

Title	Building Disaster Resilience from the Perspective of Disaster Prevention in Mass Relocation Communities in China : Two Case Examples in Sichuan
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Citation	Osaka Human Sciences. 2022, 8, p. 75-96
Version Type	VoR
URL	https://doi.org/10.18910/86900
rights	
Note	

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Building Disaster Resilience from the Perspective of Disaster Prevention in Mass Relocation Communities in China: Two Case Examples in Sichuan

Yixuan CHEN¹ and Junko ŌTANI²

Abstract

Sichuan Province, located in Southwest China, is frequently affected by natural disasters. Earthquakes above magnitude 6.0 struck Sichuan four times between years 2008 and 2020. After the 2008 Sichuan earthquake, China began promoting community disaster risk reduction (DRR) projects at the national, provincial and municipal levels. This study examines the role of community DRR in building resilience to disasters by employing a qualitative approach. The methodology includes a literature review and semi-structured interviews with local residents, community officers, and volunteers. The fieldwork was conducted in two typical disaster prevention model communities: Erma, a relocation recovery community built on the concept of Build Back Better (BBB) after the 2008 Sichuan earthquake in a disaster-affected area, and Xinfeng, a relocation community resulting from land readjustment in Chengdu City. The results of this study can be summarized as follows: First, due to the expansion of public space, DRR activities have been diversified. Second, women and the elderly are becoming key stakeholders in the DRR community. However, it is difficult for people who do not belong to any organization to access disaster prevention information. Third, an increasing number of non-governmental organizations (NGOs) are participating in community efforts. Fourth, the disaster prevention experience was also used in the COVID-19 pandemic response. Finally, this paper explains the relationship between self-help, mutual-help, and public help in community DRR.

Key words: disaster risk reduction; mass relocation community; disaster resilience; 2008 Sichuan earthquake

This article is the English translation of the original one“Chen, Y.X., & Otani, J (2021). Building Disaster Resilience from the Perspective of Disaster Prevention in Mass Relocation Communities in China: Two Case Examples in Sichuan. *Bulletin of Graduate School of Human Sciences, Osaka University*, 47, 225–244 (in Japanese)”.

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1. Introduction

The province of Sichuan, located in southwest China, has a progressively urbanizing population but is frequently affected by disasters. In the past 12 years, four earthquakes with a magnitude of 6.0 or greater have occurred; the 2008 Sichuan earthquake with a magnitude of 8.0 was the most intense. Moreover, on February 3, 2020, while residents of Chengdu were refraining from leaving home to prevent the spread of COVID-19 infections, a magnitude 5.1 earthquake struck the city. Fortunately, this earthquake did not cause any casualties, but a disaster was totally unexpected during the spread of an infectious disease and left some residents confused about whether they should evacuate their homes. In addition to earthquakes, Sichuan is also frequently affected by flooding, debris flows, and other natural disasters. In mid-August 2020, a record-breaking heavy rain hit the Sichuan basin and caused flooding and landslides in several regions. As Sichuan is frequently affected by disasters, it is an exemplary region for making efforts to prevent disasters throughout China.

Chen(2020)emphasizes since 2008, disaster prevention involving more citizens across China, and not just in the areas affected by the Sichuan earthquake, has attracted more attention. Amid this, promoting community disaster prevention is employed as one key approach to building resilience to disasters.

Otani (2014)describes that China is urbanizing at a remarkable pace; people’s movements and changes to industry have produced new social relationships and transformed the conventional forms and concepts of community. One phenomenon is the ongoing creation of large communities where many people gather due to urban development. Wars, disasters, and large-scale infrastructure and development projects, for example, may force many people to relocate. Communities recovering from earthquake-related disasters, which proclaim a “Build Back Better” (BBB) philosophy, and relocation communities formed in the process of urbanization are expected to build new communities that surpass their original condition.

This study uses a qualitative approach to reveal the reality of disaster prevention efforts in Erma, a mass relocation community built as part of the earthquake recovery, 12 years after an earthquake occurred, and Xinfeng, a mass relocation community resulting from land readjustment for the purpose of development. Based on the findings, it considers the building of disaster resilience through community disaster prevention in China from different perspectives including the increase in public spaces, key people and overlooked people in disaster prevention, the expansion of NGO participation, and the use of disaster prevention experiences. It also presents three characteristics of community disaster prevention in China.

2. Disaster resilience and community disaster prevention

2.1 Resilience in the field of disasters

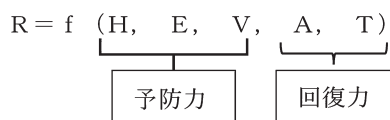
Resilience is a term originally used in engineering, particularly in materials engineering, to refer to the ability of structures such as bridges and buildings to recover to a base line after suffering damage (Zolli & Healy, 2013). Holling's (1973) introduction of this concept into ecology in the 1970s attracted much attention. From around the 1980s, it also began to be used in the humanities and social sciences, and calls for social resilience became more prominent from the 2000s. Resilience in the field of disasters has also greatly developed. The term "resilience" began to spread in the field of disasters with its use as a keyword in the theme of the Hyogo Framework for Action 2005–2015—Building the Resilience of Nations and Communities to Disasters.

