies – the Population Fund (UNFPA), the United Nations Human Settlements Programme (UN-HABITAT) and the International Strategy for Disaster Reduction (UNISDR) – decided to join efforts and undertake a process of conceptualization and analysis of the linkages between population dynamics, urban development and disaster risk reduction in order to stimulate discussion and contribute to analysis in the region and dialogue in international forums such as Rio +20, Cairo 2014, among others.

The preparation of this document was entrusted to two renowned international experts, Dr. Rogelio Fernandez and Haris Sanahuja, and was subsequently discussed at a regional workshop attended by over thirty experts in population dynamics, urbanization and disaster risk reduction in the region.

Today, we are pleased to present this document as a first effort of reflection. We hope that it will help to promote dialogue and analysis on these issues and steer possible lines of action in order to modify the critical reality of the poor, a reality that combines precarious, unsustainable and highly disaster vulnerable urban settlements coupled with the effects of a changing climate.

The common challenge ahead is to ensure a coordinated response among different key stakeholders in countries, the international community and the United Nations system to contribute concretely and effectively to a paradigm shift in land occupation and use that accounts for the characteristics of population dynamics and contributes to the resilience of people and communities, while providing a hope for change for the most excluded and vulnerable today.

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This work emerges from the growing concern about the impact of disasters on the population and economy. The incidence of natural disasters has grown steadily in recent years, both globally and regionally, with events of enormous magnitude and impact. These disasters not only result in an immediate high cost in terms of human lives, affected population and economic losses, but the consequences can severely affect a population's quality of life for several years, in addition to a country's development processes and capacity for achieving the Millennium Development Goals. This has led governments in the region and the international community to intensify efforts to develop forward-looking, corrective and compensatory risk management strategies. At the same time, they look for more effective mechanisms to prevent and eventually better manage the impacts of disasters, whether hydrometeorologic, geodynamic or human-induced (anthropogenic). Therefore methodologies to anticipate new risks and reduce the vulnerability of at-risk communities (both people and goods) represent a major contribution to these efforts.

Based on size and location, people and their economic activity are a determinant of the socioeconomic and environmental impact of these disasters. Along with the magnitude and intensity of the event, the cause of the impact and effects of disasters define the readiness of governments and communities, expressed in the strategies and concrete actions for disaster risk reduction and adaptation to climate change. The population and its dynamics play a dual role. First, the level of exposure is determined by the volume and distribution in the at-risk areas at a given moment in time, combined with the vulnerability of the population. Moreover, the evolution of growth and its spatial distribution will determine the future conditions of exposure. Additionally, population, economic activities and consumption patterns lead to changes in climate that increase the frequency and magnitude of extreme weather events.

Thorough knowledge of the population's situation is, therefore, an essential input in designing corrective strategies and rapid responses. Moreover, demographic analysis contributes to the understanding of factors regulating population dynamics, its impact on population changes, and mechanisms that would modify or at least moderate demographic change. This knowledge enables, on the one hand, the building of scenarios to anticipate future levels of exposure and, therefore, guide land use plans and policy in order to mitigate risk. Furthermore, this knowledge provides the basis for developing climate change adaptation strategies. This paper seeks to further a better understanding of population dynamics, its various components and programme options as tools for shaping urban spaces that are less susceptible to various risks, particularly weather-related factors. The paper argues that, beyond the value of updated and disaggregated population data to guide corrective risk interventions and rapid response, the use of demographics can greatly contribute to the construction of prospective scenarios that help prevent and mitigate risk factors.



# LINKAGES BETWEEN POPULATION DYNAMICS, URBANIZATION PROCESSES AND DISASTER RISK



Photo: Tony Delaney





# 1. 1. BACKGROUND

## 1.1 Demographic evolution

In the history of mankind, the current rate of population growth has been a unique phenomenon, unseen until the second half of the twentieth century. Never before had processes of change occurred so rapidly and with such magnitude, and we do believe that they will repeat on this same scale. The human population has grown very slowly throughout history, with long periods of stagnation and even decline. The Agricultural Revolution (about 500 BC) was a classic period of sustained growth, followed by slow and oscillating expansion until the Industrial Revolution in the 18th century. Throughout this century, the annual growth rate remained slightly below 0.5 percent, and the first billion people mark was only reached at the beginning of the 19th century (around 1804)<sup>1</sup>. The growth rate increased slightly and remained at about 0.5 percent during the 19th century, reaching two billion in 1927. This second billion was accumulated in 127 years<sup>2</sup>. Since then, the population has grown by five billion more people: one billion in just over 11 years, from 1987 to 1999; another billion within just the following 12 years, when the world population reached 7 billion inhabitants around October 31 of this year. The highest overall growth rate (2.07 percent) occurred between 1965 and 1970. The current growth rate is 1.1 percent and is projected at 0.4 percent for 2050.



Photo: UNISDR/J. J. Trelles



Photo: UNICEF/Gonzalo Bell

1 United Nations Population Division, "Frequently Asked Questions – When has the world population reached or is expected to reach each successive billion?" World Population Prospects, the 2010 Revision, New York: <http://esa.un.org/wpp/other-information/faq.htm>, ultimo acceso el 28/10/11; and United Nations Population Division, "The World at Six Billion", <http://www.un.org/esa/population/publications/sixbillion/sixbillion.htm> ultimo acceso el 28/10/11

2 Hania Zlotnik 2009, Does Population Matters for Climate Change?, en Guzman, J.M. et al. (Ed.) "Population Dynamics and Climate Change", UNFPA y IIED, 2009.

## 1.2 Linkages between demographic change, urbanization and disaster risk

A change in the human presence and scale of activities such as the one observed in the last four decades will necessarily have significant effects on the environment and ecosystems. This change in the scale of human presence translates into increasing exposure and vulnerability to the impact of various natural hazards and, therefore, to increasing disaster risk and the magnitude of impact on human settlements and the economy. But this relationship is not static. The current situation is the result of past trends and processes that will define the profile of the future scenarios. Given this underlying dynamic, the relationship is expressed in two ways for each point in time.

**The first way is direct** because without interventions aimed at controlling and reducing risk, risk exposure increases as does the size of the population and its activities. The greater the number of people settled in an at-risk area, the higher the probability of human casualties as a result of climatic or geodynamic events. With respect to the volume of human activity, we refer to economic activities: production and consumption. Production is associated with investments, infrastructure and economic assets, which will determine the magnitude of value at risk. In turn, consumption determines the level of natural resource use and waste produced, which contribute to risk factors either by removing natural barriers that act as protection against the risks or, for example, blocking drains or other events that exacerbate the impact of natural phenomena.

**The second way is indirect**, through the effect that people and their activities have on the territory and its environment, including increased frequency and intensity of extreme weather events caused by **climate change**.

This is a process of gradual cumulative effects and of global reach. Its impact is not necessarily evident in the area where the activities that generate greenhouse gases (GHG), determinants of climate change, are carried out, but these impacts affect ecosystems worldwide.

Another relevant distinction in the interaction between population, urbanization and disasters caused by natural hazards, is associated with the time horizon. In the **short term**, the population can be considered a **constant factor** in terms of volume and location. The evolution of the population and its past activities have already taken effect and are incorporated into the current shape of the natural and built physical environment and the current location of the population, a result of past trends. Therefore, for any given moment, the population's volume and location, as well as activities and interaction with the natural and built physical environment are fixed and define a particular risk profile. This does not mean that risk management efforts can ignore population factors. The composition of the population, by age and sex, household structure and, other demographic variables are essential in defining the vulnerability profiles and formulating actions and plans to prevent and mitigate the impacts of disasters, as well as rehabilitation efforts in the affected areas.

In **the medium and long term**, population dynamics take on a very different meaning. Not only will the level and changes in the dynamics determine a new population volume, composition and distribution at each point in future risk planning and management, but the population volume, composition and distribution will play a very important role in the transformation of the natural and built physical environment, which will define the new risk profiles. Furthermore, through production and consumption patterns, population changes will affect the level and intensity of weather events and their effects on the human population and economy. Medium- and long-term scenarios are important in defining policies and programs to influence both population dynamics and prospective planning for climate change adaptation and mitigation and risk and vulnerability reduction. This paper places a major emphasis on the options and opportunities to influence population dynamics, recognizing their primary role in shaping future scenarios.





Photo: Eva Schuster

Population growth and activity have been widely recognized as global drivers of increasing vulnerability to disasters and are important elements in the treatment and analysis of risk settings. Almost all authors recognize that the population significantly influences climate change. By influencing climate change and its effects (heat waves, precipitation patterns, frequency and intensity of extreme weather events, etc.), population dynamics and activity affect risk patterns and the consequences of disaster. The size of the population, its activities and distribution determine the magnitude of both the economic and social impact of disasters. With regard to distribution, both population and economic activities have rapidly converged in urban areas in recent decades. As argued below, population growth has been concentrated mainly in the cities, globally and particularly in Latin America. The population/climate change

interaction, the distribution of human settlements and disaster risk patterns are therefore largely defined in the cities. It is therefore in the cities. As such, even the very first efforts to conceptualize and analyze the relationship between vulnerability to disasters and global dynamic processes, population growth and rapid urbanization were identified as root causes in the configuration of disaster risk, as shown in Figure 1 (Blaikie *et al.*, 1994)<sup>3</sup>. This notion of increasing vulnerability has emerged not only as a mere reflection of an increased number of people living in hazard-prone environments, but as processes that occur in a more general context of access to land and resources, where vulnerability to the impact of disasters furthers poverty, environmental degradation and poor governance. Disaster is, therefore, the realization of a pre-existing risk, and risk is a social dynamic in which people, institutions and public policy are crucial elements.

<sup>3</sup> Blaikie, et. al. 1994. *At Risk: natural hazards, people's vulnerability, and disasters*. Routledge.



## ***BOX 1: Definitions and Basic Concepts***

**-Adaptation to Climate Change:** Refers to the adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities. Various types of adaptation can be distinguished, including anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation.

