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Understanding Social and Environmental Hazards in Urban Areas: An Analysis from Barranquilla, Colombia

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Abstract: The present research aims to understand the challenges faced by a Colombian city in the context of multidimensional risk scenarios, given the existing demographic and socio-economic conditions and local perspectives and perceptions regarding socio-environmental risks. The research was undertaken in the city of Barranquilla, northern Colombia. A survey was designed to analyze (1) the general socio-economic and vulnerability conditions of a communities' sample, (2) information related to hazards and disaster risk in their neighbourhoods, and (3) information on actions to mitigate risk. Three hundred and ninety-one people were surveyed. Likert scale and Pearson's Chi-square test and descriptive, inferential statistical methods, regression models, and the Mann–Whitney U test were used to process the results. Respondents lived, in general, under precarious socio-economic conditions (such as low income or lack of infrastructure and others). Given socio-environmental constraints, the research revealed that hazards such as urban stream flooding and robbery were the most negatively associated with the respondent's quality of life. Regarding the actions to avoid losses, 84% of respondents had not implemented any preventive action. Respondents also have low awareness of the need to implement risk prevention actions. Social risks and the configuration of anthropic hazards stand out as principal centres for concern.

Keywords: developing cities; quality of life; risk reduction; social vulnerability; sustainable development goals; urban poverty

1. Introduction

Floods, droughts, extreme temperatures, and storms are of concern to people and institutions (Hardoy and Pandiella 2009) because urban authorities in developing countries are obliged to consider the challenges and contribution of disaster risk to their plans for poverty reduction and economic growth (Choudhary et al. 2019). In this context, risk contributes a level of stress for vulnerable cities and populations that must make decisions facing many uncertainties (Hardoy and Pandiella 2009). The above is magnified by the conditions faced by cities located in the global south. (Choudhary et al. 2019). Therefore, there is widespread concern about the current and future implications of disaster risk for urban areas in developing countries, where cities proliferate most rapidly, and a high proportion of urban populations are poor (Tyler and Moench 2012). The above situation is what some authors call the 'double exposure' of cities in developing countries (Silver et al. 2013).

The most impoverished countries and poorest people are most vulnerable because of a lack of sufficient means to adapt, mitigate and prevent, signifying that damage and loss are unequally distributed (De Sherbinin et al. 2007). One essential cause of disasters in developing cities is the uneven distribution of social and financial capital (Choudhary et al. 2019). Moreover, in urban areas where the land available for housing is unaffordable for low-income groups, the choices for a location with low exposure to natural hazards are limited (Hardoy and Pandiella 2009). Thus, urban expansion occurs in areas prone to hazards (Mavromatidi et al. 2018) such as landslides or flash floods.

The above-described context means that the most vulnerable groups (i.e., low-income groups in general, women, children, and the elderly) may often find their everyday struggles and difficulties compounded by the presence of disaster risk and disaster itself[1]. The emerging impacts of climate change and newer biotic and social hazards, together with the dangers inherent to the areas where cities are built, will increase the risk to these populations (Silver et al. 2013).

The vulnerability has an intrinsic association with people, places or things, regardless of whether they experience a hazard that may or may not cause harm (Carter et al. 2015).

Furthermore, vulnerability is the degree to which a system is likely to experience harm due to exposure to perturbations or stresses (Milanés Batista and Szlafsztein 2018; De Sherbinin et al. 2007) and is many times a pre-existing condition and an internal state (Leary et al. 2008). In this sense, social vulnerability is understood as the product of social stratification, social inequalities among different groups of people, and different environmental locations (Ge et al. 2017). Therefore, vulnerability is associated with several disadvantages in the context of social progress (Medina Pérez et al. 2019).

As disaster risks are strongly related to social vulnerability, impact assessment must be viewed from the perspective of society (Mavromatidi et al. 2018; Milanes et al. 2021). Increasing hazards and city growth call for strategies for the analysis of risk (including hazard, exposure and vulnerability factors) in urban areas (Zanetti et al. 2016) since this kind of assessment is needed to set up relevant disaster risk management and climate change adaptation policies (Yoo et al. 2011).

It is well known that urban areas today are home to 55% of the world's population (UNFPA 2018) and more than 80% of the Latin American and Caribbean population, and will continue growing for the next decades. In these circumstances, disaster risk is rapidly presenting additional obstacles for those subsisting and surviving under already poor living conditions in informal settlements (Dodman et al. 2018). The above evidence the scarse governability of these territories (Padilla-Llano 2015, 2020) and threatens the quality of life of the citizens.

