

# Comprehensive Disaster Management, Sustainability and Resilience to Climate Change with a One Health Approach

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## ABSTRACT

**Introduction:** Knowledge management in disaster risk reduction demands the recognition of the interdependence of climate, ecosystem, biodiversity, and society from a Planetary Health perspective.

**General Objective:** To strengthen capacities for integrated disaster risk reduction in the health sector from a scientific, health, and environmental perspective, based on resilience and sustainability in climate change adaptation and the One Health approach.

**Materials and Methods:** A mixed-methods development research study was conducted between January 2024 and December 2025. The sample consisted of various universities across the country.

**Results:** The results are geared towards scientific, social, environmental, and economic aspects, expressed in the impact of science on solving health problems and the preparation of human resources as a necessity for local development.

**Conclusions:** Strengthening capacities within the health sector for integrated disaster risk reduction in health-related actions from a scientific, health, and environmental perspective, based on resilience and sustainability in climate change adaptation and the One Health approach.

**Keywords:** Risk Management; Adaptation; Mitigation; Deforestation

## Introduction

Scientific data clearly reveal that human activity (RC [1]), particularly the use of fossil fuels and the resulting emission of pollutants that affect the climate, is causing significant changes in the global climate. According to Mesa, et al. [2], this is also having consequences for the environmental and social conditions of all continents. (Salermo [3]) Given that weather and climate conditions strongly influence most health problems, this poses risks to human health that can be grouped into: direct effects, such as those resulting from injuries and illnesses due to the increasing frequency and severity of extreme weather events, according to Salermo, et al. [4]; effects on the envi-

ronmental system, for example, increased air pollution and changing patterns of vector-borne, food-, and waterborne diseases; and consequences of climate change on social and human systems, including the effects of malnutrition, occupational heat stress, and mental illness, as well as potential increases in population displacement. WHO [5]. Anthropogenic climate warming profoundly alters some of the essential elements for life that are fundamental to health: water, air, and food. Gorry C, et al. [6]. Populations in developing countries are more likely to be particularly vulnerable to flooding, as they live in high-risk areas such as floodplains and coastal zones, and have inadequate public health infrastructure, resulting in proportionally greater economic damage. (Collective of authors [7]).

We pose the following scientific problem: How to articulate capacities in the health sector for the integrated reduction of disaster risk in actions in the field of Health from a scientific, health and environmental perspective based on resilience and sustainability in adaptation to climate change and the One Health approach?

### General Objective

To strengthen capacities for integrated disaster risk reduction in the field of Health from a scientific, health and environmental perspective and on the basis of resilience and sustainability in adaptation to climate change, the One Health health strategy and Planetary Health.

### Methods

A mixed-methods development research project will be carried out with the participation of Medical Sciences Universities in the country during the period of January 2024 and December 2025. The universe will consist of the 6 universities linked to the project and the sample will be selected by an intentional non-probabilistic sampling that will consist of the representatives (leaders) of the Universities of Medical Sciences who have high training, experience and common background related to the objective of the study, of recognized prestige in the field of Higher Medical Education and with experience in the issues related to disaster risk management, climate change and One Health, which will serve for the scientific evaluation of the proposed actions.

### Theoretical Level Methods

**Induction-Deduction:** Will make it possible to have an overview of the purpose of the research from the study of the various theoretical sources, as well as the analysis and interpretation of all the results obtained before, during and after to contribute to the improvement of the teaching process and propose the improvement of the undergraduate and postgraduate curricula in the comprehensive management of disaster risk reduction, in the face of climate change and the One Health approach with an environmental vision.

### Theoretical Methods

For the analysis and synthesis of the information obtained, from the review of the literature and specialized documentation, and the modeling to shape the proposed actions. The historical-logical approach: will facilitate obtaining historical background information on the topic being investigated. Systemic structural functional: it will be used to develop integrated actions and establish the components, structure, dialectical relationships and stages.

### Document Review

Relevant documentation will be reviewed, as well as guidelines and regulations according to the policies of Directive 1, Task Life and the One Health health strategy.