**-Urban Areas:** Towns or settlements that have been defined as “urban” by the national statistical agencies.

**-Rate of natural increase:** Difference between the number of births and deaths in a given population.

**-Urban Growth:** Increase in the number of people living in cities, which can be measured in relative or absolute terms.

**-Population dynamics:** The concept of population dynamics refers to the drivers of population changes: changes in population size, rate of change in population size, population composition (by age and sex, basically, but the process of demographic change can also modify the composition of social groups as a result of differential dynamics).

**-Drivers of population dynamics:** Population dynamics is the result of interactions of a set of drivers. The main variables that determine population dynamics are mortality, fertility and migration. The birth rate is in turn affected by the levels of fertility (number of children per woman at the end of reproductive life), the age distribution of the population, marriage and the age pattern of onset of reproduction.

**-Corrective risk management:** Management activities aimed at reducing the levels of risk in society, which are the product of historical processes of land use, the promotion of production and the construction of infrastructure and buildings, among others.

**-Prospective risk management:** Management activities that address and seek to avoid the development of new disaster risks associated with new development processes and investments. This should be an integral component of development planning.

**-Mitigation of Climate Change:** Refers to the reduction of the rate and/or magnitude of climate change through reducing greenhouse gas emissions, which are associated with climate change. This concept differs from disaster risk mitigation, which refers to the implementation of measures aimed at reducing the adverse impact of natural hazards, generally divided into structural and nonstructural measures.

**-Reducing Disaster Risk:** The concept and practice of reducing disaster risks through systematic efforts to analyze and manage the causal factors of disasters, including through reduced exposure to hazards, lessened vulnerability of people and property, wise management of land and the environment, and improved preparedness for adverse events.

**-Urban Transition:** The transformation of a society from predominantly rural to predominantly urban.

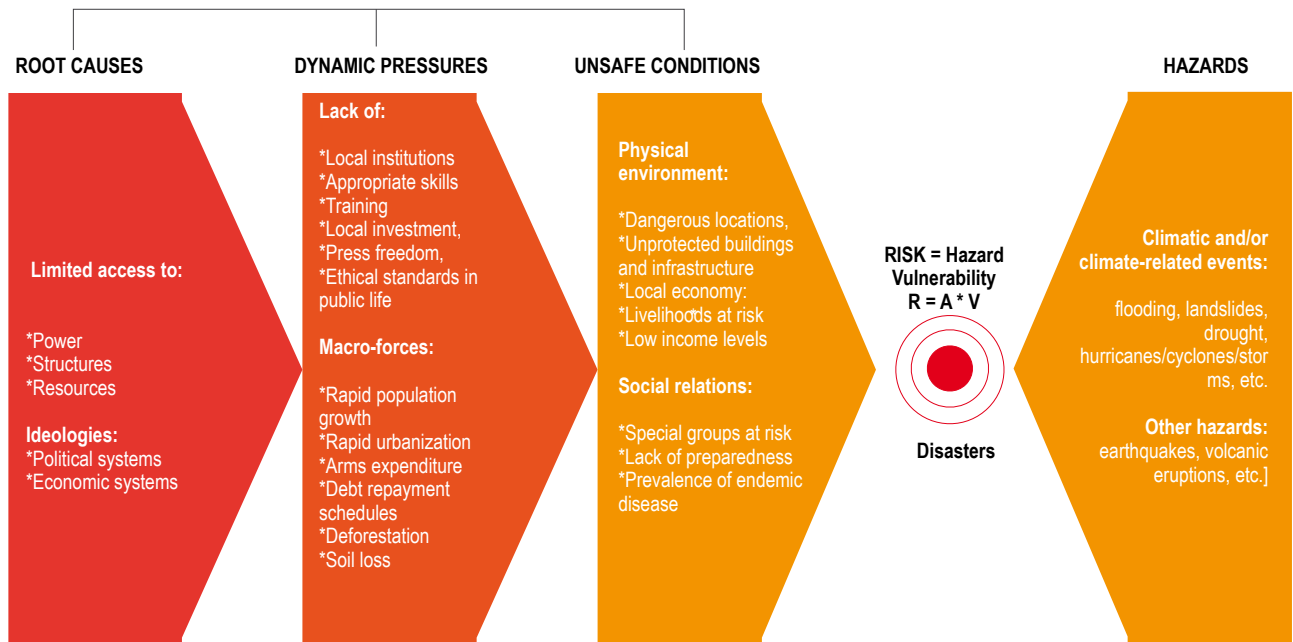
**-Urbanization:** The process of transition from a rural to a more urban society. Statistically, urbanization reflects an increasing proportion of the population living in settlements defined as urban, primarily through net rural to urban migration. The level of urbanization is the percentage of the total population living in towns and cities while the rate of urbanization is the rate at which it grows.

### 1.3 Current methodological treatment of the linkages between demographic change, urbanization and disaster risk

Despite this recognition, demographic factors have not always been appropriately integrated into the analyses of climate change and its effect on disaster risk and impact, although there are some positive experiences. Probably, the greatest weakness lies in the often static approach used to address these linkages. In general, population issues are considered in the diagnostic phase, but very little is done in terms of its evolution and even less in terms of a dynamic mainstreaming, as the changes and trends are rarely considered in prospective plans<sup>4</sup>. For the most part, references to population issues focus on size and speed of growth, while population policies mainly sought to impact growth. These factors are relevant, but not necessarily the most important, let alone if considered in the short to medium term. Policies and programs can achieve only limited changes in population size in a period of ten years. However, it is essential to plan immediate actions to influence both risk management and demographic trends, which will play a crucial role in the future. Concerning risk, risk management agencies and policy makers should address

present and immediate hazards. Concerns raised by the plans and future development should never be a cause for inaction against the specific risks of the moment. As for demographic trends, although the demographic change is a gradual phenomenon that develops over time, *interventions* must be raised *today* to establish the foundations for impact on growth rates and land occupation trends and how those spaces can be prepared to accommodate new settlements. It is therefore essential that appropriate policy and planning decisions be made on a sound basis, avoiding inconsistent perceptions and prejudices, and applied in a systematic manner in the coming decades. The challenge is to ensure that current initiatives do not simply treat immediate issues. The bases to be established today may be a stumbling block to adapt to possible situations within 10 or 20 years resulting from current trends. Therefore, interventions should be part of a comprehensive and dynamic vision that enables the prevention of risk situations in the future and pave the way for safer scenarios in the medium and long term.

Figure 1. Pressure and Release Model (PAR)



Source: adaptado de "Presión y Liberación de los Desastres, Blaikie, P.

4 Even in the area of Climate Change, where more progress has been achieved, the development of climate change scenarios (focusing on the physical aspects of the problem) is much more advanced than socioeconomic and population scenarios.

## 1.4 Expected demographic evolution and consequences

Almost all current and future population growth worldwide in the coming decades will occur in countries with a relatively low contribution to greenhouse gas emissions, as is the case of most countries in Latin America and the Caribbean, which together contribute less than 6 percent of world emissions<sup>5</sup>. The impact of population growth on emissions is mediated by the level and nature of human activities and consumption. This explains why some authors prefer to use the concept of “consumers” rather than population<sup>6</sup>. However, the size of the population should not be viewed as irrelevant. From the standpoint of mitigation and adaptation to climate change, as well as from the perspective of disaster risk reduction, the current population size and potential growth should not be dismissed. The current patterns of resource consumption and use in lesser developed countries will not remain constant, although it does not appear likely that the transformation processes in the coming decades similar to those observed in China in recent decades. Therefore, it seems that the focus in Latin America should be on the challenges to sustainable development (see **Box 2**).

### *BOX 2: Articulation of Risk Management and Adaptation to Climate Change*

It is commonly accepted that the approaches and tools developed in recent decades for climate risk management can inform more recent efforts to adapt to climate change. The Hyogo Framework for Action, which is the main roadmap adopted by 168 countries to guide disaster risk reduction efforts, explicitly identifies the need to “promote the integration of disaster risk reduction with climate variability and climate change into disaster risk reduction strategies and adaptation to climate change.” Based on the potential synergies between the areas of convergence of the two fields, conceptual approaches that articulate them within the broader context of sustainable development have been postulated, such as Climate Smart Disaster Management Risk (CSDRM), and the concept of Climate Compatible Development.

In this context, it is important to note that the region has experienced some progress in recent years, most notably the development of policies at the sub regional level to articulate both issues, and initiatives for coordination of agendas in many countries in the region. These efforts represent a sound basis to develop a more holistic approach to urban planning based on integrated initiatives for disaster risk reduction and climate change adaptation.

5 2005 Human Development Report. UNDP. United Nations.

6 Satterthwaite, D., 2009. “The Implications of Population Growth and Urbanization for Climate Change”, en Guzman, J.M., et al. (Ed.) Population Dynamics and Climate Change, UNFPA y IIED, 2009.-





Photo: Ifel Barrenechea, Jamie Brelsford, Caio Beltrao

These challenges require increased attention to disaster risk reduction and adaptation rather than mitigation efforts to reduce the level of future emissions. However, even when greenhouse gas (GHG) emissions in the region are relatively low, it must be remembered that energy production and transportation are major emitters. The energy consumption of the inhabitants, transportation and the energy sector that supports the urban population are some factors that must be considered by the population's development (and consumption) expectations. These expectations should not be precluded and one should keep in mind that a country's goal is to increase development in the shortest possible timeframe. In that context, if the *per capita* consumption of today's developed countries were to be achieved by rapidly growing populations of less developed countries, "under the same technological and environmental control conditions, [...] many more planets would be needed to provide the resources that would allow the rest of the world to attain the same standard of living currently enjoyed by industrialized countries" (George Martine, 2009<sup>7</sup>). This suggests that efforts in these countries should be geared mainly towards adaptation

strategies to reduce the effects of climate change, although mitigation measures should not be excluded in the longer term. Also, while the region's greenhouse gas contribution is relatively low, as previously mentioned, the consequences of changes in land use are significant<sup>8</sup> (mainly in terms of deforestation). Nevertheless, it should also be stressed that the population size and growth rate are not the only (and, in many cases, most important) factors influencing population dynamics in the relationship between population, climate change and disaster risks.

