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Assessment of disaster risk perception of indigenous people in traditional villages

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Abstract: *Grasping the disaster risk perception of traditional village indigenous people is crucial to the formulation and implementation of disaster prevention and mitigation policies.This paper introduced the regional disaster system theory,constructed the disaster risk perception evaluation model of "disaster-causing factor - disaster-conceiving environment - disaster-bearing body",and designed a questionnaire to investigate and evaluate the disaster risk perception of the indigenous people of six traditional villages in Northwest Sichuan.The results showed that: ①the overall disaster risk perception of the aborigines in the study area was at a medium level, with the perception of disaster-bearing body (62.23) > the perception of disaster-causing factors (47.28) > the perception of disaster-conceiving environment (37.01). ②The differences in the disaster risk perception of the aborigines in the six traditional villages were obvious.*

Keywords: *Regional hazard system theory; disaster risk perception; hierarchical analysis; traditional villages*

1. Foreword

Traditional villages in northwest Sichuan have been hit by earthquakes and mountain disasters (debris flow, collapse and landslides) for a long time.Especially in recent years, under the combined action of climate change and human activities, traditional villages bearing material and intangible cultural heritage have been exposed to hidden disasters for a long time[1].The indigenous people of traditional villages are not only the affected bodies of various disasters,but also the implementer of disaster reduction policies and measures.Their enthusiasm for disaster reduction behavior depends on the perception and judgment of disaster risk.Disaster risk perception (Disaster Risk Perception) is a subjective judgment made on the characteristics and severity of specific risks after the public's understanding and digestion of disaster risk information[2].However,due to the subjectivity and variation of the public's disaster risk perception, the regional disaster prevention, reduction and post-disaster recovery is quite different under the influence of different pregnancy disaster environments and disaster-causing factors[3].The difference in disaster risk perception includes subjective disaster risk judgment and objective disaster risk background,which is a comprehensive embodiment of natural,economic, social and cultural characteristics[4].Previous studies are mainly based on psychological research paradigms such as disaster reduction knowledge,attitude and behavior[5].Most current disaster risk perception studies are based on research paradigms such as geography,psychology and cultural theory[3,6-7].There are few studies based on public disaster risk perception from the perspective of disaster risk.

The perception of natural disaster risk is different in different regions and is influenced by the natural environment and social environment[8].As a multi-ethnic integrated settlement area,northwest Sichuan is prone to natural disasters,lagging social and economic development and insufficient emergency rescue capacity, which restricts the ecological protection and high-quality development in the region[9].In view of this, this study introduces the regional disaster system theory into the disaster risk perception research, constructs the disaster risk perception evaluation model of traditional villages and designs the questionnaire, aiming to expand the current disaster risk perception evaluation index system.

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2. Disaster risk perception evaluation model and questionnaire design

2.1 Disaster risk perception model

2.1.1 Disaster-causing factor perception

Disaster-causing factors refer to natural disasters and man-made disasters and other factors that may threaten people's life environment [10]. The case area is prone to natural disasters, and the indigenous perception of natural disaster types, frequencies, losses and other disaster characteristics is the main content of disaster risk perception research[11]. In the face of all kinds of natural disaster risks, various disaster reduction activities and disaster preparedness activities carried out by the village committee and the indigenous people are important conditions to reduce disaster risks, and also important indicators of disaster risk perception and research[12].

2.1.2 Environmental perception of pregnancy disaster

Pregnant disaster environment is the natural environment and human environment that breeds disasters.In recent years, frequent disasters,climate change is one of the important reasons[13].The frequent occurrence of flood, rainstorm,landslide, and debris flow in the study area is mostly caused by precipitation changes, so this study focuses on the perception of indigenous people on climate change and its effects.The more indigenous people know about climate change and its impacts,the more vigilant and more willing to mitigate disaster risks,and the more information people have a higher perception of flood risk[6,8].

