THE HEALTH LITERACY ON EARTHQUAKE PREPAREDNESS AMONG SECONDARY SCHOOL OF CHENGMAI COUNTY IN HAINAN, CHINA

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The Independents Submitted to Chiang Rai Rajabhat University

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摘要

题目:海南省澄迈县中学地震防灾健康素养调查

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本研究旨在调查海南省澄迈县中学生的地震健康素养、地震应对准备情况，并确定中学生的地震准备和应对指南。采用分层随机抽样和目的抽样相结合的方法，选取澄迈县第三中学学生 345 人，教师 40 人。数据收集分为两部分：第一部分涉及学生，包括基本信息和地震卫生素养。第二部分以教师为研究对象，收集了学校防震的基本信息和防震准备的利弊。数据分析使用描述性统计，包括频率和百分比，以及定性数据的内容分析。

结果显示，学生获得地震相关信息和媒体的渠道有限。大多数受访者（50.73%）的地震卫生知识水平较低。在教师中，大部分（42.50%）担任地震

演习的组织者、会计。大多数教师（65.00%）表示接受过系统培训。此外，60.00%的人表示他们在地震准备活动中没有遇到任何问题。共有 37.50%的学生接受过紧急自救技能的培训，而 40.00%的学生报告说学校设施得到了良好的维护和定期检查。在此基础上，本研究建议将地震教育的理论与实践相结合，加强演习的真实性，加强教师的急救和心理支持培训，改善资源管理。这些策略旨在提高学校的整体地震防备和响应能力。

关键词: 中学生；地震防范；健康素养；调查研究

ABSTRACT

Title: The Health Literacy on Earthquake Preparedness among Secondary Schools of Chengmai County in Hainan, China

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This cross-sectional descriptive study aimed to investigate earthquake health literacy, the preparedness for earthquake response, and to determine the earthquake preparedness and response guidelines for secondary school students in Chengmai County, Hainan Province. A total of 345 students and 40 teachers were selected from Chengmai County No. 3 Middle School using stratified random sampling and purposive sampling methods. Data collection was divided into two parts; Part 1 involved students and included basic information, and earthquake health literacy, Part 2 focused on teachers and collected basic information, school earthquake prevention, and advantages and disadvantages of earthquake preparedness. Data were analyzed using descriptive

statistics, including frequency and percentage, along with content analysis for qualitative data.

The results revealed that students had limited access to earthquake-related information and media. A majority of respondents (50.73%) demonstrated a low level of earthquake health literacy. Among teachers appeared that the majority (42.50%) served as earthquake drill organizers. Most teachers (65.00%) reported receiving systematic training. Additionally, 60.00% indicated that they had not encountered any problems during earthquake preparedness activities. 37.50% of students had received training in emergency self-rescue skills, while 40.00% reported that school facilities were well-maintained and regularly inspected. Based on these findings, the study recommends integrating theory with practice in earthquake education, enhancing the accuracy of drills, strengthening teacher training in first aid and psychological support, and improving resource management. These strategies aim to boost schools' overall earthquake preparedness and response capacity.

Keywords: Secondary school students; Earthquake preparedness; Health literacy; Survey research.

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As I write the words "Acknowledgments," it signifies that my graduate studies are nearing their end, and a new chapter in life is about to begin. Throughout this academic journey, I have received tremendous support and help from many people, and I would like to express my sincerest gratitude to all of them.

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Finally, I would like to thank myself. Throughout this long academic journey, I persevered, overcoming countless challenges and difficulties, always maintaining my confidence and moving forward courageously. Every effort and every moment of persistence has been the foundation that allowed me to successfully complete my studies today.

With this, I dedicate this work to all those who have helped, supported, and warmed me throughout my academic journey. Thank you all!

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July 2025

CONTENTS

PAGE

CONTENTS (Continued)

CONTENTS (Continued)

CHAPTER **PAGE**

LIST OF TABLES

LIST OF TABLES (Contiuned)

TABLES **PAGE**

LIST OF TABLES (Contiuned)

TABLES **PAGE**

LIST OF TABLES (Contiuned)

TABLES **PAGE**

LIST OF TABLES (Contiuned)

TABLES **PAGE**

LIST OF FIGURES

CHAPTER I

INTRODUCTION

Background and Rationale

About 5 million earthquakes occur around the world every year (CCTV, 2023), and their destructive power depends on earthquake intensity, population density, building quality, etc. Earthquake intensity ranges from magnitude 1 to magnitude 9. As the magnitude increases, the destructive power increases significantly. Especially earthquakes above magnitude 8, which may cause huge casualties and property losses, are equivalent to the energy of a billion tons of TNT explosion. In order to reduce the impact of earthquake disasters (Kiani et al, 2022), China has implemented a mass monitoring and prevention system since the 1970s, and has strengthened disaster prevention through legal means such as the "Law of the People's Republic of China on Earthquake Prevention and Disaster Mitigation". Population density is an important factor in assessing earthquake risk, and areas with high population density such as the Yushu earthquake zone are therefore particularly vulnerable. The 2010 Yushu earthquake caused serious casualties and property losses. Building quality directly affects earthquake resistance. High-quality buildings can effectively reduce losses, such as the 2018 Osaka earthquake in Japan, the 2004 Indian Ocean earthquake, the 2010 Haiti earthquake, the 2008 Wenchuan earthquake in Sichuan, China, etc. Global seismic activity is affected by a variety of geological processes and is concentrated at plate boundaries and specific seismic zones, such as the Pacific Rim of Volcanoes and Seismic Zones. Scientists work to improve the accuracy of earthquake predictions

through earthquake monitoring and research. In short, it is necessary to strengthen the early warning system, popularize emergency risk avoidance education, and establish an efficient post-disaster rescue mechanism. These measures are of great significance for reducing earthquake disasters and ensuring the safety of life and property (Zaremohzzabieh et al, 2021; Bhuiya et al, 2022).

China has frequent earthquakes, mainly due to the movement of the earth's plates, especially the northward movement of the Indian plate and the collision of the Eurasian plate, which has triggered seismic activity in the Qinghai-Tibet Plateau, the Qinling-Bayankala Mountains, and the southeastern coastal areas. Due to the active geological structure in these areas, earthquakes occur at a high frequency and intensity (Global Magazine, 2024). The impact of earthquakes in China is also affected by the increase in population density, especially in the eastern and southeastern regions, where even low-frequency earthquakes can cause significant damage. Major earthquake events in history, such as the Tangshan earthquake in 1976 and the Wenchuan earthquake in 2008, have had a profound impact on China's earthquake disaster prevention and mitigation work, prompting the government and the scientific community to strengthen earthquake monitoring, protection construction, and emergency response capabilities. In the early and mid- 20th century, scientists from all over the world actively carried out earthquake prediction work. Chinese scientists successfully predicted the Haicheng earthquake in the 1970s, but the sudden Tangshan earthquake changed the situation. Scientists began to use geological and historical data to assess earthquake hazards. The China Earthquake Administration's " Catalogue of Strong Earthquakes in Chinese History" records in detail 1,034 strong earthquakes from the 23rd century BC to the end of the Qing Dynasty, providing an important basis for

future earthquake disaster prevention and control and building seismic design, and helping to determine the scope of earthquake impact and seismic design requirements for buildings. Hainan Island is located near the intersection of the Eurasian Plate, the Indo-Australian Plate and the Philippine Plate, and has a unique geological structure. Affected by the interaction of plates and the multi-stage expansion activities of the South China Sea back-arc basin, Hainan Island and its neighboring areas have complex geological structures, complex regional crust, and strong tectonic, seismic and volcanic activities. The entire island of Hainan is in an earthquake-resistant fortification zone, and 9 cities and counties are in earthquake-resistant fortification zones of seven degrees or above. Among them, Haikou City has an earthquake intensity of 0.30g (seismic fortification intensity of 8 degrees), and is one of the provincial capital cities with the highest earthquake fortification requirements in the country (International Tourism Island Business Daily, 2022). In history, Hainan Island and its offshore areas have experienced 41 earthquakes of magnitude 5 or above, 26 earthquakes of magnitude 6 or above, and 1 earthquake of magnitude 7 or above. In 1605, a magnitude 7.5 Qiongzhou earthquake occurred on Hainan Island, 72 villages sank to the bottom of the sea, and more than 3,300 people died. It was the earthquake with the highest death toll and the most serious disaster in South China since records began. Since 1969, moderate to strong earthquakes have occurred frequently in the southern part of Hainan Island and the surrounding waters, which has attracted widespread attention from the society (Hainan Provincial Emergency Management Department, 2022). Natural disasters such as earthquakes are extremely harmful and destructive. In daily life, we must strengthen our awareness of prevention and master certain self-rescue and mutual rescue knowledge. The theme of "Disaster Prevention and Reduction Day" on May 12 every

year is "Reduce Disaster Risks and Protect Our Beautiful Homeland". The Provincial Emergency Management Department and the Provincial Earthquake Bureau have carried out popular science activities around "Volcanoes and Earthquakes", and the popular science content mainly includes earthquake disaster knowledge, earthquake prevention knowledge, earthquake early warning knowledge, earthquake self-rescue and mutual rescue knowledge, etc. Therefore, we must always be vigilant and make good earthquake prevention preparations (Wu, 2022).

Earthquakes are sudden and highly destructive natural disasters, posing a particularly serious threat to vulnerable groups such as students. Therefore, schools must develop and implement earthquake emergency plans to minimize casualties and property losses. Studies have shown that a well-designed emergency plan should not only include response procedures, but also cover earthquake risk assessment, the establishment of early warning systems, evacuation and rescue strategies, as well as training and drills for teachers and students (Zaremohzzabieh et al., 2021; Mukherjee et al., 2020). These measures help enhance the overall emergency management capacity of schools, foster a culture of safety, and strengthen the safety awareness and self- and mutual-aid abilities of both teachers and students. In addition, developing an earthquake emergency plan is a basic safety management requirement mandated by educational authorities and local governments, and it reflects a school’s responsibility to protect the lives of its students and staff. Through systematic earthquake education, students can understand the causes, hazards, and coping strategies related to earthquakes, enabling them to respond appropriately during disasters. This not only improves individual and collective emergency response abilities, but also reduces panic and misjudgment. More

importantly, such education helps build a strong school safety culture, enhances the school's public image, and lays a foundation for international cooperation and support. Children, as a high-risk group in disasters, must be given special priority in safety planning. According to the United Nations Office for Disaster Risk Reduction (UNISDR), approximately 175 million children are affected by natural disasters worldwide each year. Due to their underdeveloped physical and psychological capacity, children are more vulnerable during emergencies. However, research also shows that through participation in disaster education, children can not only improve their own preparedness but also play a key role in spreading disaster awareness and promoting risk reduction efforts within their families and communities (Yildiz et al., 2020).

This research aims to examine earthquake preparedness among secondary school students in Chengmai County, Hainan Province, with the goal of protecting students' lives, improving their emergency response capabilities, and promoting disaster prevention awareness. By enhancing students' ability to respond to emergencies effectively, this research seeks to build safer school environments and ensure timely, effective self-protection during earthquakes. Through such initiatives, students can develop the necessary skills to reduce casualties and property loss, ultimately contributing to the overall safety of individuals and communities.

Objective

1. To Investigate the earthquake health literacy of secondary school students in Chengmai County, Hainan Province

2. To survey the preparedness for earthquake response of secondary schools in Chengmai County, Hainan Province

3. To determine the earthquake preparedness and response guidelines of secondary school students in Chengmai County, Hainan Province

Research question

1. What is the current status of earthquake health literacy among secondary school students in Chengmai County, Hainan Province?

2. How is preparedness for earthquake response of secondary schools in Chengmai County, Hainan Province?

3. What are the earthquake preparedness and response guidelines for secondary school students in Chengmai County, Hainan Province?

Operational definition

Health literacy refers to the degree to which individuals can find, understand, and use information and services to inform health-related decisions and actions for themselves and others.

Earthquake health literacy Earthquake health literacy refers to the ability and literacy among middle school students and teachers to cope and respond effectively when an earthquake occurs comprises access to earthquake data, knowledge of earthquakes, earthquake communication skills, decision-making skills, self-management, and media literacy.

Access earthquake information refers to understanding the basic concepts of earthquakes, including the occurrence, hazards, and impacts of earthquakes, early warning and prevention measures, response methods when an earthquake occurs, post-disaster treatment, psychological comfort, etc. By learning and mastering this knowledge, children can better protect themselves when an earthquake occurs, improve disaster awareness and emergency response capabilities, thereby reducing casualties and property losses, and ensuring the safety of individuals and communities.

Knowledge of earthquakes refers to the children's understanding of the basic knowledge of earthquakes, including the causes of earthquakes, earthquake warning signals, and the dangers of aftershocks. The children’s understanding of the hazards that may be caused by earthquakes and their coping strategies, through learning and practice, children can master basic knowledge and safety skills of earthquakes, such as identification of early warning signals, methods of safe evacuation, and self-rescue and mutual rescue skills after disasters.

Communication skills of earthquakes refers to Communication skills during earthquakes including using accurate and concise language to convey information, using multiple communication tools such as oral, written and digital platforms for two-way communication, and non-verbal communication through gestures and visual signals. At the same time, you should maintain a calm attitude and show empathy to calm others. Regular drills and training, establishing emergency communication networks, using emergency broadcast systems, and preparing predefined information templates and emergency plans can effectively improve communication efficiency during earthquakes, ensure personnel safety, and reduce confusion and losses.

Decision skills of earthquakes refers to conducting risk assessments, developing emergency response plans, acquiring and disseminating information in real-time, using decision support systems for scientific analysis, and cross-sector collaboration and resource deployment to ensure effective response and disaster reduction during and after an earthquake

Self-management of earthquakes refers to individuals formulating emergency plans, preparing emergency supplies, and checking environmental safety before an earthquake occurs; responding quickly and taking appropriate risk avoidance measures when an earthquake occurs; conducting self-assessment and first aid, checking environmental safety, obtaining information through reliable channels and making psychological adjustments after an earthquake, to comprehensively manage their safety and health and reduce the harm and losses caused by earthquakes.

Media literacy of earthquakes refers to the comprehensive ability to identify reliable information sources, verify the authenticity and timeliness of information, understand and interpret earthquake terms and data, accurately disseminate information and explain it to people from different backgrounds, and take appropriate emergency preparedness and response measures based on earthquake information.

Earthquake preparation refers to a series of preventive and emergency measures taken by schools including the formulation of earthquake emergency plans, regular facility safety assessments, faculty and staff training, regular drills and simulations, earthquake prevention knowledge publicity and education, cooperation with local governments and communities, etc.,

Expected Benefits and Applications

Benefits to students

1. Improve awareness and knowledge of earthquake prevention: By participating in the research, students can enhance their cognition and understanding of earthquake disasters, and learn effective response strategies and self-rescue skills.

2. Enhance emergency response capabilities: The research results can help students better understand and practice emergency response processes and improve their response capabilities in emergencies.

3. Promote health literacy: The research can guide students to form healthy lifestyles and behavioral habits and improve overall health literacy, not only limited to earthquake response but also covering the ability to deal with other emergencies.

Benefits to schools

1. Evaluate and improve educational effects: Through the research results, schools can evaluate the implementation effect of current earthquake prevention education, discover and improve the deficiencies in education, and further improve the quality of education.

2. Develop more effective response strategies: Schools can develop more targeted and effective earthquake response strategies and plans based on the research results to improve the overall emergency management level.

3. Improve social reputation and safety awareness: Actively promoting earthquake prevention education will help schools establish a good social image and reputation, and enhance the trust and recognition of the community and parents in school safety management.

CHAPTER II

LITERATURE REVIEW

This chapter summarizes the following aspects and explains the overall conceptual framework of the research. The following are specific studies that support this study as follows:

1. Earthquake
    1.1 Causes of earthquakes
    1.2 Types of earthquakes
    1.3 Occurrence of earthquakes
    1.4 Distribution of earthquakes
    1.5 Impact of earthquakes on schools
    1.6 Earthquake disaster prevention measures
2. Health literacy
    2.1 Safety awareness and early warning system
    2.2 Emergency response during earthquakes
    2.3 On-site first aid
    2.4 Self-rescue during earthquakes
    2.5 Mutual rescue during earthquakes
3. School safety measures
4. Psychological coping ability during earthquakes
5. Earthquake Preparedness and Emergency Guide
6. Research related to this study
7. Conceptual framework

Earthquake

Earthquakes are also called earthquakes or seismic vibrations. They are caused by the rapid release of energy from the earth's crust, which produces seismic waves. The main cause of earthquakes is the collision of plates on the earth, which causes displacement and rupture of the edges and interiors of the plates.

1. Causes of earthquakes

The composition of the Earth from the inner core to the surface is the same as that of other terrestrial planets. From the outside to the inside, it consists of a siliceous crust, a highly viscous mantle, and a core. The outer layer is a non-viscous liquid outer core, and the inner core is solid. These layers are divided from the outside to the inside according to their respective chemical properties and rheological characteristics into the crust (0-100km), upper mantle (100-1000km), lower mantle (1000-2900km), outer core (2900-5100km), and inner core (5100-6378km), as shown in Figure 1.

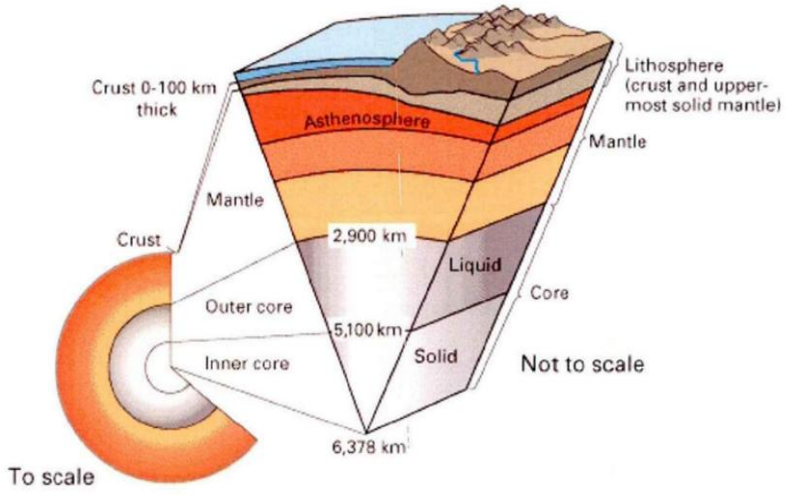


Figure 1 The internal structure of the earth (Baidu,2024)

Movement of Materials in the Earth's Interior

Plate tectonics (also known as the plate tectonic hypothesis, plate tectonic theory, or plate tectonics) is a geological theory developed to explain the phenomenon of continental drift. The theory holds that the Earth's lithosphere is composed of plates: the world is divided into six major plates, and the positions of oceans and land are constantly changing. According to this theory, the outermost layer of the Earth's internal structure is divided into two parts: the outer lithosphere and the inner asthenosphere. This theory is based on two independent geological observations: seafloor spreading and continental drift. Plate movement is above the asthenosphere, driven by the driving force of the geothermal column. The movement of materials in the Earth's interior can be seen as a cycle of the following states:

Upper mantle asthenosphere the material in the upper mantle asthenosphere is ejected from the mid-ocean ridge, pushing the lithosphere with a total thickness of about 100 kilometers above the asthenosphere to move horizontally, forming a new seabed; at the trench, the lithosphere is inserted under another part of the lithosphere and returns to the asthenosphere.

The power of lithosphere movement comes from the convection of mantle material convection occurs in the asthenosphere, acting on the bottom of the rock layer, but does not reach the bottom of the earth: mid-ocean ridges are formed in the convection rising zone, and trenches are formed in the convection descending zone.

The form of convection circulation is determined by the interior of the earth. The continents are like sitting on a conveyor belt, flowing with the rock layers. When the continents drift to the descending zone, they collide with the oceanic plates. The continental plates stay on top, while the oceanic plates are inserted below and return to the mantle: the mid-ocean ridges and trenches are both the edges of the plates. As shown in Figure 2.