Population dynamics should be considered in terms of size, growth rate, composition, spatial mobility and location, as well as vulnerability and resilience of different population groups<sup>9</sup>. Individuals, families and communities can reduce their vulnerability more easily through good disaster risk management and adaptation to climate change that incorporate the various aspects of population dynamics in land use plans, and more so if the people themselves are able to participate in the design and implementation of intervention programs aimed at reducing the impacts of potential disasters.

7 Martine, G., 2009, "Population Dynamics and Choices in the Context of Climate Change", en Guzman, J.M., et al. (Ed.) Population Dynamics and Climate Change, UNFPA/IIED, 2009.-

8 Wilches-Chaux, G. 2008. La Gestión del Riesgo del Desastres Hoy, Contextos globales, herramientas locales. International Strategy for Disaster Reduction (ISDR). United Nations.

9 UNFPA, Unleashing the Potential of Urban Growth. 2007 State of World Population Report.





Photo: OXFAM





## 2. THE SITUATION IN LATIN AMERICA: Demographic process, disaster risk, characteristics and consequences

In recent decades, the population of Latin America has seen some of the most rapid and pronounced changes ever recorded worldwide. However, in order for the incorporation of population factors in efforts to reduce the impact of disasters and climate change adaptation policies to be relevant, we must thoroughly analyze and understand these changes. Furthermore, understanding population dynamics offers significant advantages for development planning. Such advantages should be exploited for the effectiveness of programs.

From the point of view of the opportunities for intervention in population trends, both in Latin America and in other regions, the emphasis has too often been on the wrong variables. In the current world scenario, and especially in Latin America, population growth has a significant inertial component, which requires more complex approaches than routine interventions designed to facilitate the widespread use of contraceptives as a means of slowing population growth. Globally, a significant part of population growth is caused by the inertia inherent in the age structure: the number of couples of reproductive age increases as a result of rapid growth in the past; this generates an increase in the number of births, although the average number of children per family is declining. High fertility as a dominant factor in population growth occurs in a shrinking number of countries, almost all of which are located in Sub-Saharan Africa.



Photo: Carlos Paes



Photo: UNFPA/Carina Wint



In Latin America, the average total fertility rate for the period 2005-2010 has been relatively low at 2.26 children per woman<sup>10</sup>. During the period 2000-2010, only Guatemala, Haiti and Bolivia registered years with overall fertility rates around four or more children per woman. The fertility rates of most countries are close to the regional average, and countries such as Brazil, Chile and Cuba have already ended this decade with rates below the replacement level (around 1.70, 1.89 and 1.50 respectively), although their populations will continue to grow over the next 30 years, except for Cuba, as a result of the age distribution mentioned above.

Although a significant part of the region's population growth is due to the momentum of growth inherent in age distribution, there is still room for policies that aim to slow population growth and gain time for adapting, mitigating and reducing vulnerabilities. This time would allow cities and their populations to prepare to cope with future scenarios and to advance adaptation efforts in preparation the changes ahead. Moreover, demographic analysis may be helpful to better understand population factors and incorporate them into disaster risk reduction and adaptation policies and strategies in a more efficient manner, thus providing significant advantages in developing more effective prospective plans. These prospective plans would be guided by population projections and incorporate policy elements and their expected impact on demographic variables, according to proposed analyses and interventions. The following sections describe the specific determinants of population

dynamics, the way these affect adaptation and risk management plans, and possible options to influence demographic trends from a prospective approach.

Regarding disaster risk, the Latin America and the Caribbean region has experienced a growing incidence of disasters over the past four decades, second only to Asia as the region with the highest annual average number of disasters. Figure 2 shows how the increasing occurrence of disasters reflects a growing influence of hydrometeorological hazards, compared to the impact of geological hazards, which remains relatively constant over time. Consistent with global trends, nearly 70 percent of the disasters recorded for the period 1970-2010 are related to floods and storms. During this period, the region registered more than 467 thousand deaths, an annual average of 4.5 million affected, and estimated losses of 160 billion dollars<sup>11</sup>. These figures represent only a fraction of the large number of small and medium disasters that constantly affect the region, which have a significant cumulative impact, mostly in the form of damaged housing and infrastructure and loss of livelihoods. Figures 3 and 4 display the differential impact by type of hazard associated with the disaster. On the one hand, they reveal the high mortality rate related to geological hazards and, on the other, the large impact of hydrometeorological hazards based on the number of people affected by a disaster. Exposure to this type of hazards has also increased significantly. For example, it is estimated that the annual number of people exposed to tropical cyclones in the region has increased from 1.1 million in the 1970s to 5.2 million in the last decade<sup>12</sup>.

10 The population indicators cited in this document are based on United Nations: "World Population Prospects, the 2010 Revision" and "World Urbanization Prospects, the 2009 Revision", unless otherwise indicated.

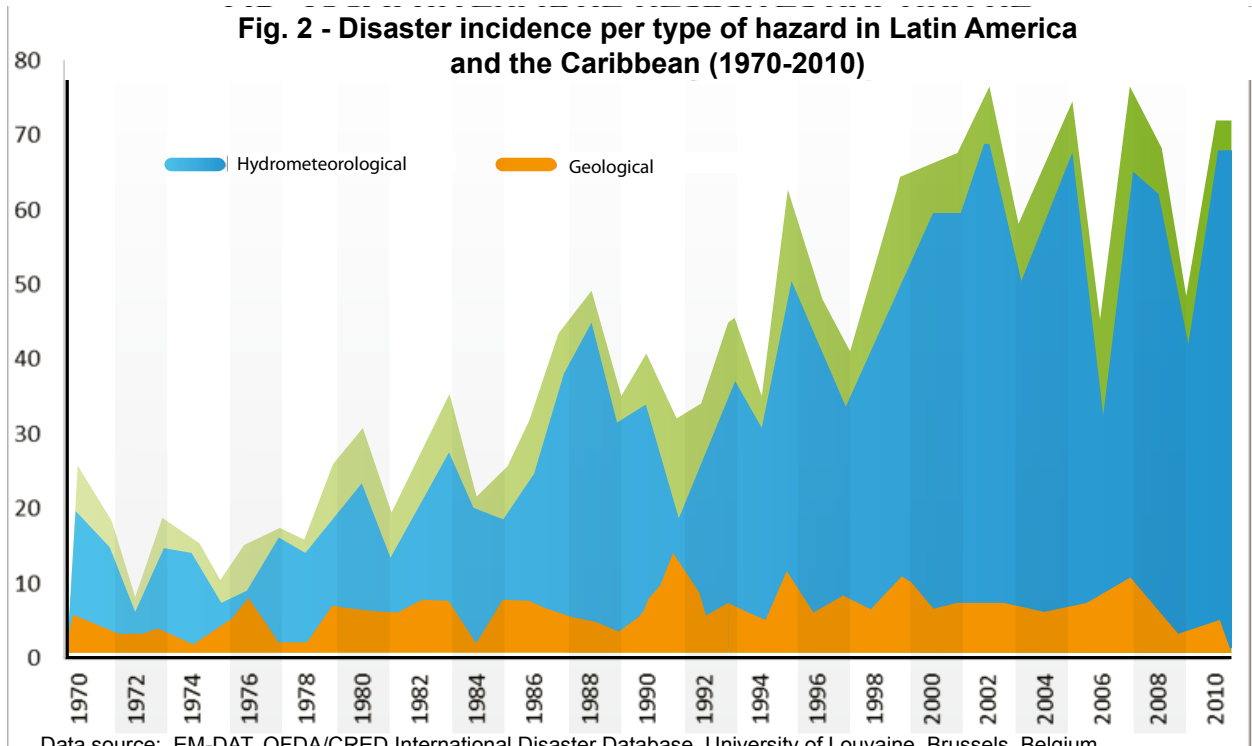
11 Figures based on records maintained by the EM-DAT international database ([www.emdat.be](http://www.emdat.be)), for the countries in the region and associated with geological and hydrometeorological hazard impacts. Biological and technological hazards have not been included in the analysis.

12 Data shaped by the World Bank in: Global Assessment Report on Disaster Risk Reduction: Revealing Risk, Redefining Development. 2011. United Nations.

In addition, national disaster reports suggest new risk patterns in urban environments. According to the *2011 Global Assessment Report on Disaster Risk Reduction*, over 80 percent of disasters reported by national sources occur in urban areas. Although each country has a different urban

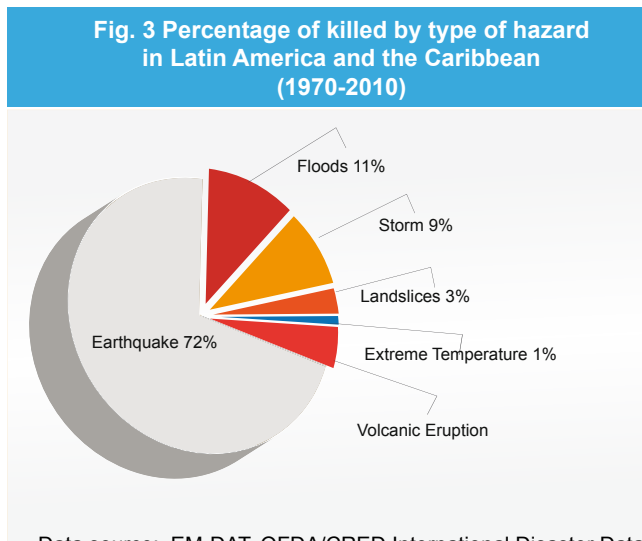
structure, between 40 and 70 percent of disasters occur in urban centers of less than 100 thousand inhabitants, and between 14 and 36 percent in small urban centers, and these proportions are increasing. This will be discussed in greater detail in the following sections.

