



# Nurses' role in environmental disasters: a reflection in light of Callista Roy's theory

*Atuação dos enfermeiros frente aos desastres ambientais: uma reflexão à luz da teoria de Callista Roy*

*Actuación de los enfermeros ante desastres ambientales: reflexión a la luz de la teoría de Callista Roy*

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## ABSTRACT

**Objective:** to reflect on nurses' role in environmental disaster situations, using Callista Roy's Adaptation Theory as a framework. **Method:** a reflective essay that emerged from discussions in a graduate-level Nursing course, in line with the four adaptive modes proposed by Callista Roy and in the literature on nursing practice in environmental disaster situations. **Results:** environmental disasters should be understood as complex social processes, with direct and indirect impacts on public health, including physical harm, psychological distress, social disruption, and overload of health services. Callista Roy's Adaptation Model proved to be a relevant framework for interpreting these responses, as it allows the identification of focal, contextual, and residual stimuli, as well as regulatory and cognator coping mechanisms. The application of the four adaptive modes made it possible to organize Nursing actions ranging from immediate physical care to emotional support, reorganization of social roles, and strengthening of community support networks. **Final considerations and implications for the practice:** Roy's Theory is relevant to guide Nursing practice in environmental disasters, as it promotes a comprehensive and systematic approach to care and management. By placing adaptation at the center of the intervention, the model supports practices for community recovery and resilience.

**Keywords:** Disaster Response; Environmental Disasters; Nursing; Nursing Models; Nursing Theory.

## RESUMO

**Objetivo:** refletir sobre a atuação do enfermeiro frente aos desastres e às catástrofes ambientais à luz da Teoria da Adaptação de Callista Roy. **Método:** ensaio reflexivo que emergiu das discussões em uma disciplina de Pós-graduação em Enfermagem, o qual se encontra ancorado nos quatro modos adaptativos propostos por Roy e na literatura sobre a atuação do enfermeiro em situações de desastre ambiental. **Resultados:** os desastres e as catástrofes ambientais devem ser compreendidos como processos sociais complexos, com impactos diretos e indiretos sobre a saúde pública, incluindo agravos físicos, sofrimento psíquico, rupturas sociais e sobrecarga dos serviços de saúde. O Modelo da Adaptação mostrou-se consistente para interpretar tais respostas, ao permitir identificar estímulos focais, contextuais e residuais e os mecanismos regulador e cognador. A aplicação dos modos adaptativos possibilita organizar a atuação do enfermeiro desde o cuidado físico imediato até o suporte emocional, a reorganização de papéis sociais e o fortalecimento das redes de apoio comunitário. **Considerações finais e implicações para a prática:** a Teoria da Adaptação permite orientar a atuação do enfermeiro em desastres ambientais, favorecendo uma abordagem integral e sistematizada do cuidado e da gestão. Ao colocar a adaptação no centro da intervenção, o modelo subsidia práticas voltadas à recuperação e resiliência das comunidades.

**Palavras-chave:** Desastres Ambientais; Enfermagem; Modelos de Enfermagem; Resposta em Desastres; Teoria de Enfermagem.

## RESUMEN

**Objetivo:** reflexionar sobre el desempeño de las enfermeras en situaciones de desastre ambiental, utilizando la Teoría de Adaptación de Callista Roy como marco. **Método:** ensayo reflexivo sobre las posibilidades de los profesionales de enfermería en situaciones de desastre ambiental, en consonancia con los cuatro modos de adaptación propuestos por Callista Roy. **Resultados:** desastres ambientales deben comprenderse como procesos sociales complejos, con impactos directos e indirectos sobre la salud pública, incluyendo daños físicos, sufrimiento psíquico, rupturas sociales y sobrecarga de los servicios de salud. El Modelo de Adaptación de Callista Roy se mostró como un referente para interpretar estas respuestas, al permitir la identificación de estímulos focales, contextuales y residuales, así como de los mecanismos regulador y cognador. La aplicación de los cuatro modos adaptativos permitió organizar la actuación del enfermero desde el cuidado físico inmediato hasta el apoyo emocional, la reorganización de roles sociales y el fortalecimiento de redes de apoyo comunitario. **Consideraciones finales e implicaciones para la práctica:** la Teoría de la Adaptación orienta las acciones del personal de enfermería ante desastres ambientales, promoviendo un enfoque integral y sistemático de la atención y la gestión. Al centrar la adaptación en la intervención, el modelo apoya prácticas para la recuperación y la resiliencia comunitarias.

