

Article

# Understanding and Building Community Disaster Resilience: Perspectives from Different Types of Communities

Linpei Zhai and Jae Eun Lee\*

Department of Public Administration & National Crisisonomy Institute, Chungbuk National Univesity, Cheongju, Chungbuk 28644, Korea,

\* Correspondence: [jeunlee@chungbuk.ac.kr](mailto:jeunlee@chungbuk.ac.kr) Tel.: +82-43-261-3337

**Abstract:** This study aimed to explore whether the differences in different types of community resilience are significant and how to improve community disaster resilience. This study selects the citizens of Zhengzhou city as the research object, and the main results of the analysis are as follows: In general, commercial housing communities scored highest on the three dimensions of human capital, physical infrastructure capital, and adaptation, urban village communities scored highest on the three dimensions of social capital, institutional capital, and community competence, and family court communities scored the lowest on each dimension. There are some differences among the three types of communities in each dimension. The three types of communities differed the most in human capital, followed by community competence and social capital, adaptation, and finally institutional capital and physical infrastructure. At the same time, targeted enhancement paths and countermeasures are proposed for three different types of communities, providing relevant thinking and countermeasure suggestions for relevant government departments and other stakeholders to enhance disaster community resilience, effectively respond to disasters, and reduce disaster risk paths.

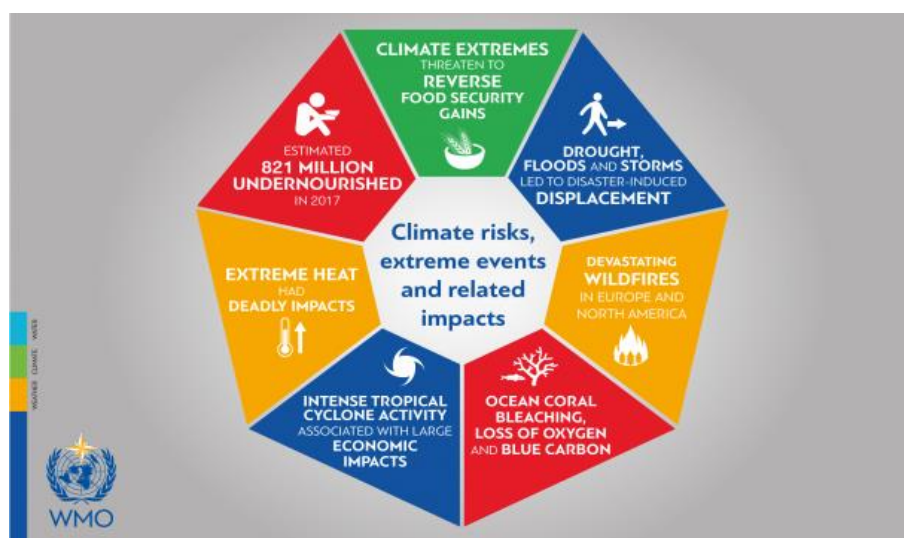
**Keywords:** resilience; disaster resilience; community disaster resilience; climate emergency; disaster governance; disaster risk reduction

## 1. Introduction

One of the biggest challenges facing the world today is climate change, which is posing a number of ecological, environmental, social, and economic issues that threaten human survival and growth. Human activities and natural environmental changes are important factors affecting global climate change, with greenhouse gas emissions brought on by human activity serving as the primary driver of global warming (Karl and Trenberth, 2003: 1719; Stern, 2007: 4). The negative consequences of melting glaciers, increasing sea levels, and an increase in extreme weather events (such as heat waves, droughts, strong tropical storms, and heavy precipitation events) have been brought on by global warming (Wu et al., 2013: 809). According to the IPCC report from 2022, anthropogenically induced climate change, including more frequent and powerful extreme events, has had widespread negative effects and related losses on nature and humans that go beyond the normal rate of climate fluctuation. The most vulnerable persons and systems appear to be disproportionately impacted across sectors and geographical areas. Extreme weather and climate events are increasing, outpacing nature and human systems' capacity to adapt, which has resulted in various irreversible effects (IPCC, 2022: 9). The effects of climate change are multifaceted, and weather (climate) change is already having a big impact on a lot of different things, like national income, economic growth, agricultural production, industry, and tourism, as well as on things like human health, labor productivity, energy demand, conflict/political stability, and population migration. In developing countries,

where vulnerable groups are already fighting to eliminate poverty and achieve sustainable development, climate change poses extra dangers in the form of greater temperatures, unpredictable extreme events, and changes in precipitation (Huq et al., 2004: 6). Barnett and Adger (2007: 640) also point out that the term "security" is being used more frequently to describe these climate-related dangers, which could heighten the likelihood of armed conflict.

Climate emergency and disasters are related. Global severe weather events have become more frequent and more intense due to climate change (Coronese et al., 2019: 21450; Van Aalst, 2006: 7-8). Although disasters are sometimes seen as a continuous issue, their effects are visible at the local level (Mohammad, 2016:12). Climate change-related disaster extreme events, whether they are natural or man-made, exceed the tolerable magnitude of the range or last for an extended period of time, making adaptation challenging and resulting in catastrophic property losses and the paralysis of income and livelihoods (Khan et al., 2008: 43). These occurrences have severe negative consequences on society as they accelerate environmental natural processes and lead to catastrophes. Natural catastrophes can happen everywhere, but their consequences can be lessened even when they cannot be stopped (Alfaras, 2020: 1). There is mounting evidence that climate change is contributing to a rise in the frequency and severity of extreme weather, which has a terrible effect on people's lives and constitutes a serious threat to the entire world (as shown in the Figure 1).



**Figure 1.** Climate-related Disaster Impact.

Source: World Meteorological Organization (WMO,2018)

In the last few years, resilience has gained attention in the political sphere, the field of crisis management, and the news media, drawing the attention of scholars and policy-makers from various disciplines and sectors. Resilience is an innovative way of thinking about disaster governance and is a rather modern concept in the context of disaster management (Dessavre et al., 2016: 34; Meerow & Newell, 2015: 236). Communities must identify resources and make plans for how to use them in the event of a disaster in order to be prepared for emergencies. All of these can be employed to lessen the harm a disaster causes and boost the resilience of the people affected by it (Alfaras, 2020: 1). Effective disaster management, which emphasizes not only disaster response but also disaster resilience, recognizes the need to reduce the damage and duration of disasters in order to support the operations of emergency management systems. This requires the integration of resilience into disaster governance.