In Japanese, resilience can be expressed as 回復力 (*kaifukuryoku*; power/ability to restore) or 強靱化 (*kyōjinka*; making/becoming tough). According to The 2013 White Paper on Disaster Management published by Cabinet Office Japan, disaster resilience means "protection" from external forces that cause disaster and broadly covers fields relating to national and regional economic societies. It means the ability to of the overall systems of an economic society to "resist" or "restore." Although the term "restore" is used, Shiozaki et al. (2015) emphasizes that resilience does not mean returning to the original state, but is used as a conceptual framework for controlling social systems in a desirable state on the assumption that the qualities, characteristics, and functions of the systems may vary depending on the degree of change, like in resilience in ecological systems.

Resilience is translated into Chinese as 韧性 (*renxing*). The definition of resilience in disaster from Zhang *et al.* (2018) emphasizes the three functions of emergency response, recovery, and adaptation to change. Han *et al.* (2014) examines the potential for building community resilience and managing risk by more effectively realizing more diverse transmission of information on disasters, support for those requiring consideration, and other efforts using big data and artificial intelligence. Yang *et al.* (2019) compares resilience mechanisms enacted in previous studies in other countries and demonstrates the feasibility of improving the disaster preparation capacity of society as a whole by building resilience in the community. Sun *et al.* (2020) analyzes the elements of local vulnerability that inhibits community resilience, clarifies that the use of space has a strong influence, and proposes securing spaces for emergency response and improvements to the openness of space and personnel structures. At present, Chinese studies on resilience go no further than introducing concepts and theories, debating policy, and explaining developments in technical aspects; and few have conducted empirical research.

When resilience was originally introduced to the field of disasters, the discussion mainly considered *recovery*, that is, restoration after suffering a disaster. For example,

McCreight (2010) describes five criteria for assessing resilience: (1) personal and familial sociopsychological wellbeing; (2) organizational and institutional restoration; (3) economic and commercial resumption of services and productivity; (4) restoration of infrastructural systems integrity; and (5) operational regularity of public safety and government. However, as practice in the field of disaster resilience advances, the importance of the power of *prevention*, in addition to *recovery*, has come to be recognized. Hayashi (2016) analyzes the recovery process after the 1995 Great Hanshin-Awaji Earthquake over the long term and points out that the integration of “preventative abilities” and “restorative abilities” with regard to disasters is essential when building resilience with the aim of achieving “a society resilient to disaster.” On this basis, he explains that the variables that influence disaster resilience (R) are hazards (H), exposure to disaster (E), vulnerability of structures (V), human activity (A), and time (T), among which H, E, and V are preventative ability variables and A and T are restorative ability variables. The resilience model is shown below.



[Preventative ability] [Restorative ability]

Source: Hayashi (2016,p36)

2.2 Communities and the promotion of community disaster prevention in China

(1) What is community in China?

In Japan, community is expressed as 共同体 (*kyōdōtai*) or 地域社会 (*chiiki shakai*) and refers to a collective of people living in a fixed geographical area with a sense of mutual belonging. The concept of community was first proposed by the American sociologist R.M. Maclver (2012) in 1917, in contrast to “association.” The concept of community was first imported into China in the 1930s and has been translated since then as 社区 (*shequ*). Wu (2010), who began proposing community studies in Chinese society at the time, held that the three elements of community are people, residential addresses, and lifestyle or culture.

The practice of culture in China preceded the introduction of the concept, but mentioning “shequ” in China today gives rise to an image closer to that of the lowest-level government organizations, rather than a naturally forming community of people with a sense of mutual belonging. “Shequ” in China today refers to an area of a fixed scope under the direction of a *residential committee*. This great change in the image of shequ in China from its original sense is said to have occurred “because some of the functions played by the government and workplaces under the planned economy regime were shifted to the community due to the economic reforms that began in the late 1980s” (Li, 2013). Residential committees are meant to be self-governing organizations of residents, but their distinction with the government

is not clearly marked. This is because, in practice, they also perform public service roles, such as issuing residence certificates and accrediting people for special support, in addition to activities for the local public benefit. At present, some places have changed their “shequ residential committee” signs to “shequ service center,” in conjunction with the diversification of shequ public functions.

The *family register system* that began in the 1950s placed urban and rural areas in Chinese society under different systems. Until the 1990s, residences for urban residents were mainly provided in nationally or publicly operated units corresponding to their place of work. As the market economy expanded, residences in urban areas changed radically from a system of distribution by workplace to commercialized entities. Against this background, areas naturally formed by the gathering of many residences originated as shequ. Until the 2010s, “shequ” gave an impression of urban communities; in contrast, communities in rural areas were called “villages” and their resident self-governing bodies, “village committees.” As urbanization accelerates and development of rural areas is promoted to reduce the disparity between the city and the country, an increasing number of rural communities have begun to refer to themselves as “shequ” (Minami, 2011; Li, 2013; Tsujinaka et al , 2014).

“Community” in China as used in this study is defined as a concept identical to “shequ,” and refers to a fixed area under the jurisdiction of a single residential committee.

