Research on the Systematic Improvement of Community Public Health Disaster Response Ability

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Abstract: In the prevention and control of the new crown pneumonia epidemic, the community has become a strong fortress, but some weaknesses have also been exposed. Community disaster resilience theory can analyze community disaster response capacity more systematically and comprehensively. Based on this theory, the paper constructs a community public health disaster systemic response capacity framework that integrates static and dynamic capabilities. Based on this framework and combined with large-scale community surveys and interviews, the paper examines the problems of my country's community systemic response capacity in epidemic prevention and control. It also proposes ways to build community institutional resilience, social resilience, economic resilience, resource and environmental resilience, and individual resilience, and propose measures to systematically improve the community's ability to respond to public health disasters.
Keywords: epidemic prevention and control; governance; community public health; disaster resilience system

1. Introduction

After the outbreak of the COVID-19 epidemic, the Chinese people have achieved a phased victory in the prevention and control of the epidemic. Since 2021, epidemics in China are showing a trend of multiple occurrences and local outbreaks, and the community has continued to be the key frontline for epidemic prevention. Despite its function as a strong fortress in front of the complex public health emergency, the shortcomings of insufficient response have been exposed. At the third meeting of the 13th National People's Congress of the People's Republic of China and the third meeting of the 13th National Committee of the Chinese People's Political Consultative Conference in 2020, President Xi Jinping pointed out that it is necessary to strengthen the grassroots' prevention and control capacities to weave the first line of defense; to follow the principles of "overall planning, systematic reshaping, and comprehensive improvement" to prevent and resolve major risks of epidemics and public health emergency.

Epidemic prevention and control is a systematic project. Horizontally, it involves the community's economic, social, governance system, infrastructure, and emergency resource system, etc. However, these subsystems may be complementary or even there are conflicts between each other. The shortcomings of any system may fail in the work without systematic research and overall improvement of the community's disaster response capabilities. Therefore, the concept of system and the principle of overall promotion are quite important. Vertically, it involves pre-disaster preparation, response during disasters, and post-disaster recovery and reconstruction three periods. The integration of normal and abnormal governance in communities must be realized during the dynamic process. As a community of social life composed of people, the participation of residents and the improvement of the autonomy level are the keys to improve the epidemic prevention and control capabilities, and this must rely on the integration. Without cooperative autonomy of residents during normal times, it is even more difficult to form a resident participation cooperation mechanism in emergency management. As Shuhua Li said, "In a holistic system, not only is there a non-linear feedback relationship with functional coupling between units at the same level, but also an inseparable functional coupling and information loop relationship between different levels." [1] If there is a problem in one point, there will be problems everywhere. After the emergence of the COVID-19, scholars proposed to improve the community's prevention and control capabilities by strengthening the construction of public health and other infrastructure[2], of information and technology systems[3], of community grid and cooperative governance system [4], and improving residents' participation mechanisms[5]. However, these studies are insightful but in-systemic because of lacking support from a systematic analysis framework for disaster management. As a result, it is quite necessary to build a systematic assessment and analysis tool for the community disasters management.

2. Community Disaster Resilience
2.1 Concept of the Community Disaster Resilience

Since the 1980s, in order to cope with the increasing global disaster events, the concept of "resilience" has been introduced into the field of urban planning and management represented by disaster prevention. It is

generally used to describe the resilience, adaptability and sustainability of the community, as a Complex Adaptive System（CAS）[①], in the face of external interference, pressure or adversity[6].

The analysis of community disaster response capacity from the perspective of community disaster resilience is a new and systematic research paradigm. Based on the construction of a community disaster resilience capacity system, it integrates spatial and geographic planning, resource and environmental system construction, economic diversification, social capital development, and information dissemination technology. Not only does it pay attention to improving the community governance system and strengthening top-down state support, but also concentrates on the participation of community residents and the construction of social capital from the bottom up. Not only does it pay attention to the construction of a static capacity system, but also attaches importance to linking the community's adaptive capacity system with the dynamic processes of the community, which contains pre-disaster preparation, response during the disaster, and post-disaster recovery and reconstruction. It does not only emphasize the establishment of an external support system for the community but also attaches importance to the construction of community self-organization and self-learning capabilities. As a result, the community can make necessary adjustments to its structure and functions according to the disasters[7].

