

Extended Abstract

Socio-environmental risk management of the COVID-19 pandemic in Central America: unity became strength even in times of uncertainty [†]

Roberth Steven Gutiérrez-Murillo ^{1,*}, Patrícia Krieger Grossi ²

¹ School of Medicine, Doctoral Program of Biomedical Gerontology, Pontifical Catholic University of Rio Grande do Sul – PUCRS; roberth.murillo@edu.pucrs.br

² School of Medicine, Doctoral Program of Biomedical Gerontology, Pontifical Catholic University of Rio Grande do Sul – PUCRS; pkgrossi@edu.pucrs.br

* Correspondence: roberth.murillo@edu.pucrs.br; Tel.: +55 (45) 988406824

[†] Presented at the 4th International Electronic Conference on Environmental Research and Public Health — Climate Change and Health in a Broad Perspective, 15–30 October 2022 ; Available online: <https://ecerph-4.sciforum.net>.

Abstract: This brief note discusses the articulation of Central American countries in the fight against the pandemic from a socio-environmental perspective. Central America is one of the most disaster-prone regions in the world; hurricanes, earthquakes, droughts, floods, and volcanic eruptions are the main threats to the nations. The emergence of SARS-CoV-2 exacerbated the socio-environmental risks, demanding the emergency action of joint management within the framework of the Central American Integration Scheme (CAIS). Thus, technical meetings of the Coordination Center for Disaster Prevention in Central America sought to maintain a synergy to reduce social vulnerability and the environmental impacts of the pandemic. The region adopted intersectorality as a mechanism of articulation among all CAIS-derived bodies, allowing for more comprehensive humanitarian assistance to groups at higher risk (involving all human life cycles). The joint negotiation between the countries sought to provide technical support for estimates and projections for the calculation of needs, as well as to adjust health measures in each country according to the following scenarios recommended by WHO: i) no cases, ii) sporadic cases, iii) clusters of cases, and iv) sustained transmission. Therefore, the countries promoted the participation of the population in the prevention and mitigation phases, which helped to mitigate the pent-up demand in the health sector and strengthened community-based interventions. Thus, the region managed to keep the case fatality rate below 5% and reinforce compliance with local sanitary measures in the first two pandemic years due to the multi-systemic approach to risk management. The role of the community led to the development of social groups more aware of socio-environmental and public health responsibilities, besides the benefits of working as a collective.

Keywords: Central American integration scheme; Public health; Community-based medicine; Pandemics.

Citation: Lastname, F.; Lastname, F.; Lastname, F. Title. *Environ. Sci. Proc.* **2022**, *4*, x. <https://doi.org/10.3390/xxxxx>

Academic Editor: Firstname Lastname

Published: date

Publisher's Note: MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



Copyright: © 2022 by the authors.

Submitted for possible open access publication under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

1. Initial notes on Central American regional integration and environmental profiles

Geographically speaking, continental Central America is conformed of seven countries, Belize, Costa Rica, El Salvador, Honduras, Guatemala, Nicaragua, and Panama [1]. These countries are located in the region bordering Mexico to the south and Colombia to the north, bordering the Pacific Ocean and the Caribbean Sea. The Spanish language is predominant, with Belize being the only English-speaking country. The countries share

historical and cultural aspects that date back to the processes of emancipation from the Kingdom of Spain, which ruled the region for more than two hundred years [2]. Even with very close distances, the countries have divergent socioeconomic profiles (Table 1).

Central America is one of the most disaster-prone regions in the world; hurricanes, earthquakes, droughts, floods, and volcanic eruptions are the main threats to the nations. A recent study observed the number of disaster occurrences classified by extensive, intensive, and combined risks in Central American countries between 1960 and 2015. Of a total of 23,727, the majority were combined (n=20,683; 87%), followed by extensive (n=1922; 8%) and intense (n=1122; 5%), respectively. Costa Rica was the country with the most disasters (n=11,750; 49.5%) and Belize the least (n=113; 0.5%) [3].

Table 1. Socioeconomic parameters for Central American countries.