(2) Government movements concerning community disaster prevention following earthquakes

The Hyogo Framework for Action 2005–2015, which was adopted by the 2005 United Nations World Conference on Disaster Reduction, sets developing and strengthening the capacities of community-level disaster prevention systems as a strategic goal (UN ISDR, 2005). Hagiwara *et al.* (2006) state that community disaster prevention has importance as a means of reducing local vulnerability for building a more safe and secure society. Due to the 2008 Sichuan earthquake, China recognized the importance of disaster prevention and mitigation, and began to actively conduct studies and formulate policies in the field of disasters. Against this background, the government announced plans for community disaster prevention projects at the national, provincial, and municipal levels one after another. The “National Comprehensive Disaster Mitigation Exemplary Community” launched by the Ministry of Civil Affairs (a department equivalent to Japan’s Ministry of Health, Labour and Welfare) in 2009 is an example. Subsequently, the “11th State Comprehensive Five-Year Plan for Disaster Mitigation” announced in 2011 looked back on the responses to past disasters and raised the issue of the weakness of disaster prevention capacities at the “basic level” and explicitly proclaimed the improvement of disaster prevention and mitigation capabilities at the shequ community level as a key target. As China did not have an overarching disaster risk management department until 2018, recognition of disaster prevention exemplary communities at the national level in the early stages varied between departments. However,

in 2018, departments involved with safety in administrative institutions such as firefighting, civil affairs, meteorology, forestry, agriculture, land, and earthquakes teamed up to form the Ministry of Emergency Management of the People's Republic of China. Since then, the recognition of National Comprehensive Disaster Mitigation Exemplary Communities has been conducted through collaboration between the four administrative departments for emergency management, earthquakes, meteorology, and civil affairs.

(3) From the creation of “disaster-preventing communities” to the promotion of “community disaster prevention”

As more and more community disaster prevention projects commence at the national, provisional, and municipal levels, Chengdu—Sichuan's central city—has launched the “Chengdu Community Comprehensive Disaster Mitigation Standardization Project.” Although the project was launched in Chengdu, it has come to be promoted in other regions of Sichuan and is now a representative community disaster prevention and mitigation project in Sichuan.

Installations of evacuation signs have increased in the past few years, from the center of Chengdu to its suburbs and even to remote villages. Moreover, “Comprehensive Disaster Mitigation Standardized Community” signs have appeared in many communities. Studies on the public perception significantly help in comprehending temporal changes and specific efforts in community disaster prevention. Therefore, the authors interviewed Q—the person in charge of the comprehensive disaster mitigation standardization project at the Chengdu Institute of Standardization, which was heavily involved with planning and setting criteria for the “Comprehensive Disaster Mitigation Standardized Communities”—about information on the project, details of construction, effects, and other matters. The survey gave the authors an understanding of the administration's thinking about promoting “community disaster prevention” through the construction of “disaster-preventing communities.” The details of changes to the Chengdu Community Comprehensive Disaster Mitigation Standardization Project, its concrete standards, and the sources of funds and construction are discussed below.

First is the background to the establishment of the project and the process of its promotion. Immediately after the 2008 Sichuan earthquake, the lack of organization in evacuation and rescue activities arose as an issue, and the government's Emergency Management Office (renamed the Municipal Emergency Management Bureau in 2018) launched the “Comprehensive Disaster Mitigation Standardized Community” project to improve the situation. The project was conducted provisionally in 10 communities in central Chengdu in 2013 and expanded to 823 communities by 2018. The administration has since set the targets of reaching 1,000 communities by 2020 and 3,000 by 2025. Furthermore, because disaster-preventing communities cannot be created in a short time, three starting points were listed. The first point is working from easy items to harder ones, which means beginning with communities that already have existing routes and spaces that can be used as evacuation

routes and points during a disaster, and locations with a population that has an eager attitude toward disaster prevention. The second point is covering all disasters that may occur in Chengdu. The third point is bringing all urban and rural sections of the 21 districts, cities, and counties under Chengdu's jurisdiction. Second, what are the "standards," which is a keyword in the project title? The standards referred to by the "Comprehensive Disaster Mitigation Standardized Community" are building standards, and include nine criteria—disaster prevention logos, community plan diagrams, personnel structure and team building, signs for evacuation routes, signs for evacuation points, risk signs, locations of headquarters in the event of disaster, locations of material stores, and day-to-day publicity columns. Third is funding and construction. Chengdu's treasury provides 100,000 Yuan (about 1.5 million yen) to each community. Moreover, in line with the local situation, district treasuries also provide funds if possible. In principle, evacuation routes and locations are designed with the participation of local people and support of firefighters, civil affairs bureaus, and construction companies. However, we found that in more than a few cases, people from the construction companies actually conduct all the work.

This standardization project has greater disaster prevention effects than in the case when such a project is absent. However, apart from the visualized "standards," there is a lack of intangible items, like guides and training. Moreover, because of insufficient resident participation in construction and maintenance after construction, it seems that those involved in community disaster prevention should think about how to guarantee the "continuity" of comprehensive risk management from an approach to risk handling that focuses on tangible items.

3. Outline of fieldwork

From 2017 to 2019, the authors conducted fieldwork in Erma—a relocation community for earthquake recovery built in Beichuan County in Mianyang City of Sichuan—and Xinfeng—a relocation community built in the suburbs of Chengdu after land readjustment.

In March and September 2019, we interviewed leaders and staff from the residential committee, residents, volunteers, and other non-disaster-affected residents relocated from outside the community, among others. We also visited the earthquake museum near Erma for a tour as an interpreter guide. In addition, from March 2017 to September 2019, we conducted a total of five surveys on residents, residential committee leaders, community center staff members, and others in Xinfeng. The contents included outlines of the communities, community activities, lifestyle and mentality after relocation, and disaster prevention (temporal changes, contents, characteristics, participants, social collaboration, and model communities).

These locations were chosen because of their similarities. First, Erma is a National Comprehensive Disaster Prevention and Mitigation Model Community and Xinfeng is a

Chengdu Disaster Prevention and Mitigation Standardized Community; that is, both are representative communities that have made progress in disaster prevention. Second, both are relocation residences formed over a short time period by administrative planning, rather than naturally, and the form of their communities is similar. Conversely, their differences emerge from their experience of disasters (or lack of experience) and the industrial structure surrounding each.