Nations, cities, communities, and people who are resilient are able to react quickly with post-disaster recovery and adaptation, as well as defend against and mitigate disaster losses. Communities are on the front lines of disaster resilience, whether in the fight against COVID-19 or in the face of other natural disasters like floods and rainfall brought on by abrupt climate change. Community resilience and disaster recovery will also influence and reduce disaster recovery time, and community-level responses are essential to disaster loss reduction and disaster governance. Community resilience, or the sustained capacity of communities to withstand and recover from adversity, is an emerging approach to disaster emergency preparedness and response that emphasizes effective and efficient disaster risk reduction, response, and recovery. It includes individual preparedness as well as the creation of a supportive social environment in the community (Plough et al., 2013: 1191; Chandra et al., 2013: 1182).

Building disaster-resilient communities has thus become one of the main goals of disaster governance, while community resilience and its response to disasters have become an important component of disaster prevention and mitigation. Communities are therefore crucial as the first position and basic line of defense for disaster response (Xu, et al., 2021: 2). The idea of disaster resilience has arisen to offer fresh perspectives on managing disasters, particularly when it comes to integrated multi-hazard prevention. It is difficult to say that society must "adapt" to the failures that cause disasters to occur at the local level; rather, resilience is understood as the capacity to reduce the risk and impact of crises and disasters at the local level. This requires more than an understanding of the adaptive capacity of social systems. Even though upper governmental echelons are involved, emergency management tends to place more of the burden of service delivery on local authorities (Murphy, 2007: 297).

Community disaster resilience offers a fresh perspective through which to evaluate such management, even though it is self-evident that local-level disaster and emergency management study has been ongoing for decades. Particularly for those societies whose regions rely on resources sensitive to climate change, the vulnerability of societies to risks related to climate change may exacerbate ongoing social and fiscal challenges. Therefore, understanding the local context of vulnerability is essential for effective adaptation. This calls for a deliberate and inclusive approach to adaptation decision-making, with a vulnerability-based perspective that shifts risk assessment from climate change impacts to local guidelines on how to respond to vulnerability (Ayers, 2011: 62). This is related to the need to strengthen communities' adaptive, absorptive, and resilient capacities, which has emerged as a key concept in modern urban planning, emergency response, and disaster management (Leichenko, 2011: 164; Godschalk, 2003: 137; Meerow et al., 2016: 38), and in particular "community resilience" (Cutter et al., 2008: 604; Khalili et al., 2015: 248; Rose & Krausmann, 2013: 79). Therefore, it is crucial to investigate and assess "community disaster resilience" in the framework of climate emergency.

## 2. Theoretical Background

### 2.1. *Community Disaster Resilience*

It's vital to first define the term "community" before discussing community catastrophe resilience. Despite the fact that the term "community" has been defined in a variety of ways, there is still no one, approved definition of it in the literature (Mulligan et al., 2016:3). The academic literature has employed a variety of definitions of the community up to this point, but no single term has garnered widespread agreement (Sharifi & Yamagata, 2016: 115). The word "community" is of Roman origin and has numerous definitions from various disciplinary viewpoints (Kumar, 2005: 282-283). Communities should be defined "case-by-case," according to some, and multiple scales (from community to county) might be employed as suitable analytical units for resilience evaluation (Sherrieb et al., 2010: 236).

Within the broader framework of resilience, community resilience is a developing field. Despite the word "community resilience" being frequently used in discussions of sustainability and catastrophe risk reduction, neither term has a universally agreed-upon definition. The definition of community disaster resilience is still up for debate among academics. Resilience often places more of an emphasis on the governance, environment, and social community organization problems connected with catastrophe mitigation and preparedness when applied to social systems as opposed to natural systems. In reality, society is focusing on strategies to improve and strive toward a community's overall resilience to a variety of harsh disasters (Renschler et al, 2010: 1).

This study focuses on community resilience to disasters, which is sometimes characterized as a community's capacity to deal with natural catastrophes, endure them, and recover (Castleden, et al., 2011; Collier et al., 2009; Obrist, Pfeiffer & Henley, 2010;). The ability to anticipate risk is distinct from "resilience," according to Links et al. (2018: 127) and Longstaff et al. (2010: 3), and resistance is not opposed to resilience; rather, resilience includes it. They contend that concentrating solely on resilience or resistance can result in inadequacies. A community's resources are sufficient to prevent interruptions that weaken community functioning without any adaptation if it can withstand disruptions.

In their analysis of the various stages of disaster management, Sharifi & Yamagata (2016: 115-116) define community resilience as the capacity of a community to adapt more successfully to unfavorable events and restore equilibrium. In addition to outcome-based metrics like speed of recovery and loss estimation, the definition also emphasizes the use of participatory approaches and process-based metrics like soc. According to Norris et al. (2008: 128) research of the definition and evaluation of CR, the idea of "community resilience" is challenged by the evolving definition of community as an organization with geographic borders and a shared purpose, consisting of constructed nature, and natural resources.

As a result, research on community resilience has been split into two primary strands: one focuses primarily on community resilience as a way to shield residents from suffering physical or mental health issues as a result of disasters. The other approach discusses good organizational behavior and catastrophe management, which is significantly more focused on community resilience. To put it another way, he says that building a resilient community is "the act of tying a collection of adaptive capacities to positive functional and adaptive trajectories" (Norris et al., 2008: 130). Community-level adaptation is characterized by "a high prevalence of health conditions in the community, defined as high and undifferentiated levels of psychological and behavioral health, role functioning, and quality of life of the constituent population" (Norris et al., 2008: 133).

Building and achieving community resilience is based on how these risks are controlled through risk reduction techniques. The changes that natural disasters bring about to the physical, social, and psychological realities of social existence might make this impossible. That is, whether it reflects the disaster's immediate effects or the recovery and reconstruction efforts, the post-disaster reality will present community members with a new reality that may differ in significant ways from the pre-disaster one that was the norm. As a result, people must adjust to the changed reality (either the disaster itself or the social response to it) (Paton & Johnston, 2006: 7- 8).