Compared with simply emphasizing that communities should strengthen economic diversification, infrastructure and resource protection, community disaster resilience researchers have increasingly emphasized the importance of identifying and developing the community's advantages in recent years. Since "community people" have common and binding ideology and belief, they could adapt to each other in a similar way when facing disasters. Therefore, it is the key to improving the community's ability to respond to disasters that concentrating on the social connections between people in the community to improve the collaborative governance between the government and society, cultivating common values and beliefs, and ultimately stimulating the vitality of residents' self-organization [8]. Manyena further pointed out that "people" should be the center of disaster resilience construction in the community, and resilient individuals are the inherent strength generated by the resilience of the community to disasters]. The conceptualization of community disaster resilience means that people have realized that not all threats could be avoided, but that mechanisms should be established to actively adapt to disasters and minimize their interference. The United States has taken the construction of disaster resilience in urban and rural grassroots communities as a national strategy. In 2007, Bush proposed in the Presidential Order of Homeland Security that community disaster resilience, biological monitoring, and treatment of large-scale casualties should be incorporated into the key components of national public health and medical preparation; The Obama administration further incorporated community disaster resilience into the White House's national security strategy and national disaster recovery framework[9]. The two World Disaster Reduction Conferences in 2005 and 2015 also focused on bottom-up community disaster resilience.

2.2 Framework and construction of the Community Disaster Resilience

Although there are different views on the composition of the community disaster resilience system, most of the researches believed that community organizations and systems, cultural and social relations, economy and production, region and facilities, population and their capabilities constitute the five basic elements of a community. Based on these elements, the community has the potential to successfully respond to disasters. For example, Bruneau (2003) integrated the disaster resilience indicators of communities into four dimensions: technical resilience, organizational resilience, social resilience and economic resilience[10]. Norris et al. (2008) proposed a community disaster resilience network including economic development capability, social capital capability, information and communication capability, as well as individual resilience and collective action capability within the community, they work together to provide communities with disaster preparedness strategies[11]. Renschler et al. (2010) further proposes seven dimensions to measure the community disaster resilience: population structure capacity indicators, natural environment or ecosystem capacity indicators, organized government service capacity, infrastructure guarantee capacity, community life and collective action capacity, economic development capacity, social capital capacity, etc. (referred to as PEOPLES) [12].Djalante R [13] pointed out that the community disaster resilience indicators include at least the institutional resilience brought about by the coordination of government governance and community autonomy, the social resilience brought about by the prosperity of culture and social capital, the economic resilience brought about by the diversified economic development, the social resilience brought about by the community's resources and facilities, and the individual resilience related to the residents' awareness and collective action abilities, etc. These abilities together constitute an indivisible organic whole, relying on each other to support each other. The overall resilience of the community would decline with any ability absence. At the same time, the construction process of these five capabilities is a process of mutual support between normal governance and abnormal governance, it combines the dynamic capacities before, during and after a disaster.

As a result, this paper constructs a framework and system of the community's public health disaster response capabilities, which includes both static capability and dynamic capability (Figure 1). In terms of static capacity, it is a structural system that includes community institutional resilience capacity, social resilience capacity, economic resilience capacity, resource and environmental resilience capacity, and resident individual resilience capacity. Firstly, the institutional resilience capacity depends on the inclusiveness and synergy between the government and the community[14], it provides institutional support for the construction of other resilience capacity. Secondly, the social resilience capacity is the maintenance of social integration and promotion of effective operation of community society when encountering destructive forces. Social resilience is closely connected with social capital elements such as community organization system and community social network[15]. Social resilience capabilities provide the basis for organization and mobilization for other resilience capabilities. The economic resilience is the ability to respond to disasters based on the level of community economic development, and it provides the economic foundation for building other resilience capabilities. Resource and environmental resilience is mainly based on the resilience and resistance to disasters formed by the hardware conditions of the community. Therefore, this resilience capacity provides the hardware foundation and guarantee capacity for other resilience capacities. Individual resilience mainly refers to the ability of community residents to effectively screen information and obey order in the face of disaster scenarios such as epidemics. At the same time, they are good at learning and accumulating knowledge from disaster scenarios. The "people" of resilient individuals should be at the center of community disaster resilience. Generally, these five capabilities are interdependent and mutually supportive, and none of them are indispensable.