In this context, several authors have discussed the relationship between quality of life and disaster risk in vulnerable scenarios (Sarmiento and Torres-Muñoz 2020; Cui and Han 2018; Aihara et al. 2018; Khachadourian et al. 2015; Lin et al. 2002; Wang et al. 2000). As the quality of life is a multidimensional construct that includes at least physical capacity, psychological well-being, social relationships, and environment (Lin et al. 2002), disasters signify devastating physical and psycho-social impacts on human life (Ardalan et al. 2011). Therefore, this concept becomes perplexing in the context of complex urban networks, as the human component constitutes a social network itself (Bozza et al. 2015).

In the context of disaster risk management, disaster risk is influenced by broader national and global factors; however, it is shaped at the local level (Maskrey 2011). Moreover, identifying societal vulnerability is crucial for effective disaster risk management (Zhou et al. 2014). An interesting definition of vulnerability states that vulnerability is the unfavourable property of socio-ecological systems "which unfolds in the interaction between humans and nature, and it can be reduced by enhancing preparedness and promoting social learning" (Lei et al. 2014, p. 4). The role of the local population is topical for local disaster risk reduction because, despite socio-economic constraints, local people can respond, recover and deploy activities to face emergencies (Akter and Mallick 2013; Sandoval Díaz et al. 2018). They also can contribute to a significant reduction and prevention of

risk factors, underlying causes and drivers of risk. Hence, the decision-making in disaster risk management has evolved from 'top-down approaches' to 'people-centred' approaches (Scolobig et al. 2015).

Given the former considerations, our research is framed in the context of the Sustainable Development Goals, mainly the 11th goal, 'Sustainable cities and communities.' The present paper is a result of the project 'Knowledge in Action for Urban Equality' (https://www.urban-know.com/ accessed on 15 October 2021), which considers resilience, poverty and prosperity and promotes comparative inquiry for helping achieve civil equality in different countries and cities. The project challenges how communities across urban contexts similarly or differently experience or relate to poverty, prosperity and resilience.

The geographical conditions of Colombian cities and the growth and evolution of urban settlements have consolidated un-adapted cities for preventing multidimensional risk scenarios (Guo et al. 2018; Pardo Martínez 2018).

In this case, we present Barranquilla as a case study on Latin American cities' current process of growth and configuration and the challenges they face in integrating notions of development, prosperity, and quality of life into planning formats and actions. Furthermore, the need to analyze the reduction of social inequities that preceded risk situations in urban growth and how they could participate in disaster risk management at the local level are highlighted. In this sense, we expect to understand the challenges that developing cities face, where multidimensional risk scenarios are present, given the existing demographic and socio-economic conditions and local perspectives regarding socio-environmental vulnerabilities and hazards.

This work aimed to analyze the perception that citizens have of the threats to which they are exposed, determining how they affect their appreciation of the quality of life and the actions that people take to mitigate the risk in two localities of Barranquilla city. This city is the most affected by urban streams in South America, which occur every time it rains (Acosta-Coll et al. 2018). Moreover, landslides are characteristic of the southwestern side of the city and are exacerbated by the rainy season each year.

2. Materials and Methods

2.1. Study Area

The research was undertaken in the city of Barranquilla, one of the main cities of the country, located in northern Colombia (see Figure 1). The economic dynamics of the city at the end of the 19th century led to the rapid growth of the population, mainly through international migration (especially Germans, Americans, Italians, Spanish, Lebanese, Jews, among others), and through rural-urban migration. This two-pronged process led to the city's expansion following two distinct socio-economic patterns: the business elite to the northwest and the working-class neighbourhoods consolidated to the south of the city (Romero De Gutiérrez 2018). Land invasions also occurred, especially in the southwestern zone. These were transformed into subnormal neighbourhoods lacking essential public services. As the city grew, issues arose, such as informality, the inability of the administrations to generate development policies for the entire population, and the corruption that influenced the lack of social investment opportunities. Expansion towards the northwest occurred with the construction of housing and residential areas following planning dictates and norms for a population with more significant economic resources (Romero De Gutiérrez 2018).