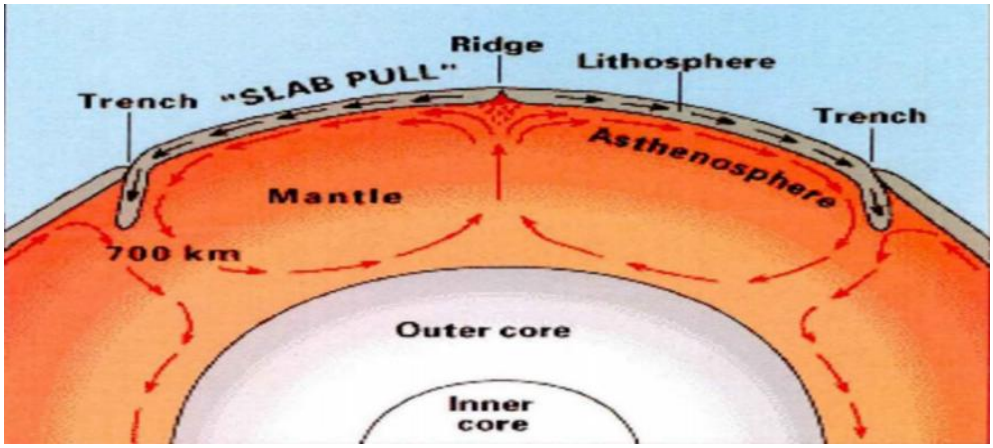


Figure 2 Schematic diagram of the thermal movement of matter inside the earth (Baidu,2024)

2. Interaction of Earth Plates

There are three relative movement modes between plates: convergence, rift, and conservative (dislocation), so the plate boundaries can be divided into three types: rift plate boundaries, convergence plate boundaries, and dislocation plate boundaries. Convergence plate boundaries are areas where plates squeeze each other. In terms of landforms, they are manifested as trenches, volcanic island arcs, folded mountains, etc. The rift plate boundaries are areas where plates stretch each other, and in terms of landforms, they are manifested as rift valleys, mid-ocean ridges, etc. The dislocation plate boundaries (conservative plate boundaries) are areas where two plates rub against

each other, with transform faults developed, and their movement mode is similar to the strike-slip faults on the surface. As shown in Figure 3.

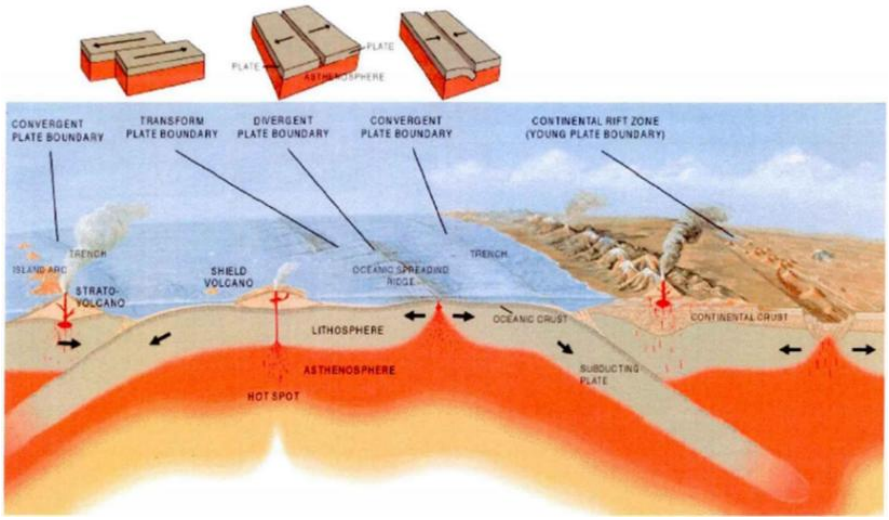


Figure 3 Schematic diagram of thermal motion of matter inside the earth (Baidu,2024)

3. Types of Earthquakes

There are many reasons for the vibration of the earth's surface. According to the causes of earthquakes, earthquakes can be divided into the following types(People's Government of Zhen'an Town, Longling County, 2022):

Tectonic earthquakes caused by the dislocation and rupture of rock layers deep underground are called tectonic earthquakes. This type of earthquake occurs the most frequently and has the greatest destructive power, accounting for more than 90% of earthquakes in the world.

Volcanic earthquakes caused by volcanic activities, such as magma activities and gas explosions, are called volcanic earthquakes. Volcanic earthquakes can only occur in volcanic activity areas. This type of earthquake only accounts for about 7% of earthquakes in the world.

Collapse earthquakes caused by the collapse of underground caves or mine tops are called collapse earthquakes. This type of earthquake is relatively small in scale and rarely occurs. Even if it occurs, it often occurs in limestone areas with dense caves or large-scale underground mining areas.

Induced earthquakes caused by activities such as reservoir water storage and oil field water injection are called induced earthquakes. This type of earthquake only occurs in certain specific reservoir areas or oil field areas.

Artificial earthquakes Ground vibrations caused by underground nuclear explosions, explosive blasts, etc. are called man-made earthquakes. Artificial earthquakes are earthquakes caused by human activities. For example, vibrations caused by industrial blasting and underground nuclear.

Explosions High-pressure water injection in deep wells and water storage in large reservoirs increase the pressure on the earth's crust, which sometimes induces earthquakes.

4. Occurrence of earthquakes

Here we mainly talk about the mechanism of tectonic earthquakes. Regarding the occurrence of earthquakes, the elastic rebound theory is the earliest and most widely used hypothesis about the cause of earthquakes. It is based on the discovery of the horizontal movement of the San Andreas Fault during the 1H magnitude San Francisco earthquake in 1906. This hypothesis can better explain the cause of shallow earthquakes,

but it may not apply to medium and deep earthquakes, because at a considerable depth underground, the rocks have become plastic, and elastic rebound is impossible.

Seismic waves are elastic waves transmitted by seismic sources in the earth's medium. There are basic interfaces, Moho surfaces and Gutenberg surfaces where the velocity of seismic waves suddenly changes inside the earth, dividing the earth's interior into three layers: the crust, mantle, and core. Elastic waves are transmitted by seismic sources in the earth's medium. When an earthquake occurs, the medium in the source area breaks and moves rapidly, and this disturbance constitutes the wave source. Because the earth's medium is continuous, this wave propagates to the interior and surface of the earth, forming elastic waves in the continuous medium. Seismic waves are divided into three types according to the propagation mode: longitudinal waves, transverse waves and surface waves. P-waves are propagation waves, with a propagation speed of 5.5-7 km/s in the earth's crust. They are the first to reach the epicenter, also known as P-waves, causing the ground to vibrate up and down, and are less destructive. S-waves are shear waves, with a propagation speed of 3.2-4.0 km/s in the earth's crust. They are the second waves to reach the epicenter, also known as S-waves, causing the ground to shake back and forth, and are more destructive. Surface waves are mixed waves generated by the encounter of P-waves and S-waves on the surface. They have a large wavelength and strong amplitude. They can only propagate along the surface and are highly destructive to buildings (National Fire and Rescue Administration, 2023).

Earthquake early-warning the principle of earthquake early warning (Figure 4) tells us that when an earthquake occurs, the less destructive but faster seismic wave (P wave) arrives first, followed by the more destructive but slower seismic wave (S wave). There is a time difference of several seconds to tens of seconds between the two seismic waves. Technicians use this time difference to detect the P wave with instruments and quickly issue an early warning. Before the S wave arrives, people can get a few seconds to more than ten seconds of precious escape time. Emergency earthquake early warning can help people minimize the losses caused by earthquakes: people can protect themselves at home, in the office or on the edge of a cliff, railway workers can reduce the speed of trains, factory workers can stop production lines, and surgeons can suspend operations. For example, in the 2011 Northeast Pacific Offshore Earthquake in Japan, the emergency earthquake early warning system and Japan's tsunami early warning system were considered effective. But the early warning system also faces an embarrassing fact: the more severely affected the epicenter area is, the shorter the early warning time is; the farther away from the epicenter, the longer the early warning time is. For example, during the Wenchuan earthquake, Yingxiu Town, which was close to the epicenter, was a blind spot in the early warning system and it was almost impossible to get an early warning; and Beijing, which was about 1,500 kilometers away from the epicenter, could get about 3 minutes of early warning, but it was almost meaningless (Hosted by China Science and Technology. 2022).

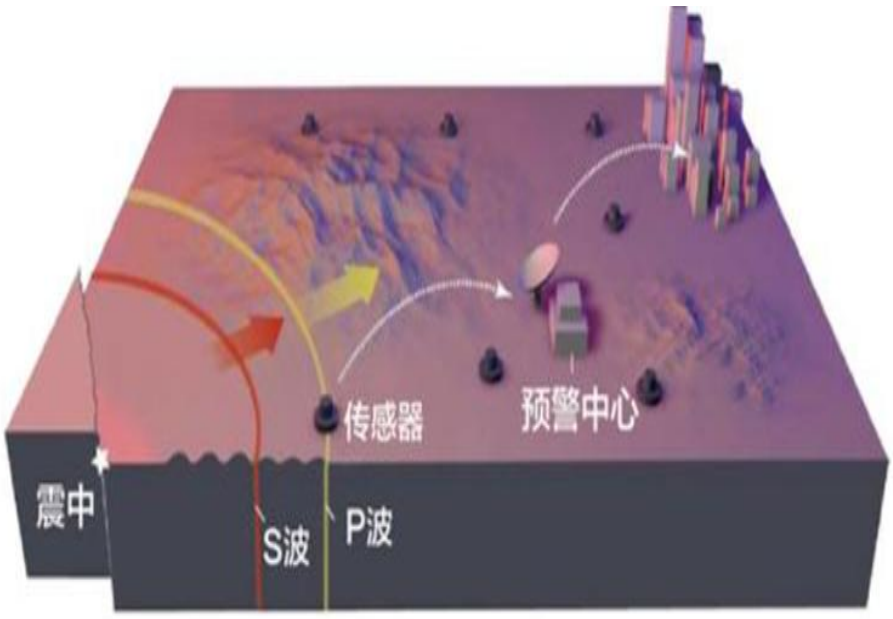


Figure 4 Earthquake early warning (Shanghai Science and Technology, 2024)

Magnitude and intensity of earthquakes Seismologists use two important seismic measurement methods to calculate the severity of earthquakes, magnitude measurement and intensity measurement. Magnitude measurement calculates the power or energy of an earthquake, while intensity measurement calculates the intensity of vibration at a certain point on the surface, referred to as magnitude. There are nine levels of magnitude. Earthquakes below magnitude 2.5 are not felt by humans, and those above magnitude 5 can cause damage. Magnitude includes body wave magnitude (mb), Richter magnitude (ML), moment magnitude (Mw), and surface wave magnitude (Ms). The official data published in my country is usually the surface wave magnitude (Ms). Earthquakes are classified according to magnitude: below magnitude 1 is an ultra-micro earthquake, M≥1 and less than magnitude 3 is a microearthquake, M≥3 and less than magnitude 4.5 is a perceptible earthquake, M≥4.5 and less than magnitude 6 is a

moderate-strong earthquake, M≥6 and less than magnitude 7 is a strong earthquake, M≥7 and less than magnitude 8 is a major earthquake, and above magnitude 8 is also a major earthquake National Earthquake Science Data Center, 2020).

Earthquake measurement There are two units of measurement for earthquakes: magnitude and intensity. These two terms can easily be misunderstood as the same unit of measurement. Earthquake intensity refers to the degree to which the ground and various types of buildings in a certain area are affected by the earthquake. After an earthquake occurs, the intensity of the earthquake in different areas from the epicenter is evaluated based on the degree of damage to the buildings and the changes in the surface, and is intensity lines are drawn as a description of the degree of earthquake damage. Earthquake intensity mainly describes the extent of the impact of an earthquake that has occurred. The intensity of an area is not only related to the energy released by the earthquake (i.e., magnitude), the depth of the epicenter, the distance from the epicenter, etc., but also to the engineering geological conditions and the characteristics of the engineering buildings on the propagation path of the seismic waves.

5. Distribution of earthquakes

Earthquakes are distributed very unevenly around the world. Some areas have dense epicenters, which are called seismic belts. Outside of seismic belts, earthquakes rarely occur and are relatively scattered. The existence of seismic belts is related to certain geological structures. The areas with the most frequent earthquakes in the world are distributed at the edges of plates. Figure 5 is a global earthquake distribution map. It can be seen that large earthquakes mainly occur at the junction of crustal plates or

around fault zones within plates, that is, seismic belts. There are four main seismic belts on the earth (Sichuan Provincial Seismological Bureau, 2021).

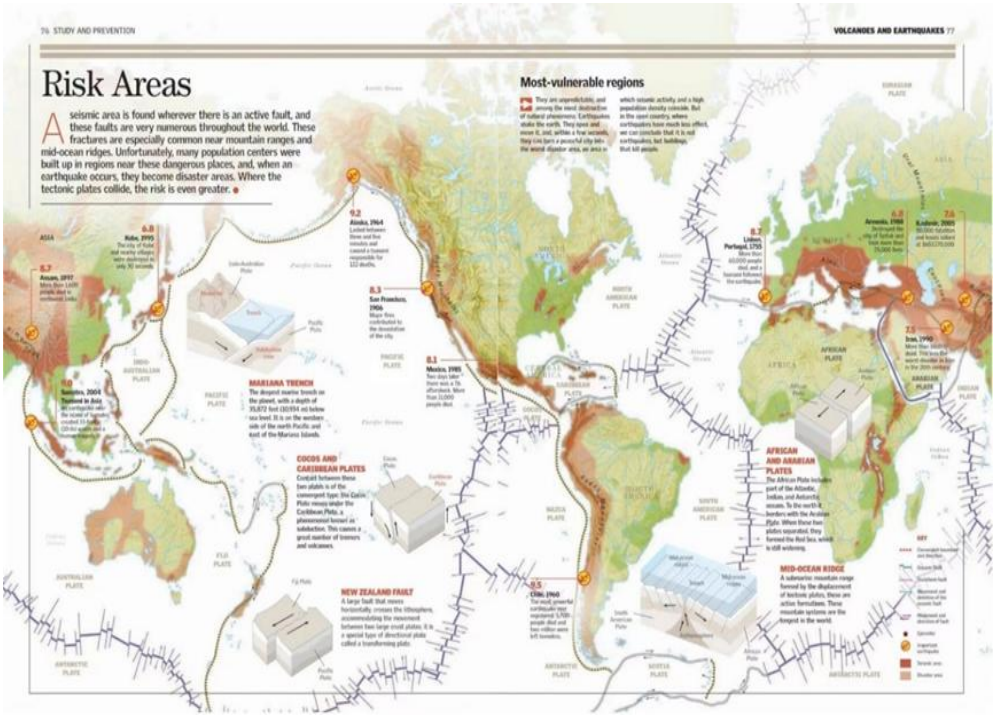


Figure 5 Global earthquake distribution map (Baidu, 2024)

Pacific Rim Seismic Belt About 80% of the world's shallow-source earthquakes, 90% of the medium-source earthquakes and almost all the deep-source earthquakes occur in this belt, and the seismic energy released accounts for about 80% of the world's total energy, but its area accounts for only half of the world's total earthquake area.

Eurasian Seismic Belt Also known as the Mediterranean-Himalayan Seismic Belt, it is a seismic belt that spans the Eurasian continent and includes North Africa, and is roughly east-west. It is about 15,000 kilometers long, with different widths in different places. The continental part is often wider and has branches. Other large shallow-source earthquakes and medium-source earthquakes outside the Pacific Rim Seismic Belt almost all occur in this seismic belt.

Mid-ocean Ridge Seismic Belt Mid-Atlantic Ridge Seismic Belt, Indian Ocean Ridge Seismic Belt, East Pacific Middle Rise Seismic Belt. These three seismic belts are dominated by shallow-source earthquakes.

Continental Rift Seismic Belt Regional fault belt or graben tectonic belt, mainly the East African Fault Belt, the Red Sea Graben, the Gulf of Aden and the Dead Sea, Lake Baikal, the Hawaiian Islands in the Pacific Ocean, etc. Mainly shallow-source earthquakes.

6. Impact of earthquakes on schools

The impact of earthquakes on schools covers student safety, teaching order, building damage, mental health, and other aspects. The specific impacts are as follows:

Student safety Earthquakes may cause school buildings to collapse and objects to fall, threatening the lives of students and faculty. The panic and tension caused by earthquakes may have a long-term negative impact on students' mental health.

Teaching order Earthquakes cause schools to suspend classes, affecting normal teaching activities and students' academic progress. Damaged school buildings need to be repaired and rebuilt, which may lead to temporary closure or relocation of schools.

Buildings and facilities School buildings with unqualified earthquake-resistant designs may collapse or be severely damaged, causing huge property losses; classrooms, libraries, laboratories, and other teaching facilities may be damaged, affecting the use of educational resources.

Community and family After an earthquake, parents will be very concerned about the safety of their students, which will affect the relationship between the school and parents. Schools need to rely on the support of the community for post-disaster reconstruction and recovery.

Emergency Management Schools need to establish and improve emergency plans and enhance the emergency response capabilities of teachers and students. Regular earthquake emergency drills and training should be carried out to improve the self-rescue and mutual rescue capabilities of teachers and students.

Laws and policies Schools must formulate and implement earthquake prevention and disaster reduction plans by the regulations of the education department and local governments. They can appropriately strengthen the requirements for the earthquake resistance level of school buildings to encourage schools to strengthen and renovate school buildings.

Economic impact Post-earthquake reconstruction and repair require a lot of funds, which may bring economic pressure on schools. Schools may need to seek financial support and help from the government, social groups, and enterprises.

Comprehensive impact Earthquake disasters prompt schools to strengthen safety culture construction and improve the safety awareness and disaster prevention and mitigation capabilities of all teachers and students. Earthquakes affect the long-term development plan of schools, prompting schools to pay more attention to safety and emergency management in construction and management.

7. Earthquake Disaster Prevention Measures

The formulation and implementation of earthquake prevention and disaster prevention measures in schools is to ensure the safety of teachers and students, reduce property losses, and maintain normal teaching order. The specific disaster prevention measures are as follows:

Establish and improve earthquake emergency plans (Nujiang Prefecture Earthquake Administration, 2024)

1. Risk assessment: Regularly assess the earthquake risks in the area where the school is located, and understand the geological structure and historical earthquake activities.

2. Emergency plan: Develop a detailed earthquake emergency plan, including emergency evacuation routes, assembly points, emergency material preparation, etc.

3. Emergency organization: Establish an emergency management team and clarify the division of responsibilities, including evacuation command, medical rescue, safety assurance, etc.

Earthquake safety education

1. Course setting: Add earthquake knowledge and emergency skills education to the curriculum to improve students' understanding and prevention of earthquakes.

2. Publicity activities: Popularize earthquake prevention and disaster prevention knowledge through posters, lectures, simulation exercises, etc., and enhance teachers' and student's awareness of disaster prevention.

Conduct emergency drills regularly (Yeji Education Bureau, 2023)

1. Drill plan: Develop an annual emergency drill plan to ensure that all teachers and students in the school can participate.

2. Simulation drills: simulate earthquake emergency drills in different scenarios such as classes, breaks, indoors, and outdoors to train teachers and students to cope with emergencies.

3. Summary and feedback: summarize after each drill, find problems and deficiencies, and make improvements.

Building seismic renovation

1. Seismic testing: regularly tests the seismic performance of school buildings to evaluate the safety of buildings.

2. Structural reinforcement: reinforce and renovate school buildings that do not meet seismic standards to improve seismic resistance.

3. New building standards: New school buildings must meet national and local seismic design standards to ensure the safety of buildings.

Emergency material preparation

1. Material reserves: prepare sufficient emergency materials, including first aid medicines, food, drinking water, emergency lighting equipment, etc.

2. Management and maintenance: regularly check and update emergency materials to ensure that they can be effectively used in emergencies.

Emergency evacuation routes and shelters

1. Evacuation routes: Mark emergency evacuation routes in prominent locations on campus to ensure that teachers and students can evacuate quickly and safely when an earthquake occurs.

2. Shelters: Set up safe shelters to ensure that teachers and students have safe temporary shelters after an earthquake.

Psychological support and counseling (Liu et al, 2019;Tanaka et al, 2020)

1. Psychological counseling: Provide psychological counseling after the earthquake to help students and faculty relieve the psychological pressure and trauma caused by the earthquake.

2. Support system: Establish a psychological support system, including the participation of psychological counselors, teachers, parents, etc., to help students resume normal life.

Home-school cooperation

Communication mechanism: Establish a communication mechanism with parents, and regularly inform the school of earthquake prevention measures and students' earthquake prevention education.

Family education: Encourage parents to carry out earthquake prevention and disaster prevention education at home, and teach children methods and skills of self-rescue and mutual rescue.