**Table 1.** Diverse Definitions of Community Disaster Resilience.

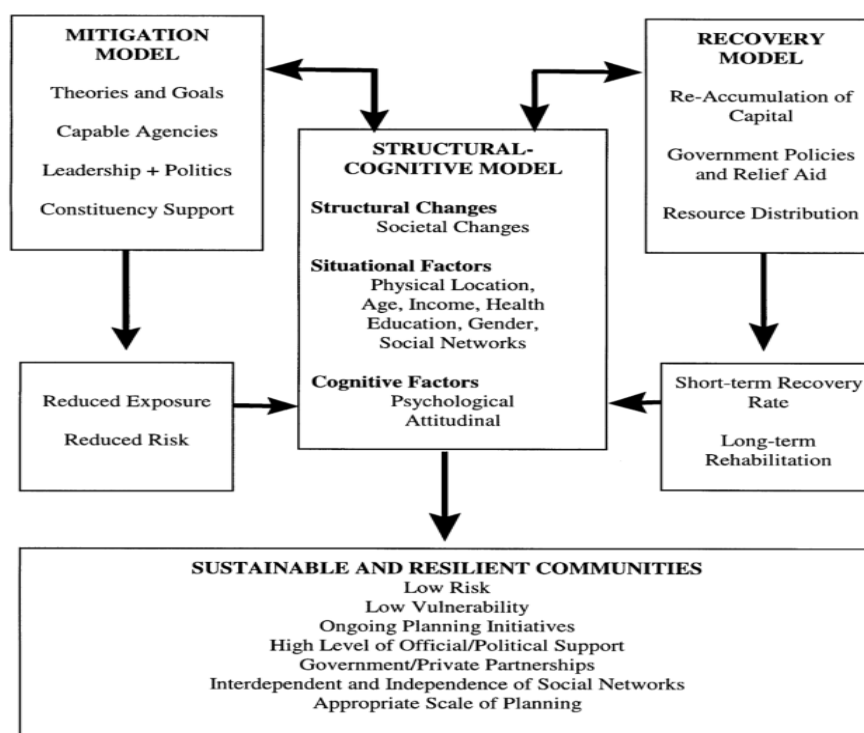
|                                    |  |
|------------------------------------|--|
| Paton & Johnston, 2001: 275        | Community resilience must include several key adaptive capabilities to ensure disaster preparedness and post-disaster recovery.  |
| Bruneau et al., 2003: 4            | Ability of social units (e.g., organisations, communities) to mitigate hazards, contain the effects of disasters when they occur, and carry out recovery activities in ways that minimize social disruption and mitigate the effects of future earthquakes.”   |
| Norris et al., 2008: 130           | Community resilience is "the process of linking a range of adaptive capacities to positive trajectories of functioning and adaptation".  |
| Lorenz, 2013: 12                   | Internal ability of the social system to counteract events described as the failure of expectation toward its environment during disasters, crises, and emergencies.”  |
| Boston et al., 2014: 3             | Community resilience is the ability of a community to recover its previous state, to function after a disturbance (e.g., earthquake) and to adapt to environmental impacts.  |
| Cox & Hamlen, 2015: 223-224        | Community resilience is the ability of a community or its components to recover from the harmful effects of a disaster. It is an adaptive, variable, and recoverable capacity through which a community can adapt and respond to emergencies in a disaster or risk context while continuing to maintain critical systems and preserve the uniqueness of the community. |
| Khalili et al., 2015: 249          | The ability of a community to withstand external social shock toward enhancing social capacity to resist disaster losses during disaster and regenerate after disaster.  |
| Adger, 2000: 347                   | Ability of groups or communities to cope with external stresses and disturbances as a result of social, political and environmental change.  |
| Kimhi & Shamai, 2004: 442          | Individuals’ sense of the ability of their own community to deal successfully with the emerging threat.  |
| Kwok et al., 2016: 205             | The ability of a community's social environment to effectively anticipate, cope with, and recover from disasters, which depends on the presence and robustness of other community features, resources, and processes.  |
| Sharifi & Yamagata, 2016a: 115-116 | Community resilience is the ability of a community to prepare and plan for, absorb, recover from, and more successfully adapt to adverse events and restore homeostasis.   |

## 2.2. Characteristics of a Disaster Resilient Community

Communities should be structurally arranged to lessen the effects of disasters and to quickly revitalize them through socioeconomic recovery. From a theoretical standpoint, it is simple to foresee such an outcome, but it is more difficult to put a detailed strategy into practice. In reality, a wide range of social, economic, political, and physical factors influence how disasters and community sustainability/resilience are related. The suggested model adopts an ecological viewpoint, drawing on political economy, human ecology, and all other facets of social political philosophy to provide a comprehensive analysis of disasters. Structured cognitive elements have a significant role in both the mitigation and

recovery phases of the disaster cycle. The structural cognitive model, the recovery model, and the three independent models (Figure 2) are combined (Tobin, 1999: 13-14).

The pre-disaster scenarios with clear objectives, sufficient resources, and long-term commitment are the emphasis of the Tobin model of disaster mitigation. Having defined policy objectives, political determination, and technical skills (including leadership and administrative ability) are essential components for implementing effective mitigation measures. Tobin advises concentrating on the important elements that aid recovery in the recovery model. Basic cleanup and recovery measures are insufficient to put communities back on their feet. The viability of long-term recovery procedures depends on their ability to account for local engagement by marginalized groups, current socioeconomic realities, and structural limitations. Focusing on structural and cognitive restrictions is the structural-cognitive model. Structure-based limitations can thwart progress by perpetuating outdated systems that could spell disaster. The mental and emotional beliefs that might produce favorable or unfavorable circumstances are known as cognitive limitations. Age-sex-race, culture, economics, and other variables may have an impact on these. Disaster resilience can be increased by including psychological factors such social-individual traits, judgments based on personal experience, and community traditions.