**Palabras clave:** Desastres Ambientales; Enfermería; Modelos de Enfermería; Respuesta a los Desastres; Teoría de Enfermería.

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## INTRODUCTION

Historically, in different parts of the world, environmental disasters such as floods, earthquakes, wildfires, and prolonged droughts have produced losses in biodiversity, deaths and sequelae, destruction of infrastructure, and profound social transformations. However, in recent decades, the frequency and magnitude of these events have intensified, largely associated with anthropogenic climate change, which alters natural cycles and intensifies the occurrence of disasters.<sup>1</sup>

In Brazil, this reality has become particularly evident, especially in the South and Southeast regions, where recurring hydrological disasters have caused population displacements, significant economic damage, and significant repercussions on the physical and mental health of people living in the affected communities, constituting an emerging demand for health services and their professionals.<sup>2</sup>

Environmental disasters and catastrophes do not reverberate homogeneously across populations. They affect more severely those who are in a situation of greater social vulnerability, for whom access to material resources and health services is already limited. This inequality increases exposure to physical and emotional harm, such as anxiety disorders, depression, and post-traumatic stress, in addition to compromising the capacity for community recovery. The experience of these events also directly impacts healthcare professionals who, being on the front lines, deal with work overload, emotional suffering, and the challenge of maintaining the quality of care in contexts marked by severity, unpredictability, and scarcity of resources.<sup>3</sup>

In this scenario, health systems are challenged to respond quickly, efficiently, and sensitively, coordinating actions that integrate prevention, mitigation, emergency response, and post-disaster rehabilitation. Among the professionals involved, nurses occupy a strategic position, not only in direct assistance to victims, but also in planning, team management, and the promotion of community resilience. Their practice demands technical, ethical, and communicational skills, as well as the ability to support people in adaptation processes in the face of critical and uncertain situations.<sup>4</sup>

To support this perspective, Callista Roy's Adaptation Theory offers a theoretical framework capable of grounding the understanding of the processes by which individuals and communities face and reorganize themselves in the face of adversity. By conceiving the human being as an adaptive system in constant interaction with the environment, the theory makes it possible to critically reflect on care strategies that favor not only immediate survival, but also social reorganization, the strengthening of community ties, and the promotion of comprehensive health. Thus, it is necessary to analyze how the principles of this theory can support the nurse's practice, so that they favor the adaptation of individuals and communities in contexts of climatic and environmental disasters and catastrophes, contributing to care that integrates physical, emotional, and social aspects in crisis contexts.

The objective was to reflect on the nurse's role in the face of disasters and environmental catastrophes in light of Callista Roy's Adaptation Theory.

## METHOD

This is a reflective essay, stemming from discussions in the course "Planetary Health and Global Health: current challenges and future perspectives", offered by the Postgraduate Program in Nursing at the Universidade Estadual de Maringá (UEM), in partnership with the Postgraduate Program in Health and Nutrition at the Universidade Federal de Ouro Preto (UFOP).

To support the reflections presented, two researchers independently conducted searches in the Latin American and Caribbean Literature in Health Sciences (LILACS) database, through the Virtual Health Library (BVS), the Nursing Database (BDENF), and PubMed/MEDLINE, using the descriptors "Climate Change," "Environmental Health," "Disaster Response," "Environmental Disasters," "Nursing," and "Nursing Theory," combined with the Boolean operators "AND" and "OR." This step was crucial for identifying the most relevant texts that would be used for theoretical reflection.

The database search took place in June 2025, and only complete and free publications in Portuguese, English, and Spanish were considered, due to the researchers' proficiency in these languages. No time restriction was established for the selection of texts, since the aim was to include fundamental theoretical and historical frameworks to support the discussion developed in the study.

In the selected texts, the analysis focused on the description of how nurses acted directly in the face of environmental and climatic catastrophes. In addition to the database search, a manual search was also carried out in order to broaden the scope of the selected texts and include relevant studies that had not been identified in the previous step.

After carefully reading the texts and discussions in the course, the main points of the reflective essay were based on an analysis of the literature on the possibilities for the Nursing professional to act in environmental disaster/catastrophe situations, considering the four modes of adaptation proposed by Roy (physiological, self-concept, role function, and interdependence).