Health literacy

1. The Components of Health Literacy

Health literacy refers to the degree to which individuals can obtain, process, and understand basic health information and services needed to make appropriate health decisions**.** Limited health literacy affects people of all ages, races, incomes, and education levels, but the impact of limited health literacy disproportionately affects lower socioeconomic and minority groups**.** It affects people**'**s ability to search for and use health information, adopt healthy behaviors, and act on important public health alerts**.** Limited health literacy is also associated with worse health outcomes and higher costs**.** Healthy People 2030 addresses both personal health literacy and organizational health literacy and provides the following definitions**: (**U**.**S**.** Department of Health and Human Services, 2020**)**

Personal health literacy is the degree to which individuals have the ability to find, understand, and use information and services to inform health-related decisions and actions for themselves and others**.**

Organizational health literacy is the degree to which organizations equitably enable individuals to find, understand, and use information and services to inform health-related decisions and actions for themselves and others**.**

Nutbeam proposed the concept of health literacy in 2008, including access, knowledge, communication skills, self-management, media literacy and decision-making skills**.**

The importance of health literacy

Health literacy has been accepted as a keystone for health care services. Health literacy can be defined as "the prescription to end the confusion" or a "degree by which a person can develop the capability to understand the fundamental health-related information and services to make proper health decisions". Health and social care professionals should consider the influences of cultural and conceptual knowledge in health-related practices (Nutbeam, D, 2020). The concept of health literacy is not limited to the practice of health and social care professionals. It also involves awareness of lay people in accessing and utilizing health care services available to them.The WHO recommends health literacy as an instrument for achieving several key targets listed in the Sustainable Development Goals

2. Safety awareness and early warning system

Student safety awareness Students need to understand the dangers that earthquakes may bring, including building collapse, ground cracking, etc., as well as the threats these dangers pose to life and property. Schools should cultivate students' self-protection awareness and ability to act when an earthquake occurs through classroom education and simulation drills. Students need to be familiar with the school's earthquake emergency plan and master the location and methods of escape, refuge, and gathering points.

Early warning system Schools should formulate detailed earthquake emergency plans, including evacuation procedures, teacher and student role allocation, emergency communication plans, etc., to ensure orderly response when an earthquake occurs. Installing an earthquake early warning system can issue an alarm from a few seconds to tens of seconds in advance, helping schools prevent disasters before they happen and protect the safety of teachers and students. Regularly organize earthquake safety education and drills to enhance the safety awareness and response capabilities of teachers and students, and ensure that they can respond correctly in emergencies.

The importance of safety awareness and early warning systems An effective safety awareness and early warning system can significantly reduce casualties and property losses caused by earthquakes, establish a safety culture, promote teamwork between teachers and students, and improve overall emergency management capabilities. It also has a positive impact on surrounding communities and improves overall disaster reduction and emergency response capabilities.

3. Emergency response during earthquake

School earthquake emergency response is an important measure to ensure that students and faculty members can evacuate quickly and safely when an earthquake occurs and to reduce casualties and property losses. The following are the key steps and measures for school earthquake emergency response.

Prevention and preparation stage

The school should formulate a detailed earthquake emergency plan, including evacuation routes, assembly points, and the configuration of emergency supplies and equipment, and form an emergency team to clarify the responsibilities and tasks of each member, such as command, evacuation, and medical rescue. The school should also regularly carry out earthquake prevention and disaster reduction knowledge education to improve the earthquake prevention awareness and emergency response capabilities of teachers and students, and organize all teachers and students in the school to conduct earthquake emergency drills to familiarize themselves with evacuation routes and emergency procedures. At the same time, the school needs to be equipped with necessary emergency equipment, such as first aid kits, fire extinguishers, and emergency communication equipment, and reserve sufficient emergency supplies, such as drinking water, food, and emergency lighting equipment

Response when an earthquake occurs

When an earthquake occurs, the school should immediately take on-site shelter measures, such as taking shelter under a table or next to sturdy furniture protecting the head, staying calm, and obeying the instructions of teachers and emergency teams. After the main shock of the earthquake, the emergency team should direct all teachers and students in the school to evacuate to safe open areas in an orderly manner according to the predetermined evacuation route, avoiding dangerous areas. After arriving at the assembly point, teachers and the emergency team should count the number of people, confirm that all personnel have evacuated safely, and provide initial medical care to the injured. Report the situation to superiors and parents through emergency communication equipment, and convey the safety information of teachers and students. Set up temporary resettlement points in safe areas, provide drinking water, food and temporary housing, and provide psychological counseling for frightened teachers and students to help them calm down and reduce psychological pressure. Through the above measures, the school can respond quickly when an earthquake occurs, ensure the safety of teachers and students, and provide strong support for post-earthquake recovery.

4. On-site first aid

When an earthquake occurs, a large number of injured people appear at the same time. On-site rescue often requires the help of the masses. It is very important to do a good job of on-site command and on-site casualty classification (Shenzhen Municipal Health Commission, 2024).

On-site command Rescuers must understand the on-site situation, including the degree of building collapse, the number of possible injured people, and the location, and choose a safe rescue location. Set up an on-site rescue command station to organize rescuers to remove the injured from the injury site and conduct on-site rescue of the injured at a selected safe location.

On-site classification of the injured Classification according to the degree of injury, location, and changes in vital signs of the injured is conducive to rescue and transfer to the hospital according to the severity of the injury. Mechanical injuries refer to injuries caused by direct impact and squeezing of collapsed objects and various equipment, generally accounting for 95% to 98% of earthquake injuries. In addition, there are pressure asphyxiation injuries, complete starvation injuries, burns, etc.

Self-rescue and mutual rescue after the earthquake According to statistics, 570,000 people were buried in the Tangshan earthquake, and about 450,000 people escaped through self-rescue and mutual rescue. Generally speaking, the survival rate of buried people rescued within half an hour after a major earthquake is 99%. It can be seen that self-rescue and mutual rescue are one of the main measures to reduce casualties.

5. Self-rescue during an earthquake

At home Hide under solid furniture or in the bathroom or kitchen in the triangular area, protect your head, stay away from windows and elevators, and do not jump off the building. Run to an open area within 20 seconds after the earthquake to prevent aftershocks, as shown in Figure 6.

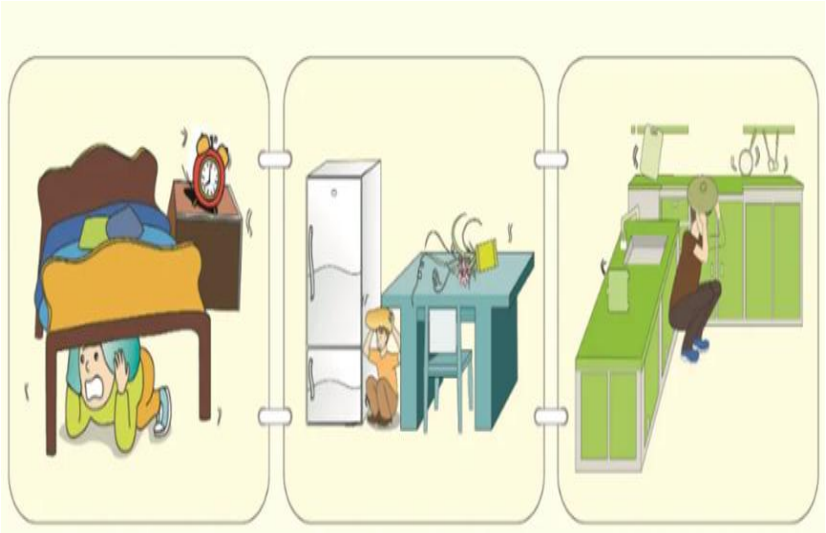


Figure 6 Earthquake protection at home (Linzhou, 2024)

In the classroom follow the teacher's instructions, hold your head, close your eyes, and squat under the desk. After the earthquake stops, evacuate quickly and orderly. Do not crowd, as shown in Figure 7.

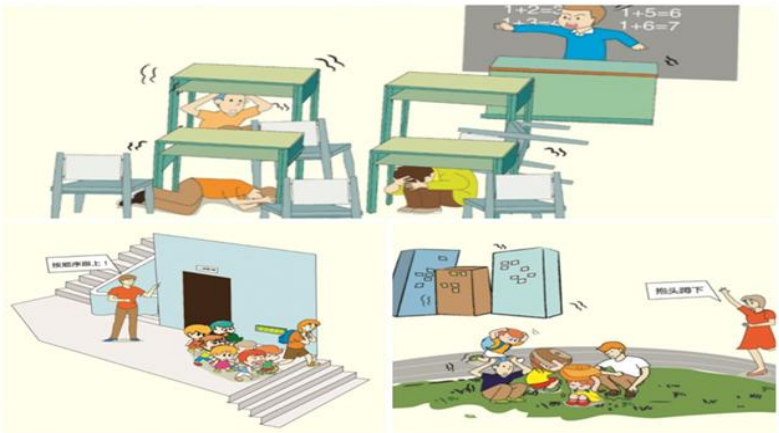


Figure 7 Classroom shock absorption (Gongliu County Media Integration Center, 2024)

In department stores or supermarkets hide near pillars or large commodities, avoid tall shelves or glass cabinets. In theaters, gymnasiums, restaurants and other places, cover your head and lie down under the seat or hide under the stage or orchestra pit. Audiences at the door should quickly run out, as shown in Figure 8.

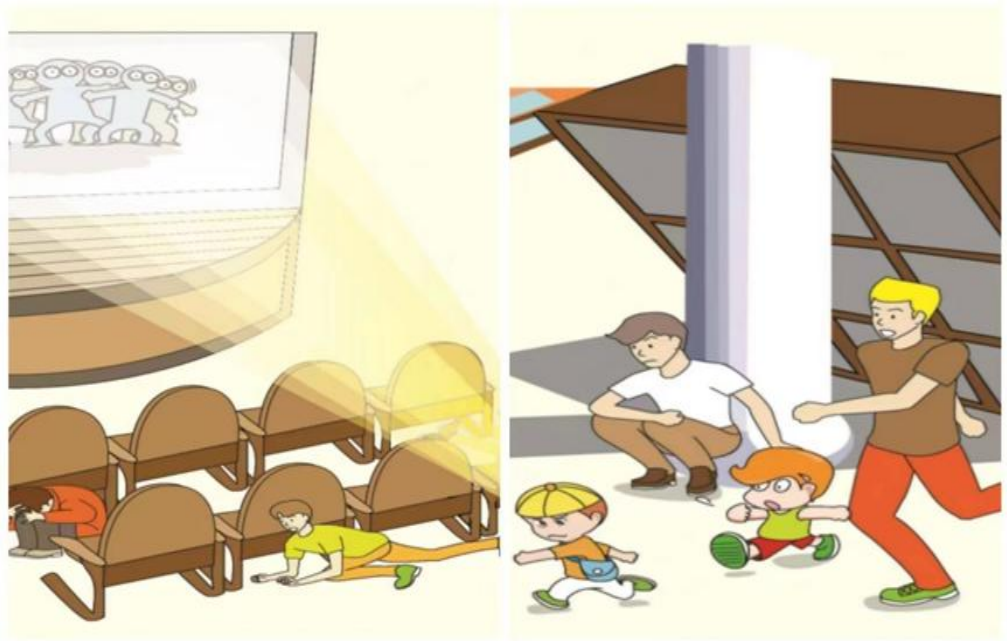


Figure 8 Shock absorption in public places (Gongliu County Media Center, 2024)

In the wild or mountainous areas avoid cliffs, rocks, and rivers to prevent accidents such as rolling stones, landslides, or flooding. Choose an open and safe place to crouch or lie down outdoors, away from narrow streets, tall buildings, tall chimneys, transformers, glass curtain wall buildings, viaducts, and dangerous goods storage areas. Do not easily run back to uncollapsed buildings after an earthquake, as shown in Figure 9.

Figure 9 Outdoor shock absorption (Gongliu County Media Center, 2024)

In a moving vehicle Hold the handrails tightly to prevent falling or scratching, and be careful to prevent luggage from falling. Get off the vehicle quickly after the earthquake and move to an open area, as shown in Figure 10.

Figure 10 In-car shock absorbers (Linzhou No. 3 Primary School, 2024)

6. Earthquake Rescue Guide:

1. Listen: Pay attention to the shouts, groans, and knocks of the trapped people.

2. Determine the location: Determine the location of the trapped people according to the structure of the house before rescuing them to prevent accidental casualties.

3. Edge rescue: Give priority to rescuing survivors in the ruins at the edge of the building and expand the mutual rescue team.

4. Select the rescue site: Foreign aid rescue teams give priority to hospitals, schools, hotels, and other crowded places for rescue.

5. Correct method: Expose the head first, remove dust from the mouth and nose, prevent suffocation, and do not use sharp tools to dig.

6. For those who have been buried for a long time: Give water or drinks first, support while digging, and pay attention to protecting the eyes of the survivors.

7. For those with cervical and lumbar injuries: Do not pull or lift them hard during rescue.

8. For those who are seriously injured: Treat them on the spot as much as possible, and then quickly send them to a hospital or medical point.

School safety measures

Safety measures for schools during earthquakes include the following aspects:

Earthquake early-warning alarm system Schools should be equipped with effective earthquake early warning equipment and alarm systems to issue alarms in time

before an earthquake occurs, reminding teachers and students to take emergency measures.

Safety assessment of building structures and facilities School buildings should be regularly assessed for earthquake safety to ensure that the building structure can withstand earthquake forces, and install and maintain earthquake emergency equipment such as fire extinguishers and emergency lights.

Earthquake emergency plan Schools should formulate detailed earthquake emergency plans, clarify the response measures, evacuation routes and assembly points under various earthquake scenarios, and ensure that teachers and students evacuate to safe places quickly and orderly.

Earthquake training for teachers and students Schools should conduct earthquake training regularly to educate teachers and students on how to stay calm and act correctly when an earthquake occurs, including evacuation skills and basic self-rescue and mutual rescue methods.

Emergency supplies and equipment reserves Schools should reserve sufficient emergency supplies and equipment, such as first aid kits, food, water **sources,** etc., to ensure survival and basic needs in emergencies.

Regular drills and evaluations Schools should regularly organize earthquake emergency evacuation drills, evaluate the implementation effect of emergency plans, and promptly adjust and improve plans and response strategies (Hainan Earthquake Administration, 2022).

Psychological coping ability during earthquakes

The psychological impact of earthquakes on students is very significant. Students will have a series of emotional reactions such as anxiety, fear, and confusion. The following are the key points of students' psychological coping abilities before and after the earthquake:

1. Psychological preparation before an earthquake

Education and publicity Schools and families should improve students' earthquake awareness and response awareness through disaster education courses and discussions, and help them understand the possible hazards caused by earthquakes and response measures.

Psychological warning and relaxation techniques Teach students to use techniques such as relaxation and deep breathing to reduce anxiety and tension before an earthquake and enhance their psychological preparation for disasters.

2. Emergency response when an earthquake occurs

Self-protection and safety awareness Students should know how to quickly take safety measures when an earthquake occurs, such as finding shelter, protecting their heads, and other basic self-protection skills.

Group collaboration and leadership skills Schools can cultivate students' teamwork and leadership skills in emergencies through simulation drills or classroom activities, and enhance collective safety awareness.

3. Psychological response after the earthquake

Emotional support and psychological counseling Schools should provide mental health support services to help students deal with emotional problems that may arise after the earthquake, such as fear, worry, sadness, etc.

Restore and rebuild confidence Students need to understand plans for rebuilding safely after a disaster and participate in community and school recovery activities to help them regain confidence and a sense of security.

4.4 Family and Community Support

Family Roles and Support Parents and guardians play an important role after an earthquake. They need to provide emotional support and understanding to their children and help them adapt to post-disaster life.

Community resources and collective support Schools should work with the community and use community resources to provide post-disaster support and services to students and families and promote students' psychological and social rehabilitation.

Earthquake Preparedness and Emergency Guide

1 .China Earthquake Preparedness and Emergency Guide

China's earthquake preparedness and emergency response are primarily the responsibility of the China Earthquake Administration (CEA) and the State Disaster Reduction Committee (SCC). Key strategies include:

1.1 National preparedness strategy

Earthquake-resistant design and engineering standards: China has implemented standards such as the Code for Seismic Design of Buildings (GB50011) and the Code for Seismic Design of High-rise Buildings (GB50009) to guide the seismic design of buildings (China Architecture & Building Press , 2021).

Earthquake monitoring and early warning: A nationwide earthquake monitoring network has been established, using the seismic network system to provide real-time data and early warning information (Peng C et al, 2021). For example, the "China Earthquake Early Warning System" provides early warning services through the analysis of seismic wave data.

Public education and drills: China establishes " Disaster Prevention and Reduction Day " on May 12 every year , and conducts earthquake emergency drills in schools and communities at all levels to popularize earthquake prevention knowledge (Central Commission for Discipline Inspection and National Supervisory Commission website, 2024).

1.2 Earthquake emergency response

Emergency command and coordination: After the earthquake, the emergency response mechanism was quickly activated and rescue work was coordinated through local emergency management departments (National Disaster Reduction Network, 20 24).

Post-disaster recovery and reconstruction: Formulate a detailed post-disaster recovery plan, including infrastructure repair, economic recovery, and social reconstruction, to ensure the normal functioning of life after the disaster (Xinhua News Agency , 2023).

2. Hainan Province Earthquake Preparedness and Emergency Guidelines

There are relatively few earthquakes in Hainan Province, but there is still a need to strengthen earthquake preparedness and emergency response. The main measures for Hainan Province to deal with earthquakes include:

2.1 Current status of earthquake preparedness in Hainan Province

Local seismic design specifications: Hainan Province implements local building seismic standards in accordance with the "Building Seismic Design Specifications (GB50011)" to ensure the seismic performance of buildings (Wang Y et al, 2024).

Earthquake monitoring and early warning system**:** The Hainan Provincial Earthquake Bureau has set up multiple earthquake monitoring stations in the province to conduct real**-**time monitoring and data analysis **(** Hainan Provincial Earthquake Bureau , 2022 **).**

2**.**2 Hainan Earthquake Emergency Response

Local emergency response plan**:** Hainan Province has formulated an earthquake emergency response plan, including an earthquake emergency command system, emergency rescue forces and resource allocation **(** Earthquake Disaster Prevention Department , 2023 **).**

Public education and drills**:** Conduct earthquake knowledge popularization and emergency drills in schools and communities at all levels to improve the public's emergency response capabilities (Earthquake Disaster Prevention Department , 2023)

3. School Earthquake Preparedness Emergency Guide

There is relatively little earthquake activity in Hainan Province, but schools still need to be prepared for earthquakes and emergencies. The main measures include:

3**.**1 Basic information of the school **(** Earthquake Disaster Prevention Department, 2019; Hainan Provincial Earthquake Bureau, 2022 **)**

Campus size**:** including the number and distribution of on**-**campus buildings, classrooms, dormitories, administrative office buildings, etc**.**

Building Type**:** Structural type and purpose of various buildings on campus**.**

Earthquake resistance**:** the earthquake resistance standard for building design acceptance or the earthquake resistance rating made by a professional organization **(**Hainan Provincial Department of Housing and Urban-Rural Development , 2021 **) .**

Water, electricity and gas structure**:** type and layout of water, electricity, gas and other infrastructure**.**

Secondary disaster sources**:** such as the distribution of gas facilities, chemical storage points, etc**.**

Emergency rescue capability assessment**:** Assessment of on**-**campus first aid equipment, personnel training, and emergency resources**.**

3**.**2 Earthquake emergency response responsibility system

Responsible persons and managers **:** Clarify the earthquake emergency response responsibilities and functions of school leaders, department heads, class teachers, etc.

Command organization**:** Establish an earthquake emergency response command organization and clarify its composition and responsibilities**.**

3**.**3**.** Activation of the emergency plan **(**Hainan Provincial Earthquake Bureau, 2020 , Hainan Provincial Seismological Bureau , 2023 **)**

Triggering conditions**:** Specific conditions that trigger the plan, such as the distance from the epicenter of the earthquake, magnitude, etc**.**

Activation method**:** The process of activating the plan, including the method of activating the alarm system**.**

Communication interruption situation**:** How to issue orders and instructions when communications are interrupted**.**

3**.**4 Key points for emergency response during earthquakes

Risk avoidance methods**:** such as finding cover, staying calm, avoiding windows, etc**.**

Important positions**:** Responsibilities and action measures of personnel in key positions**.**

Disposal of secondary disaster sources**:** How to deal with secondary disasters that may be caused, such as gas leaks**.**

3**.**5 Key points for post-earthquake evacuation **(** Dong fang City Earthquake Service Center , 2022; Hainan Provincial Earthquake Bureau, 2022 **).**

Evacuation Plan**:** Define the overall plan and strategy for evacuation**.**

Evacuation site**:** Set up a safe evacuation site and its layout**.**

Evacuation routes**:** Plan and mark evacuation routes to avoid congestion**.**

Evacuation order and method**:** Evacuate in an orderly manner to ensure safety.

Counseling language**:** unified counseling language and communication methods to maintain order**.**

3**.**6 Key points for post**-**earthquake emergency rescue **(** Hainan Provincial Seismological Bureau, 2023**)**

Self**-**rescue and mutual rescue measures**:** such as simple first aid skills, how to help injured people, etc**.**

Rescue plan for new casualties**:** including emergency medical rescue measures such as casualty classification and priority treatment**.**

3**.**7 Evaluation and Revision

Annual evaluation**:** The earthquake emergency plan is evaluated annually to ensure its effectiveness **(** Haikou Municipal Earthquake Bureau, 2023 **).**

Revision frequency**:** Necessary revisions shall be made according to the evaluation results, and the revision interval should not exceed five years. (China Earthquake Administration website, 2019).