**Figure 2.** Tobin Model.  
Source: Tobin (1999:14)

### 3. Materials and Methods

This study used a questionnaire survey to collect data, to verify how the community disaster resilience evaluation index system and the constituent elements affect community disaster resilience and to what extent, Zhengzhou city was selected as the validation case area in this study, and a questionnaire survey was used to explore the influencing factors of community disaster resilience with citizens as the target population, and then to verify the validity of the index system. At the same time, the comprehensive resilience index values of different types of communities will be compared to reveal the differences in community resilience levels, and to compare the differences in the resilience of various

types of communities in different dimensions such as human, social, physical infrastructure, and community competence and explore the reasons for them.

The questionnaire survey in this study was commissioned to the largest questionnaire company in China (Wenjuan Xing) to distribute through online route, which was distributed from April 21 to May 1, 2023, and 396 questionnaires were collected, and after excluding 18 invalid data, the final valid questionnaires were 378. SPSS26 was used for the analysis of the questionnaire data, including reliability and validity tests, one-way ANOVA, t-test, correlation analysis, and regression analysis.

According to the analysis results (Table 2), among the 264 commercial housing community samples, men and women were roughly equal, accounting for 41.3% and 58.7%, respectively. Men and women made up roughly equal percentages of the 264 commercial housing community samples, accounting for 41.3% and 58.7%, respectively. The age structure was primarily young and middle-aged, with people primarily between the ages of 31 and 40 and 21 to 30, accounting for 45.8% and 34.5%, respectively. The education level of the interviewed families was primarily a university degree, with 188 people, accounting for 71.2%. Regarding occupational structure, residents of commercial communities were primarily company employees, accounting for 62.1%; regarding income, individuals typically earned between 5,000 and 8,000 RMB per month, with 91 people accounting for 34.5% of that amount, followed by 8,000 to 12,000 RMB with 72 people accounting for 27.3%.

The monthly household income was mainly concentrated between 10,000 and 20,000 RMB, accounting for 47.3%, followed by income between 20,000 and 30,000 RMB, accounting for 25.8%, followed by households with income below 10,000 RMB, accounting for 16.7%, and households with monthly income higher than 30,000 RMB were the least, accounting for 1.9% of all households. The number of people earning less than 5,000 was at least 46, accounting for 17.4% of all households. In terms of housing ownership, 88.3% of the residents had independent house ownership, 8% of the residents live in rented houses, followed by staff dormitories, accounting for 2.7%, and finally, 1.1% of the people temporarily borrowed from relatives or friends. In terms of length of residence, more than 60% of the residents have lived in the house for more than 5 years, and 34.8% of the residents have lived in the house for 1-5 years.

**Table 2.** Characteristics of Commercial Housing Community Residents (N=264).

| Characteristics      |           | Frequency             | Percent | Characteristics                          |                        | Frequency | Percent |
|----------------------|-----------|-----------------------|---------|--|------------------------|-----------|---------|
| Gender               | Male      | 109                   | 41.3    | Monthly income                           | <5000RMB               | 46        | 17.4    |
|                      | Female    | 155                   | 58.7    |  | 5000-8000RMB           | 91        | 34.5    |
| Age                  | 20        | 8                     | 3.0     |  | 8000-12000RMB          | 72        | 27.3    |
|                      | 21-30     | 91                    | 34.5    |  | > 12000RMB             | 55        | 20.8    |
|                      | 31-40     | 121                   | 45.8    | Monthly family income                    | < 10,000RMB            | 44        | 16.7    |
|                      | 41-50     | 16                    | 6.1     |  | 10,000-20,000 RMB      | 125       | 47.3    |
|                      | 51-60     | 18                    | 6.8     |  | 20,000-30,000 RMB      | 68        | 25.8    |
|                      | 60        | 10                    | 3.8     |  | > 30,000 RMB           | 27        | 10.2    |
|                      | Education | Less than high school | 6       | 2.3                                      | The ownership of house | Own house | 233     |
| High school          |           | 16                    | 6.1     | Rented house                             |                        | 21        | 8.0     |
| College              |           | 32                    | 12.1    | Temporary stay with relatives or friends |                        | 3         | 1.1     |
| Four-year university |           | 188                   | 71.2    | Staff dormitory                          |                        | 7         | 2.7     |

|            |   |     |      |                     |            |    |      |
|------------|---|-----|------|---------------------|------------|----|------|
| Employment | Graduate school                         | 22  | 8.3  | Length of residence | < 1 year   | 6  | 2.3  |
|            | Student                                 | 24  | 9.1  |                     | 1-5 years  | 92 | 34.8 |
|            | Government and public institution staff | 35  | 13.3 |                     | 5-10 years | 83 | 31.4 |
|            | Company employee                        | 164 | 62.1 |                     | > 10 years | 83 | 31.4 |
|            | Company owner or self-employed          | 27  | 10.2 |                     |            |    |      |
|            | Freelancer                              | 11  | 4.2  |                     |            |    |      |
|            | Other                                   | 3   | 1.1  |                     |            |    |      |

Note: \* 1000 Chinese yuan (USD 1 = RMB 7.253).

According to the analysis results (Table 3), among the 53 family court community samples, men and women were roughly equal, accounting for 54.7% and 45.3%, respectively; the age structure was mainly 21-30 years old, accounting for more than 50%; the education level was mainly bachelor's degree, with 33 people, accounting for 62.3%; from the occupational structure, the family home community residents were mainly company employees, accounting for 39.6%; from the perspective of income, personal monthly income was mostly between 5000-8000 RMB, accounting for 41.5%, followed by income below 5000 RMB, accounting for 24.5%; the number of people with income higher than 12000 RMB was the least, accounting for 11.3%; family monthly income was mainly concentrated between 10000-20000 RMB, accounting for 56.6%, followed by families with income below 10000 RMB, accounting for 24.5%, followed by families with monthly income higher than RMB 30,000, accounting for 13.2%. In terms of housing ownership, 75.5% of the residents have independent house ownership, 15.1% of the residents live in rented houses, followed by employee dormitories, accounting for 9.4%, and 0 temporary borrowing from relatives or friends, which also verifies the characteristics of the family home community. In terms of length of residence, 37.7% of the residents have lived in the house for 1-5 years, 30.2% have lived in the house for 5-10 years, and 24.5% have lived in the house for more than 10 years.