**Fig. 2 - Disaster incidence per type of hazard in Latin America and the Caribbean (1970-2010)**



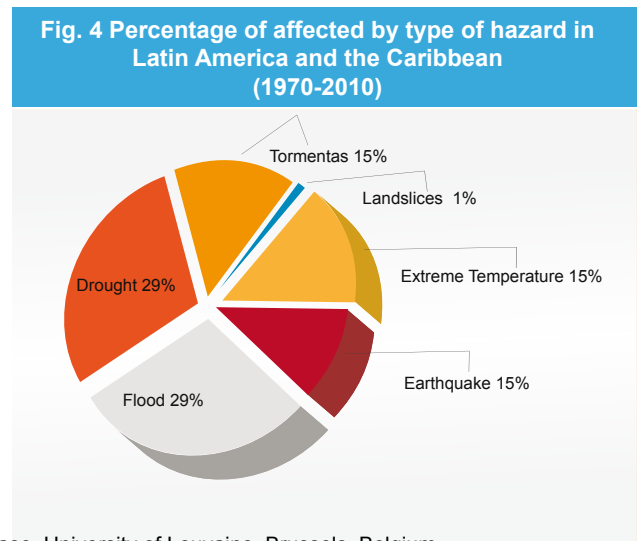
Data source: EM-DAT, OFDA/CRED International Disaster Database, University of Louvaine, Brussels, Belgium (www.emdat.be). Last accessed 14 of November, 2011.

**Fig. 3 Percentage of killed by type of hazard in Latin America and the Caribbean (1970-2010)**



Data source: EM-DAT, OFDA/CRED International Disaster Database, University of Louvaine, Brussels, Belgium (www.emdat.be). Last accessed 14 of November, 2011.

**Fig. 4 Percentage of affected by type of hazard in Latin America and the Caribbean (1970-2010)**



Data source: EM-DAT, OFDA/CRED International Disaster Database, University of Louvaine, Brussels, Belgium (www.emdat.be). Last accessed 14 of November, 2011.



Photo: Carlos Paes





### 3. POPULATION PROJECTIONS AND SCENARIO BUILDING FOR PLANNING

A major advantage of taking demographic processes into account during the construction and analysis of future development scenarios lies in the relative inertia of these processes. The margin of error of a population projection over a 5 to 10 year scenario is very narrow. The uncertainties in these time horizons are primarily linked to factors unrelated to demographic variables. In general, these factors do not affect (or to a small extent) the population size but can cause serious changes in the spatial distribution, for example, massive displacement caused by disasters associated with natural hazards or serious conflict.



Photo: RyGRHC-GTZ

From this perspective, the explicit recognition of the factors involved in population dynamics and its expression in future scenarios would allow for the adaptation of disaster risk reduction and adaptation strategies according to the most likely development of population size, composition and spatial distribution. This understanding of population dynamics helps to design better grounded strategies with a greater probability of success: once the demographic parameters are established, the margins of variation of the other factors are bound by the range necessary for consistency with these demographic scenarios.



Photo: Candice Villarreal

In short, the proper incorporation of population dynamics would help to:

1. *More accurately gauge and extend the time horizon* for action to achieve adaptation goals (and possibly mitigation). Faster growth reduces the period of time in which critical thresholds can be reached, and therefore the margins to develop appropriate responses, including the design and implementation of risk management strategies.
2. *Adopt more dynamic and proactive approaches to adaptation and risk management*, by anticipating the different possible trends of population size, composition and spatial distribution. Thus, more effective strategies can be achieved by quantifying the most probable population trajectory.
3. Add the human and social dimensions to the physical perspectives on adaptation, to avoid concentrating on specific risks, which could result in insufficient attention to the affected populations, as well as their composition, characteristics and adaptability.







Photos: MOCAPRED, MOCAPRED, UNFPA/Carina Wint, RyGRHC-GTZ, PCGIR, UNICEF/Gonzalo Bell

4. *Combining the physical dimension with social perspectives in interventions*, with more specific actions to reduce vulnerability, and thus respond to the individual and social characteristics of affected groups locally. The nature of the various hazards and exposure to risk is expressed differently depending on the distribution of the population, its age and sex, the socioeconomic status of the groups, and the existing social networks of the affected populations at the local level. The value of these variables can vary significantly from one context to another.

5. *Mobilize support and emphasize* discussions and efforts to influence political will more effectively from a solid foundation, based on an accurate analysis of population dynamics and the scenarios derived from these tendencies. This avoids simplifications and generalizations based only on population size and averages for each variable when aggregating its values.

6. An adequate understanding of the population base and its dynamics can help to *more accurately predict complementary scenarios* on the level of economic activity and quantify the assets and infrastructure that may be affected by various risks in the planning horizon.

Below is an analysis of the different components of population dynamics and the policy and program choices they present.





Photo: UNISDR/J.J. Trelles

## 4. POPULATION GROWTH AND URBANIZATION: demographic determinants and their effects on risk management

### 4.1. Population growth and the level of urbanization in Latin America

**G**rowth and urbanization peaked earlier in Latin America than in other regions. The highest growth rates in the region, around 2.76 percent annually, were recorded between 1960 and 1965. These rates doubled the population in 25 years. Some countries like Costa Rica, Mexico and Venezuela recorded rates of 3.42, 3.36 and 3.9 respectively, doubling the population over a 17.7 to 20 year period. Average urban growth rates in Latin America were also above 4 percent between 1950 and 1970, and above 3 percent until 1985. With rates like these, the population doubles in just 17 years (with 4 per percent growth, or even less for higher rates). High rates of population growth in Latin America and the Caribbean in the second half of the twentieth century resulted from high fertility rates and reduced mortality rates. The transition from high to low fertility and mortality rates, with a time lag by which mortality decreases first and growth accelerates, known in the demographic literature as **demographic transition**, occurred rapidly in the region over a relatively short period of time. Women in the region bore an average of six children each between 1960 and 1965, and several countries recorded an average of more than seven children per woman. By 2010, the average number of children per woman was around 2.2 and is expected to continue to decline until it reaches the replacement level around 2020. Although fertility rates will continue to fall below the replacement level until 2050, the total population will grow to exceed 750 million by 2050, or 160 million more people than there are today.

Beside changes in the population size, urbanization has certainly been a key factor in population dynamics in recent decades in Latin America and will remain so in the coming decades. As mentioned above, the region has experienced urban growth rates with a potential to double the urban population in 17 years. In fact, population growth throughout Latin American since 1995 has been concentrated in cities and is expected to continue in the coming decades. The urban profile of this population dynamic is highly relevant to understanding the processes of the social construction of disaster risk and prioritizing all efforts that can be implemented to reduce the vulnerability of exposed populations and the impacts of the factors associated with climate change, as well as its effects on the escalation of risks.







Photo: UNFPA/Carina Wint

## 4.2. Urban expansion and disaster risks

Naturally, this type of growth brings enormous challenges. And it is not just about growth. The urban lifestyle transforms the territory and fragments the natural landscape, compromising both biodiversity and the capacity of ecosystems to mitigate the consequences of human activities<sup>13</sup>. Cities grew very rapidly and often in a disorderly manner, with a limited capacity to provide basic services and infrastructure to a growing population. To a great extent, this has produced a negative perception of urban growth, generating policies that tried to somehow slow this dynamic and spawn rural development. It should be noted that the growth of cities and the concentration of population in urban areas are not opposed to rural development. These processes complement and stimulate each other. The urban population creates demand for food and primary products, which stimulates rural production. However, increased agricultural productivity does not necessarily lead to increased rural labor. Therefore, increased production and rural development do not require a proportional

increase of the population living in rural areas. In return, diversification and increased production dynamics in urban areas offer better job opportunities and income.

Therefore, policies to prevent migration towards the city were promoted in response to the inadequate perception of these processes. Such efforts were not based on an accurate understanding of demographic processes and ignored the available data. As a result, these policies have failed to stop both urban growth and migration from rural to urban areas. Rather, they have increased the difficulties of the urban poor and exacerbated the conditions in which migrant groups enter the urban fabric. In 2005, an estimated 106 million people lived in slums<sup>14</sup> in Latin American and Caribbean countries. High concentrations of people and poor sanitation and infrastructure in these areas increase vulnerability and therefore increase the economic and humanitarian impact of disasters

(see **Box 3**).

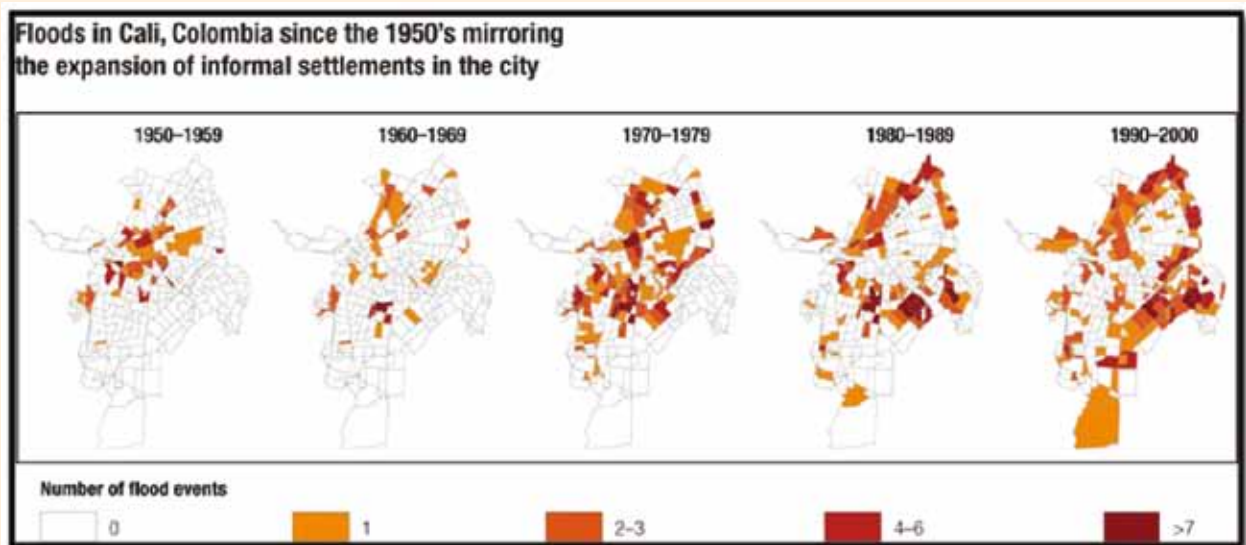
13 Hogan D. Marandola E. (Org.), 2009, População e Mudança Climática: Dimensões humanas das mudanças ambientais globais. UNFPA, NEPO, UNICAMP, Campinas, September 2009.