Country	GDP/capita (2020)	Pop. (total, 2020)	Surface area (sq.km, 2020)	Pop. density (inh/sq.km, 2020)	Urban pop. (% of pop., 2020)	HDI (2019)	Poverty lines (% total pop., 2019)
Belize	4435.6	397,621	22,970	17	46	0.716	52
Costa Rica	12,076.8	5,094,114	5100	100	81	0.810	30
El Salvador	3798.6	6,486,201	21,040	313	73	0.673	26
Guatemala	4603.3	16,858,333	108,890	157	52	0.663	59
Honduras	2405.7	9,904,608	112,490	89	58	0.634	48
Nicaragua	1905.3	6,624,554	130,370	55	59	0.660	25
Panama	12,269	4,314,768	75,320	58	68	0.815	22

Source: Borrowed from Quesada-Román and Campos-Durán (p. 3) [3].

Historically, Central American countries have shown a sense of brotherhood and unity that, over the last hundred years, have helped forge the paths of regional integration, despite the ups and downs generated by some individual interests. In the socio-environmental field, the countries have more than thirty years of team experience (Figure 1), establishing solid frameworks for the protection of environmental wealth and addressing regional threats (Figure 2). A brief contextualizing is given below:

With the creation in 1987 of the Coordination Center for the Prevention of Natural Disasters in Central America (CEPREDENAC, from Spanish acronym), and the entry into force of its Constitutive Agreement in 2007, it contributes to the reduction of vulnerability and the impact of disasters, which have been causing severe human and material losses in the region and in pursuit of Sustainable Development in accordance with the Tegucigalpa Protocol, the Alliance for Sustainable Development (ALIDES, from Spanish acronym) and the Sustainable Development Goals 2030. In line with the integral development process and in view of the need to address the constant threats of recurrent disasters in Central America, the Heads of State and Heads of State of the SICA region at their XXV meeting on June 29-30, 2010, approved the Central American Policy on Comprehensive Disaster Risk Management, with the aim of providing the region with a guiding framework for comprehensive disaster risk management

intertwined with economic management, social cohesion management and environmental management through a systemic approach [4 (p.6)].



Figure 1. Governing Bodies Members of the Coordination Center for Disaster Prevention in Central America [5]. The entities act individually in their countries of origin, but during emergencies they weave regional support networks, involving the availability of human resources and physical assets to counter socio-environmental challenges.

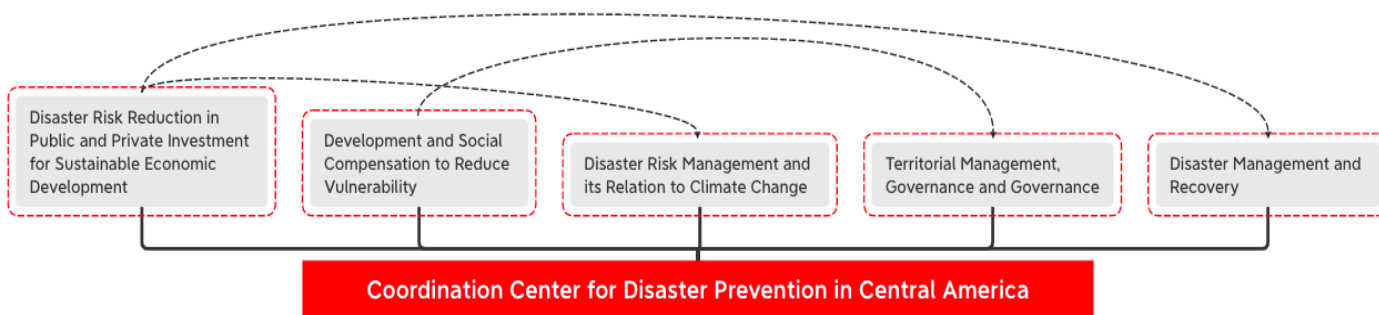


Figure 2. Coordination Center for Disaster Prevention in Central America Central Axes [5]. These central axes are inseparably integrated, and seek to contribute to the reduction of vulnerability and the impact of disasters, as an integral part of the transformation and development process of Central American integration.