In terms of dynamic capabilities, it includes the dynamic process of community pre-disaster preparation, disaster response, and post-disaster recovery and reconstruction. The construction of community public health disaster response capacity should connect static capacity building with dynamic governance process, to realize the mutual intervention and support of normal and abnormal governance of the community. In general, the systematic improvement of the community's capacity to respond to public health disasters is a process of interaction and influence between subjects and subjects, and between subjects and the environment in the community. In this continuous process of interaction, subjects continuously 'learn' and 'accumulate experience' from the bottom up, and change their structures and behavior in response to this experience, which constitutes the main driving force for the long-term evolution and autonomous evolution of complex systems in communities[16].
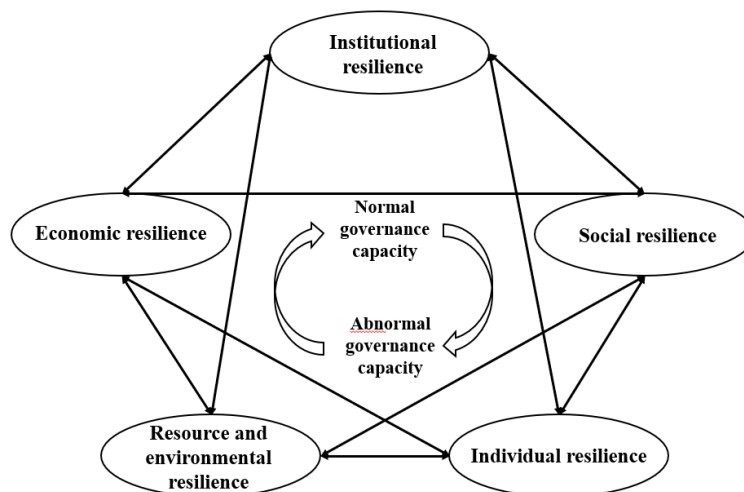

Fig.1 The framework and system of the community's public health disaster response capabilities

3. A systematic review of the community capacity to respond to public health disasters

In order to systematically review the capacity of communities to respond to public health disasters, this study conducted a questionnaire survey and interviews with some grassroots cadres involved in prevention and control in 97 urban and rural communities in China from September to December 2020[2], and the following conclusions could be drawn.

3.1 Shortcomings in community governance models affect the ability to shape the resilience of community systems

In recent years, China's grassroots governance system and governance methods have undergone great changes. In the process of daily governance at the grassroots level in urban and rural areas, communities are

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Volume 06 - Issue 06, 2023
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becoming more and more administrative, there is a growing hierarchy of community cadres, and administrative departments are increasingly accustomed to carrying out community work through administrative delegation and executive orders. Some places have habitually adopted this approach to governance in epidemic prevention and control, pressing a lot of work into the community and boosting community control capacity by deploying cadres and resources, which is manageable in normal times, but often unable to fulfil urgent and complex tasks in times of disaster response. In January 2021, when Tonghua city adopted a closed community approach in response to the new crown epidemic, the grassroots administrative and community systems were paralyzed simply in the face of an explosion in demand for household goods from residents, not to mention that community residents have other multi-level, individual needs that cannot be met by community cadres. Xi Jinping, therefore, pointed out the necessary to build up a people's defense against the epidemic. Unfortunately, the results of the study showed that 88.66% of the sample communities were mainly staffed by cadres of different classes or a small number of party volunteers, with very little participation from ordinary residents (see Table 1 for details). The fundamental reason is that some local grassroots governance still has not changed this governance method of administrativeizing the community, and has not actively guided and cultivated the ability of the community to form disaster self-rescue, then the residents were hardly involved.

Table 1: Sources of front-line prevention and control personnel in the community

Sources	Frequency (person)	Percentage (%)
Community cadres (including the sinking cadres)	44	45.36
Community cadres (including the sinking cadres) and party member volunteers	42	43.3
Persons from each family	4	4.12
Others	7	7.22
Total	97	100

Sources: self-calculation.

During the Great East Japan Earthquake in 2011, the administrative systems and administrative functions of some local municipalities were paralyzed, unable to provide sufficient assistance to the victims, and ultimately had to rely on the self-help and mutual assistance of residents and enterprises in the community. Afterwards, Japan revised the "Basic Law on Disaster Countermeasures", clarifying the main role of residents or enterprises in disaster prevention and relief activities in cities, towns and villages. The government has shifted from a purely government-led "top-down" disaster reduction system to a strengthened "bottom-up" disaster reduction system to achieve a balance between the two. The UK government has enacted various laws and regulations to regulate the behaviour of different groups, organizations, families and individuals in the community to provide institutional safeguards for the democratic participation of community members in disaster reduction and relief work. The UK Cabinet Office has formulated the Strategic Framework for Building Resilience in Community Systems, which details the guiding principles for the behaviour of individuals, communities and other participants in building resilience in community systems.