Related research topics

Liu S et al，2019. Objective To investigate and evaluate the school adaptation and post-traumatic stress disorder (PTSD) symptoms of adolescent survivors of the Yushu earthquake five years after the earthquake. Five years after the earthquake, a large-scale school mental health survey was conducted among Tibetan students in Yushu City using the Adolescent School Adaptation Scale (ASAS) and the PTSD Checklist. Results: A total of 1976 questionnaires were returned. A total of 30.7% of Tibetan adolescents had poor school adaptation, and 19.5% of them were estimated to

suffer from PTSD. Logistic regression analysis showed that females (OR=0.73, 95%CI: 0.60-0.89), senior students (OR=0.48, 95%CI: 0.39-0.59) and students who participated in post-disaster reconstruction (OR=0.68, 95%CI: 0.54-0.85) had a lower risk of school maladjustment, while students who were buried by collapsed buildings (OR=1.47, 95%CI: 1.04-2.09) and experienced loss of relatives (OR=1.77, 95%CI: 1.27-2.45) had a positive correlation with the risk of school maladjustment. Students who experienced loss of relatives also had a higher risk of PTSD (OR=1.60, 95%CI: 1.12-2.28). Conclusion: The post-traumatic effects of the Yushu earthquake on Tibetan adolescents are severe and lasting, and sustainable long-term mental health services are needed to help adolescents rebuild their mental health.

Paton D，2019. Improving people's ability to anticipate, prepare for, and recover from disasters is an important component of the United Nations International Strategy for Disaster Reduction. This paper first discusses how hazard characteristics and psychological constructs influence people's ability to anticipate uncertain future events. It reviews how psychological theories (Health Belief Model, Protection Motivation Theory, PrE-Theory, Theory of Planned Behavior, Critical Consciousness Theory, Social Marketing, Protection Action Decision Model, Social Capital, Community Engagement Theory, and Social Identity Theory) can help inform people's preparedness for possible and current hazard events. The discussion then turns to the

application of concepts and theories to understand preparedness for current disasters. This paper discusses the all-hazards and cross-cultural applicability of preparedness theories and the need for critical evaluation of preparedness, its predictors, the nature and development of the preparedness process, and its application in promoting effective intervention strategies.

Hong, Y et al，2019. This study aimed to analyze the role of media contact in changing emergency preparedness behavior for natural and man-made disasters. We checked the adequacy of the measurement using confirmatory factor analysis and tested the hypotheses using hierarchical regression analysis based on 688 questionnaires in Hangzhou, China. The conditional effects of media contact on risk perception and emergency preparedness behavior were examined using the Johnson-Neyman technique. The results showed that: media contact had a positive effect on emergency preparedness behavior and risk perception; risk perception mediated the relationship between media contact and emergency preparedness cooperative behavior; disaster experience moderated the relationship between media contact and risk perception; disaster experience moderated the relationship between media contact and emergency preparedness cooperative behavior; risk perception mediated the interaction between media contact and disaster experience on emergency preparedness cooperative behavior.

Seddighi H et al，2020. The main objective of this research investigation was to determine the approaches, outcomes, facilitators and barriers of school education programs to prepare individuals below 18 years of age for disasters. The main factors that influence children's behavior and response to disasters are improving children's risk perception and knowledge. When children perceive the possibility, susceptibility and severity of disasters such as earthquakes, they are able and willing to learn how to prepare for them. Schools play a key role in disaster risk reduction as they facilitate the process of disaster risk reduction education for children. By utilizing appropriate policy frameworks, skilled teachers, textbooks and learning curricula, and peer education, schools provide an ideal space for children's disaster preparedness. Children's access to these educational resources is a key factor. Their inability to access educational resources may simply be due to lack of resources such as schools, teachers, daycare or financial capacity. The main outcome is that appropriate attention is paid to children's disaster preparedness (knowledge, attitudes and behaviors). Therefore, they need more protection before, during and after disasters.

Tanaka E et al，2020. Factors contributing to long-term mental health in adolescent survivors of the 2008 Wenchuan earthquake in China were explored. Associations between their long-term mental health and disaster-related storytelling and school psychoeducation, as well as between school psychoeducation and disaster-related storytelling, were examined. A cross-sectional survey was conducted in middle schools 6 years after the disaster. Participants (N = 1028, mean age 15 years, SD 1.38, 51% male) with traumatic experiences (e.g., injury, loss, witnessing someone die/injured, and house destroyed) were eligible. Mental health/disaster education (MHE/DE) was defined as attending one or more MHE and/or DE classes at school

since the earthquake. Disaster storytelling experiences included expressing painful memories and feelings about the earthquake since the disaster, and were divided into four groups: never expressed painful memories and feelings, expressed through writing/drawing, expressed through talking to lay supporters, and expressed through talking to health professionals. Mean scores of the Symptom Checklist-90 (SCL-90), Athens Insomnia Scale (AIS), and five selected subscales of the Psychotic-Like Experiences (PLEs) scale were compared among the four storytelling groups using analysis of covariance. Linear regression analysis was used to determine the relationship between MHE/DE and current mental health measured by SCL-90, AIS, and PLEs. The relationship between education and storytelling was explored using the $\chi 2$ test. Conclusion: MHE and DE in school may promote adolescents' mental health after disasters. The experience of telling disaster stories to ordinary supporters may contribute to long-term psychological recovery and may be a potential mediating factor between school education and improvement in mental health. As this study was cross-sectional, causal relationships cannot be inferred; therefore, further prospective intervention studies are needed to clarify the impact of these factors on the mental health of adolescent survivors.

Huang, K et al，2020.The survey found that experts unanimously believed that emergency evacuation immediately after a disaster was the safest and most effective way for residents to cope with the disaster, and this behavior was directly affected by residents' disaster risk perception and built environment. To explore the relationship between earthquake evacuation behavior, risk perception and built environment, this study used a random sampling questionnaire survey in the areas most affected by the 2008 Wenchuan earthquake, combined with exploratory factor analysis

and binary logistic regression analysis. The results showed that residents' built environment and risk perception positively affected their evacuation choice behavior. Specifically, when rural residents perceived that the evacuation route was reasonable and the quality of the village road was good, they would flee their homes immediately after the earthquake. In terms of earthquake risk perception, if residents perceived that the negative consequences of the earthquake were more, they would flee their homes immediately after the earthquake. This conclusion highlights the importance of strengthening the construction of ecological civilization in disaster-prone areas and improving residents' earthquake disaster awareness and risk cognition. This study has practical significance for the further construction of earthquake-stricken areas.

Yildiz A et al，2020. The perception of earthquake risk and preparedness level among children in Van and Kocaeli provinces, Turkey, was investigated. A mixed method approach was used, including questionnaires and interviews, as well as the Graphical Representation and Self-Measurement of Illness (PRISM) technique. Results showed that most schoolchildren did not participate in disaster education programs, even though they lived in areas with a high earthquake risk. The sampled children were generally aware of earthquake risks in their hometowns. However, their preparedness level was low. Consistent relationships were found in the following aspects: earthquake

risk perception; earthquake awareness;factual knowledge of preparedness; importance of preparedness;earthquake education programs. Results showed that children who participated in earthquake education programs had higher earthquake awareness and could foresee the occurrence and potential causes of injuries of future earthquakes. The importance of information sharing within the family was also highlighted as a factor influencing children's earthquake risk perception and preparedness. The findings are considered valuable for actors in the disaster risk reduction sector. They provide perceptual insights to improve the communication and dissemination of information about earthquake risk.

Kiani UBN et al， 2022. This study evaluates the potential association between household-level perceived risk and earthquake preparedness in urban, peri-urban and rural areas of Rawalakot city in Azad Jammu and Kashmir (AJK) region. Based on the Yamane method, 400 samples were collected from urban, peri-urban and rural study areas using random sampling technique. Primary data were collected through face-to-face interviews using a structured questionnaire. An index-based approach was used to determine the risk perception and preparedness index. Quantify the overall level of risk perception and its important dimensions (fear, awareness, trust and attitude) using an appropriate set of indicators. Linear regression models were used to find significant differences in any relationship between risk perceptions and preparedness. Results show that risk perceptions are significantly affected by fear of future earthquakes, anticipated supply disruptions, and anticipated structural damage to homes. The study also found that risk perception and its individual dimensions may significantly influence earthquake preparedness. Relevant authorities can use the results

of this study to develop comprehensive risk awareness and preparedness plans at the household level.

Rahman, M et al，2023. This study aimed to assess the preparedness of the population of Dhaka, the capital of Bangladesh, for potential earthquakes. A model consisting of six dimensions was adopted to comprehensively assess the level of individual preparedness. The aim of this cross-sectional study was to assess the earthquake preparedness of individuals living in the city of Dhaka, Bangladesh. The questions for the survey were derived from HIPM and other studies. Before preparing the final questionnaire, a pilot survey was conducted on 35 university students. It was then modified based on their feedback and the opinions of experts. The final questionnaire consisted of two parts: demographic information and questions about arthquakes. The second part contained preparedness cues based on HIPM. The summary of the findings showed that about 92% of the population had experienced an earthquake. More than 65% of the population had never received earthquake safety training. Many people in the study population had superior knowledge, social bonds, and adaptability. However, the survival and loss minimization aspects of HIPM could be further emphasized. In addition, statistics suggest that having the right knowledge and a positive attitude could be beneficial for earthquake safety.

Shams, L et al，2024. To investigate the effect of earthquake preparedness training using face-to-face or cascade method among rural households in Juybar County, Iran in 2018. The study was conducted using an experimental design with pre-test and post-test on married women aged 10-49 years (n = 372) living in Kurdkolay village, Juybar County. The participants were randomly divided into two groups: training group (n = 95) and face-to-face cascade method group (n = 95). Data were collected using the Disaster Preparedness Assessment Index, including demographic and educational components. Data were collected using the Disaster Preparedness Assessment Index and analyzed using SPSS version 24. The findings of the study can expand our knowledge and thus improve the preparedness of the society. Regarding the significant contribution of disaster and emergency education in improving the awareness, attitudes, and performance of families, especially parents.

Conceptual Framework

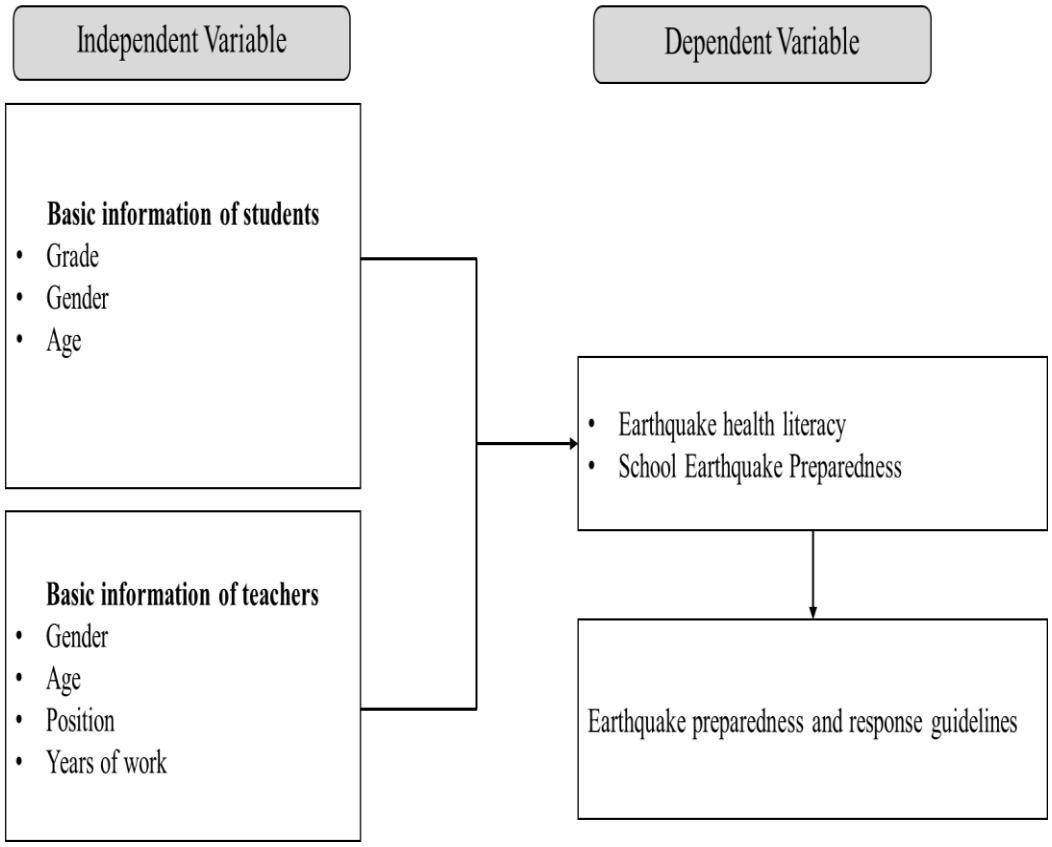


Figure 11 Conceptual framework of the study

CHAPTER III

RESEARCH METHODOLOGY

This chapter systematically investigates and analyzes the earthquake health literacy of middle school students in Chengmai County, providing the scientific basis for relevant education departments, thereby improving students' earthquake coping abilities. This study is divided into the following 8 parts:

1. Research design
2. Population and sample size
    2.1 Population
    2.2 Sample Size and Sampling Technique
    2.3 Inclusion Criteria
    2.4 Exclusion Criteria
3. Study area
4. Study period
5. Measurement instruments
6. Data collection
7. Data analysis

Research design

The research design of this study was a cross-sectional descriptive study. All samples were collected at in Chengmai County.

Population and sample size

Population

The sample population of this study is a middle school in Chengmai County, and the research subjects are 1,268 students and 40 class teachers of Chengmai County No. 3 Middle School.

Sample Size and Sampling Technique

This study included 1,268 students from Chengmai County No. 3 Middle School. The subjects were determined according to the inclusion and exclusion criteria, but the proportion of researchers who withdrew from the study due to illness or unavoidable accidents was expected to be no more than 10%. The sample size was calculated using the Yamane Taro formula

$$n = \frac{N}{1 + N_{e^2}}$$

$$n = \frac{1268}{1+1268*(0.05)\text{^}2} \qquad n\approx304$$

Error level=304×10%=30

Sample size=304+30=334

n = sample size (sample size of 304 subjects)

N = population (1,268 students in schools in Chengmai County)

e = acceptable error level (0.05)

Then consider 10% sample loss: 304×10%=30.4≈30

Sample size: 304+30=334

Sampling Technique

This study employed a stratified sampling technique across the provincial, district, and sub-district levels. Once schools at the sub-district level were identified, simple random sampling was conducted to select one secondary school to serve as the prototype. Subsequently, a sample group of 334 students was drawn from the school's total population of 1,268 students. The sampling was proportionally stratified according to grade levels (grades 1–3) at Chengmai County No. 3 Middle School, resulting in the following distribution: Grade 1 – 193 students, Grade 2 – 100 students, and Grade 3 – 141 students. The number of students selected from each grade level was proportionate to their representation in the school’s overall student population. Within each grade, simple random sampling was used at the classroom level to select participants. The final selection adhered to predefined inclusion and exclusion criteria to ensure appropriateness of the sample.

Table 1 Population and sample size

Chengmai County No.3 Middle School	Population	Sample size (n)
level 1	352	93
level 2	378	100
level 3	538	141
Total	1,268	334

Student:

Inclusion Criteria

1. Students currently enrolled in middle school in Chengmai County, Hainan Province.

2. Voluntarily participate in the survey

Exclusion Criteria

1. New students who have not been in school for a full semester

2. Students with severe cognitive or physical disabilities that prevent them from understanding the survey or providing relevant responses, unless adaptations can be made.

3. Failure to obtain informed consent from the student and his/her parents or guardians.

4. Students who are unable to complete the questionnaire independently

Teacher:

For teacher participants, a purposive sampling method was used to select class teachers from 40 classes from grades 1 to 3 of Chengmai County No. 3 Middle School. (Each class is assigned a class teacher)

Table 2 Teacher sample size

Chengmai County No.3 Middle School	**Sample size (n)**
level 1	15
level 2	13
level 3	12
Total	40

Inclusion Criteria

1. Head teachers with at least one year of teaching experience

2. Head teachers currently serving in grades 1 to 3 at Chengmai County No. 3 Middle School.

3. Voluntarily participate in the survey and sign the informed consent form

Exclusion Criteria

1. Temporary class teacher

2. Head teachers who are on leave or otherwise absent during the data collection period.

Study area

The research area is a secondary school in Chengmai County, a county-level city under the jurisdiction of Hainan Province. The research will cover school students of different grades and genders to ensure the diversity and representativeness of the sample, and comprehensively and in-depth understand the current situation and problems of earthquake health literacy among students of all grades in Chengmai County No. 3 Middle School, providing a scientific basis for formulating effective earthquake education policies and measures.

Figure 12 Map of Chengmai County Secondary School (Google Maps, 2024)

Study period

This study was conducted from August 2024 to March 2025.

Measuring instruments

Measurement Tool

1. For students:

Part I Basic information of students

Part I of this questionnaire aims to collect basic information of students, mainly including demographic characteristics such as gender, grade and age.

Part II Earthquake health literacy

The questionnaire includes six parts: earthquake information acquisition, earthquake knowledge, earthquake communication ability, earthquake self-management, earthquake media literacy, and earthquake decision-making ability.

Earthquake information acquisition ability: evaluate the channels and efficiency of students to obtain earthquake-related information.

Earthquake basic knowledge: examine students' mastery of earthquake-related scientific knowledge.

Communication ability: evaluate students' ability to communicate effectively with others during earthquake response.

Self-management ability: measure students' self-regulation and management level in earthquake emergency situations.

Media literacy: focus on students' ability to identify, understand and judge earthquake-related media information.

Decision-making ability: evaluate students' ability to make scientific and reasonable decisions in earthquake situations.

The earthquake literacy questionnaire is designed to assess students' literacy across six parts. However, the evaluation of earthquake literacy levels in this study focused on two key parts: earthquake information and earthquake media. These two parts were selected due to their relevance and importance in ensuring that students are informed and prepared to respond appropriately to earthquake-related events. The ability to access, interpret, and apply information from various media sources is crucial in building effective earthquake preparedness.

Scoring was based on 1 point being awarded for each correct answer and 0 points were assigned for incorrect responses. The total score was interpreted according to the following criteria to determine the level of earthquake literacy. (Hernandez-Suarez, C. M., et al. 2022).

0–2.00 indicates low literacy

2.01–4.00indicates moderate literacy

4.01–6.00 indicates good literacy

2. For teachers:

Part I Basic information of teachers

The basic information of teachers in the questionnaire includes gender, age, position, years of work, etc.

Part II School earthquake prevention

The questionnaire consists of three parts: earthquake prevention policy, earthquake training policy, and advantages and disadvantages of school earthquake prevention policy.

Part III Advantages and Disadvantages of Earthquake Preparedness

For Student

Research tool quality

The accuracy of the study content requires the expert to believe that the research question is determined to meet the measured content or the purpose of the study

A score of +1 means to be certain of the content/purpose of the question.

A score of 0 means being uncertain about the content/purpose of the question.

A score of -1 means to identify an issue without measuring its content/purpose

Index of item-objective congruence IOC

According to the formula:

IOC=ΣR/N

R stands for the sum of expert reviews.

N represents the number of majors.

If the IOC criterion is 0.05 or above, then the problem is objective.

Tool development process

1. Research literature, including literature related to the research, to optimize the research questionnaire.

2. Consult the supervisor's research questionnaire.

3. Submit the questionnaire to three experts for evaluation.

4. Modify the questionnaire according to expert suggestions. The above is appropriate.

5. Conduct sample tests in the study area.

Reliability

The modified questionnaire was pretested among 30 students and teachers from Chengmai County Siyuan Senior High School who met the target population

criteria. The data collected from the pretest were analyzed to determine the reliability of the instrument. The Cronbach's alpha coefficient of the student questionnaire "Earthquake Health Literacy" was 0.82; the Cronbach's alpha coefficient of the teacher questionnaire "School Earthquake Preparedness" was 0.87, indicating good internal consistency and confirming that the instrument is suitable for students and teachers of Chengmai County No. 3 Middle School

Data collection

1. Questionnaire preparation

Determine the research questions and research objectives, consult relevant literature, prepare questionnaires based on the research content, conduct statistics and analysis on the collected data, and draw conclusions.

2. Questionnaire distribution and collection

Select the most representative sample group based on the inclusion and exclusion criteria of the research population. This study adopts the method of online questionnaire distribution and uses the network platform to collect questionnaire information. During the collection process, invalid questionnaires that are incomplete or obviously do not meet the standards will be eliminated to ensure the validity and reliability of the data. Subsequently, a detailed data analysis will be conducted on the screened valid questionnaires, and suggestions for improvement of earthquake health literacy in primary and secondary schools in Chengmai County will be proposed, including possible educational strategies and policy recommendations.