3.1 Erma, a mass relocation community built in the earthquake recovery

Erma is located in the town of Yongchang, Beichuan, Mianyang, 150 km from the center of Chengdu, and is a recovery community relocated after an earthquake. The county of Beichuan is a region populated by the Qiang minority, and Erma means “child of the sky, prosperous land” in the Qiang language.

Beichuan was one of the regions that suffered severe damage in the 2008 Sichuan earthquake. The center of Beichuan in particular is located above a fault line and its buildings poorly withstood earthquakes. Resultantly, the town was almost entirely destroyed after the earthquake, with a death toll of 7,000. Considering the geographical conditions, the risk of disaster was high and the damage to the town was not conducive to on-site recovery. Therefore, in the recovery from the earthquake, Beichuan was the only disaster-affected area where the entire town had to be reconstructed in another location. The disaster-affected town was retained as a remnant of the earthquake, referred to by the residents as “Old Beichuan.” The recovery town created on a flat land 30 km away, is referred to as “New Beichuan.” Photo 1 shows the disaster-affected Old Beichuan, while Photo 2 shows New Beichuan after recovery from the earthquake.



Photo 1. Disaster-affected Old Beichuan Source:People's Daily Online <http://dangshi.people.com.cn/n1/2019/0813/c427898-31292326.html>(Accessed on November20, 2021)



Photo 2. New Beichuan

Authors' photograph (September 2019)

New Beichuan was constructed between March 2009 and October 2010, and the people affected by the disaster moved into their new recovery residences in the autumn of 2011. The two communities located in the center of Beichuan and the two villages on the outskirts before the earthquake were converted into three communities in Yongchang, New Beichuan.

Among these three communities, Erma was the largest, with a total of 130 recovery residence buildings divided into nine areas similar to the Japanese public housing. The first floor on the roadside consists of shops rather than residences. Residential committee leader L informed that by the end of 2011, 2,884 households, consisting of 7,122 people, took up residence in the recovery residences. Further, by May 2018, the population increased to 12,000 people. Among them, about 9,000 people are permanent residents who have their households registered in Erma, and most of the remaining 3,000 people have moved in for commercial purposes. In addition, Qiang account for 53% of the total population, with the remainder being made up of Han, Hui, Tibetans, and other ethnic groups.

3.2 Xinfeng, a relocation community due to land readjustment

Xinfeng is located in the north, about 35 km from the center of Chengdu. Until June 2005, this area was a settlement with scattered farmhouses. It was home to about 1,680 households, consisting of 3,680 people. With land readjustments in the district resulting from urbanization and industrial adjustment, an industrial district, a large-scale logistics center for a railway connecting to Europe, and mass relocation residences were built in this area. Accordingly, from September 2006, transportation and demolition works began in several surrounding villages and the residents received reparations and rental allowances to spend about five years in rented residences. This area has three designated mass relocation communities and

construction of each was completed at different times; people could decide where they would live based on their preferences and ballots. Xinfeng is the newest and largest of the three. The first group of residents moved in to this community in 2016 and the third group in the autumn of 2018.