3.2 Poor development of community social organizations affects the building of community social resilience

In the process of disaster response such as epidemic prevention and control, effective resident participation and collective action are the basic elements for the formation of community social resilience, and these need to be based on certain community organizations[17], which include residents' self-organization, institutional organizations and professional organizations.

3.2.1 Shortcoming from the construction of residents' self-organization system

Resident self-organization is a community social organization formed spontaneously by residents from bottom to top with the support of the government and the community. Community epidemic prevention and control, as a community public affair, requires the joint participation of residents. In particular, the diversified and individualized needs of residents in epidemic prevention and control cannot fully rely on the government, nor can they fully rely on village cadres who are busy with various affairs. Therefore, it is necessary to pay attention to the self-organization of residents based on the residents' social network and the mutual assistance of various small groups. Studies have proved that resident groups and self-organizations based on resident social networks are of great significance for community pre-disaster preparation, emergency response and post-disaster recovery[18]. For instance, Norris (2008) pointed out that a social network with strong accessibility can provide diversified and accessible support to residents in distress due to disasters, such as psychological support,

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www.ijlrhss.com || PP. 190-201

borrowing money, ride-hailing, etc., which is crucial for improving the social resilience of the community[19]. Chengdu has cultivated a lot of residents' self-organizations in the community in accordance with the principles of "government guidance, social coordination, and diverse participation". After the Spring Festival in 2020, there are 736 micro-teams with more than 8,000 backbone members in only Jinniu District participated in the epidemic prevention and control work. Chengdu has become one of the cities with the fastest resumption of work and production and the best restoration of order and vitality in the country. However, the survey also found that some community cadres believed that residents' self-organization based on social networks would hinder their work, so they usually suppress these organizations. 87.63% of the sample communities have not established township councils or have established councils but have not played a practical role. Of course, it is difficult for these organizations to play a role in mobilizing residents in disaster response.

3.3.2 Insufficient role of institutional organizations

Institutional organizations include community residents (villagers) groups, community groups, and women's federations. Firstly, as the most basic self-governing unit, the resident (village) group should have played a role of mutual assistance. However, the survey found that many urban communities do not have resident groups. Although most rural communities have set up villager groups, they played little role in 56.82% of the rural community. Secondly, community group organizations should often organize youths to carry out activities. During the epidemic prevention and control period, youth should be organized to help each other and participate in community prevention and control. However, the survey found that due to insufficient cultivation of group organizations during the normal governance period, 81.44% of communities had no group organizations or had league organizations that did not normally function (see Table 2 for details). The epidemic broke out during the Spring Festival holiday in 2020, young people, including college students, who are usually not in the community are generally at home, but the survey shows that among the 97 college students who participated in the survey, only 14 participated in volunteer service activities for epidemic prevention and control. College students reported that it was not that they were unwilling to participate in epidemic prevention and control, but the community youth mobilization mechanism is insufficient[3]. Some community officials felt troublesome to issue volunteer service certificates to college students involved in community prevention and control.

Table 2: The organization and mobilization of Communist Youth League in the community

Period of normal governance	Frequency (person)	Percentage (%)	Period of epidemic prevention and control	Frequency (persons)	Percentage (%)
Frequent youth activities with League Organization	6	6.19	Organizing youth to participate in community epidemic prevention and control	10	10.31
Occasional youth activities with League Organization	12	12.37	Organizing mutual aid among youths	4	4.12
No function with or without youth activities and League Organization	79	81.44	No function	83	85.57
Total	97	100	Total	97	100

Sources: self-calculation.

With many male youths going out to work, left-behind women have become the main force of the village labor force. However, the survey shows that many village women's federations lack organization and mobilization of women. 72.73% of the villages' women's federations failed to organize their village women to carry out activities during the normal governance period, and 52.27% of the women's federation did not mobilize women to participate in prevention and control or organize women's internal mutual assistance[4] (Table 3).

Table 3: Women's Federation's work on women's organizations

Normal governance period	Frequency (persons)	Percentage (%)	Epidemic prevention and control period	Frequency (persons)	Percentage (%)
Organizing women's activities frequently	5	11.36	Organizing women to participate in epidemic prevention and control	14	31.82
Organizing women's activities occasionally	7	15.91	Organizing mutual assistance among women in the village	5	11.36
No	32	72.73	No	25	52.27
Sum	44	100	Sum	44	100

Sources: self-calculation.