3. Data processing

Systematically organize and analyze the collected data, and use statistical software such as SPSS or Excel to process the data to quantify and compare the relationship between different variables. Analyze the data results, discuss the significance and potential impact of the findings, and put forward suggestions for improvement or policy recommendations.

Data analysis

Descriptive statistics, including frequencies and percentages, were employed to analyze the basic demographic characteristics of students and teachers, earthquake health literacy levels, and the status of earthquake preparedness in schools, and content analysis for qualitative data.

CHAPTER IV

RESULTS

The Results include objective

This chapter collects the research results, aiming to investigate and analyze the earthquake health literacy and earthquake disaster relief preparedness of middle school students in Chengmai county, Hainan Province, and formulate earthquake disaster prevention and reduction guidelines based on the research results. The participants of this study are students and class teachers of Chengmai County No. 3 Middle School.

The research subjects are junior high school students and class teachers of Chengmai County No. 3 Middle School. The research will start in August 2024 and end in March 2025. At the beginning of the study, pretest data were collected through questionnaires and on-site observations; at the end of the study, post-test data were collected again using the same method, and pretest and post-test results were analyzed.

The research results include the following four parts:

Students

Part 1: Basic Information of Students；

Part 2: Earthquake health literacy。

Teacher

Part 1: Basic Information of Teachers；

Part 2: School Earthquake preparedness.

Part 3: Strengths and weaknesses of earthquake preparedness

Students

Part 1: Basic Information of Students

Table 3 Frequency and percentage gender of students. (n=345)

Gender	Number (n=345)	Percentage (%)
Male	187	54.20
Female	158	45.80
Total	345	100

Table 3 shows the frequency and percentage of students by gender. The majority of cases were male, with a total of 187 individuals (54.20%), while females accounted for 158 individuals (45.80%).

Table 4 Frequency and percentage grades of student. (n=345)

Grade	Number (n=345)	Percentage (%)
1	113	32.75
2	124	35.95
3	108	31.30
Total	345	100

Table 4 shows the frequency and percentage of students across different grades. The majority of cases were from grade 2, with a total of 124 individuals (35.95%), followed by grade 1 with 113 individuals (32.75%), while the lowest represented group was from grade 3, accounting for 108 individuals (31.30%).

Table 5 Frequency and percentage age of student .(n=345)

Age	Number (n=345)	Percentage (%)
12	49	14.20
13	121	35.07
14	127	36.82
15	48	13.91
Total	345	100

Table 5 shows the frequency and percentage of students across different ages. The majority of cases were from age 14, with a total of 127 individuals (36.82%), followed by age 13 with 121 individuals (35.07%), while the lowest represented group was age 15, accounting for 48 individuals (13.91%).

Part 2: Earthquake health literacy

Access earthquake information

Table 6 Frequency and percentage access to information of students. (n=345)

Access to information	**Number (n=345)**	**Percentage (%)**
School or Teacher	104	30.14
News media (e.g. TV, radio)	72	20.87
Internet (e.g. news website, social media)	107	31.01
Family or friends	55	15.94
Other (please specify)	7	2.04
Total	345	100

Table 6 shows the frequency and percentage of students' access to information. The majority of students accessed information through the Internet (e.g., news websites, social media), with 107 cases (31.01%), followed by School or Teacher with 104 cases (30.14%). The lowest represented group was "Other" (please specify), accounting for 7 cases (2.04%).

Table 7 Frequency and percentage to get earthquake data through the internet of students. (n=345)

Get earthquake data through the internet	Number (n=345)	Percentage (%)
Yes	134	38.84
No	211	61.16
Total	345	100

Table 7 shows the frequency and percentage of students using earthquake data applications or websites. The majority of students did not use the applications or websites, with a total of 211 individuals (61.16%), while 134 students (38.84%) reported using them.

Table 8: Frequency and percentage ability to identify earthquake terms of students. (n=345)

Ability to identify earthquake terms	Number (n=345)	Percentage (%)
Yes	99	28.69
No	246	71.31
Total	345	100

Table 8 shows the frequency and percentage of students' ability to identify earthquake terms. The majority of respondents were unable to identify earthquake terms, with a total of 246 individuals (71.31%), while 99 students (28.69%) were able to identify them.

Table 9 Frequency and percentage perception of earthquake information reliability factors of students. (n=345)

Perception of earthquake information reliability factors	**Number (n=345)**	**Percentage (%)**
Authority of the source	141	40.87
Time of information release	55	15.94
Detail of information	41	11.89
Credibility of the publisher	108	31.30
Total	345	100

Table 9 shows the frequency and percentage of students' perception of earthquake information reliability factors. The majority of respondents considered the authority of the source as the most important factor, with a total of 141 individuals (40.87%), followed by the credibility of the publisher with 108 individuals (31.30%). The least represented factor was the detail of information, accounting for 41 individuals (11.89%).

Table 10 Frequency and percentage usage of earthquake data applications or websites of students. (n=345)

Usage of earthquake data applications or websites	Number (n=345)	Percentage (%)
Yes	126	36.52
No	219	63.48
Total	345	100

Table 10 shows the frequency and percentage of students' usage of earthquake data applications or websites. The majority of respondents did not use the applications or websites, with a total of 219 individuals (63.48%), while 126 respondents (36.52%) reported using them.

Knowledge of earthquakes

Table 11 Frequency and percentage perception of earthquake causes of students. (n=345)

Perception of earthquake causes	Number (n=345)	Percentage (%)
Natural causes (e.g., crustal plate movement, volcanic eruption)	315	91.30
Human-related causes (e.g., large explosions, underground mining)	30	8.70
Total	345	100

Table 11 shows the frequency and percentage of students' perception of earthquake causes. The majority of respondents identified natural causes (e.g., crustal plate movement, volcanic eruption) as the primary cause, with a total of 315 individuals (91.30%), while 30 respondents (8.70%) attributed earthquakes to human-related causes (e.g., large explosions, underground mining).

Table 12 Frequency and percentage preferred earthquake safety locations of students. (n=345)

Preferred earthquake safety locations	**Number (n=345)**	**Percentage (%)**
Corner away from windows	103	29.85
Doorway	19	5.51
Outdoor open area Outdoor open area	196	56.81
The top floor of a tall building	27	7.83
Total	345	100

Table 12 shows the frequency and percentage of students' preferred earthquake safety locations. The majority of respondents chose outdoor open areas as the safest place, with a total of 196 individuals (56.81%), while 103 individuals (29.85%) preferred the corner away from windows. The least represented group was those who preferred the doorway, accounting for 19 individuals (5.51%).

Table 13 Frequency and percentage understanding of earthquake epicenter of students. (n=345)

Epicenter	Number (n=345)	Percentage (%)
Ground location where the earthquake occurs	30	8.70
Deep underground where the earthquake occurs	175	50.72
The area where the earthquake wave is the strongest	140	40.58
Total	345	100

Table 13 shows the frequency and percentage of students' understanding of the earthquake epicenter. The majority of students identified deep underground as the location where the earthquake occurs, with 175 individuals (50.72%), while the least chosen option was the ground location where the earthquake occurs, with 30 individuals (8.70%).

Table 14 Frequency and percentage response methods after losing contact during an earthquake of students. (n=345)

Response methods after losing contact during an earthquake	**Number (n=345)**	**Percentage (%)**
Contact by phone or text	61	17.68
Use social media to post missing person information	109	31.59
Wait at the agreed gathering point at home	175	50.73
Total	**345**	**100**

Table 14 shows the frequency and percentage of students' response methods after losing contact during an earthquake. The majority of students would wait at the agreed gathering point at home, with 175 individuals (50.73%), while the least chosen response was contacting by phone or text, with 61 individuals (17.68%).

Table 15 Frequency and percentage perception of secondary earthquake disasters of students. (n=345)

Perception of secondary earthquake disasters	Number (n=345)	Percentage (%)
Fire	80	23.19
Liquefaction	44	12.75
Landslide	144	41.74
Flood	77	22.32
Total	**345**	**100**

Table 15 shows the frequency and percentage of students' perception of secondary earthquake disasters. The majority of students identified landslides as the most likely secondary disaster, with 144 individuals (41.74%), followed by fire with 80 individuals (23.19%). The least recognized secondary disaster was liquefaction, with 44 individuals (12.75%).

Communication skills of earthquakes

Table 16 Frequency and percentage understanding of earthquake magnitude of students. (n=345)

Understanding of earthquake magnitude	**Number (n=345)**	**Percentage (%)**
According to the amplitude of the seismic wave	161	46.67
According to the duration of the earthquake	58	16.81
According to the extent of damage caused by the earthquake	126	36.52
Total	**345**	**100**

Table 16 shows the frequency and percentage of students' understanding of earthquake magnitude. The majority of students identified the amplitude of the seismic wave as the basis for determining magnitude, with 161 individuals (46.67%), while the least chosen basis was the duration of the earthquake, with 58 individuals (16.81%).

Table 17 Frequency and percentage communication methods during earthquakes of students. (n=345)

Communication methods during earthquakes	Number (n=345)	Percentage (%)
By phone or text message	186	53.91
By social media	37	10.72
(Direct face-to-face communication	94	27.25
Don't know	28	8.12
Total	**345**	**100**

Table 17 shows the frequency and percentage of students' preferred communication methods during an earthquake. The majority of students preferred to communicate by phone or text message, with 186 individuals (53.91%), followed by direct face-to-face communication with 94 individuals (27.25%). The least chosen method was "don't know," with 28 individuals (8.12%).

Table 18 Frequency and percentage reporting methods during earthquakes of students. (n=345)

Reporting methods during earthquakes	**Number (n=345)**	**Percentage (%)**
Through the school's emergency system	187	54.20
Directly inform the teacher	98	28.41
Use the school's social media account	60	17.39
Total	**345**	**100**

Table 18 shows the frequency and percentage of students' preferred methods for reporting during an earthquake. The majority of students preferred to report through the school's emergency system, with a total of 187 individuals (54.20%), while the least chosen method was using the school's social media account, accounting for 60 individuals (17.41%).

Table 19 Frequency and percentage reporting methods when an earthquake occurs of students. (n=345)

Reporting methods when an earthquake occurs	**Number (n=345)**	**Percentage (%)**
Immediately call the school emergency personnel	140	40.58
Dial the emergency number on your mobile phone	89	25.79
Report directly to the teacher	116	33.63
Total	**345**	**100**

Table 19 shows the frequency and percentage of students' reporting methods during an earthquake. The majority of students preferred to immediately call the school emergency personnel, with a total of 140 individuals (40.58%), while the least chosen method was dialing the emergency number on their mobile phone, accounting for 89 individuals (25.79%).

Table 20: Frequency and percentage help-seeking methods during an earthquake of students. (n=345)

Help-seeking methods during an earthquake	Number (n=345)	Percentage (%)
Directly ask for help from nearby adults	154	44.64
Post help information through social media	61	17.68
Use the emergency call system	130	37.68
Total	**345**	**100**

Table 20 shows the frequency and percentage of students' help-seeking methods during an earthquake. The majority of students preferred to directly ask for help from nearby adults, with a total of 154 individuals (44.64%), while the least chosen method was posting help information through social media, accounting for 61 individuals (17.68%).

Self-management of earthquakes

Table 21 Frequency and percentage coping methods during an earthquake of students. (n=345)

Coping methods during an earthquake	**Number (n=345)**	**Percentage (%)**
Try to calm down	99	28.70
Seek help from others	137	39.71
Take deep breaths	109	31.59
Total	**345**	**100**

Table 21 shows the frequency and percentage of students' coping methods during an earthquake. The majority of students preferred to seek help from others, with a total of 137 individuals (39.71%), while the least chosen coping method was trying to calm down, accounting for 99 individuals (28.70%).

Table 22 Frequency and percentage methods to calm down during an earthquake of students. (n=345)

Methods to calm down during an earthquake	**Number (n=345)**	**Percentage (%)**
Follow experience from training or drills	116	33.62
Reference to advice from parents or teachers	119	34.49
Listen to official guidance	110	31.89
Total	**345**	**100**

Table 22 shows the frequency and percentage of students' methods to calm down during an earthquake. The majority of students preferred to refer to advice from parents or teachers, with a total of 119 individuals (34.49%), while the least chosen method was listening to official guidance, accounting for 110 individuals (31.89%).

Table 23 Frequency and percentage family coping methods during an earthquake of students. (n=345)

Family coping methods during an earthquake	Number (n=345)	Percentage (%)
Follow the emergency plan	143	41.45
Ensure communication is smooth	102	29.57
Check the surrounding environment regularly	100	28.98
Total	**345**	**100**

Table 23 shows the frequency and percentage of students' family coping methods during an earthquake. The majority of students reported that their family follows the emergency plan, with a total of 143 individuals (41.45%), while the least chosen method was checking the surrounding environment regularly, accounting for 100 individuals (28.98%).

Table 24 Frequency and percentage personal management methods during an earthquake of students. (n=345)

Personal management methods during an earthquake	Number (n=345)	Percentage(%)
Stay hydrated and fed	144	41.74
Rest and keep warm	120	34.78
Avoid unnecessary physical activity	81	23.48
Total	**345**	**100**

Table 24 shows the frequency and percentage of students' personal management methods during an earthquake. The majority of students reported staying hydrated and fed, with a total of 144 individuals (41.74%), while the least chosen method was avoiding unnecessary physical activity, accounting for 81 individuals (23.48%).

Table 25 Frequency and percentage effective coping methods during an earthquake of students. (n=345)

Effective coping methods during an earthquake	**Number (n=345)**	**Percentage (%)**
Record damage and injuries	113	32.75
Report to officials and rescuers	81	23.48
Evaluate and adjust emergency plans	151	43.77
Total	**345**	**100**

Table 25 shows the frequency and percentage of students' effective coping methods during an earthquake. The majority of students reported evaluating and adjusting emergency plans, with a total of 151 individuals (43.77%), while the least chosen method was reporting to officials and rescuers, accounting for 81 individuals (23.48%).

Media literacy of earthquakes

Table 26 Frequency and percentage methods for judging information during an earthquake of students. (n=345)

Methods for judging information during an earthquake	**Number (n=345)**	**Percentage (%)**
Search for information through multiple channels	83	24.06
Check official news	152	44.06
Ask teachers or parents	110	31.88
Total	**345**	**100**

Table 26 shows the frequency and percentage of students' methods for judging information during an earthquake. The majority of students reported checking official news, with a total of 152 individuals (44.06%), while the least chosen method was searching for information through multiple channels, accounting for 83 individuals (24.06%).

Table 27 Frequency and percentage sources of information during an earthquake of students. (n=345)

Sources of information during an earthquake	**Number (n=345)**	**Percentage (%)**
Official news websites	89	25.80
Announcements from government departments	168	48.69
Blogs of professional organizations or experts	61	17.68
Discussions on social media platforms	27	7.83
Total	**345**	**100**

Table 27 shows the frequency and percentage of students' sources of information during an earthquake. The majority of students reported receiving information from announcements from government departments, with 168 individuals (48.69%), followed by official news websites with 89 individuals (25.80%). The least chosen source was discussions on social media platforms, with 27 individuals (7.83%).

Table 28 Frequency and percentage perception of earthquake information authenticity of students. (n=345)

Perception of earthquake information authenticity	Number (n=345)	Percentage (%)
Yes	213	61.74
No	132	38.26
Total	**345**	**100**

Table 28 shows the frequency and percentage of students' perception of earthquake information authenticity. The majority of students believed the information to be true, with a total of 213 individuals (61.74%), while the lowest group consisted of those who did not believe the information, accounting for 132 individuals (38.26%).

Table 29 Frequency and percentage perception of earthquake protection measures of students. (n=345)

Perception of earthquake protection measures	Number (n=345)	Percentage (%)
Yes	211	61.16
No	134	38.84
Total	**345**	**100**

Table 29 shows the frequency and percentage of students' perception of earthquake protection measures. The majority of students reported using protection measures, with a total of 211 individuals (61.16%), while the lowest group consisted of those who did not use protection measures, accounting for 134 individuals (38.84%).

Table 30 Frequency and percentage preferences for methods of earthquake preparedness education of students. (n=345)

Preferences for methods of earthquake preparedness education	**Number (n=345)**	**Percentage (%)**
Increase the teaching time of relevant knowledge in class	82	23.77
Use multiple media formats (e.g. video, etc.)	116	33.63
Organize earthquake drills regularly	147	42.60
Total	**345**	**100**

Table 30 shows the frequency and percentage of students' preferences for methods of earthquake preparedness education. The majority of students preferred organizing earthquake drills regularly, with a total of 147 individuals (42.60%), while the least preferred method was increasing the teaching time of relevant knowledge in class, accounting for 82 individuals (23.77%).

Decision skills of earthquakes

Table 31 Frequency and percentage initial coping methods during an earthquake of students. (n=345)

Initial coping methods during an earthquake	Number (n=345)	Percentage (%)
Find a safe shelter	97	28.11
Escape the building immediately	154	44.64
Wait until the shaking stops before taking action	94	27.25
Total	**345**	**100**

Table 31 shows the frequency and percentage of students' initial coping methods during an earthquake. The majority of students reported escaping the building immediately, with a total of 154 individuals (44.64%), while the least chosen method was waiting until the shaking stops before taking action, accounting for 94 individuals (27.25%).

Table 32 Frequency and percentage methods for checking building safety after an earthquake of students (n=345)

Methods for checking building safety after an earthquake	**Number (n=345)**	**Percentage (%)**
Check the building for obvious cracks	160	46.38
Listen to the official safety assessment	122	35.36
Inspect the structure of the building yourself	63	18.26
Total	**345**	**100**

Table 32 shows the frequency and percentage of students' methods for checking building safety after an earthquake. The majority of students reported checking the building for obvious cracks, with a total of 160 individuals (46.38%), while the least chosen method was inspecting the structure of the building themselves, accounting for 63 individuals (18.26%).

Table 33 Frequency and percentage emergency preparedness plans for an earthquake of students. (n=345)

Emergency preparedness plans for an earthquake	**Number (n=345)**	**Percentage (%)**
Determine the gathering point for your family	108	31.30
Prepare an emergency kit and necessary items	130	37.68
Learn first-aid skills	107	31.02
Total	**345**	**100**

Table 33 shows the frequency and percentage of students' emergency preparedness plans for an earthquake. The majority of students reported preparing an emergency kit and necessary items, with a total of 130 individuals (37.68%), while the least chosen plan was learning first-aid skills, accounting for 107 individuals (31.02%).

Table 34 Frequency and percentage resource usage during an earthquake of students. (n=345)

Resource usage during an earthquake	Number (n=345)	Percentage (%)
Prioritize meeting basic needs	169	48.98
Share and cooperate with others	86	24.93
Use resources according to official guidance	90	26.09
Total	**345**	**100**

Table 34 shows the frequency and percentage of students' resource usage during an earthquake. The majority of students prioritized meeting basic needs, with a total of 169 individuals (48.98%), while the lowest priority was sharing and cooperating with others, accounting for 86 individuals (24.93%).

Table 35 Frequency and percentage priorities during an earthquake of students. (n=345)

Priorities during an earthquake	Number (n=345)	Percentage(%)
Deal with life-threatening injuries	214	62.03
Help those who cannot move	57	16.52
Seek medical help	74	21.45
Total	**345**	**100**

Table 35 shows the frequency and percentage of students' priorities during an earthquake. The majority of students prioritized dealing with life-threatening injuries, with a total of 214 individuals (62.03%), while the lowest priority was helping those who cannot move, accounting for 57 individuals (16.52%).

Table 36 Frequency and Percentage of earthquake information and earthquake media in Earthquake Health Literacy（n=345）

Health literacy	No		yes	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Earthquake information				
Do you know how to obtain seismic data through the Internet?	211	61.16	134	38.84
Can you identify the technical terms commonly used in earthquakes? (e.g. Epicenter, magnitude, focal depth)	246	71.30	99	28.70
Do you know how to use a seismic data application or website?	219	63.48	126	36.52

Table 36 (Continued)

Health literacy	No		yes	
	Frequency	**Percentage (%)**	**Frequency**	**Percentage (%)**
Earthquake media				
Which media channels do you think are more reliable for earthquake protection information?	256	74.20	89	25.80
Do you know how to identify earthquake false information or rumors on the Internet?	132	38.26	213	61.74
Do you think the service provided by the school is sufficient?	134	38.84	211	61.16

Table 36 Frequency and Percentage of earthquake information and earthquake media in Earthquake Health Literacy. Earthquake Information, more than 38.84% of know how to obtain seismic data through the interne, follow by know how to use a seismic data application or website (36.52%) and identify the technical terms commonly used in earthquakes (28.70%). For earthquake media, the majority was

known how to identify earthquake false information or rumors on the internet (61.74%) and think the service provided by the school is sufficient (61.16%).