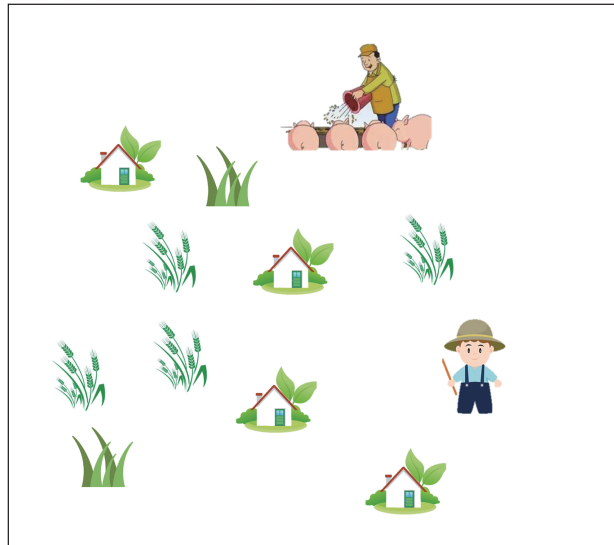


Fig. 1. Image of Xinfeng before 2005

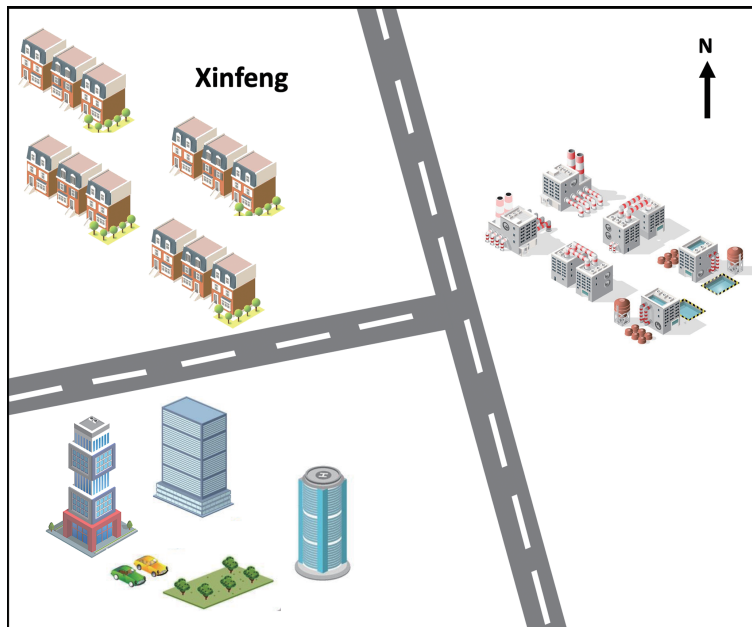


Fig. 2. Image of Xinfeng from 2016

Authors' work

3.3 Disaster prevention efforts in Erma and Xinfeng

(1) Common efforts

The details of the disaster prevention efforts of those from the two communities are shown below. As can be seen in Table 1, disaster prevention efforts in Erma mainly comprise eight parts. Conversely, Xinfeng has nine items: organizational structure, management system and measures, rescue team, disaster preparation plan, disaster prevention material, disaster preparation training and education, information dissemination systems, installing evacuation points, and installing signs. Erma is a national-level Disaster Prevention and Mitigation Model Community, while Xinfeng is a city-level Disaster Prevention and Mitigation Standardized Community. However, as expected, the disaster prevention systems of both communities are similar. A slight difference can be seen in their conduct of disaster preparation training. In Erma, which has experienced the disaster, many residences and related organizations are involved in the disaster preparation training, while participation is limited mainly to the community's security forces and residential committee members in Xinfeng.

Table 1. Erma's disaster prevention efforts

1. Organizational structure for disaster mitigation	Division of roles, action guidelines, contents of actions, transmission of disaster information
2. Risk measurement	Resident participation methods, creating lists of residents requiring consideration and checking people who will help, hazard maps
3. Emergency situation response plan and disaster preparation training	Plans according to disaster, conduct and assessment of disaster preparation training
4. Enlightenment activities for disaster mitigation	Seminars, evacuation training, Disaster Prevention Day events, community multi-actor collaboration
5. Self-assistance attitudes and skills among residents	Disaster prevention goods, behavior in the event of a disaster, participation in disaster prevention activities
6. Evacuation points and materials	Securing evacuation points and routes, locations for disaster prevention education, material storage and distribution plans
7. Management and maintenance	Regular evaluation of people with responsibility, regular inspection of risks, maintenance of equipment and facilities
8. Document storage	Paper documents, electronic documents

Extract from Erma's 2013 application materials for National Comprehensive Disaster Mitigation Model Community

Photos 3 to 6 show the conduct of community disaster prevention. Photo 3 shows disaster preparation training in Erma and Photo 4 shows a disaster prevention lecture for residents hosted by Erma. From these photos, it is apparent that many participants are middle-aged and senior residents. Photo 5 shows a safety lecture for children delivered by an NGO at the cultural center in Xinfeng, and Photo 6 shows Xinfeng's hand-drawn disaster preparation map.

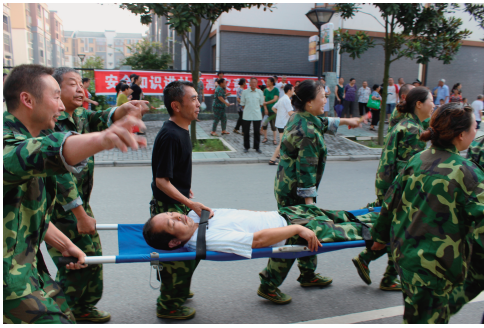


Photo 3. Disaster preparation training



Photo 4. Disaster prevention lecture



Photo 5. Safety lecture



Photo 6. Disaster preparation map

Authors' photographs (March and September 2019)

Furthermore, both communities are divided into several areas, each with contact officials to manage the risks hidden in the everyday living environment and to gain information about the situation and respond to emergencies more smoothly in the event of a disaster. The contact officials play the role of a bridge between the residents and the residential committee, and between the area and the community as a whole; their main duties are to regularly check for risks within their area, ascertain the people who need consideration in the event of a disaster and confirm how they will be helped, and transmit information about disaster prevention. Together, they form about 30 disaster rescue volunteer teams, consisting of residents, social workers, and security personnel stationed in the community. Roles in rescue, medical treatment, material support, and information dissemination are divided between the volunteers according to their occupational experience and physical condition. The volunteer teams are regularly trained by NGOs in the field of disasters and the fire department.

(2) Disaster prevention efforts unique to recovery communities

Disaster prevention in Erma has been much more varied and proactive than in Xinfeng. Two disaster prevention efforts unique to Erma, a recovery community, are presented below.

The first is the distribution of small promotional vouchers to people participating in activities to spend within the community. The interviews revealed the issue of residents'

decreasing willingness to participate in disaster prevention activities; this is because the activities have become an annual custom even in regions that have experienced disasters and have a culture of disaster preparedness. To inspire interest in disaster prevention activities, a member of the group planning community activities (people from the residential committee and volunteers) devised a mechanism of distributing small-value vouchers that can be used in shops in the community to the activity participants. Photo 7 shows a *zegu*. The vouchers were denominated in 1, 2, 5, and 10 *zegu* (the word for money in the language of the Qiang ethnic group; 1 *zegu* is equivalent to 1 Yuan); and were distributed by giving 1 or 2 *zegu* to people who just participated and 5 or 10 *zegu* to those who helped with the activities. The vouchers were funded from the community-building activity funds received from the government. From the perspective of funding, distributing original vouchers to activity participants would not be possible without “public help,” but it appears that local wisdom is essential when searching for ways to use funds to improve the effects of the activities.

