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# Nursing Research and Innovation in Disaster Management and Public Health Emergency

Assist. Prof. Dr. M.L. Somjinda Chompunud

Srisavarindhira Thai Red Cross Institute of Nursing E-mail: somjinda.c@stin.ac.th



The

to Commemorate the 125th Anniversary of the Birth of HRH Princess Srinagarindra

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## **Disaster Context**





Source: Centre for Research on the Epidemiology of Disaster (2024)









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#### AHA Centre Annual Report 2024

#### **DISASTER BY** THE NUMBERS

1 JANUARY - 29 DECEMBER 2024



In 2024, the ASEAN region experienced widespread natural disasters, resulting in significant economic losses. The vast majority of these events occurred in Indonesia, Viet Nam, Thailand, and the Philippines.



#### IMPACT OF THE DISASTERS





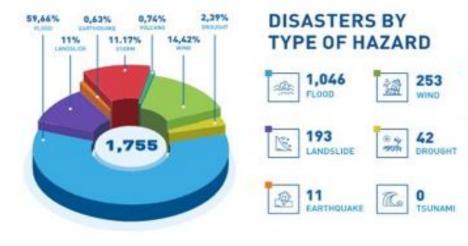








These disasters had a major human impact, affecting millions across the region, with large numbers of people displaced, injured, or reported dead or missing.



Flooding was the most common type of disaster, followed by wind-related events, storms, landslides, and droughts-reflecting the region's vulnerability to hydrometeorological hazards.



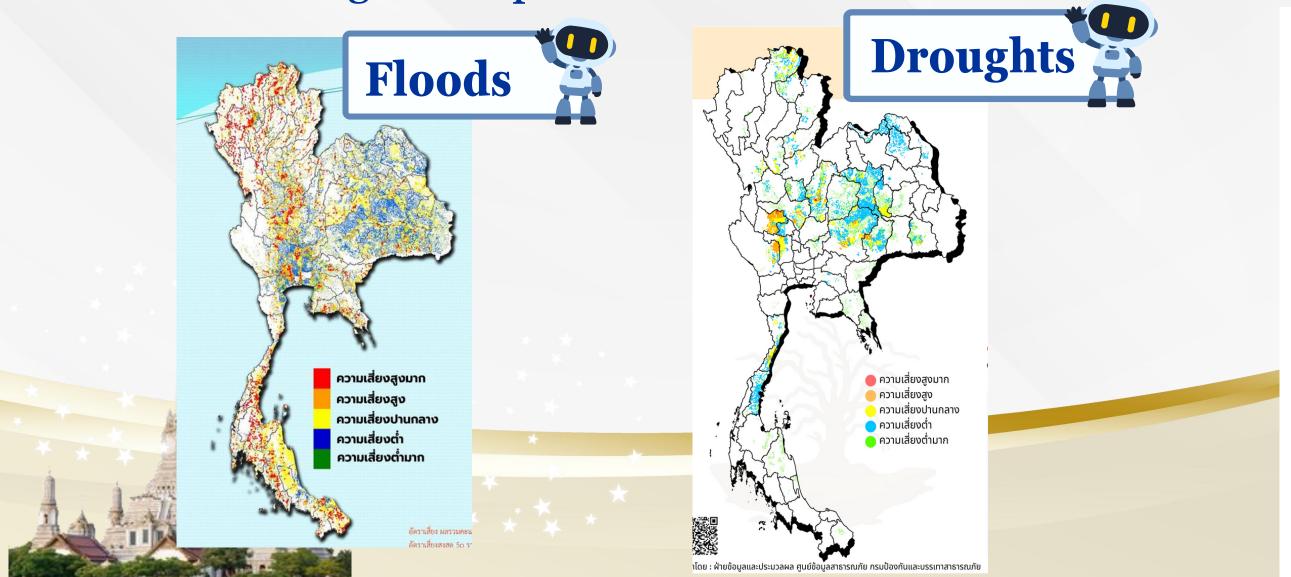
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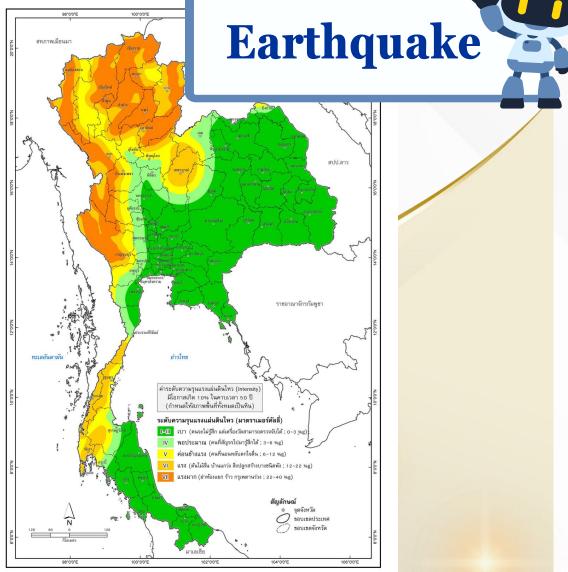
## Thailand's Disaster Context