The city is organized into 5 administrative units, Riomar, Norte Centro Histórico, Metropolitana, Suroriente and Suroccidente. For the present study, historically populated neighbourhoods located in high-risk areas on the periphery of the city were selected. Two areas (localities) were selected; one located on the hillside of the Magdalena River in the north-eastern area—Riomar Locality (RML), and the other on the southwestern slope—the Suroccidente Locality (SOL) (see Figure 1). RML is characterized by a marked inequality in socio-economic characteristics, urban endowment, and exposure to disaster risks. On the

other hand, the SOL is characterized by poor socio-economic conditions, and a significant part of the population is affected by landslides, urban pluvial streams, and flooding.

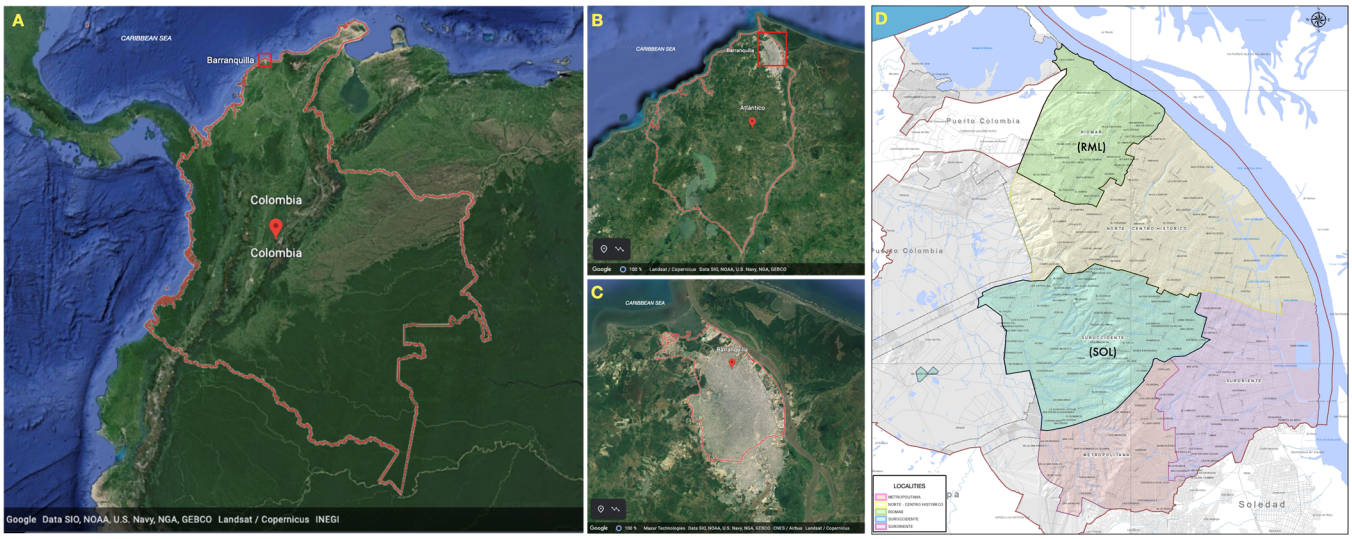

Figure 1. (**A**). Barranquilla city's location at the Republic of Colombia; (**B**). Atlántico department and its capital Barranquilla; (**C**). Barranquilla city. Scheme 2021, accessed on 25 August 2021. (**D**). Riomar (RML) and Suroccidente (SOL), localities of the city of Barranquilla focused on the study. Source: adapted from Plan de Ordenamiento Territorial de Barranquilla 2012–2032.

2.2. Study Design

A survey was designed in order to analyze (1) the general socio-economic and vulnerability conditions of those interviewed; (2) information related to hazards and disaster risk in the neighbourhoods; and (3) information on actions taken to mitigate risk. A purposive sample of 25 people from the SOL answered a preliminary version of the survey, where a semantic validation of the items was undertaken. Additionally, correlations were made between the items on the scale that allowed identifying those most relevant and conditioned to one another. The scales of some questions were clarified, and questions that were difficult for the community to understand were deleted. Moreover, MacDonald's ω (0.65) and Guttman's $\lambda 6$ (0.72) were used to estimate the final reliability of the questionnaire.