14 According to UN-HABITAT, a “slum household” is a group of individuals living under the same roof in an urban area who lack one or more of the following: durable housing, sufficient living area, access to improved water, access to sanitation and secure tenure. Cited in: UNFPA 2007, State of World Population: Unleashing the Potential of Urban Growth. Box 4-page 16.



### ***BOX 3: Urban sprawl and its expression as disaster risk***

The 2009 Global Assessment Report on Disaster Risk Reduction (GAR) discusses in detail the process of urban sprawl and increased risk of disasters, and how these are manifested in the form of damages and loss of assets that have a differential impact on the urban poor. One of these patterns is revealed by analyzing low and medium intensity losses, related primarily to weather impacts, which are likely to be magnified in a context of climate change. Based on case studies on loss reports in Argentina, Colombia, Costa Rica and Mexico, which reveals how extensive flood risk is closely linked to increased runoff caused by the urbanization of green areas, a chronic lack of investment in drainage systems covering the entire city, the location of informal settlements and housing in flooding-prone low-lying areas, as well as management of water resources in neighboring basins. It mentions the case of San Jose, Costa Rica, where over 80 percent of urban flooding have been associated with poor drainage system and increased runoff due urban growth and accumulation of solid waste. Most of the losses and impacts on housing concentrate in informal settlements on marginal land in the city. The same report reveals concentric patterns of increased risk towards the periphery of the city, following the logic of expansion of growth of informal settlements, which is illustrated in the case of Cali, Colombia, where the increase in the number of flood losses reported since the early 1950s follows the spatial pattern of city expansion driven by the occupation of informal settlements and lack of investment in drains.



Source: Global Assessment Report on Disaster Risk Reduction (Chapter 3: Deconstructing Disaster: risk patterns and poverty trends at the local level). United Nations, 2009.

It should be noted that the notion of urban refers to many sizes and levels of structural and functional complexity of cities and towns, which can range from 5 thousand to 20 million people, from small towns to critical urban nodes with a concentration of goods and services, often the capital of the country or of major provinces/departments/states. In terms of urban risk, mega-cities or large metropolitan areas have largely attracted attention due to their size and the absolute magnitude of

the risks they entail. However, as discussed at the beginning of the document, it is the medium and small urban centers that largely contribute to increasing the world's urban population, and the latest data suggests that the risk is concentrated and growing faster in these urban centers (Mantilla, 2010)<sup>15</sup>. This is very relevant from several viewpoints. **Box 4** illustrates some aspects of this differentiation of urban settlements by size. This issue will be revisited later.

15 Mansilla, E. 2010. Riesgo Urbano y Políticas públicas en América Latina: la irregularidad y el acceso al suelo. Study prepared for the 2011 Global Assessment Report on Disaster Risk Reduction.

#### **BOX 4: Differential patterns of urbanization and risk in small and medium towns**

The analysis of data available for eight countries in the region suggests that the largest proportion of events in the past three decades is concentrated in municipalities with small urban areas (between 20 thousand and 100 thousand inhabitants), which concentrate 45.2 percent of the total events, followed by 34.4 percent of events occurred in medium-sized urban areas (between 100,000 and 1 million inhabitants). On the other hand, 15.1 percent of total events concentrated in urban transition areas (between 10,000 and 20,000 inhabitants) and only 5.4 percent occurred in large urban areas of 1 million or more people.

These data demystify the idea that it is in large urban centers where the highest number of events occur, and is much more consistent with the trends of urbanization underway in Latin America, where large cities have begun to significantly reduce population growth rates, whereas medium and small-sized cities are growing at a faster rate.

Source: Riesgo Urbano y Políticas Públicas en América Latina: La Irregularidad y el Acceso al Suelo. Mansilla, 2010. In: 2011 Global Assessment Report on Disaster Risk Reduction. United Nations.

### **4.3 Urban growth: developments and the current situation**

In view of the rate and magnitude of urban growth, urbanization is a key element in scenario building and land use planning. However, a general approach to this phenomenon does not reveal all the facets of this dynamic. In general, the growth of cities has been seen as the massive displacement of the population from the countryside to the cities. The vast majority of studies have also substantiated these findings through an analysis of the relationships and links between rapid urbanization and disaster risk.

However, even if this feature dominated urbanization in its early stages in both the region overall and in its individual countries, the growth of cities stems predominantly from the natural increase (more births than deaths) of the urban population. This is an important characteristic of the demographic dynamics of Latin America, relevant to the articulation of growth scenarios and risk reduction strategies. It is also important to note that the current population growth and that of coming decades is largely a byproduct of changes in the population's age structure and that any population growth in all countries will occur in cities. Naturally, this is not a universal pattern of population dynamics, and many variations can be found from one context to another, therefore each case must be examined individually.

Although internal migration occurs in fewer countries and with declining demographic weight, it remains an important determinant of the growth in some cities. Moreover, there are other significant movements in specific areas. Urban-urban migration plays an important role in shaping space and risk in many countries. Similarly, international migration is an important factor in shaping the urban environments of some countries in the region. The urban dynamic also attracts a large number of people who do not live in cities, and this "non-resident present" population adds to the risk of exposure in these areas. Thus, the matrix of demographic factors can be expanded based on local situations. In certain contexts, the aging process of the population is significant, and segregation associated with different socioeconomic and cultural variables can shape urban spaces with specific dynamics and characteristics. All of these factors have a varying effect on the social composition of natural hazard risks.

Another important issue to be developed below is that urban growth is not uniform across socioeconomic groups. The highest fertility levels are found in the low-income strata and populations with lower levels of education. These aspects will be developed in greater detail in the following sections through an analysis of the factors of population dynamics.



## 5. DRIVERS OF POPULATION AND URBAN GROWTH

**D**rivers of population growth are associated with birth, mortality and migration rates. Mortality reduction is pursued as an overall goal, legitimized by ethical principles, therefore policies to reduce population growth must focus on fertility rates and migration. The birth rate is generally perceived as an expression of the fertility level of the population, but, as we will see later, other factors such as age distribution and marriage patterns may be highly relevant variables. These drivers influence the growth of the total population, and of course urban growth, although with varying levels of intensity. In addition, areas and populations previously considered rural have been reclassified as urban, and growing cities have absorbed areas surrounding urban spaces. Internal migration plays an important role in the spatial redistribution of the population, and rural-urban migration is a major factor in urban growth, especially in the initial stages and during the most rapid expansion of urbanization.

### 5.1 Fertility and its social differentials

As noted above, an important part of the current population growth in the region is due to changes in age distribution, which lead to an increase of the population of a reproductive age, thus maintaining growth even when fertility is in decline.

As previously mentioned, part of the current urban growth stems from the natural growth of cities, but this is only one aspect of the characteristic of growth. The number of children per woman in the region and within countries varies substantially. The fertility rate is declining – even below replacement level<sup>16</sup> in several countries – because couples are increasingly having only one child or no children at all. However, there are still many families continue to have more than three or four children. The poor and less educated consistently continue to have the highest fertility rates. Since these social groups represent the largest proportion of slum dwellers, it can be said that population growth in these areas is significantly higher than in other parts of the city. This not only means that future population growth will be urban but will be mainly concentrated in the poor sectors of the city. This fact has important implications for risk reduction strategies, as the links between increased vulnerability to the impact of natural hazards and the urbanization of poverty are well documented<sup>17</sup>. **Box 5** summarizes the relationship between different disaster risk factors for poor people in urban areas.

Available data reveals high rates of unwanted fertility among the poor and less educated. The unmet need for family planning reaches 10 percent in the region, 20.3 percent in the Caribbean and 13.2 percent in Central America. The lack of information and/or access to family planning methods contributes to high levels of unwanted fertility rates, primarily affecting the poor.

16 In Demographics, “replacement level” refers to the situation in which the global fertility rate drops below 2.1 per woman. A fertility rate below the replacement level, depending on the age structure of the population in the medium term, will lead to a negative rate of natural increase.

17 The 2009 Global Disaster Risk Assessment (United Nations) devotes much of its contents to the analysis of the linkages between poverty and risk and provides evidence of how they are fed both in urban and rural settings. Available at: <http://www.preventionweb.net/english/hyogo/gar/report/index.php?id=9413>



Analysis of Demographic and Health Surveys (DHS) in the region indicates that fertility rates would be significantly lower if women could prevent unwanted births<sup>18</sup>. The largest differences are observed in Bolivia, 2003, where total fertility

was 3.8 versus 2.1 desired fertility; in Haiti (2005-06), total fertility was 3.9 versus desired fertility of 2.4; in Peru, 2004-2008, total fertility was 2.6 and desired fertility 1.7 (the dates listed are the survey dates).