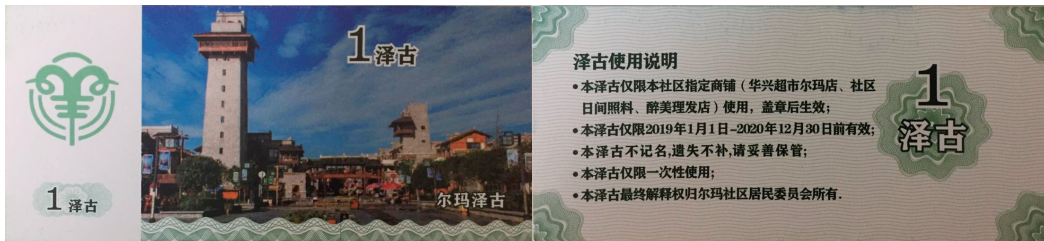


Photo 7. Front and rear of a “zegu” original voucher

Authors’ photographs (July 14, 2020)

The second effort is to revitalize communication with external bodies in the field of disaster prevention by promoting disaster prevention industries. Following the earthquake, the 5-12 Wenchuan Earthquake Memorial Museum, which passes down lessons from the earthquake, was built at the entrance to the post-earthquake remnants of Old Beichuan. A training center specializing in emergency management was also built next to the museum. The center serves as a venue for disaster research, education, and training. Beichuan intends to develop disaster prevention into an industry. Many people visit Erma, a case example of recovery, each year; and interactions between the community and external research institutions, NGOs, and other regions have become frequent there.

4. Analysis

4.1 Expanding public spaces and disaster prevention

When designing and building, public spaces such as resident activity centers and cultural centers, parks, sports grounds, and plazas were included in addition to residences in Xinfeng—the mass relocation community built after land readjustment. Various community

activities commenced once residents began moving in to Xinfeng in 2016, but activities on the theme of disaster prevention did not begin in earnest until a demand was made by the Emergency Management Bureau in 2018. The community did not autonomously begin disaster prevention; its success in promoting disaster prevention from nine directions and its recognition as a Disaster Prevention and Mitigation Standardized Community was aided by the use of public spaces in preventing disasters.

According to the records of disaster prevention activities received from staff at the Erma residential committee, disaster prevention activities began there in earnest in 2013. Disaster prevention efforts before 2013 were limited to publicizing knowledge about disaster prevention aimed at residents. Comprehensive evacuation training involving the government, fire department, medical services, and residents in the community started being conducted in May each year from 2013. Furthermore, during ordinary times, they also held lectures on disaster prevention knowledge for residents, distributed pamphlets, and conducted other activities; and gradually formed organizational structures and material stores to respond to disasters. The interviews revealed that the timing of the diversification and regularization of disaster prevention activities overlapped with that of expansion of public spaces.

Kuma (2012) organizes the changes in residence recovery and urban planning brought about by disasters throughout history and points out that tragedy alters the direction of architecture. Erma has more small plazas and rest areas between the residential buildings; and more large parks, plazas, and greenways around the residential building groups than Old Beichuan; they improve the residential environment and can be used in evacuation in the event of a disaster. However, providing public services was not considered much in design proposals during recovery. When residents first moved in from 2011 to 2013, public administrative affairs within the community were performed with only a small office. Subsequently, from 2013, the residential committee rented three roadside stores with the operating funds provided by the government to open a public administrative affairs office, conference room, and resident activity room. Interviews revealed that despite being named a resident activity room, as a matter of fact, the space is no longer used for holding events and activities, but has instead become a mahjong parlor. Several NGOs involved in child support, disaster response, and other enterprises used offices on-site, but they were rented spaces and dispersed throughout the community. With a view toward building a community, a comprehensive community center was created in Erma in 2018, in addition to the residential houses. The community center has a public administrative affairs office, general support office, police station, women and children's activity room, calligraphy room, citizens' classroom, and elderly nursing care office; a Qiang-style outdoor stage was also built. Table 2 summarizes the changes in public spaces in Erma after relocation.

The expansion of public spaces observed in the ten years after the relocation of the earthquake recovery community not only serves the purpose of BBB; in other words, it is

not a result of the trends unique to recovery communities. The promotion of “community-building” throughout China is an integral part of the social backdrop. The rapid increase in mass relocation residences can be considered a phenomenon representative of China’s urbanization. “Safety” incorporating disaster prevention in these “new” places in society is a major challenge in community-building, and the relationship between the approaches toward the use of space and the building of resilience was confirmed.

Table 2. Changes in public spaces in Erma after relocation

Existence	2011–2013	2013–2018	2018–present	Disaster prevention use
Public space				
Plazas, parks, greenways				Disaster preparation training, initial meetings, disaster prevention information signs
Public service office				Gathering and creating disaster prevention information
Conference room				Disaster prevention lectures
Citizen activity room				Disaster prevention materials
General community center				Disaster preparation training, information dissemination
Outdoor stage				

Authors’ work based on interview results

4.2 Key people in disaster prevention

(1) Gender disparity in the two communities

Section 3-3 on disaster prevention efforts mentions the existence of teams of contact officials that play the roles of gaining information about people who need consideration in the event of a disaster and disseminating information in the two communities. However, the survey found that in terms of the gender of the contact officials, the male-to-female ratio is 3:7 in Erma, but 8:2 in Xinfeng.

