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A Study to Assess the Performance of Disaster Management During the 2017 Yongji County Flood in China

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Abstract

In 2017, Yongji County, which is located in Jilin Province, China, was devastated by its worst floods for generations. Consequently, the people of Yongji County suffered losses due to both the natural disaster and the deficiencies of disaster management. The aim of this research was to evaluate the factors that influenced the experiences of victims to provide insights into the performance of disaster management. Statistical analysis was employed to describe the functions and role of disaster management in the 2017 Yongji County flood. The Logistic regression also was adopted to explore the association between the performance and outcomes of disaster management experienced by victims, and gender, age, profession, frequency of disasters, the efficiency of defense measures, the efficiency of rescue, the loss of property, the degree of normal life and productivity recovery, the satisfaction of governmental compensation, the degree of disaster information disclosure, the government attitudes, the mechanism of accountability, and public safety education. This paper is among the first studies to identify the factors that affect victims' perceptions in assessing the performance of disaster management hosted by local government. Hence, this research makes an important contribution in assisting policymakers and officers in local government to improve performance in dealing with natural and environmental disasters.

Keywords 2017 Yongji County Flood · Disaster management · Performance and outcomes · Intensive experiences of victims

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Introduction

Since the 1990s, both policymakers and professionals have paid attention to various emergencies that lead to economic losses and social impacts, and which have shown a trend of tremendous growth with the acceleration of urbanization in China (Saharia, 2017). For instance, during a flood disaster in 2016, there were 192 cities involved in flooding and the direct losses were estimated to be around 364.3 billion RMB (MWR, 2017). Hence, strengthening the capability of disaster management has become a realistic problem that currently faces every Chinese city. Moreover, as an important standard in evaluating Chinese governance, assessment of the ability to manage natural disasters, emergencies, and their recovery processes has gradually drawn the concern of victims and each level of government (Li & Mo, 2011).

Disaster management refers to the ability of local governments and related administrative sectors to take measures to achieve the goal of mitigating the effects of disasters (Li et al., 2012). It also refers to the cultivation and enhancement of administrative regions in terms of human resources, science and technology, organization, and institutions and resources that contribute to disaster prevention (Sewell et al., 2016). Thong (2019) states the efficiency of disaster management is largely determined by the administrative circumstance of the city and natural condition of the disasters. In this sense, disaster management is an umbrella concept that covers natural and social factors, hardware and software conditions, human and institutional resources, engineering and organizational capabilities, and other factors, and is an important embodiment of the comprehensive development capability of modern cities. The scale of disaster management includes not only the abilities of the top level of the system hierarchy, such as the central and provincial government, but also those of frontline sectors and institutions, such as the city government, county government, charities, social relief funds, Red Cross, hospitals, and many other non-governmental organizations (Oh et al., 2009).

The 2017 flood of Yongji County in Jilin Province is one such example of disaster management in China. Yongji County is located 20 km from Jilin city, in the middle of the northeast region of China. The watering system of Yongji County belongs to the middle reaches of Songhua River. Within a drainage area of 20 square kilometers, there are 38 rivers with a total length of 705.7 km flowing through Yongji county (Gu et al., 2011). Among these, Yinma River is a second-order stream with a length of 61.4 km; Wende, Chalu, and Aolong Rivers are third-order streams with a total length of 157.4 km. Moreover, there are seven fourth-order stream rivers and 27 fifth-order stream rivers with a total length of 486.9 km. Yongji County is warm and rainy in summer, with average annual precipitation of 667.4 mm. The maximum historical record of precipitation was in 1986, of 948.8 mm, and the minimum historical record of precipitation was in 2001, of 464.5 mm (Xiu et al., 2011). These are the natural conditions of the watering system in Yongji county which result in flood disasters continuously taking place.

In 2017, Yongji County experienced two consecutive floods on 13 and 19 of July. On 13 July, there was a rainstorm in Yongji County, with precipitation

across the whole county averaging 175.4 mm within one day; the true flood peak value was 3350 cubic meters per second. The heavy rain triggered a major disaster and resulted in a large number of trapped people as well as huge damage to infrastructure including roads, bridges, and reservoirs. According to government statistics, 279,000 people from 3050 families were affected by the flood, and 7676 buildings were destroyed by the disaster (Zhao et al., 2011). Moreover, 3558 hectares of farming land were destroyed, and 50,206 hectares of agricultural area were seriously damaged. The direct economic loss of the flood was 13.46 billion RMB in Yongji County (MWR, 2017).