Table 37 Frequency and percentage of earthquake information and earthquake media in Earthquake Health Literacy level. (n=345)

Health literacy level (earthquake information and earthquake media)	**Frequency**	**Percent (%)**
Low literacy	175	50.73
Moderate literacy	151	43.77
Good literacy	19	5.50
Total	**345**	**100**

Table 37 Frequency and percentage of earthquake information and earthquake media in Earthquake Health Literacy level. The majority of respondents (50.73%) have a low level of earthquake health literacy, indicating insufficient ability to understand, assess, and use earthquake-related information.

Teachers

Part 1: Basic Information of Teachers

Table 38: Frequency and percentage of gender distribution of teachers.（n=40）

Gender	Number（n=40）	Percentage (%)
Male	16	40.00
Female	24	60.00
Total	**40**	**100**

Table 38 shows the frequency and percentage distribution of teacher gender. The number of male participants is 16 individuals (40.00%), which is lower than the number of female participants, who total 24 individuals (60.00%).

Table 39: Frequency and percentage age of teacher distribution.（n=40）

Age	Number（n=40）	Percentage (%)
20-30 years old	13	32.50
31-40 years old	17	42.50
41-50 years old	9	22.50
51 years old and above	1	2.50
Total	**40**	**100**

Table 39 shows the frequency and percentage distribution of participants' age groups. The majority of participants were between 31-40 years old, with 17 individuals (42.50%), followed by those in the 20-30 years old group, with 13 individuals (32.50%). The least represented group was those aged 51 years and above, accounting for 1 individual (2.50%).

Table 40: Frequency and percentage positions of faculty.（n=40）

Positions	Number（n=40）	Percentage (%)
Earthquake education teacher	15	37.50
Earthquake drill organizer	17	42.50
Emergency management leader	8	20.00
Total	**40**	**100**

Table 40 shows the frequency and percentage distribution of faculty positions among participants. The majority of participants were earthquake drill organizers, with 17 individuals (42.50%), while the least represented group was emergency management leaders, accounting for 8 individuals (20.00%).

Table 41: Frequency distribution and percentage working years of teachers.（n=40）

Working years	Number（n=40）	Percentage (%)
1-5 years	9	22.50
6-10 years	13	32.50
11-15 years	7	17.50
More than 15 years	11	27.50
Total	**40**	**100**

Table 41 shows the frequency and percentage distribution of teachers' years of work experience. The majority of participants had 6-10 years of experience, with 13 individuals (32.50%), followed by those with more than 15 years of experience, with 11 individuals (27.50%). The least represented group was those with 11-15 years of experience, accounting for 7 individuals (17.50%).

Part 2: School Earthquake preparedness

Earthquake preparedness policy

Table 42 Frequency and percentage cognition of the school earthquake prevention policy of teachers.（n=40）

Cognition of school earthquake prevention policy	Number（n=40）	Percentage (%)
Yes	30	75.00
No	10	25.00
Total	**40**	**100**

Table 42 shows the frequency and percentage of teachers' cognition of the school earthquake prevention policy. The majority of teachers were aware of the policy, with 30 individuals（75.00%）, while the least represented group were those who were not aware, accounting for 10 individuals (25.00%).

Table 43: Frequency and percentage views on earthquake drills of teachers.（n=40）

Views on earthquake drills	Number（n=40）	Percentage (%)
Yes, regularly (e.g., once per semester)	26	65.00
Yes, but irregularly	11	27.50
No earthquake drill	3	7.50
Total	**40**	**100**

Table 43 shows the frequency and percentage of teachers' views on earthquake drills. The majority of teachers reported that earthquake drills are held regularly (e.g., once per semester), with 26 individuals (65.00%). A smaller group, 11 individuals (27.50%), reported that the drills are conducted irregularly. The least reported situation was no earthquake drills, with 3 individuals (7.50%).

Table 44: Frequency and percentage views on earthquake training of teachers. （n=40）

Views on earthquake training	Number（n=40）	Percentage (%)
Yes, systematic training for teachers	26	65.00
No, training only for students	14	35.00
Total	**40**	**100**

Table 44 shows the frequency and percentage of teachers' views on earthquake training. The majority of teachers reported receiving systematic training, with 26 individuals (65.00%), while the lowest percentage indicated that only students receive training, with 14 individuals (35.00%).

Table 45: Frequency and percentage views on the support provided for earthquake preparedness of teachers.（n=40）

Views on the support provided for earthquake preparedness	Number（n=40）	Percentage (%)
Yes, sufficient support	14	35.00
Yes, but limited support	18	45.00
No, insufficient support	8	20.00
Total	**40**	**100**

Table 45 shows the frequency and percentage of teachers' views on the support provided for earthquake preparedness. The majority of teachers reported receiving limited support, with 18 individuals (45.00%), followed by 14 individuals (35.00%) who felt they received sufficient support. The least represented group indicated insufficient support, with 8 individuals (20.00%).

Table 46: Frequency and percentage experiences with difficulties in earthquake preparedness of teachers.（n=40）

Experiences with difficulties in earthquake preparedness	Number（n=40）	Percentage (%)
Yes, encountered difficulties	19	47.50
No	21	52.50
Total	**40**	**100**

Table 46 shows the frequency and percentage of teachers' experiences with difficulties in earthquake preparedness. The majority of teachers reported not encountering difficulties, with 21 individuals (52.50%), while 19 individuals (47.50%) indicated they had faced difficulties, with further explanations provided.

Earthquake training policy

Table 47 Frequency and percentage responses regarding their experience with earthquake preparedness of teachers.（n=40）

Responses regarding their experience with earthquake preparedness	**Number（n=40）**	**Percentage (%)**
Yes	16	40.00
No	24	60.00
Total	**40**	**100**

Table 47 shows the frequency and percentage of teachers' responses regarding their experience with earthquake preparedness. The majority of teachers, 24 individuals (60.00%), reported not having experienced any issues, while 16 individuals (40.00%) stated that they had encountered difficulties.

Table 48 Frequency and percentage experiences with earthquake preparedness challenges of teachers.（n=40）

Experiences with earthquake preparedness challenges	**Number（n=40）**	**Percentage (%)**
Yes	16	40.00
No	24	60.00
Total	**40**	**100**

Table 48 shows the frequency and percentage of teachers' experiences with earthquake preparedness challenges. The majority of teachers, 24 individuals (60.00%), reported not facing any difficulties, while 16 individuals (40.00%) experienced difficulties.

Table 49 Frequency and percentage who have received earthquake preparedness training of teachers.（n=40）

Who have received earthquake preparedness training	**Number（n=40）**	**Percentage (%)**
Yes	29	72.50
No	11	27.50
Total	**40**	**100**

Table 49 shows the frequency and percentage of teachers who have received earthquake preparedness training. The majority of teachers, 29 individuals (72.50%), reported having received training, while 11 individuals (27.50%) did not.

Table 50 Frequency and percentage training content related to earthquake preparedness of teachers.（n=40）

Training content related to earthquake preparedness	**Number（n=40）**	**Percentage (%)**
Emergency rescue skills	10	25.00
Earthquake prevention education methods	13	32.50
Use of earthquake prevention facilities	17	42.50
Total	**40**	**100**

Table 50 shows the frequency and percentage of teachers' training content related to earthquake preparedness. The majority of teachers received training on the use of earthquake prevention facilities, with 17 individuals (42.50%), followed by education methods for earthquake prevention with 13 individuals (32.50%). The least chosen training content was emergency rescue skills, with 10 individuals (25.00%).

Table 51 Frequency and percentage training content related to earthquake response of teachers.（n=40）

Training content related to earthquake response	**Number（n=40）**	**Percentage (%)**
Basic knowledge of earthquakes	4	10.00
Emergency self-rescue skills	15	37.50
Safety behavior during earthquakes	12	30.00
Handling and seeking help after an earthquake	9	22.50
Total	40	100

Table 51 shows the frequency and percentage of teachers' training content related to earthquake response. The majority of teachers received training on emergency self-rescue skills, with 15 individuals (37.50%), followed by safety behavior during earthquakes with 12 individuals (30.00%). The least chosen training content was basic knowledge of earthquakes, with 4 individuals (10.00%).

Pros and cons of school earthquake prevention policy

Table52: Frequency and percentage evaluation of earthquake drills of teachers. （n=40）

Evaluation of earthquake drills	Number（n=40）	Percentage (%)
Moderate frequency of drills	8	20.00
Comprehensive drill content	9	22.50
Well-organized drills	5	12.50
Timely feedback and improvement measures after drills	18	45.00
Total	**40**	**100**

Table 52 shows the frequency and percentage of teachers' evaluation of earthquake drills. The majority of teachers reported that timely feedback and improvement measures were provided after the drills, with 18 individuals (45.00%). This was followed by comprehensive drill content, with 9 individuals (22.50%). The least reported aspect was well-organized drills, with 5 individuals (12.50%).

Table 53: Frequency and percentage evaluation of earthquake training of teachers. （n=40）

Evaluation of earthquake training	Number（n=40）	Percentage (%)
Systematic and practical training content	9	22.50
Sufficient training frequency	12	30.00
Diverse training formats (e.g., lectures, simulation drills)	2	5.00
Wide coverage of training, including teachers and students	17	42.50
Total	**40**	**100**

Table 53 shows the frequency and percentage of teachers' evaluation of earthquake training. The majority of teachers reported that the training covered a wide range, including both teachers and students, with 17 individuals (42.50%). This was followed by sufficient training frequency, with 12 individuals (30.00%). The least reported aspect was diverse training formats, with 2 individuals (5.00%).

Table 54 Frequency and percentage evaluation of earthquake-resistant facilities and resources of teachers.（n=40）

Evaluation of earthquake-resistant facilities and resources	**Number（n=40）**	**Percentage (%)**
Adequate configuration of earthquake-resistant facilities	9	22.50
Proper maintenance and inspection of facilities	16	40.00
Proper allocation of resources (e.g. first aid kits)	7	17.50
Facilities and resources are easy to obtain and use	8	20.00
Total	**40**	**100**

Table 54 shows the frequency and percentage of teachers' evaluation of earthquake-resistant facilities and resources. The majority of teachers reported that the facilities are properly maintained and inspected, with 16 individuals (40.00%). This was followed by adequate configuration of earthquake-resistant facilities, with 9 individuals (22.50%). The least reported aspect was the proper allocation of resources, with 7 individuals (17.50%).

Table 55 Frequency and percentage evaluations of challenges in earthquake preparedness of teachers.（n=40）

Evaluations of challenges in earthquake preparedness	**Number（n=40）**	**Percentage (%)**
Emergency drills are not frequent enough or the results are not good	12	30.00
Earthquake training content is insufficient or lacks practicality	13	32.50
Earthquake facilities are incomplete or not properly maintained	9	22.50
Insufficient resource allocation or inconvenient use	6	15.00
Total	**40**	**100**

Table 55 shows the frequency and percentage of teachers' evaluations of challenges in earthquake preparedness. The majority of teachers reported that the earthquake training content is insufficient or lacks practicality, with 13 individuals (32.50%). This was followed by emergency drills being not frequent enough or the results being not good, with 12 individuals (30.00%). The least mentioned challenge was insufficient resource allocation or inconvenient use, with 6 individuals (15.00%).

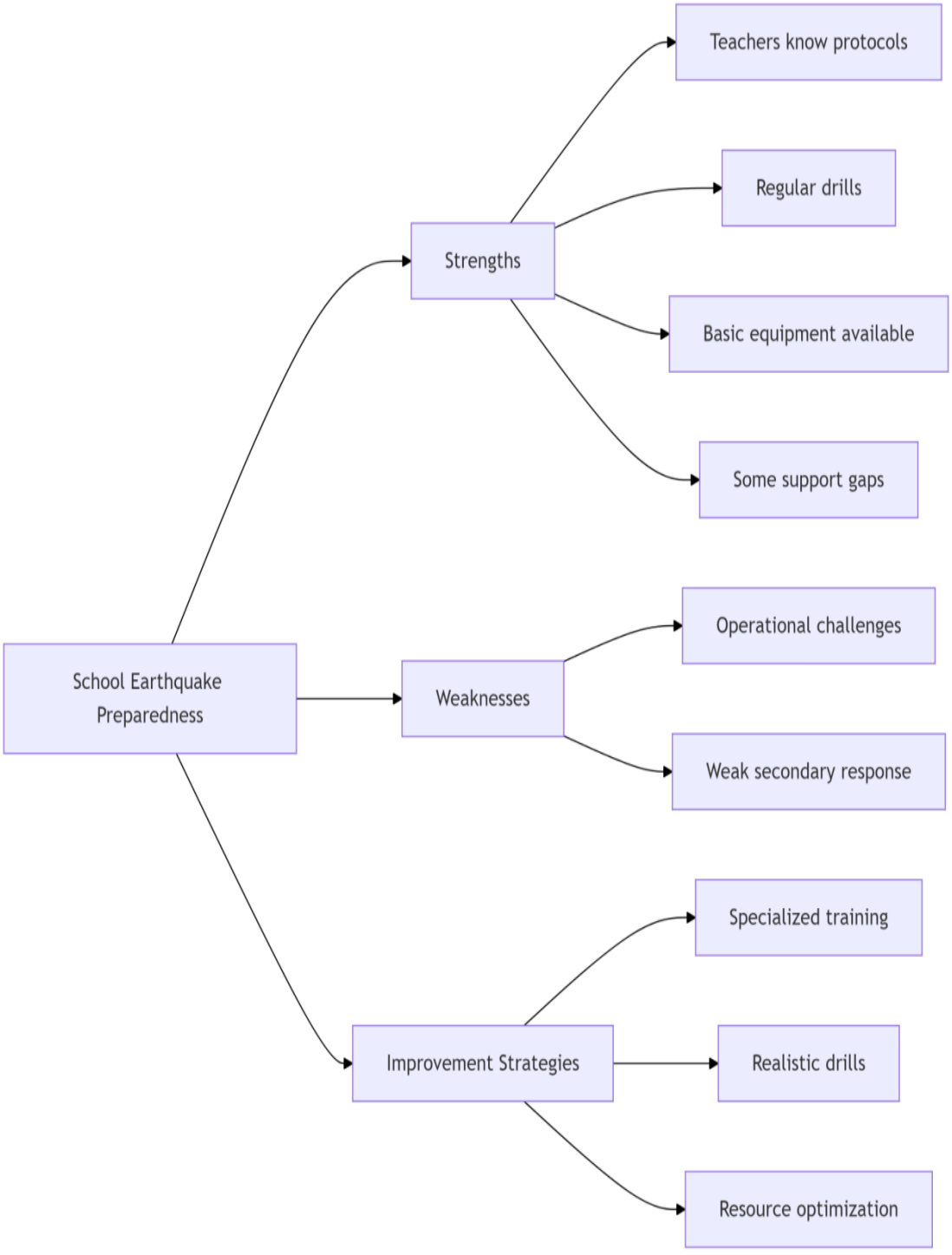
Table 56: Frequency and percentage suggestions for improving earthquake preparedness of teachers. （n=40）

Suggestions for improving earthquake preparedness	Number（n=40）	Percentage (%)
Increase the frequency and effectiveness of emergency drills	10	25.00
Enhance the content and coverage of earthquake prevention training	7	17.50
Improve the configuration and maintenance of earthquake prevention facilities	7	17.50
Increase and optimize the allocation of resources	8	20.00
Improve policy implementation and management mechanisms	8	20.00
Total	**40**	**100**

Table 56 shows the frequency and percentage of teachers' suggestions for improving earthquake preparedness. The majority of teachers suggested increasing the frequency and effectiveness of emergency drills, with 10 individuals (25.00%). The middle group included those suggesting improvements to policy implementation and management mechanisms, and the allocation of resources, both with 8 individuals

(20.00%). The least suggested improvement was enhancing the content and coverage of earthquake prevention training, with 7 individuals (17.50%).

Part 3: Strengths and weaknesses of e earthquake preparedness



Earthquake preparedness

1. Advantages

Teachers know protocols: Teachers understand the school emergency procedures when an earthquake occurs, such as evacuation routes, student resettlement points, roll-call mechanism, etc. They can organize students to evacuate quickly and orderly in the first time to prevent secondary disasters such as trampling. This familiarity is due to training and daily drills, and to a certain extent improves the overall response efficiency of the school.

Regular drills: Most schools organize at least one earthquake drill per semester, and some even conduct special emergency drills in conjunction with the national "May 12 Disaster Prevention and Reduction Day". These drills enhance students' safety awareness, allowing them to remain calm in emergencies such as earthquakes and know basic actions such as "lie down, cover, and hold on."

Basic equipment available: Schools are usually equipped with basic emergency rescue supplies, such as emergency kits, stretchers, simple medicine boxes, flashlights, fire extinguishers, alarms, etc. Some schools also have simple intercom systems. These equipment buys valuable time for initial self-rescue, especially in the "golden 72 hours" when professional rescue has not yet arrived.

Some support gaps: Despite the basic configuration, psychological intervention, post-disaster accommodation and accommodation, and home-school liaison mechanisms are often weak. For example, students may experience anxiety and panic after an earthquake, but there is a lack of professional psychological personnel involved. At the same time, schools lack spare food, water, and temporary shelters, which affects their ability to respond continuously.

2. Disadvantages

Operational challenges: In actual earthquake emergencies, you may face problems such as failure of emergency broadcasts, chaotic command, and panic among students. Especially in schools with high floors and many students, there is a risk of time delays and space congestion during the evacuation process. In addition, some teachers are unclear about the division of responsibilities, which affects the coordination and efficiency of emergency response.

Weak secondary response: Weak post-disaster recovery is a common problem in most schools. For example, there is a lack of post-disaster teaching reconstruction plans, and teaching resources such as desks and chairs are not replenished in time after being damaged; communication interruptions prevent parents from obtaining student information in the first place, increasing social panic; and there is a lack of psychological recovery mechanisms for returning to school, which affects students' academic continuity.

3. Improvement strategies

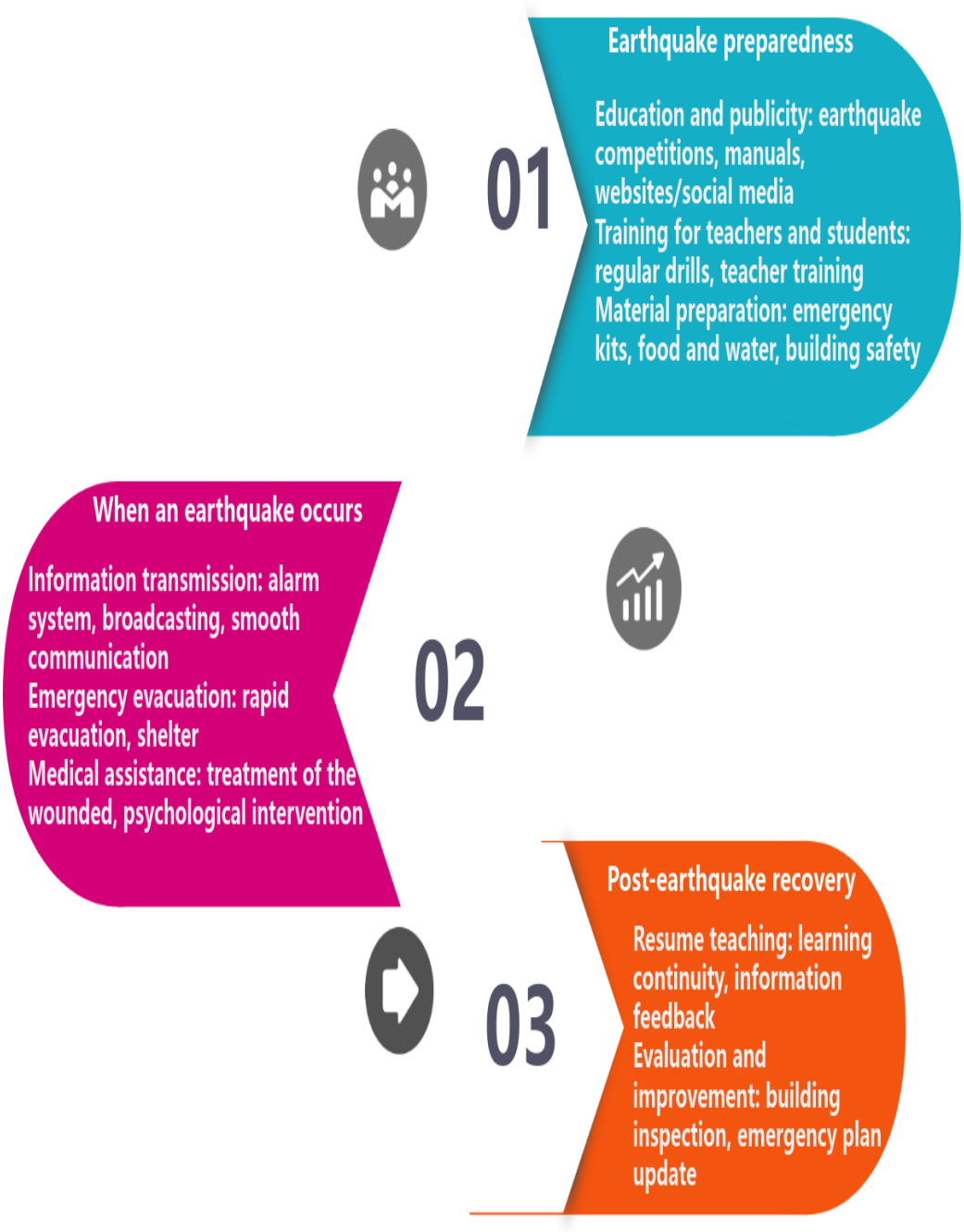
Specialized training: Teachers should receive more detailed training, including first aid for casualties on site (such as hemostasis, bandaging, cardiopulmonary resuscitation), preliminary safety assessment of building structures, psychological counseling for teachers and students, etc. Referring to the experience of Turkey, Japan and other countries, a regular rescue certification system for teachers can be established to improve their comprehensive disaster response capabilities.