Emergency management work, including epidemic prevention and control, is very professional and requires professional social support. Most communities in the UK have set up community social organizations specializing in emergency management services, such as women's volunteer service teams, Red Cross organizations, St. John's Ambulance Team, etc. The women's volunteer service team is mainly responsible for regularly sending volunteers to the community to count the types and numbers of the elderly, and investigate difficulties faced by the elderly, then to obtain a database for emergency use; the Red Cross and St. John's Ambulance Team provide general emergency rescue service knowledge, and train community residents in relevant emergency knowledge and skills [15]. However, the survey presents that there are basically no professional community social organizations dealing with disasters in our communities, and there is also a shortage of disaster relief professionals.

3.3 Disparities in economic conditions and inequitable distribution affect the construction of community economic resilience
Community is the union of people's social life and economic life. Community economic resilience is related to the basic conditions of the community's economy, industrial structure, distribution system, etc. It provides the economic foundation for the community's ability to respond to disasters.

3.3.1 Economically weak communities are more exposed to disaster risks
China is a vast territory, the community economic development in different regions varies greatly, and the economic conditions of communities in the same region are also very different. Particularly, some rural communities with remote geographical locations and relatively backward collective economies lack the basic conditions to respond to the epidemic, while the epidemic prevention and control has put forward huge demands on material consumption. The survey also finds that some remote and impoverished rural communities are connected to centralized isolation places required for epidemic prevention, and the community medical and health conditions are extremely poor. Some rural points in winter do not even have heating equipment, and the on-duty personnel cannot work in the cold environment for a long time. In addition, we find that some rural communities need to bear the salaries of other village cadres except for the village chiefs (secretaries and directors). In these rural communities, the village finances themselves are tight, and the front-line prevention and control personnel need to be given necessary subsidies in the prevention and control of the epidemic, which has put a lot of pressure on the villages with tight village finances. When the necessary wage subsidies cannot be provided to the front-line personnel, it will affect their enthusiasm for work, which in turn affects the community's prevention and control capabilities.

3.3.2 The unsound distribution mechanism of community public resources (opportunities) affects community disaster resilience
The establishment of a relatively equitable system for the distribution of economic development achievements is very important for economic resilience. Past disaster research has shown that residents with lower economic and social status usually suffer more adverse psychological consequences, but their chances of obtaining resource support are lower. Therefore, the community needs to build a mechanism that can distribute materials and employment opportunities to those who need it mostly [9]. However, the survey shows that some community cadres are more willing to hire their own relatives and friends to participate in the prevention and control to obtain higher wages or subsidies. Furthermore, In the distribution of prevention and control materials and the management of access checkpoints, the phenomenon of favoring relatives and friends has occurred frequently. The unfairness in the processing and distribution of interest relationships affects residents' trust in cadres and their compliance with community prevention and control rules, and is not conducive to the

International Journal of Latest Research in Humanities and Social Science (IJLRHSS)
Volume 06 - Issue 06, 2023
www.ijlrhss.com || PP. 190-201

improvement of community disaster resilience building and prevention and control capabilities.

3.4 The low level of community space planning and resource security affects the resilience of community resources and the environment
3.4.1 Rural community spatial planning lacks resilient design

In some villages, the construction of escape routes, public shelters and disaster prevention facilities is not complete. Some places focus on industrial development and ignore the integrated development of production, ecology and life. Economic development destroys ecology and easily induces natural disasters. In some places, when villages are merged to form a new community, they deliberately break the residential group that the villagers are familiar with. Intentionally or unintentionally, a settlement for the elderly, especially the poor elderly, is formed in some villages, but the elderly themselves are vulnerable in emergency response. Under the conditions of emergency management such as epidemic prevention and control, it is easy to form the weakest link and area of emergency management.

3.4.2 The material support system lacks robustness, redundancy and rapidity

Disasters will put huge pressure on material supply, and general material security systems often fail to function well. Norris pointed out that only emergency resource security mechanisms with three dynamic attributes of robustness⑤, redundancy and rapidity can meet the requirements. The need for disaster response, that is, when the resource security system is robust and redundant enough to respond quickly to the immediate impact of disaster stressors, the emergency resource system is not prone to malfunctions and thus forms resistance to disasters. However, the following problems are found in the survey. Firstly, many villages have not established strong facilities and material guarantee conditions for epidemic prevention and control, some centralized isolation places do not have sufficient conditions for heating and catering services, and some front-line points even don't have emergency heating equipment. Secondly, many villages have not established a redundancy mechanism for lifeline systems. Once there is a problem with facilities such as emergency transportation, emergency medical care, emergency heating, and night lighting, there is no way to work again. Thirdly, there is a lack of rapidity of resource guarantee. Some places failed to give the promised work subsidies to front-line prevention and control personnel. Some local breeders propose that they need to go out to buy forage, but it is time-consuming and labor-intensive for the village to report to the township, and the township to report to the county.