The government of the county took great notice of the 2017 flood disaster and carried out strong emergency measures. The Disease Control Bureau of Jilin Province sent experts to Yongji County for investigation and to provide advice to the local government. From 8 a.m. to 20:05 p.m. on 13 July, the corresponding emergency response mechanism was successively issued and activated by the government and Yongji County. To strengthen flood control and emergency rescue, the resettlement of victims began from about 16:00 on 13 July. Focusing on the dangerous situation of bungalows in the 8th Group of Hebei Community and Yangmu Valley that were besieged by the flood, the government of Yongji County immediately deployed more than 100 pieces of machinery for the rescue (Li, 2018). In addition, residents living on both sides of the main river and in the low-lying areas in Kouqian Town were quickly transferred to safety zones. All efforts were subsequently made to settle victims. According to preliminary statistics, 79,200 people were evacuated from Yongji County, among which 16,629 people were centrally settled, and 62,571 people were relocated to dispersed locations (Liu et al., 2019).

When the rainfall stopped, the water level in the county area dropped incrementally, but most of the water, electricity, gas, communication services, and traffic were cut off. The county government of Yongji set up 14 working groups for emergency rescue, resettlement of victims, dredging, emergency repair of infrastructure, hygiene and epidemic prevention, disaster verification, comprehensive publicity, stability maintenance, disaster relief in rural areas, logistics support, communication and liaison, public security, and personnel deployment, as well as mobilization to carry out corresponding work (Zhang & Zhang, 2019). While settling victims, the government of Yongji County also organized staff to carry out the work of consolation and troubleshooting for the purpose of further assessing the magnitude of the disaster, and at the same time carried out epidemic prevention in the affected areas to ensure that no epidemic would occur (Yang, 2019).

One of the major challenges faced in disaster management in China, highlighted by the case of the 2017 Yongji County flood, is whether the government can make decent decisions regarding disaster management and prevention, and if they can offer victims with necessary assistance. An evaluation of the performance and outcomes of disaster management is crucial to the policymakers, government, and professionals who are involved in emergency response and disaster prevention in China.

The present assessment of disaster management in the 2017 flood of Yongji County covers the following focal points: (1) Whether the people who suffered in the 2017 Yongji County flood are satisfied by the monitoring and early warning systems. (2) Whether rescue services and medical assistance were sufficiently provided

to victims. (3) Whether people who suffered during the 2017 Yongji County flood were happy with the on-site command and dissemination of disaster information by the government. (4) Whether the people who suffered during the 2017 Yongji County flood were happy with the post-disaster recovery performance, including resettlement and compensation, provided by government.

We aimed to empirically and prescriptively contribute to contemporary studies of disaster management, particularly relating to flooding in rural China. Quantitative analysis was mainly used in this research, and was based on the results of surveys that were dependent on the willingness of people who were the victims of the 2017 Yongji County flood. Few studies from this perspective on disaster management of flooding in China have been published, as most previous research has focused on an assessment of flood risks that directly influence the property damage of victims and the economic loss of society in the urban areas of China (Liu et al., 2020). This highlights the absence of investigations assessing the performance and outcomes of disaster management that provides measures to relieve the burden on both the victims and government during the post-disaster recovery process in rural areas. These phenomena show that narrow epistemological perspectives limit the current studies, as they only focus on research in metropolitan areas. Following Chen et al.'s study (2020), our research is mainly focused on observing the factors experienced by rural victims to assess the government's performance during disasters in China. The second main aim of this work was to examine whether the victims were happy with the performance and outcomes of disaster management during the 2017 Yongji County flood. We contend that disaster management has become a key policy instrument in the process of initiating a modern emergency response system in China. The third and final contribution of this paper lies in disaster management in China, which can hopefully guide Chinese policymakers and government to produce more progressive disaster management outcomes.