**BOX 5: Disaster risk factors in poor urban contexts**

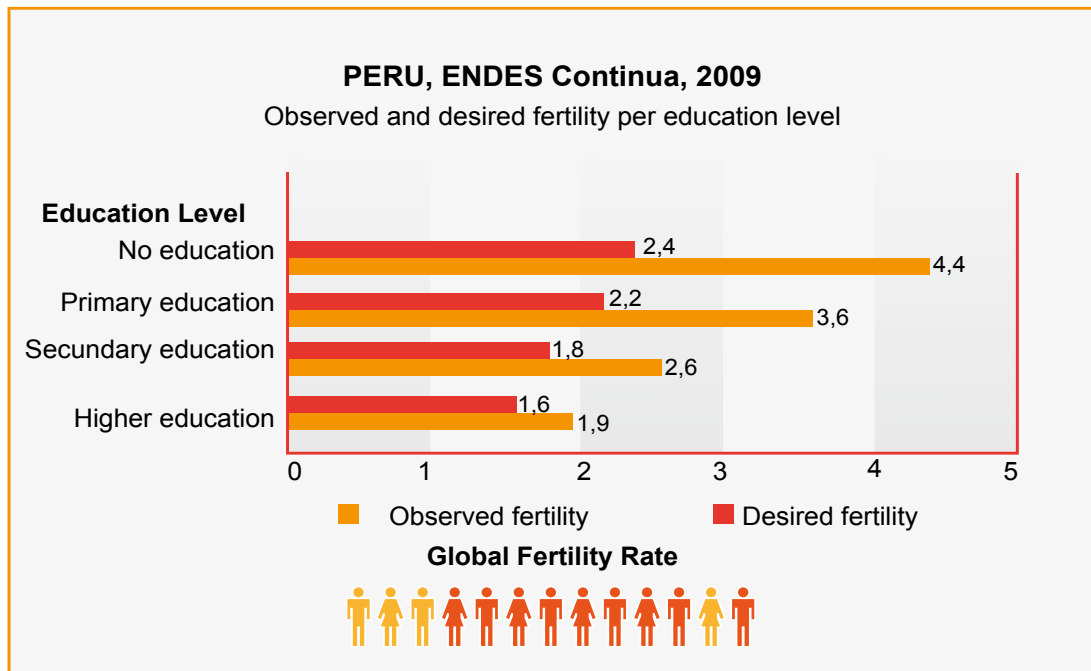
Urban poverty aspect	Consequences of daily risk	Consequences of disaster risk
Variable and often inadequate income that does not cover basic needs (food, enough drinking water, rent, transportation, access to latrines, school fees), causes debt, the repayment of which considerably reduces the revenue available to cover the needs, and/or ability to cope with the rising prices of basic commodities.	Scarce resources available to pay for a home, which, in urban areas, leads to the occupation of the poorest quality housing in less favorable neighborhoods i.e., poor quality housing in illegal settlements located in precarious areas without infrastructure or services.	In most cities and many urban centers in middle- and low-income countries, low-income housing is located in areas prone to flooding, landslides and other hazards, partly because of its location and partly because of the lack of public coverage in terms of infrastructure and services. The quality of the houses is usually poor and therefore highly vulnerable to storms, strong winds and earthquakes.
Inadequate, unstable or risky asset base (tangible and intangible assets, including school performance and housing) of individuals, households or communities, including assets that help low-income groups to address price or income variables.	Very limited capacity to handle everyday shocks and stress, including the price increases or reduction in income, illness or injury.	Very limited capacity to handle disasters.
Poor quality housing, often unsafe and even dangerous, crowded living conditions.	High level of risk of physical accidents, fires, extreme weather events and infectious diseases.	High risk of a house fire affecting the entire settlement; the living conditions favor the transmission of diseases, and can cause epidemics. The homes are at risk of damage or collapse in the event of storms and earthquakes.
Insufficient public infrastructure (water supply, sanitation, sewerage, roads, etc.), which serves to increase the health burden and often the workload.	High risk from contaminated water, inadequate sanitation, and house flooding due to lack of sewerage.	Lack of infrastructure is often the major cause of the floods. The absence of roads and sewers problematize evaluation in the event of an alert or disaster.
Inadequate basic services such as day care centers, schools, vocational training, health care, emergency services, public transportation, communications, law enforcement agencies.	Excessively elevated health burden from diseases and injuries due to lack of treatment, including emergency response.	Lack of health care, emergency services and disaster preparedness, which should provide a rapid response to disaster (besides its role in disaster risk reduction).
Limited or inexistent safety net to ensure minimum consumption if income falls, as well as access to housing, health care and other basic services when people lack the financial means to cover these costs (in whole or in part).	Very limited capacity to address impacts or stress in everyday life, including price increases or reduction in income, illness or injury.	Very limited capacity to recover from disasters: for example, inability to acquire sufficient food and water, or to rebuild homes and livelihoods.

**Source:** Adapted from Global Assessment Report on Disaster Risk - Chapter 4: The heart of the matter: the underlying risk drivers, United Nations, 2009.

18 Westoff, C.F., 2010: Desired Number of Children: 2000-2008, ICF Macro, Calveston, Mariland, USA.

Figure 5 and Table 1 show the rates and differentials observed in fertility and desired fertility, by level of education and wealth quintiles, according to data from the 2009 Demographic and Family Health Survey of Peru, 2009.

**Figure 5**



**Table 1**  
**PERU, ENDES Continua, 2009**  
**FERTILITY RATES**

→ Wealth quintile	Desired	Observed
Lower quintile	2,3	4,2
Second quintile	2,0	3,2
Intermediate quintile	1,8	2,5
Fourth quintile	1,7	2,1
Higher quintile	1,4	1,6
<b>Total population, 2009</b>	<b>1,8</b>	<b>2,6</b>

Source: 2009 Demographic and Family Health Survey of Peru.

The patterns that emerge from the differences observed between Peru's socio-economic categories are reproduced to varying extents in other countries in the region for which data is available. These variations reflect the deprivation of the exercise of a recognized human right: to decide the number of children one wants to have, and have access to the means to make these decisions, i.e., to exercise that right. The denial of information and/or access to the means to exercise this right contributes to an increase in the number of people with unmet needs as well as the number of births in groups living in more vulnerable conditions, increasing the current and future challenges to improving services and quality of life, reducing vulnerability and contributing to environmental sustainability.

The available data not only shows that most of the current urban growth originates in the city and not from the massive influx of migrants, but also that growth is concentrated in the poorest sectors of the urban population, partly as a result of deficiencies in access to reproductive health services, with significant levels of unwanted fertility. Even in the case of countries with significant migration from the countryside, the rural poor, with high fertility rates, migrate to the city, incorporating this demographic behavior to that of the urban poor.

The social cost of unwanted fertility mostly affects women, and results in higher mortality and morbidity and higher domestic burdens. This is added to the fact that women, primarily due to social factors, are more vulnerable in the event of a disaster (along with children and the elderly). This is important not only for the development of prospective urban management and risk reduction plans but also for social policies in areas such as health or gender equality. As discussed below, the prospects of success in reducing the risks associated with climate change, as well as poverty reduction and achieving the Millennium

Development Goals, require close coordination of programs that are generally managed outside of public policy circles.

This overview of the region's experience suggests that growth rates of both the overall and urban populations are in general decline. All countries will continue to grow and, by 2050, the region's population will have grown by 160 million people. This growth will be concentrated in cities and especially among the urban poor. However, the different rates observed and the current variations by country and within countries by social groups, determine a variety of situations. For example, in the countries of the region where the urban population is still less than two-thirds, the effect of rural-urban migration can still be significant. It would be inappropriate to generalize specific contexts and situations or national trends based on the average trends in the region. Fertility rates are already below the replacement level in several countries, and groups with relatively high rates do not offset the general decline in other sectors. In these countries, population growth occurs only with the evolution of the age structure. Even when growth predominantly results from an age structure with an increasing percentage of people of a reproductive age, the proportion of children born to the poor is relatively higher than other social groups. There are still countries where fertility is high, and levels of unwanted fertility remain high. In several countries, fertility begins at an early age, with significant levels of teenage pregnancy. All of these situations need to be addressed by social and health policies and have important implications for demographic trends.

Given the enormous diversity of the population dynamics between countries and that the impact of migration on urbanization is still high in some countries, scenario building and strategy design should be based on a specific analysis of how each driver of population dynamics works in each particular situation.



## 5.2 Age structure and household composition

As mentioned above, changes in the structure of the population by age group are an important determinant of current population growth rates. However, this component of population dynamics has multiple connotations, beyond its impact on population growth. Consumption patterns and levels also vary by age group. Therefore, the impact of the population on environmental sustainability is affected by the age composition of the population. The incorporation of population dynamics into adaptation or mitigation strategies must not only account for the number of people but also their age distribution. Moreover, vulnerability also varies according to age groups, and risk reduction strategies should also be informed by the age distribution of the population. Furthermore, this distribution varies throughout the city. In some urban areas, households have a very old structure, while most households in other sectors consist of young couples with young children. This data is reflected in the population census. Data analysis and the geo-referencing of census tracts enables a mapping of these features for small areas of the urban area and link demographic and physical characteristics to delineate risk and vulnerability profiles.

The structure of households is also related to age groups and is itself an important element. The same number of people in a given area can be organized into a varying number of households, depending on whether they are grouped into extended families that include members of different generations, or nuclear households. The level of household consumption varies, as does its impact on environmental sustainability accordingly. Similarly, different household structures require different adjustments to risk reduction strategies. For example, divorce changes the household structure, possibly leading to the creation of two households with profiles that differ from that of the previous family group, and to aggregate consumption, also different, even when the number of people has not changed. Therefore, the analysis of the population's age structure in specific areas of

intervention is highly important, as is the composition of those households. These factors can behave very differently and vary considerably from one area of the city to another.

In turn, the differential vulnerability of specific population groups – including children, women and the elderly – to the impact of natural hazards is well documented in risk reduction studies. We will therefore examine this aspect in detail, but it should be noted that it is an important criterion in assessing vulnerability and the ability to define risk levels. Vulnerability profiles vary by age and are related to specific threats such as extreme temperatures – which mostly affect older adults – and become even more relevant in a context of climate change. Similarly, the formation and composition of households, as well as their structuring of income opportunities, are key to understanding the configuration of disaster risk. These have been conceptualized in the so-called “access model” (see Box 6).