2. The COVID-19 pandemic and its socio-environmental implications

The disproportionate and irresponsible management of ecosystems was reflected in the Millennium Ecosystem Assessment, 2005 – indicating that since the second half of the 20th century, humans have been causing changes (some irreparable) in their habitat [6]. In human health, the urgency of addressing social vulnerability was stressed, given that the populations or subgroups with the least adaptive capacity tend to be the most affected. It is a first-degree equation of simple interpretation but with a high degree of practicality.

Thus, the pandemic came at an iconic moment, as countries set out to launch the Sustainable Development Agenda for the new decade as early as 2020. Ironically, studies have shown that, during the months of social isolation and lockdown, the rates of environmental air and water pollution, especially in metropolitan cities, suffered drastic reductions [7,8]. Notwithstanding, unprecedented production of medical and personal protective equipment (such as testing kits, disposable masks, eye protection items, and surgical gloves) brought up the challenge of providing responsible purposes for biomedical waste in hospital settings and the community [9,10].

Authors such as Salazar-Galán and colleagues [11] draw attention to the urban-rural relationship in contemporary societies since the current potential for transmission and expansion of “infectious diseases such as COVID-19 in crowded urban environments is due to causes such as high social connectivity, mobility patterns, and daily work and social routines that favor contagion by air, or through direct or indirect contact” (2). Thus, the effects seen during the pandemic invite us to think about health beyond hospital corridors. It becomes necessary to reinforce the understanding of planetary health, in which equally relevant roles are attributed to human, environmental, and animal health. Alterations in any of these domains generate inward changes in their peers [12].

3. Central American socio-environmental regional approach during the pandemic

The emergence of SARS-CoV-2 exacerbated the socio-environmental risks, demanding the emergency action of joint management within the framework of the Central American Integration Scheme (CAIS). Thus, technical meetings between the Coordination Center for Disaster Prevention in Central America and the Council of Central American Ministers of Health (COMISCA, from Spanish) sought to maintain a synergy to reduce socio-health vulnerability and the environmental impacts of the pandemic. It was necessary to activate alert mechanisms in areas with more difficult access that could be more affected by cuts in basic services such as electricity, drinking water and the transfer of patients with aggravated clinical conditions. The countries used risk flags; a generic categorization already used on other occasions. During the red activation, special efforts were deployed among health professionals, firefighters and police forces, as well as there was a leading role for organized civilian groups.

The region adopted intersectorality as a mechanism of articulation among all CAIS-derived bodies, allowing for more comprehensive humanitarian assistance to groups at higher risk (involving all human life cycles). The joint negotiation between the countries sought to provide technical support for estimates and projections for the calculation of needs, as well as to adjust health measures in each country according to the following scenarios recommended by WHO: i) no cases, ii) sporadic cases, iii) clusters of cases, and iv) sustained transmission. The assignment of tasks to monitor compliance with health measures in border and conurbation areas made it possible to reduce the pressure on the demand for hospitalization, combat misinformation, strengthen national vaccination campaigns and support community interventions to combat malnutrition and hunger during the most chaotic months. The "Regional Contingency Plan aimed oriented to implement national efforts for the prevention, containment and treatment of COVID-19" [13] structured the approach to the pandemic along five axes. Axis 1 corresponded to health and risk management, with the following components:

Component 1.1. Prevention and Containment Measures;

Component 1.2. Patient management measures in each case type;

Component 1.3. Harmonization of informative, preventive and educational messages;

Component 1.4. Access to medicines, medical devices and other goods of health interest through the COMISCA® Joint Negotiation

Component 1.5. Regional Mechanism for strengthening preparedness, mitigation, response and humanitarian assistance capacity.

Overall, the countries promoted the participation of the population in the prevention and mitigation phases, which helped to mitigate the pent-up demand in the health sector and strengthened community-based interventions. Thus, the region managed to keep the case fatality rate below 3% and reinforce compliance with local sanitary measures in the first two pandemic years due to the multi-systemic approach to risk management [14]. The role of the community led to the development of social groups more aware of socio-environmental and public health responsibilities, besides the benefits of working as a

collective, as the nations acted on vulnerabilities, their causes, and increasing capacities in order to build a safer and more resilient region.