Thus, the authors examined two research questions:

RQ1. Were the victims happy with the performance and outcomes of disaster management during the 2017 Yongji County flood?
RQ2. What is/are the main factor/s strongly associated with the experiences of victims of the 2017 Yongji County flood?

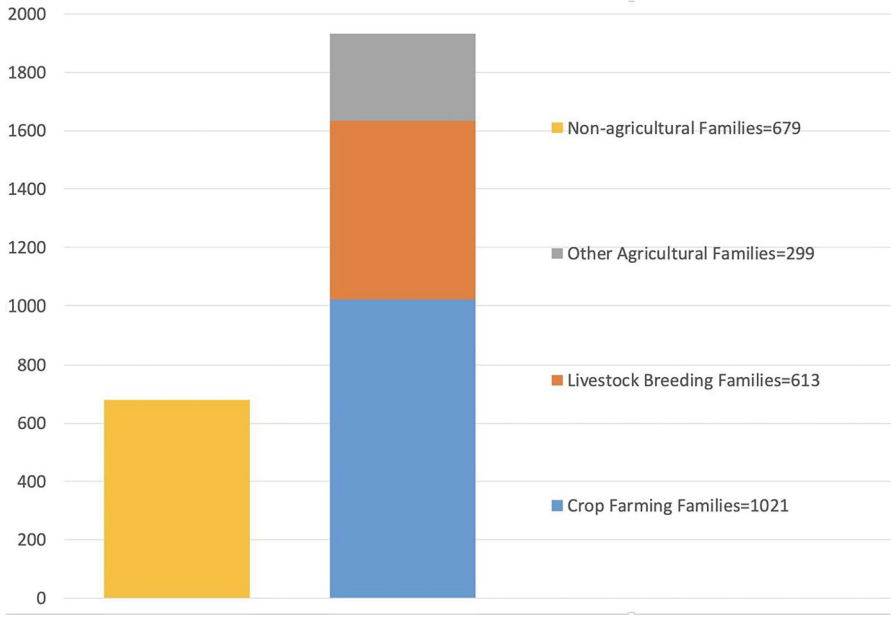
Materials and Methods

Research Design and Data Collection

This research was funded by a major project of the social science department at Jilin University (2017XXJD14). A survey titled "A Survey of Disaster Management and Recovery in 2017 Yongji County Flood" was drafted in December 2018 and was distributed to 3000 participants who were victims of the 2017 Yongji County flood. The information collected in the survey related to the issues of the efficiency of defense measures (EDM), the efficiency of rescue (ER), the loss of property (LP), the degree of normal life and productivity recovery (LPR), the

satisfaction of governmental compensation (GC), the degree of disaster information disclosure (DID), the mechanism of accountability (MA), and public safety education (PSE) during the 2017 Yongji County flood. The questionnaire was conducted using a 5-point Likert scale: 1—Completely Negative (0–20), 2—Partly Negative (21–40), 3—Neutral (41–60), 4— Partly Positive (61–80), 5—Completely Positive (81–100). The effective response number was 3000. The data of 408 participants were excluded due to invalid responses and missing records. Thus, the effective response rate was 86.4% (2592/3000). The Bar Chart 1 showed the distribution of effective response, who participated in the survey.

The participants were enthusiastic in sharing their ideas and experiences of the 2017 Yongji County flood. There were 2592 usable answers, which accounted for 86.4% of the total number of participants. Of the effective feedback, 26.20% of respondents were from non-agricultural families ($n = 679$) and 73.80% were from agricultural families ($n = 1913$). Among the agricultural participants, a total of 53.37% effective respondents (1021 individuals) were involved with crop farming, 31.99% of participants (612 individuals) from the agricultural families were involved in livestock breeding, and the remaining 298 participants (14.64%) were from other agriculture industries.