### Ethical Considerations

The formation and assimilation of norms of conduct that regulate relationships in society are recognized, instilling a system of universal human principles in behavior. Professional ethics is considered one of the main pillars of the State for the formation of a socialist personality, based on the principles of Helsinki. Informed consent will be obtained for the development of the survey.

### Results

The health impacts include the occurrence of physical injuries and an increase in diarrheal syndromes, particularly in underdeveloped countries, where malnutrition may already be on the rise. The increased incidence of respiratory illnesses may be due to overcrowding. Fungal overgrowth can also cause respiratory illnesses. (Ortis, et al. [8]) An increase in mental health conditions such as anxiety and depression is common, likely related to damage to the home environment and economic losses. Increases in suicide rates have also been reported, and behavioral disorders may rise among children. Furthermore, rising sea levels can increase the risk to coastal communities. UNCC [9] Lessons learned from confronting disaster situations in the country, conditioned by its geographical position in the fourth region of the world for tropical cyclone formation, a transit route for migratory birds, a seismically active zone, and a humid tropical climate that conditions risks from natural, technological, and health-related hazards, supported Directive 1 for disaster risk reduction management in the Republic of Cuba. Its requirements are in accordance with the international treaties on the subject to which the Republic of Cuba is a Party, and the country's commitment to the Sendai Framework for Disaster Risk Reduction 2015-2030, adopted during the Third United Nations World Conference on Disaster Reduction. RC [10] Managing health systems and services to protect the health of populations from the most devastating effects of emergencies, disasters, and climate change is an international priority. (PAHO [11])

While it is urgent to unite national and international efforts to reduce the global level of greenhouse gas emissions in the long term, it will also be necessary to adopt adaptation measures to respond to climate change. In this context, social development requires continuous processes of knowledge creation, dissemination, transfer, adaptation, and application. Knowledge, closely linked to practice, constitutes a transformative social force that postgraduate studies foster on an ongoing basis to promote the sustainable development of society. (According to the Postgraduate Regulations [12]) The experience led by the Latin American Center for Disaster Medicine (CLAMED) from 1996 to 2014, in conjunction with all the country's Medical Sciences Universities, supported a methodological and scientific approach that strengthened capacities and yielded essential results in integrating scientific knowledge on disaster risk reduction into the National Health System. (Mesa, et al. [13]) The results contributed by other scientific and technical entities in the country, along with multidisci-

plinary and intersectoral work, also led to a better understanding of hazards, vulnerabilities, and risks, the development of new guidelines and regulations for decision-making in the sector, and facilitated compliance with Cuban state laws, decrees, and resolutions for disaster risk reduction. (Mesa, et al. [14]).

The Ministry of Public Health's Life Task plan in the period 2017-2020 initially contributed to addressing climate change; this has been followed by the implementation of a strategic projection for the medium term 2021-2030 with an expanded focus towards cross-sectoral work derived from proposals for greater participation of the country's sectors and territories. (Mesa, et al. [15]).

## Results

1. Procedures from the teaching-educational process for the integration of teaching-assistance-research, education in the workplace and the interaction of medical universities with the community from the comprehensive management of disaster risk reduction, in the face of climate change, with a One Health and Planetary Health approach, in the training of human capital in health, supported at the undergraduate and postgraduate levels and proposals in the curriculum.
2. Based on the experience of the Latin American Center for Disaster Medicine (CLAMED), the integration of good practices for the creation and strengthening of capacities in disaster prevention and mitigation, technology transfer, assistance and cooperation projects with a multidisciplinary, intersectoral and social participation approach, extended to international medical cooperation, with a projection towards the comprehensive management of disaster risk reduction in the health sector, addressing climate change, the One Health and Planetary Health approach, with the creation of multidisciplinary chairs.
3. Elimination or reduction of vulnerabilities and achieving favorable impacts in the development of research on disasters, climate change, the One Health strategy and Planetary Health, in individual health, population health and the health system, with contributions and proposals for updating health plans and programs with an intersectoral approach, ensuring resilience and sustainability in the development of the sector, with territorial and institutional scope and correspondence with the PNDES-2030, the fulfillment of the SDGs-2030, by virtue of protecting the health, quality of life and well-being of populations, with access and universal health coverage. Through the development of this research, he achieves high levels of professional training and development for disaster prevention and mitigation, adaptation to climate change, the One Health approach, and Planetary Health. Inclusion in the curriculum of content that addresses integrated disaster risk reduction management, climate change management, the