3.5 Incomplete information communication and education and publicity mechanisms affects shaping residents' individual resilience

Individual resilience mainly refers to the ability of community residents to effectively identify information, self-discipline, understand others, and obey order in the face of disaster scenarios such as epidemics. At the same time, they are good at learning and accumulating knowledge from disaster scenarios, and actively rescue themselves and each other in the face of disasters, that is, residents can obey the order and actively participate in community collective actions. The building of individual resilience of community residents requires an effective community information communication and education and publicity mechanism. Xi Jinping pointed out that "it is necessary to carry out in-depth publicity and education on health emergency knowledge to improve the people's awareness of public health emergencies and the ability to prevent self-rescue and mutual rescue."

3.5.1 Unscientific community prevention and control information dissemination methods

The two-way communication mechanism of community information in emergency management can not only let residents know the information they should know and public decision-making in the community, but also provide opportunities for community residents to express their needs, opinions and attitudes, which is very important for community consensus [18]. However, the survey found that information on epidemic prevention and control and community public services was poorly communicated in some communities. Only 28.87% of the communities could listen to residents' opinions in advance on the specific prevention and control measures (Table 4). In addition, many elderly people have not joined WeChat or QQ groups, and they need to establish contact with the community by telephone and other means, but 60.82% of the communities do not have a hotline for epidemic prevention and control, or there are telephones that cannot be reached, resulting in the inability of elderly residents to report information to the community. One-way information publicity is not conducive to residents expressing their needs, opinions and attitudes, and the community cannot provide demand-oriented services. Community cadres feel that they work very hard, but residents are not satisfied, which eventually made it difficult to form "consensus" and "empathy" among cadres and groups in community prevention and control.

Table 4: Community officials communicate with residents through QQ or WeChat

Informing residents of the latest epidemic information and prevention and control services in the community	Frequency (persons)	Percentage (%)	Allowing residents to discuss and decide the prevention and control measures of the community	Frequency (persons)	Percentage (%)
Frequently	34	35.05	Frequently	28	28.87
Occasionally	35	36.08	Occasionally	28	28.87
No	28	28.87	No	41	42.27
Sum	97	100	Sum	97	100

Sources: self-calculation.

3.5.2 Organizing residents to exercise and reflect in real scenarios of epidemic prevention and control has not received much attention

The key how a society can quickly recover and rebuild after disasters is that residents have the instinct to summarize and learn in real scenarios. Failing to make good use of real scenarios to give ordinary people the opportunity to participate in experience summarization during the SARS epidemic is the main reason for our low prevention and control capabilities of grass-roots cadres and the masses in the early stage. As a country with frequent disasters, Japan initially conducted non-scenario disaster prevention drills for disaster prevention education, but they were like festivals and were mere formalities. Later, the experiential disaster prevention education allowed people to experience and learn in the designed disaster scenes, but the effect was also not good as the real scene. Therefore, in recent years, Japan has encouraged social institutions to use the real sites after disasters to establish natural schools and other methods to promote disaster education. The disaster scene has the richest information. This is the best way to effectively enhance the community's future prevention and control capabilities to let ordinary residents personally participate in epidemic prevention and control, organize residents to summarize and reflect on the experience and lessons, criticize real problems, and propose improvement plans.

Communities in Shandong, based on necessary safety protection, actively guide high school students and college students in the communities to participate in epidemic prevention and control voluntarily. Even though these students mainly undertake relatively low-risk jobs such as the construction and management of WeChat and QQ groups, and the distribution of epidemic prevention and control publicity materials, they would be motivated by receiving commendation letters to their schools from the communities. Hence, these young people make unique contributions to community prevention and control, and are also reserved future talents for public health disaster response for the country and the community. On the premise of ensuring safety, ordinary residents should be organized to participate in epidemic prevention and control, then they could summarize and reflect on the experience and lessons of epidemic prevention and control in their communities. This is the best way to educate residents, but the survey found that only 38.14 % of the community has undertaken such activity.