Bar Chart 1 The distribution of effective response

Research Methods

The performance and outcomes of disaster management regarding the intense experiences of victims of the 2017 Yongji County flood, and gender, age, profession, frequency of disasters, the efficiency of defense measures, the efficiency of rescue, the loss of property, the degree of normal life and productivity recovery, the satisfaction of governmental compensation, the degree of disaster information disclosure, the mechanism of accountability, and public safety education ($n = 2592$), were analyzed using descriptive statistics. The performance and outcomes of disaster management was set as the dependent variable, and the perception based on the remaining issues as independent variables. All statistical analyses were two-tailed and performed using SPSS 23.0 (IBM Corp., Armonk, NY, USA) and STATA (14 MAC Version Stata Corp., Texas Station, Las Vegas, NV, USA); the significance level of 0.05 was adopted.

Analysis and Results

Variable Analysis

The variable definitions and their analysis are shown in the Table 1. Among the survey feedback regarding the degree of disaster prevention, 9.57% of effective participants (248 individuals) felt completely negative, 39.12% felt partly negative (1014 individuals), 598 (23.07%) people were neutral, 595 (22.95%) people felt partly positive, and 5.29% of the effective participants (137 individuals) felt Completely Positive. Respondents' satisfaction degree on disaster prevention was the lowest among all variables. The outcome showed that nearly half of the respondents were unhappy with the early-warning mechanism against potential natural disaster, while only 30% thumbed at it. That means most respondents believed that the prevention system failed to work properly. However, people's excessive expectation on disaster prevention might also accumulated the frustration, believing that an effective system could have totally prevent their hometown from being destroyed by flood.

From the number of respondents, 4.75% (123 individuals) were completely unhappy with the efficiency of rescue completely, and 24.03% (623 individuals) were partly unhappy. A total of 31.29% (811 individuals) of the participants were neutral regarding the efficiency of rescue, 33.06% (857 individuals) felt partly positive and the remaining 178 people (6.87%) were happy with the efficiency of rescue. Respondents' attitude towards the efficiency of rescue was barely satisfactory in the mass, indicating more efforts shall be made in the face of similar incidents in future.

We collected data from Yongji County about the satisfaction of property protection during the 2017 Yongji County flood. A total of 8.49% (220 individuals) of the usable respondents were completely negative regarding their rate of loss protection, 973 people (37.54%) were partly negative, and 564 people (21.74%) held neutral attitudes. A total of 649 people (25.04%) felt partly positive and 7.17% of the respondents (186 individuals) felt completely positive regarding property protection during the 2017 Yongji County flood. Over 40% of the respondents were displeased

Table 1 Definitions and descriptions of variables included in the surveys ($n = 2592$)

	Measurement	Min	Max	Mean	SD	Percentage (N)
EDM	1 = Completely negative	1	5	2.75	1.074	9.5% (248)
	2 = Partly Negative					39.1% (1014)
	3 = Neutral					23% (598)
	4 = Partly Positive					22.9% (595)
	5 = Completely Positive					5.2% (137)
ER	1 = Completely negative	1	5	3.13	1.009	4.8% (123)
	2 = Partly Negative					24.1% (623)
	3 = Neutral					31.2% (811)
	4 = Partly Positive					33.1% (857)
	5 = Completely Positive					6.8% (178)
LP	1 = Completely negative	1	5	2.85	1.109	8.4% (220)
	2 = Partly Negative					37.6% (973)
	3 = Neutral					21.7% (564)
	4 = Partly Positive					25.1% (649)
	5 = Completely Positive					7.2% (186)
LPR	1 = Completely negative	1	5	3.74	0.980	1.2% (31)
	2 = Partly Negative					10.7% (276)
	3 = Neutral					25.4% (659)
	4 = Partly Positive					38.6% (1001)
	5 = Completely Positive					24.1% (625)
GC	1 = Completely negative	1	5	3.18	1.117	5.5% (142)
	2 = Partly Negative					24.1% (634)
	3 = Neutral					31.0% (804)
	4 = Partly Positive					24.9% (645)
	5 = Completely Positive					14.1% (367)
DID	1 = Completely negative	1	5	3.27	1.094	4.6% (118)
	2 = Partly Negative					20.0% (517)
	3 = Neutral					35.6% (925)
	4 = Partly Positive					23.5% (609)
	5 = Completely Positive					16.3% (423)
GA	1 = Completely negative	1	5	3.27	1.094	9.4% (245)
	2 = Partly Negative					16.2% (418)
	3 = Neutral					28.8% (747)
	4 = Partly Positive					39.1% (1013)
	5 = Completely Positive					6.5% (169)
MA	1 = Completely negative	1	5	3.04	1.131	6.6% (172)
	2 = Partly Negative					34.2% (889)
	3 = Neutral					15.7% (409)
	4 = Partly Positive					35.3% (915)
	5 = Completely Positive					7.9% (207)