Why are the gender compositions inverted between Erma and Xinfeng? The reason may lie in the different ways the contact officials were recruited. Erma used posters and social networking services to publish the recruitment information to all residents from the beginning, which resulted in many applications from women who are more passionate about local community activities and have time to spare. In contrast, Xinfeng used a recruitment method wherein a community committee member would ask a person who seems suitable as a contact official whether they are interested. The people who were approached were mainly veteran soldiers, members of the Chinese Communist Party, and those who had been highly regarded in the villages before relocation, most of them being men. In other words, gender disparity arose from the difference between the direct recruitment method and the approach method. An industrial area and a logistics center were built near Xinfeng, and both male and female

residents were offered good opportunities to secure a comparatively stable job. In contrast, the main industry in the post-earthquake recovery community Erma is tourism, which is seasonal, and those with stable work in many households are men. Becoming a contact official provides a monthly allowance of 650 Yuan (about 10,000 yen) and enables exchange with other people, making it attractive for women who have more spare time.

The phenomenon wherein women participate more actively in community activities than men, as in Erma, has also been observed in housing estates in Japan. In relation to this, Nishikido and Kado (2006) state that while men are incorporated into the corporate society, the majority of women, particularly stay-at-home wives, are surrounded by the suburban society. As a result, they argue that women secure the chance to become an important pillar that forms the local society through participation in consumer cooperatives and various residents' movements and citizen activities, for example. Although women's active involvement in various community activities that include the topic of disaster prevention is confirmed, they are not readily recognized as key actors in disaster prevention. When the authors participated in the disaster relief specialist training hosted in Osaka City by an approved NPO, the Japan Bousaisi Organization, they only found about a dozen women in the venue with over 100 people. The statistics on authorized and registered disaster relief specialists published by the NPO revealed that the proportion of women when disaster relief specialist accreditation began in 2003 was only 5%; moreover, although the number and proportion of women have increased since then, their proportion among the nearly 200,000 disaster relief specialists up to 2020 is only 16.5% (Japan Bousai Organization, 2020). When the authors spoke with other participants at the venue during the training, it became clear that most participants did not apply to participate at their discretion as the authors did; rather, they had been dispatched to the training because they were responsible for disaster prevention at organizations such as their local community or company. Looking at it another way, the proportion of women among disaster prevention leaders on the ground in organizations is low.

(2) Proactive middle-aged and elderly residents

Looking at different age groups, the people in the rescue and contact official teams were concentrated in the middle-aged bracket (30s to 50s), but the number of aged people who autonomously participated in the disaster prevention activities became apparent through the survey. Elderly people require consideration for both administrative organizations and NPOs; therefore, the community provides generous support in aspects including funds and human resources, activity planning, and public space design. In addition to disaster prevention themes, many efforts aimed at children and elderly people have been proposed. Moreover, many elderly people have abundant leisure time, and obtain more community information through leisure activities, in conjunction with increased exchange with people. It is suggested that their involvement with the community is stronger than the other age groups.

4.3 The people who are overlooked

Regarding the apparent lack of young people among the participants in community disaster prevention activities, the host of the community disaster prevention informed the authors that this was because most of them had already received disaster prevention education at their workplaces or schools. In addition, interviews with residents revealed a common pattern: people engaged in business in a community, particularly self-employed people from outside the community, either are not aware of or have only seen and heard of the community's disaster prevention activities.

In China, disaster prevention is mainly conducted on an organizational basis. Within a community, consideration is thoroughly shown to children, elderly, those with disabilities, and others who are in a weaker position at the time of a disaster, but are involved in disaster prevention activities. However, "people in weaker positions in disaster prevention actions" and "people in weaker positions regarding access to information" are not the same, and it seems that those who do not belong to any organization are precisely those who should be brought into future community disaster prevention.

A September 2015 UN summit adopted the 2030 Agenda for Sustainable Development, which set the 17 Sustainable Development Goals (SDGs) as concrete goals from the three aspects of society, economy, and the environment, with the basic philosophy of "Leave no one behind." Disaster prevention is also an important effort among these. In addition to organization-based disaster prevention led by "public help" to achieve "disaster prevention that leaves no one behind," it is also necessary to improve "mutual help" by the communities where every individual lives and increase their capabilities for "self-help."

4.4 Expansion of NGO participation

Community activities are being held in the two communities on a variety of themes such as health, culture, safety, support for women, childcare, and atmosphere within the home, in addition to disaster prevention. In response to the question whether work has become a greater burden as many such activities are being held, a staff member from the community committee stated as follows:

It has not increased that much. We have a support role; in fact, the social organization conducts them. ... Recently, the administration has been trying to further develop community-building. We receive funds in line with that from the government, and we have to have a third party with expertise conduct them using that money. ...

The term "third party" refers to non-profit social groups other than the community residents and government (NPOs and NGOs). The original NGOs created in the recovery community Erma related to the disaster, psychological care, and other areas have been stationed over a long period of time, and some of them now provide specialized childcare in the comprehensive activity center in the community. Furthermore, Xinfeng also had three NPOs

until 2019. The first, the “Seniors’ Association,” is a group formed by the residents that has a history of over 30 years and was already in existence before the relocation. It offers culture for the elderly, knowledge for daily life, and sport; in particular, it supports the lifestyle of poor, single elderly people. The second, “Chunlei,” is a volunteer group made up of people working at the building materials market in the industrial area on the other side of the community. Volunteers make use of their occupational skills to regularly provide free-of-cost services, such as plumbing, electrical works, furniture repairs, and lock changing for the residents. The third, “Chunfeng,” is a new group that was launched in early 2019 and is mainly involved in maintaining the environment and public safety in the community.