Thailand is located in the tropical monsoon region of Southeast Asia.

The country is highly prone to floods, storms, droughts, and landslides.

Climate change and rapid urbanization have increased disaster frequency and severity.









Houses damaged

41,070,393

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Deaths

Injuries

33

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126

## Thailand's Disaster Context

2004 - 2023







#### **FLOOD DROUGHT STORM** People affected 89,332,157 People affected 151,563,869 People affected 4,969,272 2,663 n Deaths 41,766,05 **1** Deaths Deaths 556 Houses damaged 27,906,849 Houses damaged 1,918,538 Houses damaged 1,918,538 Economic 76,489,434,738 Economic 2,255,882,028 Economic 2,255,882,028 **COLD SPELL LANDSLIDE EARTHQUAKE** People affected People affected Apr 26, 2017 - M9.1, Indian 126,366 5,156 Ocean May 5, 2014 - Chiang Rai, neaths Deaths M6.3





https://theactive.thaipbs.or.th/data/20years-disaster-loss

Houses damaged







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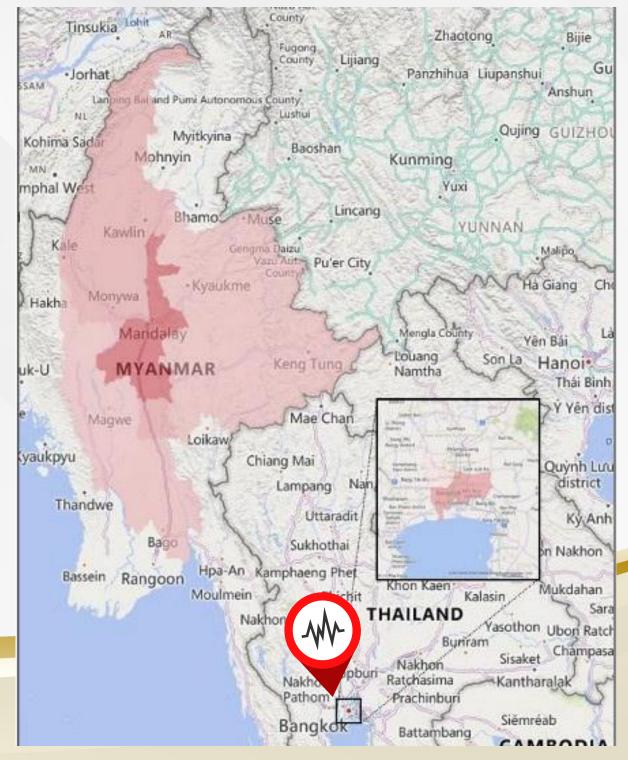
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## ONE ASEAN

SITUATION UPDATE

M7.7 EARTHQUAKE IN MYANMAR AND THAILAND Sunday, 6 April 2025, 2000 HRS (UTC+7)











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High vulnerability among older adults, children, pregnant women, people with chronic illnesses, and people with disabilities.