The discussions were organized into three topics: "Environmental disasters and catastrophes and public health", "Callista Roy's Adaptation Theory", and "The nurse's role in environmental disaster situations in light of Roy's Theory".

## RESULTS AND DISCUSSION

### **Environmental disasters and catastrophes and public health**

The distinction between the terms "disaster" and "catastrophe" adopted in this work is based on the Sociology of Disasters by Enrico Quarantelli (1998). In light of these foundations, "disaster" is understood as occurrences whose origins are related to natural factors (earthquakes, floods, droughts, and hurricanes) external

to humans, whose representation in the literature brings to light reflections on coping with the unpredictable and the uncontrolled force of the environment. On the other hand, the term “catastrophe” is proposed to address contexts in which destruction, suffering, or collapse are linked to cultural, political, or social factors, that is, instances created and organized by human beings themselves.<sup>5</sup> Nowadays, considering that climate change, which generates intense natural disasters, is a reflection of direct human action through environmental degradation, this study will use the terms disasters and catastrophes to refer to the natural problems faced by humans and other species.

Quarantelli also proposed a critical reflection on the theoretical, methodological, and empirical directions of disaster studies, advocating for the expansion of the field beyond the analysis of isolated events. The author emphasized that disasters and catastrophes should be understood as complex social processes, influenced by cultural, political, economic, and organizational factors, and not merely as consequences of isolated natural phenomena. Therefore, the need to integrate the phases of prevention, preparation, response, and recovery stands out, as well as the need to strengthen the dialogue between academic production and professional practice.<sup>5</sup>

By emphasizing that disasters and catastrophes cannot be analyzed in a fragmented way or restricted to the moment of impact, Quarantelli reinforced the need for approaches that consider human responses over time, including the phases of preparation, response, and recovery.<sup>5</sup> In this sense, Roy's Adaptation Model offers a consistent theoretical framework for understanding how individuals, families, and communities respond and adapt to stimuli generated by catastrophic or disaster situations.<sup>6</sup>

It is noteworthy that the conceptualization of natural disasters and catastrophes demands reflection, since, in contemporary times, their occurrence is strongly related to the modes of production and consumption of modern societies, linked to human factors such as deforestation, pollution, inadequate land use, and environmental degradation. Such actions contribute to the increased intensity and recurrence of these phenomena, whose impacts are broad and significantly affect the health of populations. These impacts manifest themselves both directly, through physical trauma, infectious diseases, poisoning, and deaths, and indirectly, by compromising mental well-being, favoring the emergence of psychological disorders such as anxiety and depression, restricting access to drinking water and food, and overburdening health services. Furthermore, environmental contamination and the forced displacement of communities enhance the spread of diseases and exacerbate social vulnerability, thereby impacting public health.<sup>3</sup>

In the context of global policies, the Sendai Framework for Disaster Risk Reduction (2015–2030) represents a relevant theoretical and normative reference by emphasizing prevention, risk mitigation, and strengthening the resilience of health systems and communities. This milestone recognizes health as a strategic axis for disaster and catastrophe risk management,

reinforcing the need for intersectoral integration and strengthening the response capacity of public health services.<sup>7</sup>

Given this scenario, the need for rapid, efficient, and well-coordinated responses from the authorities that coordinate public health in countries becomes evident. Well-defined emergency protocols, clear communication, and resource mobilization can be elements that differentiate the first hours after a disaster/catastrophe. However, it is important to emphasize that, in addition to efficiency, it is essential that these responses are also humanized and based on theoretical frameworks capable of supporting practice and action.<sup>2</sup>

### Callista Roy's Adaptation Theory

Callista Roy's Adaptation Theory, developed in the 1970s, is based on General Systems Theory, adaptation theory, and humanistic perspectives. In this model, the human being is conceived as an adaptive system in constant interaction with a dynamic environment, being understood in an integrated way in its biological, psychological, social, and spiritual dimensions. The theoretical proposal guides Nursing practice based on the analysis of adaptive responses emitted in the face of internal and external stimuli, with a view to promoting health and quality of life.<sup>6</sup>

One of the fundamental pillars of the theory refers to the classification of stimuli that influence the adaptive process. Roy distinguished the focal stimulus, which represents the immediate situation that requires greater attention from the individual; contextual stimuli, which correspond to other factors present in the situation and that influence the response; and residual stimuli, related to previous experiences, beliefs, values, and attitudes, whose impact may not be clearly identified, but interferes with adaptive behavior.<sup>6</sup>