In mass relocation residences, residential committees recognize that their role is changing from “management” to “providers of public services” and “community supporters.” The participation of specialized NGOs in community-building is expanding as part of community self-government and mutual help.

4.5 From disaster prevention experience to COVID-19 response

Disasters and public health are different challenges, but they share the common feature of being risks that threaten day-to-day life. Since 2008, community disaster prevention in China has been expected to upgrade from mere disaster response to general risk management deriving from disaster prevention. In community settings, experience accumulated from disaster prevention was used when handling the COVID-19 pandemic in the following ways. First, communities successfully formed organizational structures—that is, built teams of people—to respond to the emergency situation. Both communities had built contact teams for each area for the purpose of disaster prevention. Moreover, stakeholders in the region collaborated in disaster prevention planning and training in normal times. In the current COVID-19 response, the contact officials actively worked on publicizing information and measuring temperatures on entry and exit. In addition, Erma cooperated with the local hospitals to distribute preventative traditional Chinese medicines to residents. Second, communities used “color-coded health cards” as management tools when entry to and exit from the community was restricted. When medical teams enter a large-scale disaster area, the method of attaching tags colored red, yellow, green, or black according to the severity of injuries to the arms or legs of rescued people to determine the priority for treatment is used to save as many injured people as possible with limited human and material resources. Current community-level COVID-19 response sites in China use similar “color-coded health cards” as management tools when entry and exit are restricted. From mid-February 2020, “color-coded health cards” were introduced in Community A. The entry and exit restrictions were relaxed in March, but the original paper cards were later changed to electronic cards that can be used in other regions to prevent a recurrence of infections due to widespread movement of people when social activity recommenced.

5. Conclusion

The reality of the relationship between public help, mutual help, and self-help as China's mass relocation communities build up disaster resilience is described below. The leadership exhibited by the administration in building disaster prevention systems could be seen in the transition process for community disaster prevention. The top-down formulation of plans should be avoided, but in the initial stages, the administration can be considered to have played a major role in directing residents' awareness to "disaster prevention" as a challenge for the community. In other words, *public help* is essential for securing funding and directing the residents' attention. Furthermore, the importance of *mutual help* in the activity stage was confirmed. NGOs working in these communities faced the question of "who will do what and how." Some groups were long established, while others were formed because new residences had been built. Some groups moved voluntarily, while others operated with support from the administration. The latter in each pair was possible precisely because of the cooperation between administrative support, NGO action, and resident participation. A range of interactions gave rise to the cycle of calling attention, conduct, and reflection. Moreover, while sharing disaster prevention information within families was confirmed as , the order of risks within the residents' mind was revealed by phrases like "crime prevention over disaster prevention." Disaster prevention that focuses on the potential power of slight disaster prevention and takes into account local characteristics would perhaps be easier to accept.

Chinese society came to recognize disaster response as an important task for society after the Sichuan earthquake. To improve resilience, the capacity for disaster prevention should be strengthened in addition to recovery after suffering a disaster. Japan and China differ in their social systems, the scales of societies, level of development, culture, and other respects, but both are Asian countries often affected by disasters. Disaster is a challenge shared by human society that goes beyond national borders; therefore, a cooperative attitude and sharing knowledge are essential when facing a disaster. In the process of recovering from earthquakes and building its disaster prevention system, China incorporated much of Japan's experience as a country frequently affected by disasters. Ten years from the Sichuan earthquake, China continues to search for a path toward disaster response. Below are three characteristics of community disaster prevention in China.

The first characteristic is the pilot-to-promotion approach. Disaster prevention is a new topic for China that only began to be promoted in earnest from 2008, and conducting it on a wide scale in a short time is difficult. When building disaster resilience, communities that organize material, funding, space, and personnel regimes are often led by the administration. Community-building for disaster prevention is characterized by the thinking and practice of making an excellent "model" and using the power of the model to influence other places in the region. Modeling is a top-down idea, and the willingness to participate of those at the "bottom"

is not always vibrant. However, as the national, provincial, and municipal levels prepare policies and give support with funds as they work toward making models, it can play a role in raising awareness and attracting attention to “disaster prevention” as a major theme. However, how those involved should spread disaster prevention from the models of excellence to other communities around them has not yet been discussed in depth.

The second characteristic is finding an opening and advancing. Social participation in disaster prevention in China seems to be characterized by “beginning where it is easiest” and “organization-based disaster prevention.” Regions where disaster culture has formed due to geographical conditions and disaster experience can work on active disaster prevention, but treat “disasters” as something out of the ordinary and put off working on them usually find an opening toward disaster prevention and gradually promote it through trial and error. This line of thought finds an opening to take action, such as selecting targets for the initial stages of disaster prevention community-building and starting disaster prevention from organizations like schools and companies as a means of expanding social participation in disaster prevention.

The third characteristic is the expectation on women, children, and the elderly as key people in disaster prevention. Many studies treat children and the elderly as people who are at a disadvantage in disasters. However, those at a disadvantage when acting during evacuation are not necessarily at a disadvantage in terms of information during disaster prevention. This study clarifies that women, children, and the elderly require consideration during disasters, but these three groups conversely play key roles in disaster prevention in Chinese practice. Creating an environment and changing attitudes so that women, children, and the elderly can fulfill their potential as key actors in disaster prevention, rather than simply emphasizing that they are in weaker positions when disasters occur, is a challenge for community disaster prevention in the future.

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