### BOX 6: DIFFERENTIAL ACCESS MODEL AND VULNERABILITY

Unlike the Pressure and Release Model (PAR), which was outlined in Figure 1 at the beginning of this document, the access model is a more comprehensive analysis of how human vulnerability is generated by the economic and political processes that allocate assets, income and other resources to society. It also allows integrating nature into the explanation of hazard impacts, avoiding the oversimplification of the PAR model, which suggests that the dangerous event is isolated and different from the conditions behind vulnerability. In the access model, the threats by themselves alter the set of resources available to households (e.g., destruction of crops or land from flooding), and alter the recovery patterns of different groups of people. The rationale of the model is that the least access to resources, in the absence of other compensation to provide safe conditions, leads to increased vulnerability. In this context, the access model shows how systems create the conditions in which hazards have a differential impact on different societies and different groups within society and the importance of analyzing variables such as gender, age, class and ethnicity in explaining differential vulnerability to hazard impact. Blaikie *et al.* (1994) explained in detail the access model using the “home” as a sub model, as the conceptual framework to explain vulnerability to disasters.

Source: Blaikie *et al.*, 1994 (Chapter 3: Access to Resources and Coping with Adversity).



Photo: UNISDR/J. J. Trelles



## 6. PUBLIC POLICY, POPULATION DYNAMICS AND RISK REDUCTION

The breakdown of the components of population dynamics make it possible to outline specific interventions in each of these components, with more effective results to influence growth trends. Regarding fertility levels, even countries with a fertility rate close to replacement level have populations groups with significant levels of unwanted fertility. Ensuring access to reproductive health services for these sectors contributes to the promotion of empowerment and the right to health – particularly reproductive health– in the most marginalized groups. It also has a major impact on reducing the level of maternal and child mortality and on gender equality – and, of course, on population growth – and helps to extend the time horizon for implementing adaptation and risk reduction measures.

The effects of age structure on growth can be reduced through policies that invest in reproductive health (thereby reducing teenage pregnancy) and the training of young people, extending their time in the educational system and delaying marriage and the age at first reproduction. These measures help to strengthen human capital and set the foundation for realizing the potential benefits of the demographic dividend derived from an age structure where a high proportion of the population is of an economically active age, which boosts further economic growth. These actions can simultaneously contribute to risk reduction and adaptation strategies and accelerate economic growth and sustainable development in countries in the transition stage.



Photo: UNICEF/Gonzalo Bell



Photo: UNICEF/Gonzalo Bell



High levels of unwanted fertility and the lack of investment in basic infrastructure contribute to reproduction and accelerate the growth of slum conditions. Well-designed programs are necessary to slow growth and will create valuable time to improve risk reduction strategies and develop adaptation measures. It is important that policy and decision makers identify the structural and irreversible nature of rapid urbanization early on. This will prevent the misallocation of time and energy towards unsuccessful attempts to hinder urban growth. The lack of adequate policies, or the implementation of bad policies, frequently only serves to perpetuate high growth rates and greater difficulties in poor urban communities. In this scenario, the number of urban slum dwellers continues to expand. It is necessary to recognize that “urbanization can be critical to economic growth, to poverty reduction, to the stabilization of population growth and to long-term

sustainability. But achieving this potential will require a different mindset from policymakers.”<sup>19</sup> Only if urban growth is accepted and its potential benefits recognized will it be possible to implement appropriate policies for enhancing the economic and environmental benefits of the concentration of population in urban areas and manage future growth to avoid, where possible, the proliferation of slums and the concentration of social and environmental problems associated with urban sprawl and lack of infrastructure and basic services. Informal settlements, inadequate housing, lack of services and poor health are not only a reflection of poverty but also poor planning and management of urban growth. In this sense, poor urban governance and environmental degradation are challenges that must be addressed from a holistic perspective to increase the resilience and reduce the vulnerability of cities (*see Box 7*).

#### ***BOX 7: Poor urban governance and environmental degradation Drivers of urban risk***

Most cities in developing countries have only been able to absorb urban growth through the expansion of informal settlements. The location of such settlements in hazard prone areas, the vulnerability of housing and local services and the lack of provision of the infrastructure necessary to reduce hazard configure urban disaster risk. Poverty limits the capacity of many households in such cities to gain access to well-sited land and safe housing. However, the translation of poverty into risk is conditioned by the capacity of urban and local governments to plan and regulate urban development, enable access to safe land and provide hazard mitigating infrastructure and protection for poor households.

Informal settlement, inadequate housing, non-existent services and poor health, are reflections of poverty. However, they are also reflections of weaknesses in the way urban growth is planned and managed. The concentration of private capital and economic opportunity in a city does not of itself produce the institutional means to ensure that the supply of land for housing, infrastructure and services keeps up with population growth; nor does it produce the regulatory framework to ensure that the environmental, occupational and natural hazard related risks generated through urban growth are managed. Furthermore, the capacity to provide provisioning and regulating services in urban areas is decreasing. Ecosystem decline increases hazard levels at the same time as it decreases resilience, acting as a third underlying risk driver.

*Adapted* from 2009 Global Assessment Report on Disaster Risk Reduction, United Nations

19 Martine G. et al. (Ed.), 2008. The New Global Frontier: urbanization, poverty and environment in the 21st century. London: Earthscan, 2008.

Greater success can be achieved through the “active participation of the urban poor in public policy geared towards urban development and planning, managing to obtain the firm commitment of decision makers at the national and local level”<sup>20</sup>. This requires abandoning migration-focused perspectives and working on the internal components of urban growth to incorporate both age distribution and fertility, with a particular focus on the different dynamics of each sector and urban social groups, as well as the needs of the urban poor, especially in terms of access to decent housing.

An approach based on human rights and addressing to the unmet needs of the urban poor should articulate risk reduction strategies, land use plans and proposed social and demographic policies. As poverty becomes increasingly urban, the structure of income and household consumption changes dramatically, and the proportion of income devoted to housing and basic services increases. From this perspective, the most critical need of the urban poor is perhaps access to decent housing. For them “a roof and an address in a habitable neighborhood is a vital starting point [...], from which they can tap into what the city can offer them by way of jobs, income, infrastructure, services and amenities”<sup>21</sup>.

Urban population growth and the reduction of urban density and rapid expansion of the area occupied by cities require creative responses: „the world’s urban population will increase by 72 percent while the surface of the built environment inhabited by 100,000 or more people could increase by 175 percent”<sup>22</sup>. In this scenario, planners must adopt a proactive and long-term approach to ensure the right to the city. As indicated by the 2007 State of World Population Report (UNFPA), it is necessary to

reposition urban and regional planning to consider the “city-region” on a basis of negotiation and cooperation between neighboring governments in attending to basic needs, especially those of the poor. This should be based on a perspective of sustainable and social space usage. Planning is necessary to accommodate expected growth in the space as efficiently and equitably as possible. Safe and appropriate locations for affordable housing should be established. The implementation of this approach may encounter major difficulties in bigger cities, due to the relative scarcity of space, land prices and the impact of speculative investments. However, in medium and small cities there is more space available and the price is still affordable<sup>23</sup>. The above, coupled with the fact that the dynamics of growth in these cities are becoming more significant, opens up many opportunities to apply this pro-active approach and future vision.

Besides close cooperation between neighboring governments, the involvement of local residents and the articulation of different public sectors is also necessary. Social and environmental criteria should be observed that allow for the availability and distribution of land –equipped with utilities– for social housing. The prospective plans must consider physical attributes in classifying areas, risk conditions and factors, and incorporate risk reduction approaches, including seismic codes – should the geographical spaces require– in social housing plans (see **Box 8** and **9** on intervention options from a prospective risk management approach).

Similarly, corrective interventions on manifest risk in cities must be accompanied by measures to address the root causes or underlying risk factors (such as poverty, environmental degradation, violence, etc.) and create conditions that allow for future resilience.

20 Martine G. et al. (Ed.), 2008, op.cit.

21 UNFPA, 2007: Liberar el Potencial del Crecimiento Urbano, op.cit.

22 Angel, S., Shepard, S. C. y Civco, D. L., 2005: The Dynamics of Global Urban Expansion, Washington, D.C. Departamento de Transporte y Desarrollo Urbano, Banco Mundial.

23 Angel, S., 2008: “Preparing for Urban Expansion: A Proposed Strategy for Intermediate Cities in Ecuador, en Martine, G et al. The New Global Frontier, Earthscan, London, 2008.

## BOX 8: DRR-BASED URBAN MANAGEMENT

**Quito and its Infographic Atlas** - The Constitutional Agreement that in 1978 declared the city Metropolitan District, was followed by the efforts that led to the presentation of the Infographic Atlas of Quito, used to plan the future development of the capital. This project is the result of the multidisciplinary work of the Pan American Institute of Geography and History (PAIGH), National Section of Ecuador, along with the Military Geographic Institute of the country, the Municipality of Quito and the French Institute of Scientific Research for Development (ORSTOM), and the cooperation of other entities. The final product is a wide visual document, with maps at scales from ranging from 1:1,000 to 1:50,000, which describe in detail geographic, demographic and socioeconomic aspects of Quito, including a chapter on natural hazards to which this over 2 million people city is exposed. The legal incorporation of the Atlas into urban planning in Quito proves its importance.

Source Management of Environmental Services for Vulnerable Populations in Cities of Central America Project -FEMICA-BID-CEMA. 2004.

To date, responses to these challenges have not been as effective as they should. But these challenges will resolve themselves spontaneously or independently. Both governments and international agencies have their role in this process. "There is no invisible hand to manage urban growth according to societal needs, intergenerational responsibilities or gender-specific concerns."<sup>24</sup> An adequate response to these challenges requires the intense and extensive participation of stakeholders, including the people directly affected and urban and national planners, but not exclusively. Interventions designed to moderate population dynamics require the contribution of health and education sectors. The physical adaptation to reduce vulnerability and the impact of risk also requires the participation of local and national planning

agencies, as well as the housing and infrastructure sector's contribution to the provision services and promotion of access to decent housing. Private enterprise also has an important role, as long as it is guided by rules and regulations that ensure sustainability and proper risk management. With respect to access and sustainable use of the area, markets must comply with, participate in and contribute to environmental and social policies.