**Table 3.** Characteristics of Family Court Community Residents (N=53).

| Characteristics |                       | Frequency | Percent     | Characteristics        |                   | Frequency | Percent |
|-----------------|-----------------------|-----------|-------------|------------------------|-------------------|-----------|---------|
| Gender          | Male                  | 29        | 54.7        | Monthly income         | <5000RMB          | 13        | 24.5    |
|                 | Female                | 24        | 45.3        |                        | 5000-8000RMB      | 22        | 41.5    |
| Age             | ≤20                   | 3         | 5.7         |                        | 8000-12000RMB     | 12        | 22.6    |
|                 | 21-30                 | 27        | 50.9        |                        | >12000RMB         | 6         | 11.3    |
|                 | 31-40                 | 14        | 26.4        | Monthly family income  | <10,000RMB        | 13        | 24.5    |
|                 | 41-50                 | 3         | 5.7         |                        | 10,000-20,000 RMB | 30        | 56.6    |
|                 | 51-60                 | 2         | 3.8         |                        | 20,000-30,000 RMB | 3         | 5.7     |
| ≥61             | 4                     | 7.5       | >30,000 RMB |                        | 7                 | 13.2      |         |
| Education       | Less than high school | 0         | 0.0         | The ownership of house | Own house         | 40        | 75.5    |
|                 | High school           | 4         | 7.5         |                        | Rented house      | 8         | 15.1    |



|            |   |     |      |                     |  |    |      |
|------------|---|-----|------|---------------------|--|----|------|
| Employment | College                                 | 9   | 17.0 |                     | Temporary stay with relatives or friends | 0  | 0.0  |
|            | Four-year university                    | 33  | 62.3 |                     | Staff dormitory                          | 5  | 9.4  |
|            | Graduate school                         | 7   | 13.2 | Length of residence | < 1 year                                 | 4  | 7.5  |
|            | Student                                 | 13  | 24.5 |                     | 1-5 years                                | 20 | 37.7 |
|            | Government and public institution staff | 13  | 24.5 |                     | 5-10 years                               | 16 | 30.2 |
|            | Company employee                        | 21  | 39.6 |                     | > 10 years                               | 13 | 24.5 |
|            | Company owner or self-employed          | 3   | 5.7  |                     |  |    |      |
|            | Freelancer                              | 2   | 3.8  |                     |  |    |      |
| Other      | 1                                       | 1.9 |      |                     |  |    |      |

According to the analysis results (Table 4), among the 61 urban village community samples, males and females accounted for 39.3% and 60.7% respectively; the age structure was dominated by 21-30 and 31-40 years old, accounting for more than 60%; the education level was mainly university and bachelor's degree, accounting for a total of 75.4%; in terms of occupational structure, urban village community residents were mainly company employees, accounting for 49.2%. In terms of income, the monthly income of individuals is mostly between 5,000-8,000 RMB, accounting for 44.3%, followed by those earning less than 5,000 RMB, accounting for 31.1%; the number of people earning more than 12,000 RMB is the least, accounting for 4.9%; the monthly household income is mainly concentrated in those earning less than 10,000 RMB, accounting for 45.9%, followed by those earning 10,000-20,000 RMB, accounting for 37.7%. The proportion of households with monthly income higher than 30,000 RMB is 11.5%. In terms of housing ownership, 67.2% of the residents have independent house ownership, 21.3% of the residents live in rental housing; in terms of length of residence, 36.1% of the residents have lived in the house for 1-5 years, 34.4% have lived in the house for more than 10 years, and 21.3% have lived in the house for 5-10 years.

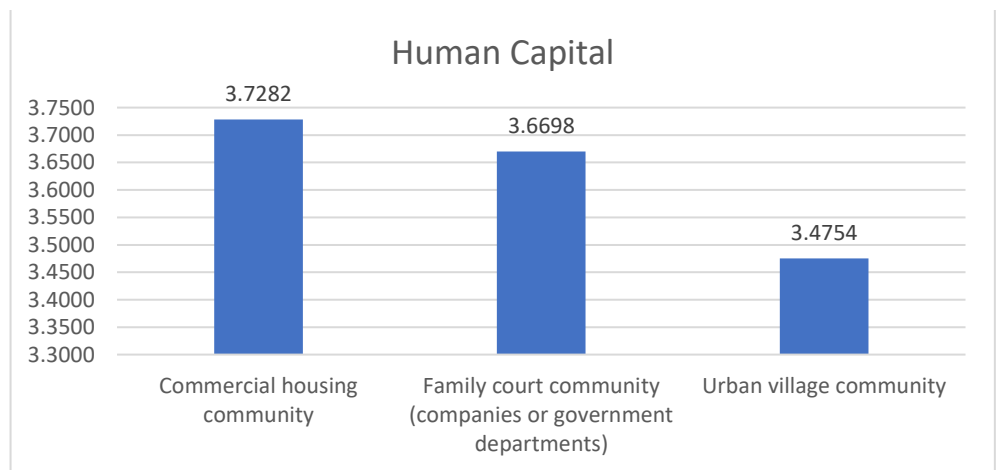
**Table 4.** Characteristics of Urban Village Community Residents(N=61).