2.1.3 Disaster-bearing body perception

Disaster carrier is the object of various disaster-causing factors, and it is the collection of various resources such as the social and natural environment where human beings and activities are located[13-14].As a disaster carrier,their local cognition, cultural bias and values can explain the perception of risk[15],Local cognition,government attention and the willingness of indigenous people to protect villages are important indicators of the social vulnerability of traditional villages[16].It is also an important embodiment of social resilience evaluation indicators such as local cognition,community support and public participation in the neighborhood scale[17].The higher the local awareness and the more likely the aborigines are to form the common protection awareness. The protection awareness and disaster prevention and mitigation willingness can reflect the public perception of disaster risk[18-19].

2.2 Questionnaire design

2.2.1 Disaster-causing factor perception

Refer to ZhAO Cen, YU Tian long and ZHOU Qian[20-22],research on the risk perception of natural disasters such as rainstorm, flood, the characteristics of regional natural disasters include disaster types,frequency and loss; disaster preparedness behavior includes the disaster preparedness behavior of indigenous people and village committees. Among them, the disaster frequency is from low to high, with individual score 1-5 points; the respondents should choose the possible natural disasters and their losses in the villages and surrounding areas.The accumulated 1-5 points, the higher the score indicates, the more the disaster and the more serious the loss estimate.In order to mitigate these losses, respondents are asked to select the daily disaster preparedness behaviors that they and their village committees take, with multiple cumulative scores of 1 to 5 points.

2.2.2 Environmental perception of pregnancy disaster

Referring to the studies of Chu Wannian [19] and Qin Yuhan [23] on flood and climate change perceptions, climate change perceptions should include feature perceptions and impact perceptions. Among them, the climate change feature perception contains temperature, precipitation and sunshine, and the cumulative score of multiple items is 1~5; the climate change impact perception is measured by the indicators of life, production and disaster-causing impact perception, and the degree of impact adopts Likert's five-level classification.

2.2.3 Disaster-bearing body perception

Refer to Yu Zhiyuan[24], Zou Jun[16]And chu wannian[19]In the study of local perception, traditional village vulnerability and public protection behavior, local cognition refers to the recognition of village characteristics and status of village protection, with 1~8 points; the recognition of village protection status is from very poor to very good, scoring 1~5 points. The degree of government attention refers to

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the importance the government departments attach to the protection of traditional villages, including the village characteristic protection measures implemented by the village committee and the government publicity. Among them, the village characteristic protection measures are consistent with the village characteristic indicators, with 1~8 points, and the government publicity is from very small to very large, scoring 1~5 points.The behavior intention of indigenous people refers to the subjective intention of indigenous people to take corresponding measures to strengthen village protection and reduce disaster risks.Respondents should choose the measures to protect villages and prevent and mitigate disasters they are willing to take, and the total of which are 1~8 points and 1~5 points respectively.

2.3 Questionnaire survey sorting and inspection

According to the protection list of traditional villages living in China, 6 traditional villages in northwest Sichuan were selected for the questionnaire survey.A total of 96 questionnaires were distributed on the site, and 90 valid questionnaires were collected. The questionnaire data were recorded and sorted out through the Excel tool.The test results showed that the α coefficient of the total samples was greater than 0.6, the KMO value was greater than 0.7, and the Bartlett spherical test value was 0.000, indicating the reliability and validity of the questionnaire data.

3. Data sources and methods

3.1 Hierarchical analysis method

Refer to Luo Ri Hong[25],in case, at the criterion level and the index level, complete the judgment of the relative importance of n indicators at the same level, and introduce the nine-scale scale method to establish the judgment matrix, and calculate the corresponding weight vector in the judgment matrix[26]; Finally, RI is introduced for the consistency test.