## Disaster management

Emergency

management

Infrastructure

and services

restoration

DISASTER

Pre-disaster

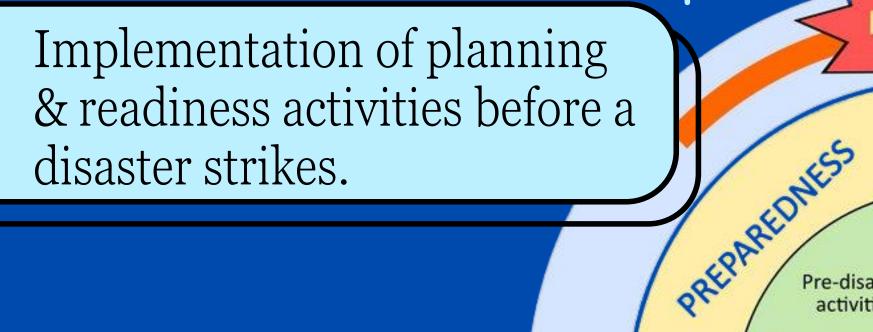
activities

Risk assessment

and planning



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0000

**BEFORE** 

THE

**EVENT** 

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Immediate actions following or during a disaster.

Action before disasters that lessen their risks and impact. PREVENTION RECOVERY Actions after to rebuild and Reconstruction restore normal operations.

**AFTER** 

THE

**EVENT** 

Enrico

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## The Role of Nursing Throughout the Disaster Management Cycle

Thailand faces increasing risks from floods, storms, and landslides, which are compounded by the emergence of infectious diseases. These challenges highlight the urgent need for effective disaster management and innovative nursing practices within communities.

Nurses are essential in all stages of the Disaster Management Cycle — from risk reduction to long-term recovery. Their actions protect lives, maintain public health, and strengthen community resilience.

> Nurses act as leaders, educators, and responders throughout all disaster phases.



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## **Prevention & Mitigation Phase**

**Goal**: Reduce or eliminate risks that may cause or worsen a disaster's impact. **Nursing Focus**: Prevention, education, advocacy, and environmental health. **Examples** 



- Develop and disseminate health education programs about sanitation, hygiene, and vector control.
- Collaborate with local authorities to establish safe housing guidelines and community safety plans.
- Participate in policy development for environmental health and safety standards.







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## **Prevention & Mitigation Phase**















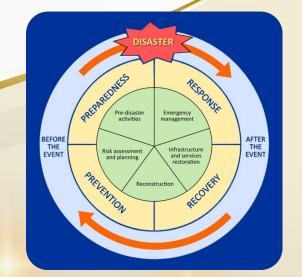


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## Preparedness Phase

**Goal**: Build readiness at individual, institutional, and community levels. **Nursing Focus**: Training, simulation, emergency planning, and communication.. **Examples** 

- Design and lead simulation drills.
- Develop triage protocols and rapid communication channels for hospitals.
- Train community health volunteers and community leaders in first aid, CPR, and early warning response.
- Prepare emergency kits and ensure medicine and medical equipment stockpiles.





Preparedness Phase





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กรรมการพัฒนารูปแบบการจัดการเรียนการส่อนด้วย Virtual Reality วัติร. ม.ล.อาปิกนก ทองแถม



One is providing care to disaster victims.





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## Development and Pilot Testing of a Virtual Reality Simulation for

#### Enhancing Nursing Students Skills in Disaster Response

This study aimed to develop and evaluate a VR simulation program designed to enhance nursing students' abilities in conducting initial assessments and providing first aid to victims of earthquakes and building collapses.

#### Results/Findings:

The VR simulation significantly improved students' knowledge, skills, and confidence in disaster response. Participants reported a strong enhancement in their understanding of initial assessment and first aid procedures (Mean=4.61), ability to analyze patient conditions and develop care plans (Mean=4.57), and overall achievement of learning objectives (Mean=4.57). The overall satisfaction with the VR experience was high (Mean=4.55).