4. Systematic improvement paths of community public health disaster response capability

4.1 Strengthen community institutional resilience, and provide institutional support for systematically improving community public health disaster response capabilities

4.1.1 Build an inclusive and collaborative working relationship between the government and the community in emergency management such as epidemic prevention and control

The most effective policies are usually tailored to the needs of a particular community, which varies from community to community. Some economically disadvantaged communities need policies aimed at strengthening economic capital and infrastructure, while others need to improve their social capital, strengthen organizational mobilization policies, etc. Therefore, the government must provide supports based on their specific conditions of the community, give the community greater autonomy, and construct an equal cooperative relationship with social organizations, residents, and enterprises in the community to support them in participating in self-help and mutual help in epidemic prevention and control.

4.1.2 Explore the list of government powers in the management of public health disasters

The basic public services that are the responsibility of the government should not "blame" the community. It is necessary to complete the evaluation system of community cadres, and incorporate the community disaster resilience into the evaluation indicator system, then, to enhance the enthusiasm of

International Journal of Latest Research in Humanities and Social Science (IJLRHSS)
Volume 06 - Issue 06, 2023
www.ijlrhss.com || PP. 190-201

community cadres to carry out this work. The Guidelines for Community Disaster Resilience should be launched as soon as possible, the government should increase its investment in community disaster resilience building, and make up for the shortcomings of disaster resilience building in backward communities, especially in rural communities. Complete leadership mechanism for emergency response work at the township level can better assume responsibility for community emergency management, such as resource reservation, emergency command system construction, professional talent team construction, community resident organization mobilization, etc. The CDC (Disease control agencies) and the community interact with each other. The system of "one case, three systems" oriented by the ability of "community self-help" could clarify those emergency situations that the community can initiate response before the government activations, confirm the rights, responsibilities and behavioral principles of enterprises and institutions, social organizations, families and individuals in the jurisdiction to participate in emergency management, and strive to make community emergency response to public emergencies gradually standardized, institutionalized, and legalized.

4.2 Strengthen the community social resilience, and provide an organizational and social foundation for systematically improving the community's public health disaster response capacities
4.2.1 Establish and complete the community organization system in normal governance through party organization leadership and public welfare incubation
The survey shows that most of the volunteers involved in community epidemic prevention and control are old party members, old cadres, old teachers, old veterans, and family heads, who are "Xiangxian", the core of the social capital of the community. It is better to form various forms of elderly associations, rural sage councils, and community councils based on them. The government should support these organizations to provide diversified and personalized services to the elderly and other vulnerable groups in the community, and provide residents with self-help and mutual assistance in community governance and emergency management. Following the principles of geographical proximity, emotional connection, and similar interests, urban community residents' groups would be established to improve the governance structure of urban and rural residents (villagers) groups, and provide conditions for villagers' groups to play their role. Young people are attracted to the groups and guided to participate in community governance and public service during the normal governance period, which provides a foundation for them to play a backbone role in emergency management.

4.2.2 Actively cultivate professional social organizations for emergency management in the community
Referring to the experience cultivated by the US Federal Emergency Management Agency (FEMA) Community Emergency Response Team (CERT) project, emergency management departments and grass-roots governments at all levels in China should encourage community doctors, young teachers, community security and other young people to construct community emergency management social organizations. The government should increase support for such organizations by setting up professional funds or venture philanthropy projects, and hand over the operation of daily community emergency prevention and control drills, residents' public safety education and other projects to such organizations.

4.3 Strengthen the community economic resilience and provide an economic foundation for systematically improving community public health disaster response capabilities
4.3.1 The government should help communities with weak economic development to make up for their shortcomings
The first is to vigorously promote the development of community collective economy, especially in rural communities, which is not only a living unit but also a production unit. It is necessary to encourage the integrated development of the primary, the secondary and the tertiary industries based on the characteristic resources of the village, to provide an economic and conceptual foundation for resident cooperation in disaster response. Secondly, special economic support should be given to communities with weak economic development levels in epidemic prevention and control, especially to increase support for emergency infrastructure construction in remote and economically backward villages. The financial support of the community ensures that the front-line community cadres and volunteers involved in the prevention and control can receive the full amounts of subsidies for the prevention and control work.

4.3.2 The government should promote the community to complete the public resource allocation mechanism
It is necessary to promote the community to improve the collective economic resource allocation mechanism. The collective economy in which every resident can obtain reasonable income can bring a sense of belonging and collective responsibility, thereby enhancing the community's disaster resilience. As a result, improving the supervision mechanism to ensure open and fair distribution of prevention and control materials

and community public resources is quite important in emergency management. strengthening support for vulnerable groups who are in trouble due to disasters and building a governance order that can ensure that post-disaster resources are distributed to those most in need are critical ways for Compliance with prevention and control rules and trust in the community.