3.2 Disaster risk perception evaluation model

The comprehensive calculation of disaster risk perception evaluation index generally includes multiplication and division and addition and subtraction[20,22,27].This paper mainly calculates the positive or negative relationship of each index on the indigenous disaster risk perception evaluation, so the weighted sum is used to calculate the comprehensive score of the indigenous disaster risk perception level, and the functional relationship is as follows:

$$D_{rp} = E_{rp} * W_i + H_{rp} * W_i + S_{rp} * W_i$$

In the formula: Drp is the comprehensive score of indigenous disaster risk perception;Erp is the perception of environmental pregnancy disaster; Hrp is the perception of disaster-causing factor;Srp is the perception of disaster-bearing body; Wi is the corresponding weight. Refer to Zhou Xiaoying[28] and Zhao Cen[20].The 100-point score in the risk perception evaluation of flood disaster, intercept at 20 points, were divided into low, lower, medium, higher, high[20].

4. Results analysis

4.1 Comprehensive assessment

As shown in Figure1,as a whole,the comprehensive score of indigenous disaster risk perception in traditional villages in northwest Sichuan is between 23.28 and 72.37, the mean value was 47.81, at the middle level.YazheVillage (51.84)>Niuwei Village (51.42)>Zhongcha Village (50.86)> Dazhai Village (45.23)>Datun Village (44.28)>Miaozhou Village (42.86), the mean difference in the comprehensive score of indigenous disaster risk perception among the villages is small, it shows that the overall disaster risk awareness level of indigenous people is not high;Aboriginal people, with the perception of disaster-bearing body (62.23) > the perception of disaster-causing factors (47.28) > the perception of disaster-conceiving environment (37.01), suggesting the insufficient perception of disaster-causing factors in the case area, aboriginal perception of resilience needs to be improved.

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4.2 Evaluation results of the criterion layer

As shown in Figure1,the perception of disaster-bearing body ranged from 56.40 to 81.09, the mean value was 62.23,at a higher level.It shows that the indigenous people have a strong willingness to protect the villages and prevent disasters.Hold a positive attitude towards the village protection and publicity work carried out by the village committee.The perception of disaster-causing factor range ranging from 45.28 to 57.98, the mean value was 47.28,at a moderate level.However, the perception of environmental pregnancy disaster score was between 33.64 and 41.21,mean value was 37.01,at lower level.It showed that climate change and impacts fails to attract attention from indigenous people, insufficient government advocacy and education on climate change awareness.Although indigenous people have some understanding of disasters such as floods,earthquakes,landslides,debris flows and collapse in and surrounding villages,but is limited by the information pathway,understanding of disaster characteristics and disaster preparedness behavior is limited.In addition,the aborigines had the most different differences among the six traditional villages,with small differences in regional disaster factors and pregnancy environment perception .

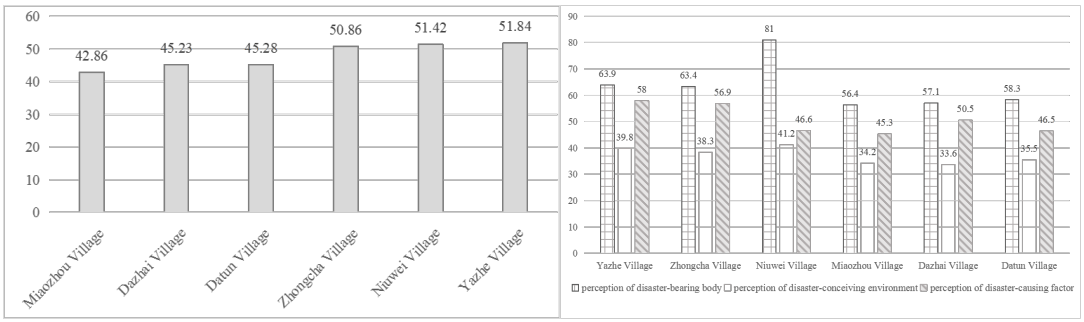

Figure 1: Comprehensive score of disaster risk perception and criterion layer score for indigenous people in different traditional villages