Table 1 (continued)

	Measurement	Min	Max	Mean	SD	Percentage (N)
PSE	1 = Completely negative	1	5	3.03	1.129	7.8% (203)
	2 = Partly Negative					31.0% (806)
	3 = Neutral					18.6% (483)
	4 = Partly Positive					34.9% (905)
	5 = Completely Positive					7.5% (195)
Performance and outcomes of Disaster Management in 2017 Yongji County Flood	1 = Completely negative	1	5	2.79	1.279	16.7% (432)
	2 = Partly Negative					32.3% (836)
	3 = Neutral					18.8% (488)
	4 = Partly Positive					19.9% (518)
	5 = Completely Positive					12.3% (318)

Efficiency of defense measures (EDM), efficiency of rescue (ER), loss of property (LP), degree of normal life and productivity recovery (LPR), satisfaction of governmental compensation (GC), degree of disaster information disclosure (DID), government attitude (GA), mechanism of accountability (MA), and public safety education (PSE)

at property protection, thinking that the government could have done better to protect their houses. Among all variables, the satisfaction of property protection ranked last but one.

Of the responses related to the recovery process of regular lifestyle and production, 1.20% (31 individuals) felt completely negative, and 10.65% (276 people) were partly negative. A total of 25.42% (659 people) were neutral, while the attitudes of 38.62% (1001 people) felt partly positive, and there were 625 people (24.11%) that felt completely positive with regard to the recovery process of regular lifestyle and production. From the perspective of level of satisfaction, respondents were most happy with the recovery process of regular lifestyle and production among all variables, indicating that the government has made great efforts in post-disaster reconstruction and distribution of relief materials.

From the survey results regarding the degree of compensation, 142 people (5.48%) considered that the degree of compensation could not support the victims' desires, 634 people (24.46%) were partly negative regarding victim compensation, and 31.02% (804 people) of respondents were neutral. A total of 645 people (24.88%) felt partly positive regarding victim compensation, and 367 people (14.16%) felt completely positive.

There were 118 people (4.55%) who believed that they could not access disaster information at all, and 19.95% (517 individuals) of respondents thought that the government did not disclose sufficient disaster information during the 2017 Yongji County flood. A total of 925 people (35.69%) did not care about the disaster information at all. A total of 609 individuals (23.49%) considered that the transparent disclosure of disaster information was partly acceptable during the flood, and 423 people (16.32%) believed the publicity of the disaster information was perfect. With 35% of the respondents believing that the information disclosure was indifferent

and nearly 40% thinking the system was good enough, most victims held the idea that the government did a decent job on this matter. One reason might be that information of the situation of disaster was not important when victims were properly placed.

Based on the survey feedback, 172 people (6.63%) felt that the oversight and accountability mechanism was not useful at all, 34.30% were partly negative regarding the oversight and accountability mechanism, and 15.78% (409 people) of respondents were neutral. A total of 915 people believed that the oversight and accountability mechanisms were partly useful, and 207 people (7.99%) felt completely positive.

Of the responses related to the education of public safety, 7.83% (203 individuals) were completely negative, and 31.10% (806 people) were partly negative. The response of 18.63% (483 people) was neutral, 34.92% (905 people) felt partly positive, and 195 people (7.52%) felt completely positive.