Realistic drills: It is recommended to use "reenactment" drills, such as simulating complex situations such as aftershocks, road obstructions, and student loss of contact, to enhance the authenticity of the drills and emergency adaptability. It is

also possible to jointly carry out "multi-department joint emergency drills" with local governments, fire departments, and medical units to improve coordination capabilities.

Resource optimization: Based on factors such as school building structure and number of students, scientifically plan emergency material reserve standards and layout methods. It is recommended to establish a "campus emergency resource map" to ensure that each building and each floor has accessible shelter space and equipment. In addition, intelligent early warning systems (such as IoT sensors) can be introduced to improve pre-warning and in-event response capabilities.

Part 4: Earthquake preparedness and response guidelines



Earthquake preparedness and response guidelines

1. Earthquake preparation

Education and publicity

Earthquake competition: hold knowledge competitions to enhance students' interest and awareness of earthquake protection.

Brochures: distribute earthquake response manuals to introduce emergency measures and risk avoidance knowledge to teachers and students.

Website/social media publicity: popularize earthquake-related knowledge through online platforms and expand the scope of dissemination.

Teacher and student training

Regular drills: conduct earthquake emergency drills regularly to improve teachers' and students' reaction speed and escape skills.

Teacher training: provide professional training for teachers so that they can correctly guide students to respond during earthquakes.

Supply preparation

Emergency kit: prepare an earthquake emergency kit, including flashlights, first aid supplies, whistles, etc.

Food and drinking water: reserve enough emergency food and water for emergencies.

Building safety inspection: conduct earthquake resistance inspection and reinforcement of school buildings and other buildings to ensure structural safety.

2. When an earthquake occurs

Information transmission

Alarm system: Activate earthquake alarm to remind people to take evacuation actions immediately.

Broadcast notification: Issue emergency instructions through campus broadcast or loudspeaker system.

Smooth communication: Ensure smooth communication channels between departments and quickly coordinate actions.

Emergency evacuation

Quick evacuation: Organize people to evacuate to safe areas in an orderly and rapid manner.

Temporary shelter: Arrange temporary shelter for people to take temporary shelter.

Medical assistance

Treatment of the injured: Provide emergency treatment for the injured.

Psychological intervention: Provide psychological support and counseling to relieve panic.

3. Post-earthquake recovery

Resume teaching

Learning continuity: Resume normal teaching as soon as possible through online teaching or temporary classrooms.

Information feedback: Collect feedback from teachers and students on earthquake response and understand problems in a timely manner.

Evaluation and improvement

Building inspection: Conduct safety assessments on campus buildings to eliminate potential risks.

Emergency plan update: Optimize and update the emergency plan based on the experience of this earthquake

CHAPTER V

CONCLUSION AND DISCUSSIONS

The title of the study was the health literacy on earthquake preparedness among secondary school of Chengmai county in Hainan, China. This study aims to investigate and analyze the earthquake health literacy and earthquake disaster relief preparedness of middle school students in Chengmai County, Hainan Province, and formulate earthquake disaster prevention and mitigation guidelines based on the research results. The study population consisted of the sample size was calculated by Taro Yamane formula and finally determined to be 334 participants, selected by simple random sampling method. The research subjects also included the head teachers of 40 classes from grade 1 to grade 3 of Chengmai County No. 3 Middle School, and the head teacher samples were selected by purposive sampling method. The questionnaire is divided into 2 parts as follows: For students' section 1: basic Information of student's section 2: Earthquake health literacy For Teacher section 1: Basic Information of Teachers section 2: School Earthquake preparedness. Data were analyzed using statistical software, employing the following statistical methods: Frequency, percentage, mean. The research findings are structured as follows:

5.1 Conclusion

5.2 Discussion of Results

5.3 Study Limitation

5.4 Generalizability

5.5 Research Recommendations

Conclusion

Student

1. Basic information of students

The majority of cases were male (54.20%), most were in grade 2 (35.90%), and the predominant age was 14 years (36.80%).

2. Earthquake health literacy

The earthquake health literacy, the student access to earthquake- related information and media was limited. A majority of respondents (50.73%) demonstrated a low level of earthquake health literacy. Among teachers revealed that the majority (42.50%) served as earthquake drill organizers, accounting. Most teachers (65.00%) reported receiving systematic training. Additionally, 60.00% indicated that they had not encountered any issues during earthquake preparedness activities. A total of 37.50% had received training in emergency self-rescue skills, while 40.00% reported that school facilities were well-maintained and regularly inspected.

Teachers

1. Basic information of teachers

The majority of teachers were female (60.00%), most were between 31–40 years old (42.50%), served as earthquake drill organizers (42.50%), and had 6–10 years of work experience (32.50%).

2. School Earthquake preparedness

The teachers believe there is limited support from the school in earthquake preparedness efforts (45%). While 65% of teachers have received earthquake training, primarily focusing on the use of earthquake-resistant infrastructure and emergency self-rescue skills, some teachers feel the training content is lacking in practicality (32.5%). Regarding earthquake drills, most teachers (45%) emphasize the importance of timely feedback and improvements, 40% of teachers believe earthquake-resistant facilities are well-maintained and inspected

3. Strengths and weaknesses of earthquake preparedness

Advantages Analysis

Teachers generally perform well in terms of familiarity with the school's earthquake emergency protocols. Survey results show that most teachers understand the school’s earthquake emergency procedures, including evacuation routes, student assembly points, and roll-call mechanisms, which are crucial for organizing students' quick and orderly evacuation during an earthquake. This familiarity largely stems from regular training and drills, which enhance the overall emergency response efficiency of the school. Conducting regular earthquake drills is one of the core components of school earthquake preparedness. Most schools conduct at least one earthquake drill per

semester, and some even hold special drills in conjunction with the national "May 12th Disaster Prevention and Reduction Day." These drills not only raise students' disaster awareness but also teach them basic actions such as "drop, cover, and hold on," which effectively reduces panic. However, these drills need to incorporate more complex scenarios to better improve both teacher and student responsiveness. In terms of emergency supplies, schools generally provide basic rescue tools such as first aid kits, stretchers, medicine boxes, etc., which offer crucial support for self-rescue during the early stages of a disaster. These supplies are particularly important during the "golden 72 hours" when professional rescue teams have not yet arrived. Some schools also equip simple intercom systems, which play a critical role in internal emergency communication.

Disadvantages Analysis

Despite the foundational infrastructure in place for earthquake preparedness, schools still face many challenges. First, during actual emergency responses, schools may encounter issues such as failure of the emergency broadcast system, chaotic command structures, and student panic. This is especially true for schools located in high-rise buildings or with large student populations, where evacuation delays and space congestion may occur. These issues not only impact the efficiency of evacuation but also increase the psychological burden on students and teachers. Additionally, some

teachers are unclear about their specific emergency responsibilities, which hampers coordination and smooth execution of the emergency response. A lack of post-disaster recovery plans is another critical issue. Many schools do not have detailed plans for post-disaster teaching reconstruction, and resources such as desks and chairs are not replenished in a timely manner after being damaged. Moreover, communication disruptions often prevent parents from receiving timely information about their children, which contributes to social panic. The lack of psychological recovery mechanisms also makes it difficult for students to quickly adjust back to school life after a disaster, further impacting their academic continuity.

Improvement Strategies

To address these existing shortcomings, we propose several improvement strategies. First, schools should enhance the professional training of teachers, extending beyond emergency rescue skills to include psychological counseling, first aid for casualties, building safety assessments, and more. Drawing on the experiences of countries like Turkey and Japan, a teacher rescue certification system could be established to improve their overall disaster response capabilities. Additionally, the realism and adaptability of earthquake drills need to be further enhanced. We recommend adopting "re-enactment" style drills, such as simulating complex situations like aftershocks, road blockages, and students losing contact, to increase the authenticity of the drills and the adaptability to emergencies. Schools could also

collaborate with local governments, fire departments, and medical units to conduct joint multi-department emergency drills to improve coordination. Regarding resource allocation, schools should scientifically plan emergency supply reserves and layouts based on factors such as building structure and student population. It is recommended to create a "campus emergency resource map" to ensure that every floor and building has accessible shelter space and necessary equipment. Introducing intelligent early warning systems (such as IoT sensors) is another crucial step in improving pre-warning and disaster response capabilities. Through these improvements, schools will be able to enhance their overall emergency preparedness and reduce the negative impact of earthquakes on students and staff.

Discussion

The earthquake health literacy

The survey conducted among 345 students in Hainan Province highlights significant gaps in earthquake health literacy, which affects their ability to respond effectively to seismic disasters. The findings show that only 31.0% of students use the internet to access earthquake-related information, with a high percentage (61.2%) not using relevant apps or websites, indicating underuse of digital platforms (Hainan Provincial Earthquake Bureau, 2022). In terms of basic knowledge, 71.3% of students could not identify key earthquake terms, and only 50% understood the concept of an epicenter. While 56.8% knew the safety principle of seeking open spaces, many still struggled with proper responses during drills (National Earthquake Science Data Center, 2020). Communication skills were moderate, with over half of students recognizing

phone or school systems as communication tools, aligning with the idea that effective communication enhances disaster resilience (Hong, Kim, & Xiong, 2019). Self-management was weak, as only 23.5% of students avoided unnecessary exertion during emergencies (Paton, 2019). A significant portion (38.3%) expressed skepticism about the accuracy of media sources, emphasizing the need for better media literacy to combat misinformation (Shams et al., 2024). Regarding decision-making, 43.8% of students were willing to assess and adjust actions independently, suggesting some ability to make proactive decisions (Wu et al., 2022). Overall, while students possess some foundational knowledge, there are clear deficiencies in digital tool use, knowledge depth, psychological coping, media discernment, and adaptive behaviors (Zaremohzzabieh et al., 2021).

Frequency and percentage of earthquake information and earthquake media in Earthquake Health Literacy level. The majority of respondents (50.73%) have a low level of earthquake health literacy, indicating insufficient ability to understand, assess, and use earthquake-related information (Hainan Provincial Seismological Bureau, 2023). Similar studies emphasize that inadequate disaster literacy negatively impacts people's ability to respond appropriately to seismic events (Paton & Johnston, 2017). Furthermore, education programs that integrate practical knowledge and risk communication significantly improve disaster preparedness and resilience (Mileti, 1999). Therefore, these results highlight the critical need for comprehensive earthquake education and communication strategies to enhance health literacy, thereby reducing risk and improving community safety.

The preparedness for earthquake

The data show that both students and teachers possess basic awareness and initial actions regarding earthquake preparedness. Among students, the most notable findings are that 37.7% have prepared personal emergency kits, 36.5% have used earthquake-related apps or websites, 31.0% have acquired basic first aid skills, and 41.4% of families have established emergency plans—reflecting a certain level of individual and family preparedness（Bhuiya, M, 2022）.At the school level, 65% of teachers reported that their schools conduct earthquake drills each semester, 75% are familiar with their school's emergency plans, and 65% have received earthquake-related training. However, only 25% received first aid training, significantly lower than Japan's 82% coverage rate. Additionally, just 12.5% of teachers believed that drills were well-organized. Resource support also remains insufficient—only 40% of teachers felt earthquake-resistant facilities were well-maintained—indicating the need for improvements in drill quality, training content, and infrastructure. （Nutbeam, D. (2020)，Shams, L. et. al (2024). These findings align with previous studies emphasizing that effective disaster preparedness depends not only on individual knowledge but also on the quality of institutional training and infrastructure (Paton & Johnston, 2017). For instance, Lindell and Perry (2012) argue that regular, realistic drills combined with comprehensive training programs are critical to enhancing response capacity and reducing disaster impact. Moreover, research by Norris et al. (2008) underscores the role of community resilience factors, including social support and resource availability, as key determinants of preparedness outcomes. Therefore, these results highlight an urgent need to improve training content, drill organization,

and infrastructure maintenance to elevate overall earthquake preparedness within schools.

The earthquake preparedness and response guidelines

The comparative analysis highlights significant disparities in earthquake preparedness and response strategies between Chengmai County and leading countries such as Japan, New Zealand, the U.S., and Turkey. Japan's practice of monthly school drills, resulting in a 92% student terminology recognition rate (Cabinet Office, Japan, 2023), exemplifies the benefits of frequent, systematic preparedness exercises. In contrast, Chengmai's average of fewer than three drills annually and less than 30% awareness (Hainan Earthquake Administration, 2022) indicates a critical need for increased drill frequency and quality. This aligns with findings by Lindell and Perry (2012), who emphasize that regular, realistic drills enhance individuals' protective action decision-making during disasters. Moreover, the substantial difference in teacher rescue training hours 72 hours biennially in Turkey versus under 10 hours in Chengmai (AFAD, 2022), reflects a gap in professional preparedness critical for effective emergency response. As suggested by Paton and Johnston (2017), comprehensive and continuous training of educators and emergency personnel is essential to build institutional resilience and community safety. The proposed three-phase plan aligns well with the adaptive capacity framework outlined by Cutter et al. (2014), which underscores the importance of multi-level interventions from certification systems to smart technology integration to improve disaster preparedness. Finally, the integration of smart early warning systems using IoT technology reflects contemporary disaster management trends. Research by Xu et al. (2021) demonstrates that real-time data collection and automated alerts significantly reduce response times and casualties in

seismic events. Thus, Chengmai’s long-term vision for IoT-enabled early warning aligns with global best practices and the goals outlined in China’s National Disaster Reduction Plan (FEMA, 2023), offering a comprehensive pathway to elevate earthquake preparedness and resilience.

Generalizability

1. The advantages and disadvantages of schools' earthquake preparedness revealed in this study provide valuable insights for other schools, especially regarding earthquake education, building safety, and emergency supplies.

2. The earthquake policies and emergency drills commonly implemented in most schools have been proven effective, making the conclusions of this study highly generalizable, particularly in areas such as emergency response, information dissemination, psychological intervention, and school-family collaboration.

3. This study emphasizes the importance of earthquake education in schools and suggests that the popularization and enhancement of earthquake education should be a core issue for schools to focus on in the long term, with high generalizability and long-term guiding value.

Recommendation for Further Research

1. Expand Sample Diversity: Future studies should include a wider range of schools across different regions, especially in earthquake-prone areas, to develop more tailored disaster preparedness strategies.

2. Evaluate Drill Effectiveness: Research should assess the frequency, realism, and outcomes of earthquake drills to improve emergency preparedness programs.

3. Address Special Needs: Studies should focus on designing personalized emergency plans and facilities for vulnerable groups, such as disabled students and elderly staff.

4. Emphasize Psychological Recovery: Research should explore post-earthquake emotional support and evaluate the effectiveness of psychological interventions.

5. Strengthen Inter-Agency Cooperation: Future work should examine collaboration among schools, governments, rescue agencies, and communities to enhance disaster response efficiency.

6. Leverage Technology: Investigate the use of big data, AI, and IoT in early warning systems, communication, and resource management to improve school resilience.

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APPENDIX

Appendix A

Interview forms

The health literacy of earthquake response among secondary school students of Chengmai County in Hainan, China

Consent Day Date.....Month.....Year.....

I am Mr./Mrs./Miss..... address..... Read the details from the information sheet for participants in the research project and I agree to voluntarily participate in the research project.

I have received a copy of the consent form that I signed and dated, along with an information sheet for research participants. This is before signing the consent form to conduct this research. I explained to the researcher the purpose of the study. The duration of the research, research methods, dangers or symptoms that may arise from the research. or from the medicine used Including the benefits that will emerge from the research and guidelines for treatment by other methods in detail, I have had enough time and opportunity to ask questions until I have a good understanding. The researcher answered various questions willingly and without concealment until I was satisfied.

I have the right to terminate my participation in the research project at any time. There is no need to inform the reason. and termination of my involvement in this research It will not affect treatment or other rights that I will continue to receive.

The researcher guarantees that my personal information will be kept secret. and will be disclosed only with my consent. Other persons on behalf of the research sponsoring company Human Research Ethics Committee the Food and Drug Administration may be permitted to inspect and process my information. This must be done to verify the accuracy of the information only. By agreeing to participate in this study, I am giving consent to have my medical history reviewed.

I have read the above and have a complete understanding of it. Willing to participate in research willingly. Therefore, signed this consent document.

.....Sign the person giving consent.

(.....) Name of person giving consent

Date .....Month.....Year.....

I have explained the purpose of the research, the research methods, dangers or adverse reactions or risks that may arise from the research. or from the medicine used Including the benefits that will arise from thorough research. Let the participants in the research project named above know and have a good understanding. Ready to sign the consent document willingly

.....

Signed by the researcher

(.....)

Name of the researcher in detail

Date .....Month……..Year…….

....

Witness signature Witness signature

(.....) (.....)

Name of witness in detail Name of witness in detail

Date .....Month…..Year……. Date .....Month……..Year…….

The health literacy of earthquake response among secondary school students of Chengmai County in Hainan, China

…….

Dear Participants

The research study will be conducted to investigate the earthquake health literacy of middle school students, survey the preparedness for earthquake response of secondary schools in Chengmai County, Hainan Province, and determine the earthquake preparedness and response guidelines of secondary school students in Chengmai County, Hainan Province. The participants in this study are voluntary and the information you give us will be confidential, which means your name will not be mentioned anywhere and information provided by you will be presented only in a summarized form.

Please select carefully the answer for each question and the possible responses. Choose and mask (√) the response option that best represents your opinion, knowledge, attitude, and practice. Please notify the interviewer if you have any concerns about the questions or other problems.

The questionnaire is divided into 2 parts as follows:

For Students

Part 1: Basic Information of Students

Part 2: Earthquake health literacy

For Teacher

Part 1: Basic Information of Teachers

Part 2: School Earthquake preparedness

Part 3: Strengths and weaknesses of earthquake preparedness

The researcher hopes for your cooperation very much and I would like to thank you very much for this opportunity.

Xu Haitong

Master of Public Health

Chiang Rai Rajabhat University

For Students

Part I: Basic Information of Students

Guidance: Please select carefully the answer for each question and choose the answer by marking (√) the response option that best represents.

Details	**Code**
1. Gender	Gender
( ) Male ( ) Female	
2. Grade: ( ) 1 ( ) 2 ( ) 3	Grade
3. Age: _____	Age

Part 2: Earthquake health literacy

Guidance: Please select carefully the answer for each question and choose the answer by marking (√) the response option that best represents.