| Characteristics |                       | Frequency | Percent      | Characteristics        |                   | Frequency | Percent |
|-----------------|-----------------------|-----------|--------------|------------------------|-------------------|-----------|---------|
| Gender          | Male                  | 24        | 39.3         | Monthly income         | <5000RMB          | 19        | 31.1    |
|                 | Female                | 37        | 60.7         |                        | 5000-8000RMB      | 27        | 44.3    |
| Age             | ≤20                   | 5         | 8.2          |                        | 8000-12000RMB     | 12        | 19.7    |
|                 | 21-30                 | 25        | 41.0         |                        | > 12000RMB        | 3         | 4.9     |
|                 | 31-40                 | 17        | 27.9         | Monthly family income  | < 10,000RMB       | 28        | 45.9    |
|                 | 41-50                 | 4         | 6.6          |                        | 10,000-20,000 RMB | 23        | 37.7    |
|                 | 51-60                 | 7         | 11.5         |                        | 20,000-30,000 RMB | 3         | 4.9     |
| ≥61             | 3                     | 4.9       | > 30,000 RMB | 7                      | 11.5              |           |         |
| Education       | Less than high school | 8         | 13.1         | The ownership of house | Own house         | 41        | 67.2    |
|                 | High school           | 6         | 9.8          |                        | Rented house      | 13        | 21.3    |

|            |   |    |      |                     |  |    |      |
|------------|---|----|------|---------------------|--|----|------|
| Employment | College                                 | 18 | 29.5 | Length of residence | Temporary stay with relatives or friends | 1  | 1.6  |
|            | Four-year university                    | 28 | 45.9 |                     | Staff dormitory                          | 6  | 9.8  |
|            | Graduate school                         | 1  | 1.6  |                     | < 1 year                                 | 5  | 8.2  |
|            | Student                                 | 13 | 21.3 |                     | 1-5 years                                | 22 | 36.1 |
|            | Government and public institution staff | 1  | 1.6  |                     | 5-10 years                               | 13 | 21.3 |
|            | Company employee                        | 30 | 49.2 |                     | > 10 years                               | 21 | 34.4 |
|            | Company owner or self-employed          | 11 | 18.0 |                     |  |    |      |
|            | Freelancer                              | 3  | 4.9  |                     |  |    |      |
|            | Other                                   | 3  | 4.9  |                     |  |    |      |

**4. Results**

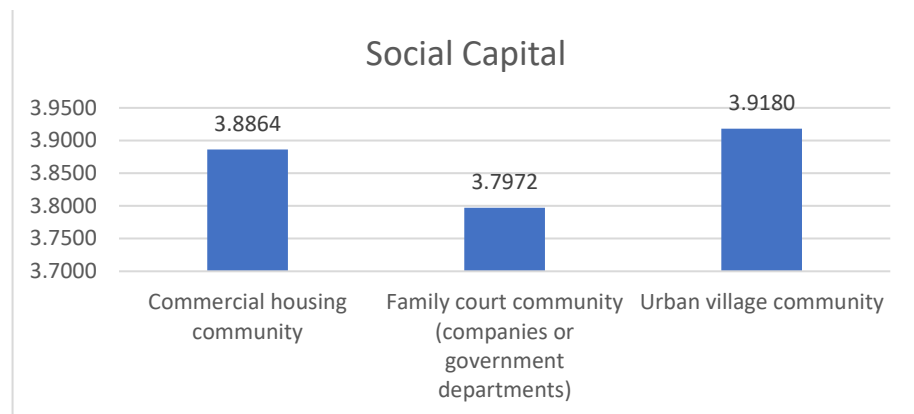
After statistical analysis of the questionnaire data, the results showed that in terms of human capital in different types of communities (Figure 3), commercial housing communities had the highest score of 3.7282, followed by family home communities with 3.6698, and finally, urban village communities with 3.4754.



**Figure 3.** Differences in the Human Capital Dimension of Three Types of Communities.

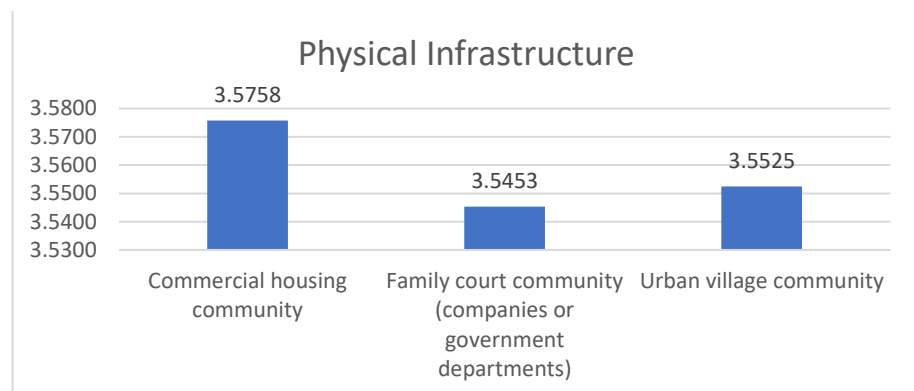
From the perspective of the social capital of different types of communities (Figure 4), urban village communities had the highest score of 3.9180, followed by commercial housing communities with 3.8864, and finally family home communities with 3.7972. Urban village communities were mostly dominated by previous villages, and residents have more profound feelings among themselves and their communities, and residents help each other and trust each other, and have a higher sense of community identification and

cohesion is also strong, and social network relationships are all within urban village communities, with relatively better relationships between family and friends and neighbors than in commercial housing communities and family court communities.



**Figure 4.** Differences in the Social Capital Dimension of Three Types of Communities.

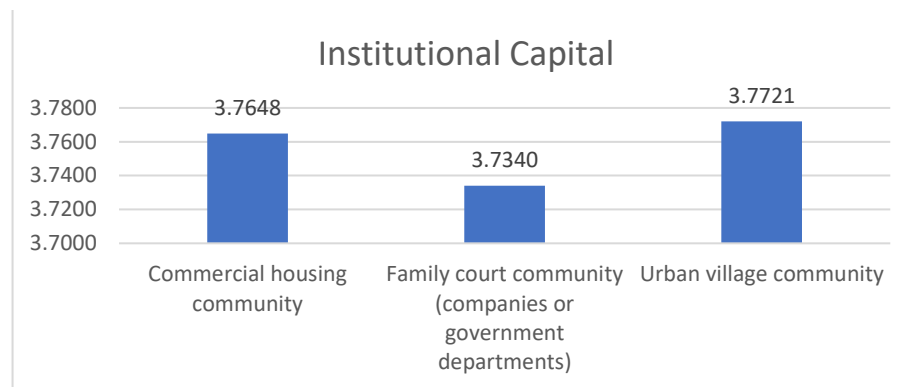
From the perspective of the physical infrastructure of different types of communities (Figure 5), the commercial housing community had the highest score of 3.5758, followed by the urban village community with 3.5525, and finally the family courtyard community with 3.545. Compared with the other two types of communities, the physical infrastructure of commercial housing community is superior and complete.