Generally speaking, people's attitudes towards all the public services provided by the government during the 2017 Yongji County Flood was a mixed picture. Respondents' positive feedbacks were slightly more than negative ones, but the government cannot just neglect the querulous voices. The foregoing data showed that roughly 30–40%, which is a considerably large share, of the respondents were not really satisfied with the government performance. Many reasons might contribute to the result, including inadequate competence of local governments, limited authority to allocate resources of departments with real power, and inadvertence or even malpractice of staff, and all the problems can be boiled down to capacity gap, namely the gap between services which the government is expected to provide and the final execution. Additionally, the contradiction between residents' excessive expectation and the actual power of execution of the government may further amplify the capacity gap. Therefore, it is necessary for the government to know exactly what the people need indeed when it comes to fights against natural disasters, allowing for the fact that local governments, usually understaffed and in short of supply, can hardly provide all-round assistance to victims. The above-mentioned data showed that respondents tended to be specifically unsatisfactory when it came to property loss and material compensation. That is understandable, residents can hardly face the natural disaster all by themselves, and they have to count on the government for necessary assistance. Under such circumstances, the security of life and property is a far higher priority than other issues.

Quantitative Analysis

Table 2 shows that the basic characteristics of the distribution of effective responses from the survey were significantly associated with the efficiency of defense measures, loss of property, and satisfaction of governmental compensation. The corresponding variance inflation factor (VIF) values of the variables in this model are all less than 10. This indicates that there is no multi-collinearity between the variables in this model. The R^2 of the model is 0.675, and the adjusted R^2 is 0.674, which indicates the model has a suitable goodness of fit and high reliability. This paper

Table 2 Coefficient of ordered logistic regression ($n = 2592$)

Variables	Coefficient (S.E.)	T test	Sig.	Variance Inflation Factor (VIF)	95% CI	
					Max	Min
EDM***	0.397 (0.017)	22.734	0.000	1.709	0.363	0.431
ER	−0.023 (0.015)	−1.552	0.121	1.064	−0.052	0.006
LP***	0.586 (0.017)	34.583	0.000	1.718	0.553	0.620
LPR	−0.020 (0.015)	−1.336	0.182	1.038	−0.049	0.009
GC	0.139 (0.015)	9.151	0.000	1.396	0.109	0.169
DID	0.022 (0.013)	1.621	0.105	1.047	−0.005	0.048
GA**	0.023 (0.013)	1.726	0.085	1.021	−0.003	0.050
MA	0.000 (0.013)	-0.009	0.993	1.059	−0.026	0.025
PSE	0.016 (0.013)	1.188	0.235	1.066	−0.010	0.041
Observations	N = 2592					
Df	9					

*** $p < 0.01$, ** $p < 0.05$

employed the F test to examine the significance of the overall linearity of the equation, and its p value is < 0.01, indicating that the regression results of the model are generally reliable. The final parameter estimates are shown in Table 2.

In Table 2, the coefficient values for efficiency of defense measures, loss of property, and satisfaction of governmental compensation were statistically significant ($p < 0.05$). In this sense, the relationships between the EDM, LP, GA, and performance and outcomes of disaster management during the 2017 Yongji County flood are significant. On the other hand, the coefficient values on the remaining issues of this survey have no statistical significance ($p > 0.05$). Thus, the results of Table 2 show that victims realized that the more the government concentrates on the efficiency of defense measures, the more positive the outcome of disaster management. Furthermore, victims thought that the less the amount of property lost, the more effective the disaster management was. Finally, victims expected they could get more reasonable compensation.

Sample Characteristics

The results of the analysis reveal the difference in the distribution of intense experiences of victims. With reference to the survey scale (1—Completely Negative (0–20), 2—Partly Negative (21–40), 3—Neutral (41–60), 4—Partly Positive (61–80), 5—Completely Positive (81–100)) of the 2592 effective survey responses, 16.67% (432 people) selected 0–20; 32.25% (836 people) chose 21–40; 18.83% (488 people) chose 41–60; 19.98% (518 people) chose 61–80; and 12.27% (318 people) chose 81–100. In exploring the degree of satisfaction of disaster management during the 2017 Yongji County flood, we found 48.92% of the effective responses were negative, which is more than the percentage that held positive views (32.25%).

Discussion

The disaster management undertaken during the 2017 Yongji County flood is an example from the front line of the current emergency response system of the Chinese government. This system has been recognized as a rational managerial instrument that can supervise the function of local government in China to mitigate the cost and impact of disasters, even those that are the product of mismanagement. Disaster management in China has focused upon the degree of administrative abilities, including the functions of disaster monitoring and earlier warning, rescue and medical assistance, on-site command, information dissemination, and the resettlement and compensation measures undertaken by government. These are the main components of the emergency response system in China. There has been a significant increase in the number of studies conducted to assess the performance of disaster management in urban areas in China, but few studies have explored the factors that influence disaster management in rural areas.