These stimuli are processed through two interdependent coping mechanisms. The regulatory subsystem is associated with automatic responses of a physiological and neuroendocrine nature, while the cognitive subsystem involves mental and emotional processes, such as perception, learning, judgment, and decision-making, that is, everything that depends on the individual's consciousness, thought, and subjective experience. According to Roy, it is responsible for transforming the stimuli received into adaptive responses from cognitive and affective processes. The articulation between these subsystems is crucial for the quality of the responses emitted, and can result in adaptive or ineffective behaviors, depending on the individual's ability to cope with the demands imposed.<sup>6</sup>

Roy then defined four modes of adaptation, in which the individual responds to internal and external stimuli:<sup>6</sup>

- Physiological mode: encompasses essential bodily functions, such as oxygenation, nutrition, elimination, rest/activity, and protection.
- Self-concept mode: refers to the individual's personal identity, how they view their body image, as well as psychological and spiritual dimensions.

- Role function mode: involves the performance of social roles (family, community, and professional).
- Interdependence mode: involves the individual's affective bonds and social support when dealing with dynamic situations.

All these adaptive modes make up the Nursing process, which, according to Roy, involves sequential steps of: adaptive behavior assessment, stimulus identification, diagnosis formulation, intervention planning and implementation, and, finally, results evaluation.<sup>6</sup> In clinical practice, Callista Roy's theory contributes significantly to Nursing work organization, as it provides a systematic framework centered on patient adaptation and quality of care.<sup>8-10</sup>

This approach places adaptation at the center of care, recognizing the patient as an adaptive system that responds to physiological, psychological, social, and spiritual factors. In this way, the nurse can develop individualized and holistic interventions, favoring more effective and comprehensive results.<sup>11</sup>

### **Nurses' Role in Disaster and Environmental Catastrophe Situations in Light of Roy's Theory**

The scenario of response to environmental and climate-related disasters and catastrophes is complex, causing great concern and suffering to individuals directly and indirectly involved. The intensification of these situations in recent decades has highlighted structural vulnerabilities in health systems and, in particular, in the work of Nursing professionals. Understanding the essential competencies of nurses in their work in the face of disasters and environmental catastrophes is necessary to understand how these competencies are articulated with Roy's Adaptation Theory.

Nursing plays a critical role in the response to environmental disasters, being essential both for the direct care of victims and for the organization and strengthening of the resilience of affected communities. In this sense, nurses assume a central role in acting as facilitators of the adaptation of patients and their families, as well as of the nurses themselves, the teams, and the health system.

In terms of health services and direct care to patients and their families, nurses often form the first line of response, performing functions such as triage, first aid, monitoring, and immediate clinical care, in addition to coordinating multidisciplinary teams that operate in the disaster scenario.<sup>12-15</sup>

In the field of management and organization, these professionals assume leadership roles in shelters, conducting the distribution of human, financial, and material resources, recording information, and protecting the health of evacuees, always adapting their strategies according to local needs.<sup>13-17</sup> In this sense, the performance of nurses requires an integrated set of technical, managerial, and psychosocial skills, developed and applied in highly complex contexts.<sup>12</sup>

Agile response emerges as a core competency, involving the ability to coordinate human and material resources, reorganize

care flows, and make quick decisions in the face of unstable scenarios, even in the presence of structural limitations such as power outages, hospital overload, and shortages of supplies. Leadership is highlighted as essential for mobilizing teams, maintaining organizational cohesion, and implementing innovative solutions in the face of unexpected problems, being enhanced by building trust relationships between managers and frontline professionals.<sup>18</sup>

Moreover, Nursing goes beyond physical care, also offering emotional support, health education, and promoting communication with victims and families, which contributes to well-being and the strengthening of community resilience.<sup>14,17-20</sup> Resilience also appears as a critical skill to sustain professional performance and the mental health of professionals in contexts of continuous pressure, involving adaptation to change, management of emotional impacts, and the use of self-care strategies. Aspects such as cultural differences, ethical dilemmas, and organizational gaps were also identified as elements that challenge and shape this competence. Effective communication, in turn, not only facilitates the coordination of actions and clarity in assignments but also acts as an instrument of emotional support, especially when associated with remote contact channels that allow maintaining family and team ties during the crisis.<sup>18</sup>

Furthermore, continuous emotional support is considered indispensable for preserving nurses' well-being, preventing disorders such as post-traumatic stress, and promoting long-term recovery. These competencies, when worked on in an integrated way, expand the professionals' response capacity, strengthen assistance in critical situations, and provide subsidies for improving disaster preparedness and management policies in Nursing.<sup>18</sup>

Chart 1 organizes the possibilities for nurses to act in the face of challenges arising from environmental disasters and catastrophes, in light of the Adaptive Modes proposed in Callista Roy's Adaptation Model. This theoretical framework understands the individual as an adaptive system in constant interaction with the environment, responding through four interdependent modes: physiological, self-concept, role function, and interdependence.