The survey comprised 20 questions and three sections (see Supplementary Materials Table S1 for details). Paper-based and random door to door questionnaires were distributed among 391 people. A sampling approach was chosen, initially based on clusters (neighbourhoods) and then through simple random sampling, according to the proportion of the population in each associated neighbourhood (SOL = 135; RML = 256).

2.3. Data Analysis

Data analysis was achieved through descriptive, inferential statistical methods (SPSS 25®) and regression models (STATA 14®). Pearson's Chi-square test ($p < 0.05$; $p < 0.10$) was applied to identify significant differences between different variables in the study locations (RML and SOL). Additionally, the Mann–Whitney U test ($p < 0.05$) was applied to identify significant differences regarding social welfare levels in the neighbourhood vs. the perceptions of various hazards amongst the population in each locality. Finally, an adjusted (multivariate) and unadjusted (bivariate) logistic model was applied to analyze the correlation between the self-reported perception on the existence of a good quality of life (yes/no) and social and environmental hazards in the study area.

3. Results

3.1. General Information about Socioeconomic Characteristics

Of the 391 respondents (see detailed results in Table 1), 60% were women. The average age of the respondents was 39 years (S.D. = 14). Sixty-five per cent of the respondents belong to the locality of RML, and the remaining 35% to SOL. Furthermore, 69% of respondents in the SOL were unemployed, while in RML, unemployment was 52%. Household occupancy consisted of four to six people (57%), and the family nucleus was made up of an average of four people per household.

Table 1. General socio-economic information.

Variable	Frequency	%	Variable	Frequency	%
Gender			Educational level		
Male	152	39	None	15	3.8
Female	234	60	Elementary	101	25.8
Monthly incomes (USD) *			Baccalaureate	174	44.5
$0–103.23	131	33.5	Technical study	62	15.9
$104–213.61	138	35.3	Undergraduate	14	3.6
$214–438.71	76	19.4	Graduate	24	6.1
>$439	14	3.6	Good quality of life		
SISBEN **			Not	156	39.9
Not	98	25.1	Yes	232	59.3
Yes	292	74.7			

* 1 USD = 3875 COP (25 August 2021). ** SISBEN: Colombian system for social assistance.

Sixty-eight per cent of respondents have incomes under 214 USD a month. The predominant educational level was high school (44%). For the most part, respondents had access to basic public services (street cleaning = 92%; water supply = 96%; electricity = 98%; household gas = 81%; sewage system = 82%); other services were scarcer such as cell phone (28%), landline phones (28%) and internet (42%).

An important research finding relates to the good quality of life (GQL) perceived in the neighbourhoods. The results show that 60% affirmatively claim to have a GQL. However, the Pearson's Chi-square test showed a significant difference between the quality of life perceived in the two localities ($p = 0.003$); thus, the SOL presented a higher proportion of people who said they did not have GQL (SOL = 55%; RML = 45%).

The survey revealed interesting aspects related to social welfare levels in the neighbourhoods (Table 2). Thus, for example, travel times to places where respondents obtained essential services was established. The estimated average times to access medical services were for general medicine, 31 min, specialized medicine, 37 min, and emergency services, 27 min. Additionally, the aspects that most contributed to welfare were established through the Likert scale (score of 1–10).

Table 2. Aspects related to the quality of life.

Items	Mean	Dev. Est.	Median
Quality in public services	5.9	2.8	6
Closeness to the workplace	6.1	3.4	7
Closeness to health services	7.0	2.6	8
Access to public transportation	8.0	2.5	9 *
Closeness to education services	8.4	2.1	9 *
Feeling of security	4.4	3.1	4
Cultural activities	4.5	3.3	4 *
Relationship with neighbours	8.1	2.5	9
Closeness to recreation areas such as parks or courts	7.4	3.1	9 *

* We identified through the Mann–Whitney U test that RML had higher values in the qualification of access to transport ($p = 0.000$), access to educational services ($p = 0.033$), cultural activities ($p = 0.001$), and proximity to recreation areas ($p = 0.000$).

It is evident from the information provided in the previous table that the aspects that least contributed to the quality of life of the respondents were the negative sense of security (4/10) and the lack of cultural activities (4/10). On the other hand, the aspects that contribute most to the quality of life were access to collective services or goods (access to public transport = 9/10, proximity to education services = 9/10, proximity to recreation areas such as park or courts 9/10; closeness to health services = 8/10 and closeness to work = 7/10).