Arbkhanok Tongtham, Somjinda Chompunud, Naruemon Sawaengsri







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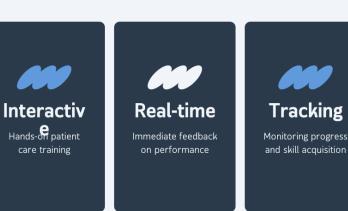
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#### **Key Features**





















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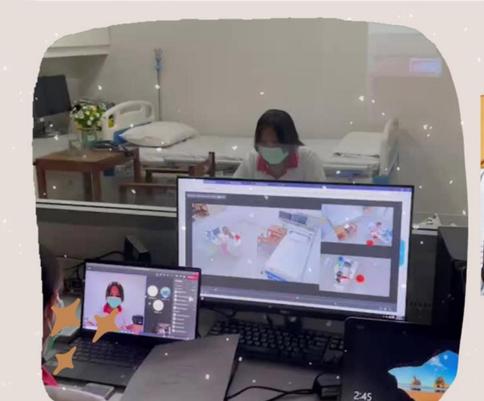




























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# Earthquake Preparedness for Children

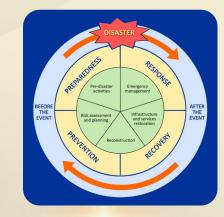


















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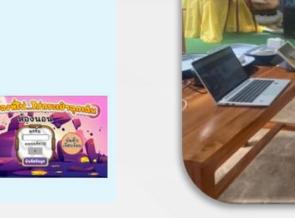
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## Response Phase

**Goal**: Provide immediate emergency care and maintain public health during a disaster

**Nursing Focus**: Emergency response, triage, crisis communication, and psychosocial care.

## **Examples**

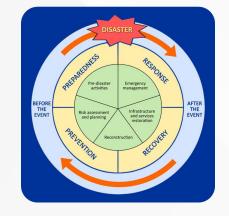
Deliver emergency medical care in disaster zones, shelters, or field hospitals.

Manage infection prevention (especially after floods, storms, or pandemics).

Provide psychological first aid (PFA) to victims, families, and responders.

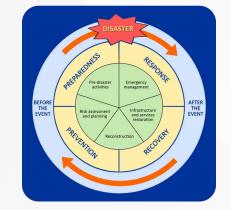
Coordinate with multidisciplinary teams (EMS, public health, military).

Collect epidemiological data for decision-making.





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Community nurses operated mobile health clinics by boat, offering care to isolated residents. They also provided tele-nursing consultations through LINE and mobile phones.







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## Recovery Phase

**Goal**: Restore health systems and help communities rebuild resilience after disasters.

**Nursing Focus**: Rehabilitation, evaluation, mental health support, and policy advocacy.

## **Examples**

- Conduct post-disaster health assessments and continue long-term patient monitoring.
- Lead rehabilitation and counseling for trauma and mental health.
- Evaluate disaster response outcomes and document best practices.
- Advocate for community rebuilding and sustainable health initiatives.
- Assist local authorities in developing "Build Back Better" plans for future disasters.

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## Recovery Phase

## Example:

## Resilience

Empowering communities through health education and support.

## **Mental Health**

Supporting survivors through emotional and psychological care.



After the 2004 Indian Ocean Tsunami, nurses in Phang Nga and Ranong provinces supported psychosocial recovery and community-based rehabilitation programs for survivors.







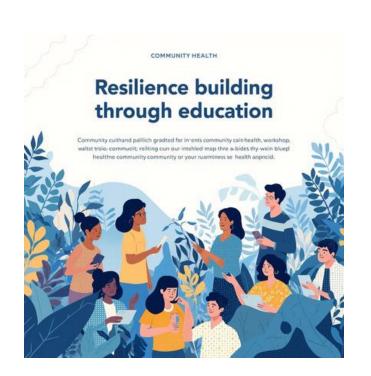
## Recovery Phase



## Example:

#### Resilience

Empowering communities through health education and support.



#### **Mental Health**

Supporting survivors through emotional and psychological care.

After the 2004 Indian Ocean Tsunami, nurses in Phang Nga and Ranong provinces supported psychosocial recovery and community-based rehabilitation programs for survivors.