The listed interventions reflect the nurse's clinical and direct care role, as well as their role in organization and referral. A critical view, however, can expand this perception to include the nurse as an agent of change, advocate, and leader in public health. In environmental disasters, the nurse can play a crucial role in advocating for more robust public policies for disaster management, in research on health impacts, and in intersectoral coordination with other agencies and professionals. Promoting volunteerism and facilitating mutual support networks are examples of interventions that already point in this broader direction, but the nurse's potential for leadership and influence can be further highlighted.

Thus, Roy's Model use as a guide enables a comprehensive approach, encompassing both the physical and emotional and social needs of affected populations, strengthening adaptive capacity and promoting recovery in disaster contexts.

**Chart 1.** Possible actions for nurses in the face of challenges caused by environmental disasters and catastrophes according to Roy's Adaptive Models.

Adaptive Model	Examples of challenges in environmental disasters	Nurse interventions according to Roy's Adaptive Model
Physiological	Malnutrition, exhaustion, illnesses/infections due to lack of hygiene, hypothermia/hyperthermia, injuries, dehydration, poisoning from contaminated water/soil.	Provide basic hygiene and nutrition care, administer medications and vaccines, check vital signs, ensure oral or intravenous hydration, perform wound care, refer to specialized care, organize shelters with adequate ventilation and sanitation, and provide guidance on disease prevention.
Self-concept	Emotional trauma, loss of family members/material possessions, anxiety, fear, feelings of helplessness, depression, hopelessness.	Provide emotional support, actively listen, encourage feelings expression, and refer patients for psychological/psychiatric support.
Role Function	Disruption of social and family roles due to the disaster, forced unemployment, inability to perform usual occupations, overload of functions, displacement to new contexts.	Reorient role strategies, support social and community reintegration through support groups, and assist in finding employment or training opportunities.
Interdependence	Isolation and community breakdown, difficulty accessing essential services, social fragmentation.	Facilitate mutual support networks within the community, provide health education, and encourage volunteering.

## FINAL CONSIDERATIONS AND IMPLICATIONS FOR PRACTICE

This theoretical reflection allowed us to analyze the nurse's role in the face of disasters and environmental catastrophes in light of Roy's Adaptation Theory, demonstrating that this framework offers a consistent conceptual support to guide comprehensive and systematized practices in crisis contexts. By articulating the four adaptive modes (physiological, self-concept, role function, and interdependence) with the clinical, managerial, and psychosocial competencies required in these scenarios, it was possible to demonstrate that the nurse acts as a facilitator of individual and collective adaptive processes, promoting not only immediate clinical care but also emotional, social, and community reorganization.

However, methodological limitations inherent to the study's essayistic nature are acknowledged. Since this is a theoretical reflection based on a narrative literature search and academic discussions, there was no application of a systematic review protocol, nor of rigorous criteria for evaluating the methodological quality of the included studies, which may introduce selection and interpretation biases. Moreover, the linguistic delimitation (Portuguese, English and Spanish) and the focus on freely accessible publications may also have limited the scope of the evidence considered.

In view of this, future perspectives include conducting empirical research that investigates the concrete application of Roy's Adaptation Model in real contexts of environmental disasters, evaluating its impacts on clinical, psychosocial and community outcomes. Intervention studies and multicenter investigations can contribute to validating and improving care protocols based

on this framework. Furthermore, it is recommended to deepen the analyses on the training and capacity building of nurses for work in global health and risk management, as well as to explore Nursing's role in the formulation of public policies and intersectoral strategies for mitigation and adaptation to climate change, strengthening scientific production and the consolidation of practices based on robust theoretical frameworks.

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## DATA AVAILABILITY RESEARCH

The contents underlying the research text are contained in the article.

## CONFLICT OF INTEREST

No conflict of interest.

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