3.2. Information Related to Socio-Environmental Hazards and Disaster Risk

The identification of social and environmental hazards in the neighbourhoods was attempted, considering their recurrence (Table 3). It is noteworthy that the most frequent hazard identified was drug addiction (85%), followed by robbery (63%), urban streams or floods (39%), and homicides (24%). That is to say, social hazards are more important in the population's life view than physical hazards, thus confirming the analysis presented in the introduction.

Table 3. Information related to the frequency of hazards in the neighbourhoods (see Supplementary Materials Table S2 for analysis in each neighbourhood).

Environmental Hazards			Social Hazards		
Variable	**Q**	**%**	**Variable**	**Q**	**%**
Fires			Drug addiction		
Never	266	68.0	Never	26	6.8
Sometimes	112	28.6	Sometimes	33	8.6
Frequently	10	2.6	Frequently	323	84.6
Urban streams			Sexual abuse		
Never	145	37.1	Never	240	61.4
Sometimes	94	24.0	Sometimes	125	32.0
Frequently	152	38.9	Frequently	22	5.6
Earthquakes			Robbery		
Never	355	90.8	Never	34	8.7
Sometimes	36	9.2	Sometimes	111	28.4
Landslides			Frequently	246	62.9
Never	360	92.1	Homicides		
Sometimes	28	7.2	Never	121	30.9
Frequently	3	0.8	Sometimes	174	44.5
Vector diseases			Frequently	95	24.3
Never	159	40.7			
Sometimes	156	39.9			
Frequently	68	17.4			

Fifteen per cent of the respondents indicated that they had suffered losses due to previously occurring disaster events. Regarding the actions generated to avoid loss, 4% stated they received training for emergency management, 2% changed their place of residence to mitigate or avoid hazards, and 84% had not developed any preventive action.

Regarding the perception of respondents about their vulnerability to different hazards (1–4 scale), the types of hazards that generated higher values were: drug addiction (4/4) and robbery (3/4). Under certain circumstances, social hazards can also be seen as a vulnerability when faced with other hazards. For example, drug addiction and robbery can be seen as hazards, but depending on where they occur, they can increase the vulnerability to natural hazards, such as flooding and landslides. Their presence may inhibit persons acting consequently due to feelings of insecurity that reduce their willingness to invest in their homes. As mentioned by Lavell et al. (2012) "*disaster signifies extreme impacts suffered when hazardous physical events interact with vulnerable social conditions to severely alter the normal functioning of a community or a society*" (p. 1).

The remaining values were in the middle to low ranges. Urban streams (2/4), homicides (2/4), sexual abuse (2/4), and illness (2/4) were rated with intermediate values. The

respondents rated fires, earthquakes, and landslides with low values (1/4). Concerning the differences in the perceptions of the inhabitants of the two localities, it was found that there were significant differences between these, with higher values for urban streams ($p = 0.024$), landslides ($p = 0.000$), and robbery ($p = 0.000$) in the SOL.

Table 4 depicts a bivariate and multivariate correlation between the respondents' perceptions of QGL and the values assigned to the hazards. The results indicate that in the bivariate analysis, hazards such as urban streams, landslides, robbery, and drug addiction significantly influenced respondents' perceptions about GQL. On the other hand, in the multivariate analysis, when the dependent variable was controlled, only socio-environmental hazards such as urban streams and robbery negatively influenced the respondent's GQL. The remaining hazards were not statistically significant in the adjusted model.

Table 4. Factors influencing respondent's perceptions of good quality of life.

Dependent Variable	Good Quality of Life							
	Unadjusted (Bivariate)				Adjusted (Multivariate)			
Independent Variables	**Coef.**	**Std. Err.**	**z**	**P > z**	**Coef.**	**Std. Err.**	**z**	**P > z**
Fires					−0.07480	0.136	−0.55	0.584
Urban streams	−0.76361	0.129	−5.89	0.000 *	−0.77290	0.138	−5.57	0.000 *
Earthquake					−0.09057	0.391	−0.23	0.817
Landslides	−0.60569	0.336	−1.80	0.072 ***	−0.13143	0.368	−0.36	0.721
Homicides					0.055201	0.132	0.42	0.676
Heists	−0.86386	0.188	−4.59	0.000 *	−0.98023	0.206	−4.75	0.000 *
Sex_abuse					−0.01474	0.012	−1.14	0.255
Drugs	−0.01864	0.008	−2.17	0.030 **	−0.01458	0.009	−1.54	0.125
Illness_vectors					0.00782	0.008	0.90	0.369
_cons					4.8875	0.807	6.06	0.000

Sig. * $p < 0.00$; ** $p < 0.05$; *** $p < 0.10$.