The Efficiency of Defense Measures

This research assessed the basic information of the victims, including gender, age, profession, frequency of disasters, the efficiency of defense measures, the efficiency of rescue, the loss of property, the degree of normal life and productivity recovery, the satisfaction of governmental compensation, the degree of disaster information disclosure, the government attitudes, the mechanism of accountability, and public safety education, in the context of the performance and outcomes of disaster management. In accordance with previous studies on disaster management (Tanner & Joseph, 2017; Guo & Hao, 2002) and post-disaster recovery in China (Yang & Song, 2013), the major observation of this study is that the performance and outcomes of disaster management are significantly related to the factors of the efficiency of defense measures, the loss of property, and the satisfaction of governmental compensation. One key result was that the efficiency of defense measures influenced the performance of disaster management during the 2017 Yongji County flood. Analyzing the weaknesses of previous measures and formulating a more effective countermeasure has vital significance for protecting against future flood disasters and promoting social stability.

The 2017 Yongji County flood demonstrated that the expectations of the public for disaster prevention are testing the government's capacity to satisfy them. In fact, the local government started immediate measures to manage the disaster and control the post-disaster recovery process. The interactive components of disaster management during the 2017 Yongji County flood integrated disaster bearing capacity, capabilities of disaster defense, resistance, rescue and recovery. The local government of Yongji County provided resources to help victims recover from the flood, and to assist local communities recover from their own challenges. The government also intensified the oversight of the use of materials and funds for disaster relief and post-disaster reconstruction, and ensured the quality of construction projects, which

offered full support to flood relief and post-disaster recovery and reconstruction. On the other hand, the local agriculture and sanitary authorities of Yongji County took contingency measures, including epidemic prevention of secondary disasters, and effective measures to establish and improve the risk prevention and control mechanisms of flood disasters in accordance with relevant national regulations. These ensured smooth progress of post-disaster rehabilitation and reconstruction in terms of the fundamental interests of the affected people, as well as the long-term development of the flood areas.

The Losses of Property

The other novel observation of this paper is that the loss of property is an important factor affecting the intensive experiences of victims of the 2017 Yongji County flood. There are multiple studies that have explored the loss of property, and the resulting victim impacts, that occur during disasters (Li, 2011). Our finding confirmed and extended previous studies in the area, finding that the 2017 Yongji County flood inflicted heavy property losses, which remain hard to gauge in terms of both victim mentality and the economy. Our research suggests that the loss of property should be lessened in every kind of disaster because it is secondary to losing a life due to a natural accident and, in particular, can extend the negative emotions of victims. Furthermore, the flood negatively affected the most fertile cropland and harmed agricultural production, which is the main pillar of economic income of Yongji County. As Zhao et al. emphasis (2011) this also led to rising food prices, especially for crops such as corn, in the Jilin province of China.

In line with previous studies, the loss of property in urban areas is limited in China due to modern urban building and management; loss of properties mainly relates to vehicle damage, lost personal belongings, etc. Property loss in rural areas in China affects almost all the possessions of individual families, including houses, cropland, farm tools, and livestock. In other words, people with a high level of farming activities may be more concerned with the loss of property than people with an urban lifestyle. Therefore, the relationship between the loss of property and the experiences of victims of the 2017 Yongji County flood is definite. This result has significance in terms of informing the local government about protecting victims' assets and property during disasters. This also indicates that victims should calculate their own losses to cooperate with the local government for compensation during the post-disaster recovery process. Determining the value of property losses from the disaster could provide a scientific basis for formulating compensation for victims. Furthermore, the results of this research should also encourage central and provincial governments to coordinate with local government to establish disaster prevention and control measures in order to avoid further loss of property of victims.