Author Contributions: Gutiérrez-Murillo, R.S. and Grossi, P.G. contributed equally to this research. Both authors have read and agreed to the published version of the manuscript.

Funding: This study was financed in part by the Coordenação de Aperfeiçoamento de Pessoal em Nivel Superior - Brasil (CAPES) - Finance Code 001".

Acknowledgments: Gutiérrez-Murillo, R.S. is a PhD student with an academic excellence scholarship from CAPES (PROEX-CAPES). The author is grateful to the institution for the full scholarship awarded during his period of study (2022-2026).

Institutional Review Board Statement: Not applicable.

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

References

1. Quesada-Román, A.; Torres-Bernhard, L.; Ruiz-Álvarez, M.A.; Rodríguez-Maradiaga, M.; Velázquez-Espinoza, G.; Espinosa-Vega, C.; et al. Geodiversity, geoconservation, and geotourism in Central America. *Land*, **2022**, *11*, 1-16.
2. Marshall, J. The Geomorphology and Physiographic Provinces of Central America. In *Central America: Geology, Resources and Hazards*; Bundschuh, J., Alvarado, G.E., Eds.; Taylor & Francis: Abingdon, UK, 2007; p. 1436.
3. Quesada-Román, A.; Campos-Durán, D. Natural disaster risk inequalities in Central America. *Papers in Applied Geography*, **2022**, 1-13.
4. Coordination Center for Disaster Prevention in Central America (Centro de Coordinación para la Prevención de los Desastres en América Central, from Spanish). Central American Policy on Comprehensive Disaster Risk Management. Available online: <https://www.ceccsica.info/sites/default/files/docs/Politica%20Centroamericana%20de%20Gestion%20Integral%20de%20Riesgo.pdf>. (Accessed on 10 October 2022).
5. Coordination Center for Disaster Prevention in Central America (Centro de Coordinación para la Prevención de los Desastres en América Central, from Spanish). About us. Available online: <http://cepredeanac.org/>. (Accessed on 10 October 2022).
6. Corvalan, C.; Hales, S.; McMichael, A.J.; Butler, C. Ecosystems and human well-being: health synthesis (Vol. 1). World health organization, 2005. Available online: <https://www.millenniumassessment.org/documents/document.357.aspx.pdf>. (Accessed on 10 October 2022).
7. Singh, V.; Mishra, V. Environmental impacts of coronavirus disease 2019 (COVID-19). *Bioresource Technology Reports*, **2021**, *15*, 1-7.
8. Fouquet, R.; O'Garra, T. The behavioural, welfare and environmental impacts of air travel reductions during and beyond COVID-19. Centre for Climate Change Economics and Policy Working Paper 372/Grantham Research Institute on Climate Change and the Environment Working Paper 342. London: London School of Economics and Political Science, **2020**, 1-55.
9. Chand, S.; Shastri, C.S.; Hiremath, S.; Joel, J.J.; Krishnabhat, C.H.; Mateti, U.V. Updates on biomedical waste management during COVID-19: The Indian scenario. *Clinical Epidemiology and Global Health*, **2021**, *11*, 100715.
10. Agrawal, P.; Kaur, G.; Kolekar, S.S. Investigation on biomedical waste management of hospitals using cohort intelligence algorithm. *Soft Computing Letters*, **2021**, *3*, 100008.
11. Salazar-Galán, S.; Mascort-Albea, E.; Sánchez-Fuentes, D. Redefinición territorial pos COVID-19: resiliencia frente a riesgos y desequilibrios en los modelos urbano-rurales. *EURE (Santiago)*, **2022**, *48*, 1-9.
12. Taludker, B.; vanLoon, G.W.; Hipel, K.W. Planetary health & COVID-19: A multi-perspective investigation. *One Health*, **2022**, *15*, 1-11.
13. Regional Contingency Plan Oriented to complement the national efforts for the prevention, containment and treatment of the COVID-19. Available online: <https://www.sica.int/coronavirus/plan>. (Accessed on 10 October 2022).
14. Cifuentes-Faura, J. COVID-19 Mortality Rate and Its Incidence in Latin America: Dependence on Demographic and Economic Variables. *Int. J. Environ. Res. Public Health*, **2021**, *18*, 6900.