3.3. Information Related to Actions to Mitigate Socio-Environmental Risk and as to Social Participation

This section discusses the extent to which respondents recognized the existence of installed capacities and knowledge as to what to do when facing threatening events in their neighbourhoods. Survey results show that only 11% of respondents were part of a social organization, and 9% have been part of projects for risk prevention. On the other hand, as regards response capacities, 50% had telephone contacts with the police, and 60% knew the lines for accessing emergency care. Concerning their knowledge about what to do in case of an emergency related to physical hazards, 55% of respondents said they did not know what to do. A Chi-square test did not show a significant association between respondents having been part of projects for risk prevention and what to do in case of an emergency ($p > 0.05$; $p = 0.06$). Likewise, 71% of the participants reported knowledge of preventive actions for vector related diseases.

4. Discussion

4.1. Socio-Environmental Context of Vulnerability

Survey results depict a context of socio-environmental vulnerabilities and hazards that comprise risk situations in urban growth and are significant in considering the necessary conditions for promoting successful disaster risk management at the local level. The questionnaire results revealed that the socio-economic conditions of the respondents are precarious (Table 2). High unemployment (60%), low levels of income (68% earn one MCLW or less), and high levels of dissatisfaction with the quality of life (bad quality = 40%) can be highlighted here. The above findings are particularly relevant in the SOL, where the perception about the GQL is lower than in the RML ($p = 0.003$). Moreover, results depict significantly lower levels of welfare in the SOL neighbourhoods (Table 2). In this sense,

results are in line with findings that report serious challenges related to the respondent's living conditions, where several socio-economic constraints exist (Goryoda et al. 2019). They also reinforce the statement that socio-economic issues significantly impact the quality of life in vulnerable environments (Chacowry 2016).

The relationship between the quality of life of the respondents and the hazards they identified revealed that some environmental and social aspects have a negative correlation with the respondents living conditions both in bivariate and multivariate analyses (Table 4). In this line of analysis, some researchers have discussed the relationship between living conditions and single environmental hazards such as earthquakes (Cui and Han 2018; Giuliani et al. 2014; Lin et al. 2017), tsunamis (Peters et al. 2016), or landslides (Nathan 2008). However, a broader and integrative perspective is proposed here as more than one environmental aspect was analyzed, while more aspects of context were also analyzed, including social and environmental dimensions. This approach shed light on the multidimensional hazards present in a developing city, such as Barranquilla, and their relationships.

4.2. Perceptions about Hazards and Risk Environments

One outstanding aspect of the project results refers to the respondents' exposure to hazards. It relates both to frequency and the associated perception of danger. In this sense, results suggest that the most threatening aspects are anthropic and related to citizen security. Results indicate that the perception of hazard is related to social aspects (Cid Ortiz et al. 2012) and highlights the fact that people's perceptions of hazards are both socially constructed (i.e., contextual) and subjective (Adomah Bempah and Olav Øyhus 2017).

The respondents rated low-risk for most of the 'environmental' hazards (i.e., fires, earthquakes, and landslides). However, in SOL, urban streams and landslides were more highly rated than in RML. This result relates to the higher levels of exposure of the inhabitants in the SOL to these phenomena and draws attention—as other research has done—to the levels of awareness of urban streams flooding (Adomah Bempah and Olav Øyhus 2017; Bodoque et al. 2016; Lara et al. 2017) and landslides (Cid Ortiz et al. 2012; Li et al. 2019). In this context, social perception is essential because it helps managers understand communities' physical and social world (Adomah Bempah and Olav Øyhus 2017) and highlights the importance of social perceptions according to the multidimensional hazards of their local context.

Other studies that seek to integrate risk management perspectives, adaptation to climate change, and city planning, have found the relevance of social aspects in the construction of resilient cities. An example of this is the City Resilience Framework project developed by ARUP with support from the Rockefeller Foundation in six cities (Cali, Colombia; Concepción, Chile; New Orleans, USA; Cape Town, South Africa; Surat, India; and Semarang, Indonesia). They have found that the concerns and priorities about the city's functioning among the most vulnerable groups are very different from those of the government and the private sector. Similarly, they have perceived a clear distinction between cities that had experienced shocks and those that had not. Even different groups within the same city had different perspectives and priorities on what makes their city resilient.