Access earthquake information	
1. How do you usually get earthquake information?	Usually
( ) School or Teacher	
( ) News media (e.g. TV, radio)	
( ) Internet (e.g. news website, social media)	
( ) Family or friends	
( ) Other (please specify)	

2. Do you know how to get earthquake data through the Internet?	Internet
( ) Yes ( ) No	
3. Can you identify the common professional terms used in earthquake information? (e.g. epicenter, magnitude, focal depth)	Identify
( ) Yes ( ) No	
4. Which factor do you think has the greatest impact on the reliability of earthquake information when obtaining earthquake information? (Please select the most important factor)	Reliability
( ) Authority of the source ( ) Time of information release ( ) Detail of information ( ) Credibility of the publisher ( ) Other (please specify)	
5. Do you know how to use earthquake data applications or websites?	Websites
( ) Yes ( ) No	

Knowledge of earthquakes	
1. What are the main causes of earthquakes?	Causes
( ) Natural causes (e.g., crustal plate movement, volcanic eruption) ( ) Human-related causes (e.g., large explosions, underground mining) ( ) Other (please specify)	
2. When an earthquake occurs, what is the safest place to avoid shock?	Occurs
( ) Corner away from windows ( ) Doorway ( ) Outdoor open area ( ) The top floor of a tall building	
3. Where is the epicenter of an earthquake?	Epicenter
( ) Ground location where the earthquake occurs ( ) Deep underground where the earthquake occurs ( ) The area where the earthquake wave is the strongest	
4. Do you know what are the common secondary disasters after an earthquake? (Multiple choices are allowed)	Secondary
( ) Fire ( ) Liquefaction ( ) Landslide ( ) Flood	

( ) Other (please specify)	
5. How to determine the magnitude of an earthquake?	Magnitude
( )According to the amplitude of the seismic wave ( )According to the duration of the earthquake ( )According to the extent of damage caused by the earthquake	
Communication skills of earthquakes	
1. When an earthquake occurs, how will you report the situation to your family?	Situation
( ) By phone or text message ( ) By social media ( ) Direct face-to-face communication ( ) Don't know ( ) Other (please specify)	
2. When an earthquake occurs, if you are separated from your family, how will you find them?	Separated
( ) Contact by phone or text ( ) Use social media to post missing person information ( ) Wait at the agreed gathering point at home	
3. How do you report the situation after the earthquake to the school?	Report
( ) Through the school's emergency system	

( ) Directly inform the teacher ( ) Use the school's social media account	
4. If you find that your classmates are injured after the earthquake, how will you communicate?	Classmates
( ) Immediately call the school emergency personnel ( ) Dial the emergency number on your mobile phone ( ) Report directly to the teacher	
5. In an earthquake, if you need help, how will you ask others for help?	Earthquake
( ) Directly ask for help from nearby adults ( ) Post help information through social media ( ) Use the emergency call system	
Self-management of earthquakes	
1. How do you deal with your emotions after an earthquake?	Deal
( ) Try to calm down ( ) Seek help from others ( ) Take deep breaths	
2. How do you stay calm during an earthquake?	Calm
( ) Follow experience from training or drills ( ) Reference to advice from parents or teachers ( ) Listen to official guidance	

3. How do you ensure the safety of yourself and your family after an earthquake?	Family
( ) Follow the emergency plan ( ) Ensure communication is smooth ( ) Check the surrounding environment regularly	
4. How do you manage your physical condition while waiting for help?	Manage
( ) Stay hydrated and fed ( ) Rest and keep warm ( ) Avoid unnecessary physical activity	
5. How do you conduct an effective self-assessment after an earthquake?	Effective
( ) Record damage and injuries ( ) Report to officials and rescuers ( ) Evaluate and adjust emergency plans	
Media literacy of earthquakes	
1. How to judge the authenticity of earthquake information?	Judge
( ) Search for information through multiple channels ( ) Check official news ( ) Ask teachers or parents	
2. Which media channels do you think are more reliable for earthquake protection information?	Media

( ) Official news websites ( ) Announcements from government departments ( ) Blogs of professional organizations or experts ( ) Discussions on social media platforms	
3. Do you know how to identify false information or rumors about earthquakes on the Internet?	False
( ) Yes ( ) No	
4. Do you think the earthquake protection education information provided by your school is sufficient?	Protection
( ) Yes ( ) No	
5. What methods do you think can improve your and your classmates' ability to obtain and understand earthquake information?	Methods
( ) Increase the teaching time of relevant knowledge in class ( ) Use multiple media formats (e.g. video, etc.) ( ) Organize earthquake drills regularly	
Decision skills of earthquakes	
1. What should you do first when an earthquake occurs?	First
( ) Find a safe shelter ( ) Escape the building immediately ( ) Wait until the shaking stops before taking action	

2. After an earthquake, how do you determine whether the building is safe?	Building
( ) Check the building for obvious cracks ( ) Listen to the official safety assessment ( ) Inspect the structure of the building yourself	
3. How to make a personal emergency plan after an earthquake?	Plan
( ) Determine the gathering point for your family ( ) Prepare an emergency kit and necessary items ( ) Learn first-aid skills	
4. How to effectively use limited resources after an earthquake?	Limited
( ) Prioritize meeting basic needs ( ) Share and cooperate with others ( ) Use resources according to official guidance	
5. If you find someone injured around you, how should you prioritize?	Prioritize
( ) Deal with life-threatening injuries ( ) Help those who cannot move ( ) Seek medical help	

For Teacher

Part 1: Basic Information of Teachers

Guidance: Please select carefully the answer for each question and choose the answer by marking (√) the response option that best represents.

Details	**Code**
1.Your gender is:	Gender
( ) Male ( ) Female	
2.Your age group is:	Age
( ) 20-30 years old ( ) 31-40 years old ( ) 41-50 years old ( ) 51 years old and above	
3.Your position is:	Position
( ) Earthquake education teacher ( ) Earthquake drill organizer ( ) Emergency management leader ( ) Other (please specify)	
4.Your years of work experience:	Experience
( ) 1-5 years ( ) 6-10 years ( ) 11-15 years ( ) More than 15 years ( ) Other (please specify)	

Part 2: School Earthquake preparedness

Guidance: Please select carefully the answer for each question and choose the answer by marking (√) the response option that best represents.

Earthquake preparedness policy	
1. Does the school have a clear earthquake preparedness policy?	Policy
( ) Yes ( ) No	
2. Does the school's earthquake preparedness policy include regular earthquake emergency drills?	Include
( ) Yes, regularly (e.g., once per semester) ( ) Yes, but irregularly ( ) No earthquake drill	
3. Does the school provide systematic earthquake training for teachers?	Systematic
( ) Yes, systematic training for teachers ( ) No, training only for students	
4. Do you think the school's earthquake preparedness policy provides sufficient support for teachers' earthquake preparedness work?	Work
( ) Yes, sufficient support ( ) Yes, but limited support ( ) No, insufficient support	

5. Have you encountered any difficulties in implementing the earthquake preparedness policy?	Preparedness
( ) Yes, encountered difficulties (please explain) ( ) No	
Earthquake training policy	
1.Have you participated in the design and implementation of earthquake education courses?	Design
( ) Yes ( ) No	
2. Are the earthquake education resources provided by your school or department sufficient?	Provided
( ) Yes ( ) No	
3. Have you received professional earthquake prevention training?	Training
( ) Yes ( ) No	
4. What further training or resources do you want to receive?	Further
( ) Emergency rescue skills ( ) Earthquake prevention education methods ( ) Use of earthquake prevention facilities ( ) Others (please specify)	
5. What is the main content of the training?	Main
( ) Basic knowledge of earthquakes ( ) Emergency self-rescue skills	

( ) Safety behavior during earthquakes ( ) Handling and seeking help after an earthquake	
Pros and cons of school earthquake prevention policy	
1.What advantages do you think the school's earthquake policy has in terms of emergency drills?	School
( ) Moderate frequency of drills ( ) Comprehensive drill content ( ) Well-organized drills ( ) Timely feedback and improvement measures after drills ( ) Others (please specify)	
2. What advantages does the school's earthquake policy have in terms of earthquake training?	Advantages
( ) Systematic and practical training content ( ) Sufficient training frequency ( ) Diverse training formats (e.g., lectures, simulation drills) ( ) Wide coverage of training, including teachers and students ( ) Others (please specify)	

3. What do you think are the main advantages of the school's earthquake policy in terms of facilities and resources?	Think
( ) Adequate configuration of earthquake-resistant facilities ( ) Proper maintenance and inspection of facilities ( ) Proper allocation of resources (e.g. first aid kits) ( ) Facilities and resources are easy to obtain and use ( ) Others (please specify)	
4. What are the main disadvantages of the school's earthquake policy?	Disadvantages
( ) Emergency drills are not frequent enough or the results are not good ( ) Earthquake training content is insufficient or lacks practicality ( ) Earthquake facilities are incomplete or not properly maintained ( ) Insufficient resource allocation or inconvenient use ( ) Other (please specify)	

5. What do you think are the priority areas for improving school earthquake prevention policies?	Improving
( ) Increase the frequency and effectiveness of emergency drills ( ) Enhance the content and coverage of earthquake prevention training ( ) Improve the configuration and maintenance of earthquake prevention facilities ( ) Increase and optimize the allocation of resources ( ) Improve policy implementation and management mechanisms ( ) Other (please specify)	

Part 3: Strengths and weaknesses of earthquake preparedness

Guidance: Please select carefully the answer for each question and choose the answer by marking (√) the response option that best represents.

1.What do you think are the school's strengths of earthquake preparedness?	Strengths
2. What do you think are the school's weaknesses of earthquake preparedness?	Weaknesses

Appendix B

Interview forms

For Students

Part I: Basic Information of Students

Guidance: Please select carefully the answer for each question and choose the answer by marking **(**√**)** the response option that best represents**.**

Question	**Comment Scores**			**Total score**	**IOC**	**Summary**
	1	**2**	**3**			
1. Gender ( ) Male ( ) Female	**+1**	**+1**	**+1**	**3**	**1**	/
2. **Grade:** ( )1 ( )2 ( ) 3	**+1**	**+1**	**+1**	**3**	**1**	/
3. Age ……. years						

Part 2: Earthquake health literacy

Guidance: Please select carefully the answer for each question and choose the answer by marking **(**√**)** the response option that best represents**.**

Access earthquake information						
1.How do you usually get earthquake information? ( ) School or Teacher ( ) News media (e.g. TV, radio) ( ) Internet (e.g. news website, social media) ( ) Family or friends ( ) Other (please specify)	**+1**	**+1**	**+1**	**3**	**1**	/
2.Do you know how to get earthquake data through the Internet? ( ) Yes ( ) No	**+1**	**+1**	**+1**	**3**	**1**	/

3.Can you identify the common professional terms used in earthquake information? (e.g. epicenter, magnitude, focal depth) ( ) Yes ( ) No	**+1**	**+1**	**+1**	**3**	**1**	
4.Which factor do you think has the greatest impact on the reliability of earthquake information when obtaining earthquake information? (Please select the most important factor) ( ) Authority of the source ( ) Time of information release ( ) Detail of information ( ) Credibility of the publisher ( ) Other (please specify)	**+1**	**+1**	**+1**	**3**	**1**	/

5.Do you know how to use earthquake data applications or websites? ( ) Yes ( )No	**+1**	**+1**	**+1**	**3**	**1**	/
Knowledge of earthquakes						
1.What are the main causes of earthquakes? ( )Natural causes (e.g., crustal plate movement, volcanic eruption) ( )Human-related causes (e.g., large explosions, underground mining) ( ) Other (please specify)	**0**	**+1**	**+1**	**2**	**1.5**	/
2.When an earthquake occurs, what is the safest place to avoid shock? ( )Corner away from windows ( ) Doorway ( ) Outdoor open area ( )The top floor of a tall building	**+1**	**+1**	**+1**	**3**	**1**	/

3.Where is the epicenter of an earthquake? ( ) Ground location where the earthquake occurs ( ) Deep underground where the earthquake occurs ( ) The area where the earthquake wave is the strongest	**+1**	**+1**	**+1**	**3**	**1**	/
4.Do you know what are the common secondary disasters after an earthquake? (Multiple choices are allowed) ( )Fire ( )Liquefaction ( ) Landslide ( ) Flood ( ) Other (please specify)	**+1**	**+1**	**+1**	**3**	**1**	/

5.How to determine the magnitude of an earthquake? ( )According to the amplitude of the seismic wave ( )According to the duration of the earthquake ( )According to the extent of damage caused by the earthquake	**+1**	**+1**	**+1**	**3**	**1**	/
Communication skills of earthquakes						
1. When an earthquake occurs, how will you report the situation to your family? ( ) By phone or text message ( )By social media ( ) Direct face-to-face communication ( ) Don't know ( )Other (please specify)	**+1**	**+1**	**+1**	**3**	**1**	/

2. When an earthquake occurs, if you are separated from your family, how will you find them? ( )Contact by phone or text ( )Use social media to post missing person information ( ) Wait at the agreed gathering point at home	**+1**	**+1**	**+1**	**3**	**1**	/
3. How do you report the situation after the earthquake to the school? ( ) Through the school's emergency system ( ) Directly inform the teacher ( ) Use the school's social media account	**+1**	**+1**	**+1**	**3**	**1**	/
4. If you find that your classmates are injured after the earthquake, how will you communicate? ( ) Immediately call the school emergency personnel ( ) Dial the emergency number on your mobile phone ( ) Report directly to the teacher	**+1**	**+1**	**+1**	**3**	**1**	/

5. In an earthquake, if you need help, how will you ask others for help? ( ) Directly ask for help from nearby adults ( )Post help information through social media ( ) Use the emergency call system	**+1**	**+1**	**+1**	**3**	**1**	/
Self-management of earthquakes						
1. How do you deal with your emotions after an earthquake? ( )Try to calm down ( )Seek help from others ( ) Take deep breaths	**+1**	**+1**	**+1**	**3**	**1**	/
2. How do you stay calm during an earthquake? ( ) Follow experience from training or drills ( ) Reference to advice from parents or teachers ( ) Listen to official guidance	**+1**	**+1**	**+1**	**3**	**1**	/

3. How do you ensure the safety of yourself and your family after an earthquake? ( ) Follow the emergency plan ( ) Ensure communication is smooth ( )Check the surrounding environment regularly	**+1**	**+1**	**+1**	**3**	**1**	/
4. How do you manage your physical condition while waiting for help? ( ) Stay hydrated and fed ( )Rest and keep warm ( )Avoid unnecessary physical activity	**+1**	**+1**	**+1**	**3**	**1**	/
5. How do you conduct an effective self-assessment after an earthquake? ( ) Record damage and injuries ( )Report to officials and rescuers ( ) Evaluate and adjust emergency plans	**+1**	**+1**	**+1**	**3**	**1**	/

Media literacy of earthquakes						
1. How to judge the authenticity of earthquake information? ( ) Search for information through multiple channels ( ) Check official news ( )Ask teachers or parents	**+1**	**+1**	**+1**	**3**	**1**	/
2. Which media channels do you think are more reliable for earthquake protection information? ( ) Official news websites ( )Announcements from government departments ( ) Blogs of professional organizations or experts ( )Discussions on social media platforms	**+1**	**+1**	**+1**	**3**	**1**	/
3. Do you know how to identify false information or rumors about earthquakes on the Internet? ( ) Yes ( )No	**+1**	**+1**	**+1**	**3**	**1**	/

4. Do you think the earthquake protection education information provided by your school is sufficient? ( )Yes ( )No	**+1**	**+1**	**+1**	**3**	**1**	/
5. What methods do you think can improve your and your classmates' ability to obtain and understand earthquake information? ( ) Increase the teaching time of relevant knowledge in class ( )Use multiple media formats (e.g. video, etc.) ( )Organize earthquake drills regularly	**+1**	**+1**	**+1**	**3**	**1**	/
Decision skills of earthquakes						
1. What should you do first when an earthquake occurs? ( )Find a safe shelter ( )Escape the building immediately ( )Wait until the shaking stops before taking action	**+1**	**+1**	**+1**	**3**	**1**	/

2. After an earthquake, how do you determine whether the building is safe? ( )Check the building for obvious cracks ( )Listen to the official safety assessment ( )Inspect the structure of the building yourself	**+1**	**+1**	**+1**	**3**	**1**	/
3. How to make a personal emergency plan after an earthquake? ( )Determine the gathering point for your family ( )Prepare an emergency kit and necessary items ( )Learn first-aid skills	**+1**	**+1**	**+1**	**3**	**1**	/
4. How to effectively use limited resources after an earthquake? ( )Prioritize meeting basic needs ( )Share and cooperate with others ( )Use resources according to official guidance	**+1**	**+1**	**+1**	**3**	**1**	/

5. If you find someone injured around you, how should you prioritize? ( )Deal with life-threatening injuries ( )Seek medical help ( )Help those who cannot move	**+1**	**+1**	**+1**	**3**	**1**	/

For Teacher

Part 1: Basic Information of Teachers

Guidance: Please select carefully the answer for each question and choose the answer by marking **(√)** the response option that best represents**.**

Question	Comment Scores			Total score	IOC	Summary
	1	**2**	**3**			
Your gender is: ( ) Male ( ) Female	+1	+1	+1	3	1	/
Your age group is: ( ) 20-30 years old ( ) 31-40 years old ( ) 41-50 years old ( ) 51 years old and above	+1	-1	+1	1	0.3	X
Your position is: ( ) Earthquake education teacher ( ) Earthquake drill organizer ( ) Emergency management leader	+1	-1	+1	1	0.3	X

( ) Other (please specify)						
Your years of work experience: ( ) 1-5 years ( ) 6-10 years ( ) 11-15 years ( ) More than 15 years ( ) Other (please specify)	+ 1	+ 1	+ 1	3	1	/

Part 2: School Earthquake preparedness

Guidance: Please select carefully the answer for each question and choose the answer by marking **(**√**)** the response option that best represents**.**

Earthquake preparedness policy						
1.Does the school have a clear earthquake preparedness policy? ( ) Yes ( ) No	+ 1	+ 1	+ 1	3	1	/
2.Does the school's earthquake preparedness policy include regular earthquake emergency drills? ( ) Yes, regularly (e.g., once per semester) ( ) Yes, but irregularly ( ) No earthquake drill	+ 1	+ 1	+ 1	3	1	/
3.Does the school provide systematic earthquake training for teachers? ( ) Yes, systematic training for teachers ( ) No, training only for students	+ 1	+ 1	+ 1	3	1	/

4.Do you think the school's earthquake preparedness policy provides sufficient support for teachers' earthquake preparedness work? ( ) Yes, sufficient support ( ) Yes, but limited support ( ) No, insufficient support	+1	+1	+1	3	1	/
5.Have you encountered any difficulties in implementing the earthquake preparedness policy? ( ) Yes, encountered difficulties (please explain) ( ) No	+1	+1	+1	3	1	/
Earthquake training policy						
1.Have you participated in the design and implementation of earthquake education courses? ( ) Yes ( ) No	+1	+1	+1	3	1	/

2.Are the earthquake education resources provided by your school or department sufficient? ( ) Yes ( ) No	+1	+1	+1	3	1	/
3.Have you received professional earthquake prevention training? ( ) Yes ( ) No	+1	+1	+1	3	1	/
4.What further training or resources do you want to receive? ( ) Emergency rescue skills ( ) Earthquake prevention education methods ( ) Use of earthquake prevention facilities ( ) Others (please specify)	+1	+1	+1	3	1	/
5.What is the main content of the training? ( ) Basic knowledge of earthquakes ( ) Emergency self-rescue skills ( ) Safety behavior during earthquakes	+1	+1	+1	3	1	/

( ) Handling and seeking help after an earthquake						
Pros and cons of school earthquake prevention policy						
1. What advantages do you think the school's earthquake policy has in terms of emergency drills? ( ) Moderate frequency of drills ( ) Comprehensive drill content ( ) Well-organized drills ( ) Timely feedback and improvement measures after drills ( ) Others (please specify)	+ 1	+ 1	+ 1	3	1	/
2. What advantages does the school's earthquake policy have in terms of earthquake training? ( ) Systematic and practical training content ( ) Sufficient training frequency ( ) Diverse training formats (e.g., lectures, simulation drills) ( ) Wide coverage of training, including teachers and students	+ 1	+ 1	+ 1	3	1	/

( ) Others (please specify)						
3. What do you think are the main advantages of the school's earthquake policy in terms of facilities and resources? ( ) Adequate configuration of earthquake-resistant facilities ( ) Proper maintenance and inspection of facilities ( ) Proper allocation of resources (e.g. first aid kits) ( ) Facilities and resources are easy to obtain and use ( ) Others (please specify)	+1	+1	+1	3	1	/
4. What are the main disadvantages of the school's earthquake policy? ( ) Emergency drills are not frequent enough or the results are not good ( ) Earthquake training content is insufficient or lacks practicality	+1	+1	+1	3	1	/

( ) Earthquake facilities are incomplete or not properly maintained ( ) Insufficient resource allocation or inconvenient use ( ) Other (please specify)						
5. What do you think are the priority areas for improving school earthquake prevention policies? ( ) Increase the frequency and effectiveness of emergency drills ( ) Enhance the content and coverage of earthquake prevention training ( ) Improve the configuration and maintenance of earthquake prevention facilities ( ) Increase and optimize the allocation of resources ( ) Improve policy implementation and management mechanisms ( ) Other (please specify)	+1	+1	+1	3	1	/

Part 3: Strengths and weaknesses of earthquake preparedness

Guidance: Please select carefully the answer for each question and choose the answer by marking **(**√**)** the response option that best represents**.**

1.What do you think are the school's strengths of earthquake preparedness?	+ 1	-1	+ 1	1	0.3	X
2. What do you think are the school's weaknesses of earthquake preparedness?	+1	-1	+ 1	1	0.3	X

Measurement	**Conbach's alpha coefficient**
Earthquake health literacy	0.82
School Earthquake preparedness	0.87

BIOGRAPHY

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Graduated from: Hainan University of Science and Technology

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Graduated school: Chengmai County No. 3 Middle School

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