At the regional and global level, the development of coordination mechanisms and multi-sectoral and multi-stakeholder dialogue is being promoted, including national disaster risk reduction platforms, which encourage these sectors to participate more actively in risk reduction and adaptation to climate change issues<sup>25</sup>.

24 UNFPA, 2007: Unleashing the Potential of Urban Growth, op.cit.

25 Sanahuja, H. 2010. Plataformas Nacionales de Reducción de Riesgo de Desastres: un análisis crítico a cinco años de la adopción del Marco de Acción de Hyogo. Study commissioned by UNISDR Americas and IFRC.



**BOX 9: CLIMATE-RELATED HAZARDS AND SECTORAL ADAPTATION RESPONSES** *Examples in the event of heavy rain, with a high probability of occurrence according to projected CC*

<b>Drivers of urban exposure and vulnerability</b>	<b>Consequences for cities if not addressed</b>	<b>Sectors involved</b>	<b>Sample of adaptive responses (Not exhaustive)</b>	<b>Relative investment Level/Cost</b>
Rapid urban growth leading to informal settlements on marginal land without roads or drainage systems, or drains blocked with debris and saline.	Exacerbated floods and landslides	Land use planning, public health, emergency management	Development and enforcement of appropriate land use planning that: a) is based on an understanding of the vulnerabilities to climate change; b) implements effective incentives for mixed-use developments in resilient areas, and c) incorporates ecological planning approaches beyond the city limits (e.g., watershed management for villas on the outskirts of the city, or protection of mangroves and wetlands near the coastline)	High, includes policy and staff investment Medium to high Low
Storm drainage infrastructure not suitable to withstand the current or future runoff, amplified by deforestation/ degradation of the natural mechanisms to filter storm water	Increased runoff in the absence of ground vegetation  Increased flooding	Health, solid waste management  Natural resources management	Investment in “green infrastructure” and ecosystem planning to improve the function of natural filters (for example, planting in contour, terracing, and afforestation for erosion control)	Low (identified plantation) to high (large-scale afforestation infrastructure), with economic and environmental co-benefits
Low structural quality of homes, especially in informal settlements	Loss of lives and property	Housing, emergency management	Reinforcement of old buildings and design of new buildings (if residents remain in vulnerable areas)  Stricter risk requirements in bidding documents for urban developments  Public awareness/ emergency preparedness initiatives, to educate residents about flood risks	Medium to high Political and staff investment for compliance Low
Location of aquifers, treatment plants, waste water and other infrastructure in coastal areas or river deltas	Salt water intrusion in the infrastructure (e.g., plants providing drinking water and fluid treatment)	Water suppliers  Wastewater treatment	Pipe modification	Medium

Source: Adapted from „Sample of Climate Hazards and adaptive responses across sectors“. In Guide to Climate Change Adaptation in Cities, World Bank, 2011. ([http://www.ppiaf.org/ppiaf/sites/ppiaf.org/files/publication/Urban\\_Handbook\\_Final.pdf](http://www.ppiaf.org/ppiaf/sites/ppiaf.org/files/publication/Urban_Handbook_Final.pdf))

But these national mechanisms do not yet have their equivalents at the local government level. Development banks and international organizations contribute significantly in their respective mandate areas: their primary contributions should be toward the creation and strengthening of institutional capacities at the local and national levels, generating a base of expertise and transfer via technical cooperation and training of counterparts, advocacy and policy dialogue that will contribute to raising awareness and political commitment in local and national level decision-making. The role of local authorities and local people is essential.

In addition, donors can contribute by documenting and disseminating best practices and lessons learned. Although experiences and capacities are scattered in the region, initiatives and programs have been created in recent years that seek to develop advocacy capacities at all levels to promote public policy for disaster risk reduction in cities. In the case of Colombia, the United Nations Population Fund, in collaboration with the Ministry of Environment, Housing and Territorial Development, developed a project called **“Strengthening Population Dimension in Land Management Processes”**, in order to increase the efficiency of efforts undertaken by the Ministry, the Autonomous Regional Corporations, local and regional administrations and other stakeholders. A methodological guide, a Conceptual Framework and a series of publications that collect the various

contributions were produced. Other recent outputs of these efforts include the **Thematic Platform on Urban Risk**<sup>26</sup>, which promotes direct exchanges between cities and specific sub-regional programs that enable the systematization and socialization of experiences and lessons learned, such as the **“Program for the Reduction of Vulnerability in Andean Capitals”** (UNDP).

With regard to population dynamics, demographers have a long tradition of generating projections and scenarios based on demographic trends of demand for housing, education, health, and others. Projections have also been made for small areas, however methodological consensus is lower in these cases. Also, available human resources are scarce. It is necessary to further develop capacities in countries with a limited availability of experts in this field. The strategic program of the UNFPA includes strengthening institutional capacity and human resources and achieving greater consensus and methodological development for population projections of small areas, in coordination with other agencies. Specifically, if they are to be used in risk management and prospective planning, projection methodologies should be appropriate for small areas and incorporate, beyond demographic variables, symptomatic indicators and local advocacy mechanisms, i.e., the projection should be as accurate as possible, accounting for the social and political characteristics and dynamics of each projected work area.

26 Available at: [http://www.eird.org/wikiesp/images/PRU-Documento\\_de\\_referencia-abril\\_08.pdf](http://www.eird.org/wikiesp/images/PRU-Documento_de_referencia-abril_08.pdf)



## 7. FINAL REMARKS

**B**ased on the above, some articulating elements can be suggested to stimulate a more structured discussion of key challenges and possible synergies arising from the linkages between population dynamics, urbanization and disaster risk reduction. These elements are based on a number of trends consolidated and validated by the evidence mentioned in this document and can be summarized as follows:

- Future population growth will be concentrated in the cities. This is an irreversible trend, inherent to the current economic development, and to the people's search for better opportunities. The growth of employment opportunities will be tied to the diversification of economic activities in cities.
  - Urban growth is being generated mainly by the natural growth of cities, in contrast to past trends based on rural to urban migration. The contribution of migration to the city has declined and will continue to lose significance as a driver of urban growth. However, migration from the country to the city is still significant in certain countries, and in these cases, policies must address the situation and needs of these contingents, advocating for their right to the city.
  - Differences in fertility levels of social groups show that poor segments of urban populations make the largest contribution to urban growth, in addition to the contributions of rural migrants, also predominantly poor.
  - The urban poor and migrants have been the predominant population of urban slums. Without proactive interventions to reverse these trends, the proportion of these groups will grow, and the poor conditions of the areas they occupy will tend to reproduce or worsen.
- With the influx of these demographic trends, disaster risk also acquires an increasingly dominant urban angle. Its spatial pattern is generally associated with unplanned city growth, where the levels of vulnerability feed urban poverty and in many ways reproduce slum conditions, which also serves to amplify the hazards.
  - One of the patterns of disaster risk that emerges from the analysis of local losses is largely associated with the impact of floods and other hydrometeorological hazards. Climate change is a global factor that magnifies these hazards and increases the associated risk in urban environments. **Box 9** presents an outline to guide the analysis of the drivers of exposure and vulnerability, the consequences, and potential adaptive responses and costs associated with climate hazards. This can be used to generate a cost-benefit analysis of investments needed to reduce risk.
  - Another relevant trend is the increase of disaster risk in small- and medium-sized urban centers, most affected by losses associated with the impact of natural disasters. This pattern becomes more significant as small and medium-sized cities become the primary contributors to the overall increase of the urban population.
  - The general conditions of urban population growth and increased risk reflect, inter alia, the weakness of urban governance structures. This translates into informal settlements, substandard housing, a lack of basic services and general conditions of poverty, resulting from the absence of planning and growth management. In this context, the role of local governments and the empowerment of the urban poor become increasingly important.



## Opportunities and challenges:

Based on these patterns and trends, the following series of opportunities for and challenges to urban intervention emerge, including:

- The potential of demographic analysis and tools is not well integrated into overall urban planning, or into disaster risk reduction strategies, in particular.
- A careful study of demographic trends and their determinants would allow to better target efforts to slow overall growth and particularly in urban areas. It would also provide for improved population projections and the construction of derived scenarios as a foundation for prospective urban risk planning and reduction. Demographic projections provide a level of certainty in the short and medium term and serve as a relatively reliable base to guide prospective plans.
- The disaster risk reduction approach has promoted an even greater development of corrective management tools. This field also influences urban risk management. Similarly, there has been a greater development of tools and mechanisms to promote urban risk reduction associated with seismic hazards compared to other hazards. The current context and patterns of urban risk warrant greater efforts to promote and strengthen prospective risk management measures, especially those that address weather hazards.
- Related to this, the differential pattern of urban growth and the levels of disaster risk in small and medium-sized cities, not only demand an increased focus on the region's urban centers, but also provide greater opportunities in planning for growth. It is in these small and medium urban environments that population growth scenarios are most likely to inform strategies and measures that are more easily implemented by local authorities, in order to guide urban expansion.
- Prospective city planning needs to identify and develop areas with basic facilities in order to channel urban growth more efficiently (especially in small and medium-sized cities), in the context of rapid urbanization and disaster risk reduction.
- This focus on small and medium cities will require major efforts in both technical assistance and capacity development/building, since while they offer the best prospects for implementing the most promising approaches, these centers, because of their size, often have fewer resources and capacities.
- From this same perspective, social housing policy is one sector that offers significant opportunities to focus priority efforts, which can promote a comprehensive approach to increase the resilience of the urban population's most vulnerable groups.

These points only seek to draw attention to some issues to generate discussion and efforts to better integrate the contributions of demographics and disaster risk reduction into urban management and planning. Of note in the current context of rapid urbanization – greater concentrations of both economic activities and populations in cities, as well as poverty and disaster risk– is that the strengthening of urban governance will undoubtedly be a critical factor that will enhance all efforts to achieve more resilient cities and the well-being and security of the region's populations.

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