**Figure 5.** Differences in the Physical Infrastructure Dimension of Three Types of Communities

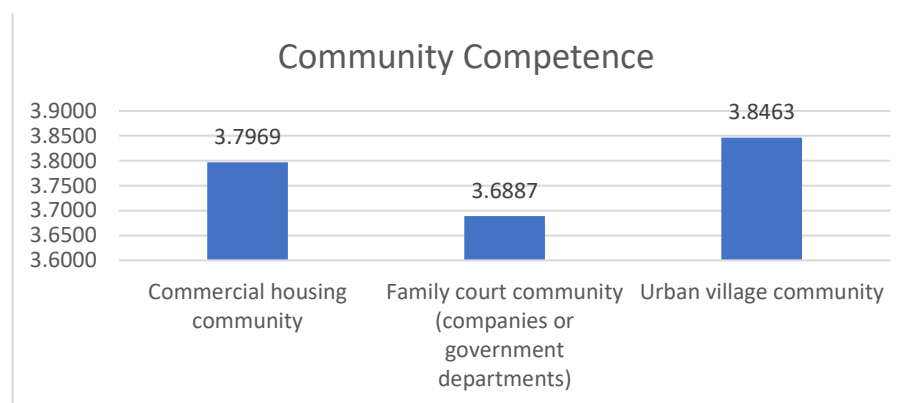
From the perspective of institutional capital of different types of communities (Figure 6), urban village communities had the highest score of 3.7721, followed by commercial housing communities with 3.7648, and finally family home communities with 3.734. Urban village communities are more professionally managed because of the special and tight-knit composition of their community members, and residents are more aware of the

community's disaster management policies and response measures, etc. When responding to disasters, the Urban village communities show more active and united.



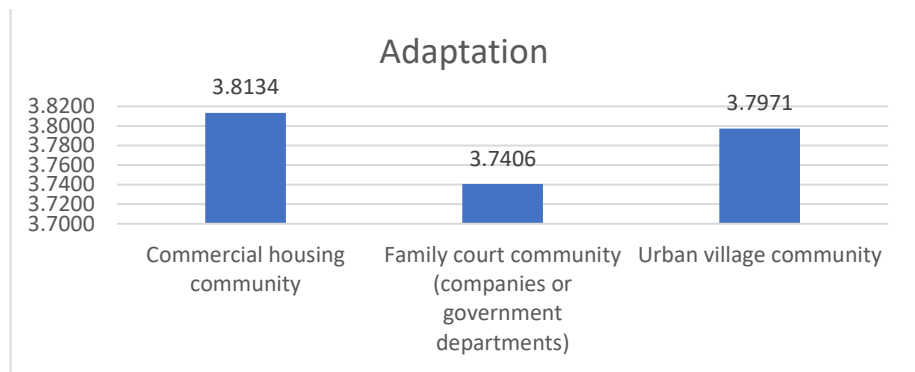
**Figure 6.** Differences in the Institutional Capital Dimension of Three Types of Communities

From the perspective of community competence in different types of communities (Figure 7), again, associated with institutional capital, urban village communities had the highest score at 3.8463, followed by commercial housing communities at 3.7969 and finally family home communities at 3.6887.



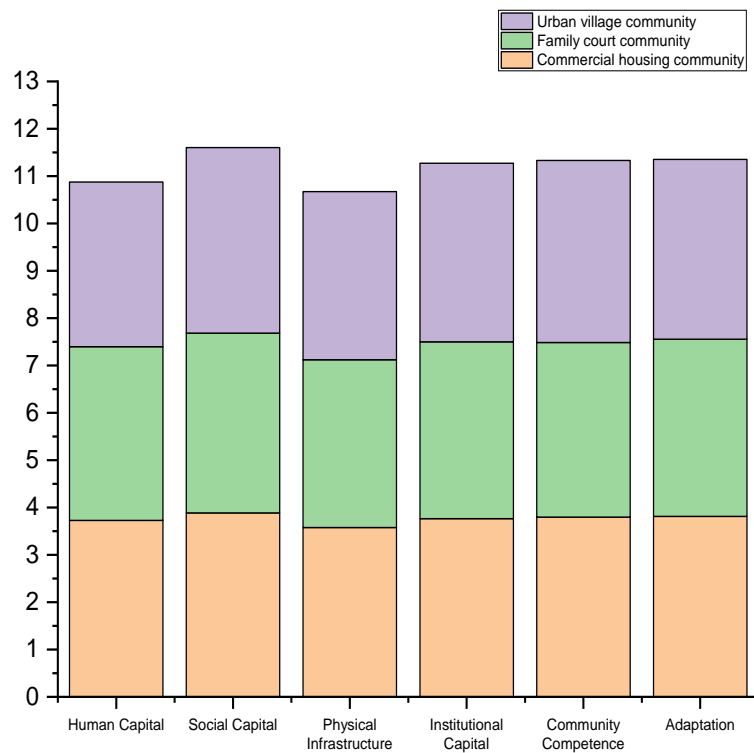
**Figure 7.** Differences in the Community Competence Dimension of Three Types of Communities

In terms of the adaptation of different types of communities (Figure 8), commercial housing communities had the highest score of 3.8134, followed by urban village communities with 3.7971, and finally, family home communities with 3.7406.