One Health approach, and Planetary Health. Intersectoral capacities to enhance resilience and sustainability in the face of disasters, climate change, the One Health approach and Planetary Health, with the creation of multidisciplinary chairs.

Compliance with regulations and legal provisions of integrated disaster risk reduction management, Task Life and the One Health health strategy with the development and implementation of impact research. Media developed for awareness, communication and information on integrated disaster risk reduction management, in the face of climate change and the One Health approach.

## Impacts

By implementing actions in the different participating universities, it is possible to update the assessment of hazards and evaluate disaster risks in the territory in question, which made it possible to comply with the guidelines for socioeconomic development to 2030 and offer tools to better deal with health disaster events by applying as quickly as possible what was approved at the VIII Party Congress, compliance with the guidelines of the economic and social policy of the Party and the Revolution and the conceptualization of the Cuban economic and social model of socialist development, which conceives transcendental innovations pending to be applied. In this effort, scientific advice and the leading role of expert knowledge of a transdisciplinary and intersectoral nature also contribute to the fulfillment of the State Plan to confront climate change (Tarea Vida) approved by the Council of Ministers in April 2017, in its medium term to 2030, and support the fulfillment of the One Health health strategy approved by the Executive Committee of the Council of Ministers in 2021. This project involves developing proposals for the introduction of the One Health approach and climate change adaptation into undergraduate and postgraduate curricula; designing courses, diplomas, and field research at the level of Higher Education Centers in health across the country that address these themes; achieving greater efficiency, rationality, and sustainability in the implementation of national policies for environmental protection and human coexistence with nature, based on the Planetary Health social movement, with an emphasis on training professionals to develop knowledge at the Primary Health Care level.

Weaknesses in disaster risk reduction approaches will be identified through a general assessment of the hazards of all types of disasters, with particular attention to those of health origin. The creation of multidisciplinary chairs and the development of existing ones were achieved, strengthening outreach activities from a historical-cultural, ethical, and committed perspective focused on human improvement and psychosocial well-being. This was accomplished in response to the acquisition of knowledge, both nationally and through international collaboration, from the field of Medical Education. Furthermore, the presentation of results at national and international events demonstrated the high scientific potential of Higher Medical Education. Considering the impact of disasters on Cuban society, conduct-

ing research and actions based on updating the identification of risks, vulnerabilities, and capacities allowed for the identification of more effective strategies supported by scientific and investigative development at the national level, which helps to mitigate the cost in the State budget. The project contributed to increasing the effectiveness of intersectoral work and the conduct of research at the national and local levels, where the Covid-19 pandemic demonstrated the need to achieve better results in reducing existing vulnerabilities and risks in the country Salerno [16].

Therefore, the project identified strategies to better prepare decision-makers, professionals, and educators so they can contribute to more effective prospective actions that prevent the accumulation of new risks, reduce existing risks (corrective measures), improve capacities to maintain basic functionality when risks cannot be effectively reduced and difficulties, failures, and changes in the environment occur (compensatory measures), as well as proactive and reactive actions in individual health, population health, and the health system itself, that contribute to preventing, protecting, and improving the population's health status, quality of life, and well-being, through better adaptation to climate change and prevention of health disasters with a One Health approach Salerno [17].

## Conclusion

Strengthening capacities for integrated disaster risk reduction in the health sector is a priority, from a scientific, health, and environmental perspective, and based on resilience and sustainability in climate change adaptation, the One Health strategy, and Planetary Health. This is intrinsically linked to achieving changes in lifestyles at the societal level.

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