The Satisfaction of Governmental Compensation

Finally, this paper also observes that the satisfaction of government compensation was another factor impacting the experiences of victims of the 2017 Yongji County

flood. A proper degree of compensation from the government played a significant role in people's psychological stabilization. There is urgent need to take countermeasures, based on scientific estimation, to assess how the government should make up for losses and how much should be paid to victims as compensation. In previous studies in China, the research found the government should make compensation for the aggrieved party and the sum of the compensation should be that of the actual damage caused to property or in flood distribution (Freebairn, 2006; Frigerio & De Amicis, 2016). Presently, only a few studies have investigated whether victims may be satisfied by governmental compensation and the degree of compensation required. The local government of Yongji County promised to indemnify the victims of the 2017 flood. The victims have since received this government compensation. However, this compensation cannot cover the losses fully. In this survey, accurate economic losses and the amount of compensation that each individual victim has received were not assessed, so it will be necessary to examine correlations with these in the future.

It was suggested that the compensation provided by local government contributes to an improvement in the intensive experiences of victims during the post-disaster recovery process. However, the negative effects on humans can be diminished through compensation. Compensating farmers for their losses, and particularly their economic damages, is another important tool to encourage the earlier recovery of production and for people to return to normal life. Therefore, it is necessary for government to accurately analyze and assess economic losses and the amount of required compensation, coordinate with insurance companies to determine flood insurance, and formulate disaster prevention and control measures.

Research Limitations and Prospects

This research has several limitations. Firstly, this study is based on a quantitative research method. The data were gathered through surveys from 10 villages and towns in Yongji County. We distributed the surveys randomly, but by location. Even though Kouqian Town was the most seriously affected area during the 2017 Yongji County flood, it was not the main area of distribution in this research. The results of the survey thus may not reflect the most important feedback. Further studies should quantify more issues in order to make the research more precise. Second, Yongji County in Jilin Province lacks effective disaster management and has experienced flooding in successive years. The 2010, 2016, and 2017 floods in Yongji County were all fatal disasters, and each was thought to be "once in a generation". This research only concentrated on the disaster of 2017, and future studies should collect data from these prior disasters as a time series. Finally, survey respondent perceptions are substituted for objective measures of key factors affecting the performance and outcomes of disaster management that victims experienced during the 2017 Yongji County flood. Although the authors of the present study tried to include all of the relevant important issues, some factors of interest to the victims were overlooked.

Conclusion

There are few studies of the intensive experiences of victims in the process of post-disaster recovery in China. The present study is among the first to evaluate the factors that are strongly associated with disaster management and their effectiveness among a population. Thus, this research provides two contributions. First, we assessed the proportion of people who were satisfied with the disaster management during the 2017 Yongji County flood. Second, we found that the efficiency of defense measures, the loss of property, and the satisfaction of governmental compensation mitigated the damage of the disaster, provided comfort, and eased the frustration of victims in the process of post-disaster recovery.

There were two research questions in the article: (1) Were the victims happy with the performance and outcomes of disaster management during 2017 Yongji County flood? (2) What is/are the main factor/s strongly associated with the post-disaster recovery process of the 2017 Yongji County flood? For the first question, as shown in the survey results, the number of negative views was 1268 out of 2592 (48.92%). Only 836 people were satisfied with the performance and outcomes of disaster management during the 2017 Yongji County flood, and the remaining 488 people, equating to 18.83%, held a neutral attitude. Hence, the answer to this question is "no", as the attitudes of victims regarding the performance and outcomes of disaster management from this research were negative. For the second research question, we used an ordered logistic regression to analyze the data. We found that the efficiency of defense measures, the loss of property, and the satisfaction of governmental compensation were significantly associated with the issues that influenced the intense experiences of victims.

This paper is the first comprehensive study on this topic that has crucial implications for disaster management and post-disaster management in rural areas of China, such as in Yongji County in Jilin province. The findings of this research provide important insights to the Chinese government and policymakers in facilitating improvement of disaster management, both in terms of mitigating the damage of disasters, and providing comfort and addressing frustrations of victims, in the process of post-disaster recovery; these results could be used to improve the performance and outcomes of disaster management in China. This research also provides a good foundation for studying the difficulties in managing disasters, and these effects will be the goal of future studies.

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Declarations

Informed Consent Not applicable.

Ethical Approval Not applicable.

Conflict of Interest None.

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