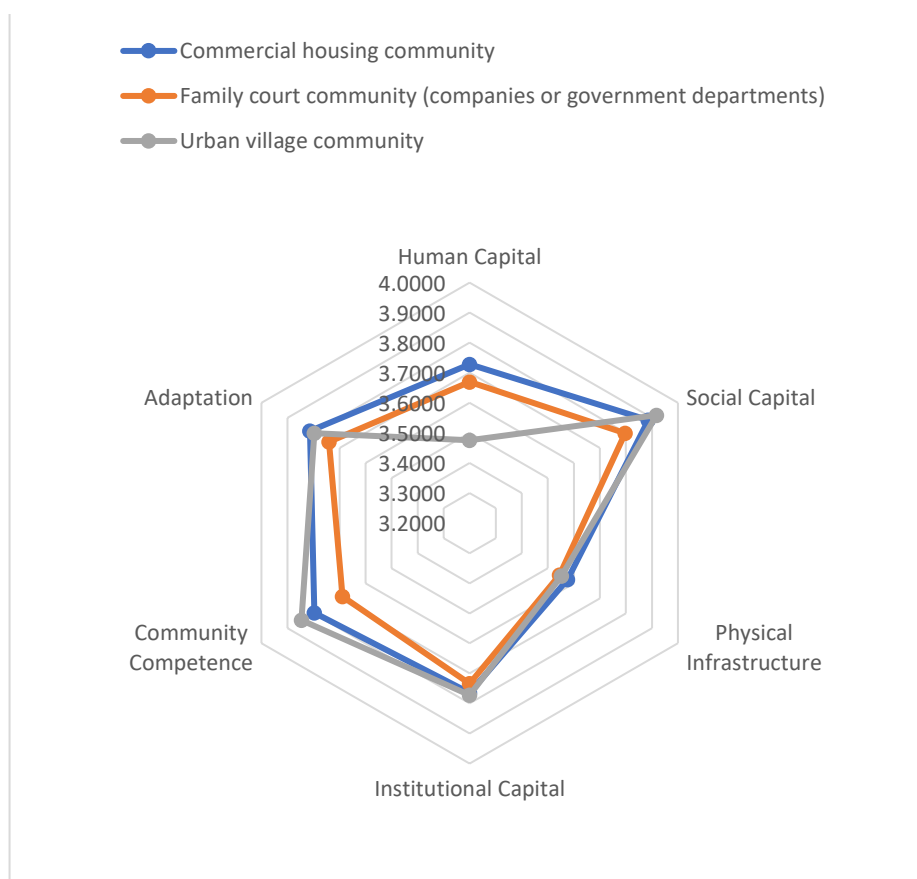


**Figure 8.** Differences in the Adaptation Dimension of Three Types of Communities.

In a comprehensive view (Figure 9), the resilience index of each dimension was concentrated between 3.5 and 4.0, and the overall community resilience was mainly in the medium level, with fewer high resilience communities. Comparing the resilience values of each dimension, we can see that social capital > adaptation > community competence > institutional capital > human capital > physical infrastructure.



**Figure 9.** Differences in Three Types of Communities.



**Figure 10.** Differences in Disaster Resilience of Different Communities.

Meanwhile, by aggregating the scores of each dimension of the three different types of communities into a radar chart (Figure 10), it can be seen that the three types of communities had the greatest differences in human capital, followed by community capacity and community competence, adaptation, and finally institutional capital and physical infrastructure. There were some differences among the three types of communities in each dimension because the various types of communities differ significantly in terms of the composition of the residents, the physical environment of the community, and the management style, so there are slight differences in resilience in the face of disaster occurrence.

The results show that commercial housing communities have the highest scores in the three dimensions of human capital, physical infrastructure capital and adaptability, urban village communities have the highest scores in the three dimensions of social capital, institutional capital and community capacity, and family home communities are at the lowest scores in each dimension. The differences between the three types of communities in each dimension can also be seen, with the three types of communities having the highest differences in human capital, followed by community capacity and community capital, adaptability, and finally institutional capital and physical infrastructure. There are some differences among the three types of communities in each dimension because there are large differences among the various types of communities in terms of the composition of the residents, the physical environment of the community, and the management style, so there are slight differences in resilience in the face of disaster occurrence.

## 5. Conclusions

Disaster management and urban planning have turned their urgent attention to improving community resilience in the context of the climate emergency, including self-organization, self-adaptation, and self-recovery before the advent of outside support. The purpose of community resilience enhancement is to improve the subject's knowledge by summarizing and deepening past experiences and problems in dealing with sudden disasters, to increase the community's capacity for adaptation and recovery from unpredictable catastrophes and risk perturbations, it is necessary to continuously search for disaster response and recovery techniques and countermeasures.

Based on the problems exposed by the community in the disaster response process obtained from the previous analysis, we integrate the community human capital, social capital, physical infrastructure, institutional capital, community competence, and adaptation, which are included in the resilience construction. We propose strategies for optimizing the resilience of urban communities and adapting to sudden-onset disasters from these six perspectives. Once a sudden disaster occurs, it is usually led by the national level, and the regional, city, and community sectors must work together to cope with the disaster, and the community, as the first line of defense, is very important to improve disaster resilience. From the research results, it is clear that all types of communities were able to carry out disaster response and post-disaster recovery work in an orderly manner under the leadership of government departments during the epidemic, but the problems faced by different types of communities differed in the process. Therefore, while grasping the comprehensive strategy of community disaster response and resilience enhancement, it is also necessary to tailor and precisely apply the strategy to different types of communities and propose a targeted and adaptive path for them.

As the main type of urban communities, commercial housing communities have relatively well-developed community living infrastructures and supporting facilities, with the majority of young and middle-aged people and relatively high education level. The three dimensions of human capital, physical infrastructure capital and adaptability of commercial housing communities have the highest scores, but their social capital, institutional capital and community capacity dimensions can be improved, and their sense of community identity and cohesion are relatively low.

Urban village communities have the highest scores in the three dimensions of social capital, institutional capital and community capacity because of the special nature of their composition, but the residents of urban villages have complex personnel structures, high population density, high residential density, uneven building quality, huge differences in surrounding facilities due to their different locations, and low degree of systematic management. We can promote the linkage of government departments at all levels, build a village network emergency platform, strengthen the participation and collaboration of multiple subjects such as village managers, residents and tenants, guide residents to strengthen their own communication ability and access to information, promote disaster prevention publicity and disaster response skills training, and strengthen residents' awareness of risk and responsibility.

The residents of family court communities are composed mostly of employees of institutions or enterprises, which are less capable of resisting unexpected disasters. The resilience of such communities to cope with public health emergencies can be improved by starting from the attributes of the units: strengthening the prevention and early warning system, building a complete set of emergency plans to guide the community management in emergency prevention, control and deployment; creating a community network emergency platform, increasing the investment of human and material resources by the government, property departments and social organizations and volunteers in the process of community emergency and disaster relief, raising residents' risk awareness, and enhancing residents and community resilience.

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