However, based on the experiences of those six cities, a certain level of agreement has been reached regarding what would be the characteristics of a resilient city: minimal human vulnerability; diverse livelihoods and employment; effective safeguards to human health and life; collective identity and community support; comprehensive security and rule of law; sustainable economy; reduced exposure and fragility; effective provision of critical services; reliable communications and mobility; effective leadership and management empowered stakeholders; and integrated development planning. On the contrary, a territory characterized by ill-health or insecurity, an unsafe environment, conflict, and deprivation would be a non-resilient city (ARUP and The Rockefeller Foundation 2014).

The relevance attributed by the participants in this study to social hazards reflects a perspective that goes beyond the delimitation of disaster risk associated with physical

threats and constitutes an opportunity to integrate the reduction of inequality and risk management in city development planning policies.

4.3. Social Awareness and Preparedness for Disaster Risks

Risk awareness and preparedness can affect people's vulnerability since poor consciousness may exacerbate vulnerability considerably (Ainuddin and Kumar Routray 2012). In this context, survey results illustrate that the community in the two studied localities have a poor knowledge base to face hazards. Just 4% have been trained in emergency management, 2% have changed their residence, 84% have not developed any preventive action. Furthermore, only 9% have been part of projects for risk prevention, and 45% stated that 'they would know' what to do in case of a disaster. A shallow level of preparedness for emergencies was found (4%), contrary to other research that found more than 20% in social training for emergencies (Castro et al. 2017). Even the values of 'what to do' facing emergencies are very low compared to results provided by other studies that found above 50% of the population were cognizant of what to do (see Bodoque et al. 2016, for example). Regarding the above, some authors stress that due to varying socio-economic conditions, the community perception about risk and their consequences—and actions—may vary (Rehman et al. 2019). Furthermore, residents' awareness of disaster risk reduction is an essential factor influencing their behavioural decisions (Xu et al. 2019). Attention must be paid to people's interpretations of risks, shaped by their own experience, feelings, values, cultural beliefs, and interpersonal and social dynamics (Eiser et al. 2012). The lack of human and technical resources produces poor disaster awareness and an ineffective implementation of prevention and mitigation strategies at the local levels (Ainuddin et al. 2013).

5. Conclusions

The aspects that stand out from the results were social vulnerability and the configuration of anthropic hazards. The elements that contribute most to the welfare in the neighbourhoods were those related to access to public goods and services that contribute to the reduction of social vulnerability. Similarly, the low levels of social awareness in the localities to face the multidimensional hazards must be highlighted. For this reason, subsequent research and policy development is necessary to encourage and develop citizen empowerment and participation schemes, which allow greater consolidation of the pathways along which plans, programs, and projects for risk prevention or mitigation can be structured. This means that it is not only important to have a presence in the decision-making places but that it is essential to promote and stimulate an active and dynamic role in the structuring and vision of local development (Remesar et al. 2012).

In the comparative analysis between localities, the SOL had higher degrees of vulnerability, not only because it presented proportionally higher levels of unemployment and poverty but also because the results showed that respondents did not perceive a GQL of life in the locality due to the absence of public services and collective goods when compared to RML. Furthermore, in the RML, higher levels of perception related to hazards existed, particularly those related to events such as urban stream flooding, landslides, and robbery.

The present article is a contribution to SDG 11.7.(A)—Strengthen national and regional development planning, and support positive economic, social and environmental links between urban, peri-urban, and rural areas by strengthening national and regional development planning. This context poses a substantial challenge from the perspective of social vulnerability management and the promotion of strategies aimed at including these communities in processes oriented to generate installed capacities and their inclusion in the city-development plans.

Supplementary Materials: The following are available online at https://www.mdpi.com/article/10.3390/socsci10110411/s1, Table S1: Description of the study variables, Table S2: Information related to the perceived frequency of hazards in each neighbourhood.

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Note

[1] Disaster risk, seen as a latent condition, signifies that communities in such areas often do not invest in their houses or infrastructure. At the same time, many local governments are normatively limited in the investments they can make in their territories. The disaster itself leads to loss of the investments made and little chance of their recovery.

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