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## **Integration Across** All Phases

Nurses apply cross-cutting skills throughout all disaster phases:



Leadership: Coordinate interprofessional response teams.



Ethics: Protect vulnerable groups and ensure equitable access to care.



Communication: Disseminate timely health information.



Technology Use: Apply telehealth, GIS mapping, and mHealth apps.



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## The Role of Research

Research plays a crucial role in enhancing disaster management and public health responses. It drives **evidence-based practices**, informs decision-making, and fosters innovation, ultimately improving patient outcomes and community resilience during crises and emergencies across diverse healthcare settings.

Nursing research in disaster management is crucial for understanding community needs, improving response strategies, and enhancing recovery efforts. Through evidence-based practices, nurses can effectively address challenges faced during disasters, ensuring better outcomes for affected populations in times of crisis.

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# Proposed Nursing Research and Innovation for Comprehensive Disaster Management

"From prevention to recovery, nursing research transforms into innovation — combining science, technology, and compassion to strengthen disaster resilience

"Bridging evidence and innovation to empower nurses in every phase of disaster management."



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## **Prevention and Risk Reduction**



Goal: Prevent or minimize disaster impacts through early assessment, education, and community action.

- Study risk factors (geographic, demographic, health) in flood-prone areas.
- Study vulnerability mapping and health risk profiling in high-risk zones.
- Evaluate effectiveness of nurse-led public education campaigns on hygiene, sanitation, and vector control.
- Examine how cultural beliefs affect disaster risk perception.

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#### **Prevention and Risk Reduction**



Goal: Prevent or minimize disaster impacts through early assessment, education, and community action.

#### Proposed Research:

- Apply AI-based predictive analytics and GIS mapping to identify health risks in flood or drought-prone areas.
- Use mobile health apps (mHealth) and social media platforms for community education and risk alerts.

Thai Red Cross nurses use mobile platforms to provide disaster risk alerts and health tips to rural communities.



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## **Preparedness**



Goal: Strengthen capacity and readiness to respond effectively when disasters occur.

- Assess effectiveness of traditional drills on disaster response skills.
- Assess the impact of VR/AR or simulation-based disaster training on nursing competence.
- Study interprofessional collaboration between nurses, paramedics, and public health officers.



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## **Preparedness**

Goal: Strengthen capacity and readiness to respond effectively when disasters occur.

- Assess effectiveness of traditional drills on disaster response skills.
- Study nurse-led volunteer training programs and disaster readiness outcomes.
- Design and validate competency-based frameworks for undergraduate disaster nursing education.

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## Response



Goal: Deliver immediate, efficient, and ethical care during the disaster.

- Triage and Emergency Care Effectiveness
- Evaluate accuracy and speed of nursing triage systems in mass-casualty incidents.
- Tele-nursing and Mobile Health (mHealth)
- Study digital tools for delivering remote care in inaccessible or flooded areas.
- Research nursing-led protocols for preventing disease outbreaks in temporary shelters.
- Psychological First Aid (PFA)



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## Recovery



Goal: Support long-term recovery, rehabilitation, and policy development post-disaster.

- ☐ Study the long-term effects of nurse-led psychosocial support on community well-being.
- ☐ Chronic Disease Management Post-Disaster
- □ Assess continuity of care for diabetes, hypertension, and other chronical conditions.
- ☐ Evaluation of Disaster Response Systems
- ☐ Community Resilience and Empowerment



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## **Cross-Phase Integration**



- ☐ Develop ethical frameworks for nurse-led disaster decision-making using AI and evidence-based models.
- ☐ Combine simulation, e-learning, and data analytics to personalize disaster education.
- ☐ Use big data, AI, and IoT to predict health system strain and guide resource allocation.



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## Conclusion

"Nursing research provides the evidence; innovation provides the tools. Together, they make disaster management comprehensive, effective, and human-centered."

"The future of disaster nursing research lies in innovation — combining compassion with technology, evidence with creativity, and local wisdom with global science."









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Assist. Prof. Dr. M.L. Somjinda Chompunud Srisavarindhira Thai Red Cross Institute of Nursing E-mail: somjinda.c@stin.ac.th