4.3 Characteristics of the index layer

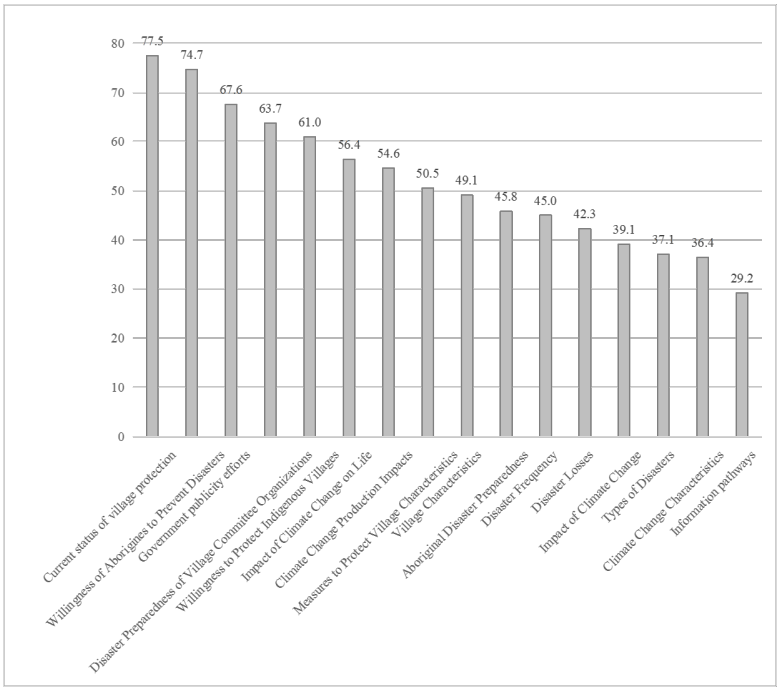

Figure 2: Average score of indigenous disaster risk perception index

As shown in Figure2,on the whole,the indicators at a high level include the status quo of village protection (77.5),disaster prevention willingness of indigenous people (74.7),government publicity (67.6), disaster preparedness of village committee (63.7) and protection willingness of indigenous villages (61.0).It shows that the indigenous people hold a positive attitude towards the current situation of village protection, government publicity and disaster prevention and mitigation work,and the village

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protection intention and disaster prevention intention is strong.At the middle level,there are climate change life (56.4) and production impact (54.6),village characteristics protection measures (50.5), village characteristics (49.1),indigenous disaster preparedness (45.8),disaster frequency (45.0) and disaster damages (42.3) and other 7 indicators.It shows that the indigenous people do not recognize the village characteristics and the village characteristics protection measures implemented by the village committee very well,given the perceived impact of climate change on life and production,low estimates of disaster frequency and loss,insufficient disaster preparedness behavior adopted in daily life.At a low level,the impact of climate change (39.1), disaster type (37.1), climate change characteristics (36.4) and a information approach (29.2).It shows that the indigenous people have a single way of information.

5. Conclusion

This paper combines the regional disaster system theory to construct the evaluation index system of traditional village indigenous disaster risk perception,takes the indigenous people of six traditional villages in northwest Sichuan as the research object,and studies the disaster risk perception level of indigenous people based on the field survey data.The study has concluded that:

(1) This study introduces the regional disaster system theory into the evaluation of disaster risk perception, takes the comprehensive score of disaster risk perception of traditional village aborigines as the general objective, takes the disaster-causing factor, disaster-conceiving environment and disaster-bearing body perception as the evaluation criterion, and contains 16 evaluation indexes, and draws on the weighted summation comprehensive evaluation model, which is capable of describing the disaster risk perception of the aborigines of the traditional villages in mountainous areas with a high accuracy, and initially proves that the evaluation index system has a certain degree of feasibility and applicability.

(2) The disaster risk perception of indigenous people in northwest Sichuan is at a medium level,among perception of disaster-bearing body (62.23)>the perception of disaster-causing factors (47.28)>the perception of disaster-conceiving environment (37.01);the score of disaster risk perception index of indigenous people in different traditional villages is significantly different.

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