4.4 Strengthen the resilience of community resources and environment, and provide hardware conditions and guarantee capabilities for the systematic improvement of community public health disaster response capabilities

4.4.1 Incorporate resilience into community building

It is important to complete the construction of disaster prevention space and disaster prevention facilities, as well as the construction of urban and rural integrated community sanitation system. For example, the layout planning of community living space should avoid the formation of elderly living areas, especially those inhabited by poor elderly people; the new rural community construction plan should try to live in groups and in groups that are conducive to the social role of acquaintances, and to provide conditions for residents to watch and help each other in emergency management such as epidemic prevention and control.

4.4.2 Increase government support and build a robust, redundant and timely emergency resource guarantee system

First is increasing support for vulnerable communities to make up for the shortcomings of epidemic prevention and control. Disaster scenarios such as epidemic prevention and control have put huge pressure on the supply of materials, especially in the construction of isolation sites, the reserve of epidemic prevention materials, the improvement of office conditions in temporary prevention and control points, and the medical conditions of public health. A robust resource security system not only requires the community to have basic emergency security capabilities, but also requires that this security must be sufficient and powerful. The second is to build a redundant mechanism for life support facilities such as community emergency transportation, electricity, communication, and medical care to fill gaps. The third is to build a rapid decision-making mechanism for rapid replenishment of emergency resource consumption and interaction between bottom and up. The special needs of the community should be responded to and the work subsidies promised to the front-line prevention and control personnel in the community should be fulfilled in a timely manner.

4.5 Strengthen the community individual resilience, and make residents the active subjects in community public health disaster response

4.5.1 Adhere to the principle of "correct information and correct dissemination methods", and improve the community information communication mechanism in emergency management

First is to ensure the scientific nature of information communication. Residents are capable partners rather than just listeners, it's better to encourage them to participate in community collective actions in an appropriate way through publicity, rather than making them afraid to Participate. Second is to improve the two-way communication mechanism. Community volunteers (especially young people) helps to establish telephone hotlines and network interaction channels, where residents can express their own voices to provide the basis for accurate and effective services for the community. At the same time, it is conducive to construct an empathy mechanism between cadres and the masses, so that residents can understand the hard work of cadres. In addition, being listened to can also alleviate the psychological pressure brought to residents by disasters.

4.5.2 Build a bottom-up self-education and self-training mechanism in community emergency management

Those social organizations in the community could carry out community-based disaster prevention and mitigation education and training. In particular, the normalized epidemic prevention and control offers an opportunity for residents to summarize problems and experiences in community prevention and control, and participate in the formulation and work of pre-disaster prevention and post-disaster recovery plans. It is necessary to seize the opportunity of the current epidemic risk reduction and normalized prevention and control, and allow all residents, including primary and secondary school students, to participate in the real epidemic prevention and control process. Only in the real scene can the fastest exercise, learning, reflection, and growth can effectively improve the ability of community residents and even the entire community to respond to new critical moments.

Note

① The theory of complex adaptive systems (CAS) was first proposed by John Holland of the Santa Fe Institute (SFI) in 1994. He believed that the complexity of the system is rooted in the adaptability of the system to the environment, that is, adaptability creates complexity.

② The theory of complex adaptive systems (CAS) was first proposed by John Holland of the Santa Fe Institute (SFI) in 1994. He believed that the complexity of the system is rooted in the adaptability of the system to the environment, that is, adaptability creates complexity.

③ A simple survey on the students of Shandong Agricultural University who participated in the survey was conducted. More than 95% of the students answered that they would be willing to join the prevention and control team as volunteers under the condition of safety. The community officials are not good at organizing and mobilizing students. A few communities have successfully mobilized the enthusiasm of college students and other young people to participate in epidemic prevention and control by writing thanks letters to their universities, issuing volunteer service certificates to college students, and publicly commending and publicizing them in the community.

④ Many local women's federation cadres actively participated in the prevention and control of the epidemic in the villages. What we are talking about here is that the women's federation lacks to organize women to participate in prevention and control and to organize women's internal mutual assistance.

⑤ Robustness is the transliteration of Robust, which means robust and strong, and it is the key to the survival of the system in abnormal and dangerous situations. Robustness was originally a term in statistics that became popular in the study of control theory in the early 1970s to characterize the insensitivity of a control system to characteristic or parameter perturbations. Robustness here means that in disaster response, there will be explosive demands for resources, especially prevention and control materials. At this time, the emergency resource system can also maintain its stable supply characteristics.

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