

Oil disasters and government actions in the face of social, environmental, and health-related impacts: A scoping review

Desastres com petróleo e ações governamentais ante os impactos socioambientais e na saúde: scoping review

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ABSTRACT This article aims to analyze the actions taken by governments to face the social, environmental, and health impacts of oil spill disasters worldwide. This scoping review was conducted in Bireme, Lilacs, SciELO, PubMed, Cochrane Library, and Embase databases, considering articles published between 1973 and 2021. The database search returned 22 articles on ten global oil disasters in three continents (Asia, the Americas, and Europe), whose causes were grounding (03), shipwreck (01), collision (02), spill (03), and explosion (01). The actions developed were characterized as intersectoral, economic, environmental, and health-related, and the most frequent were environmental and economic actions. In the actions developed, we observed criticisms of controlling, mitigating, or preventing instantaneous or future damages resulting from oil disasters, which is still an open agenda for social movements in the struggle to ensure a healthy, health-promoting environment that preserves all its biodiversity. The actions to face oil disasters in different countries seem incipient, revealing a governmental inability to guide the confrontation of the impacts of this unusual event.

KEYWORDS Petroleum pollution. Disasters. Chemical contamination. Environmental health. Health management.

RESUMO Este artigo teve por objetivo analisar as ações desenvolvidas pelos governos para o enfrentamento dos impactos socioambientais e na saúde em decorrência dos desastres envolvendo petróleo no mundo. Trata-se de uma revisão de escopo realizada na Bireme, Lilacs, SciELO, PubMed, Cochrane Library e Embase, considerando artigos publicados entre 1973 e 2021. As buscas efetuadas nas bases de dados resultaram em 22 artigos sobre 10 desastres de petróleo ao redor do mundo em três continentes (Ásia, América e Europa), cujas causas dos desastres foram encalhe (3), naufrágio (1), colisão (2), derrame (3) e explosão (1). As ações desenvolvidas foram caracterizadas como intersectoriais, econômicas, ambientais e na saúde, sendo que as mais frequentes foram ações ambientais e econômicas. Nas ações desenvolvidas, observaram-se críticas ao controle, mitigação ou prevenção dos danos instantâneos ou futuros decorrentes dos desastres por petróleo, sendo essa uma agenda ainda em aberto para os movimentos sociais na luta pela garantia de um ambiente saudável, promotor de saúde e com preservação de toda a sua biodiversidade. Conclui-se que as ações para o enfrentamento dos desastres por petróleo nos diferentes países parecem ter sido incipientes, revelando uma incapacidade governamental de orientar o enfrentamento dos impactos desse evento inusitado.

PALAVRAS-CHAVE Poluição por petróleo. Desastres. Contaminação química. Saúde Ambiental. Gestão em saúde.

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Introduction

National and subnational governments have been urged to take responsibility for the environment in a joint action for planetary preservation over the past 50 years. International conferences and treaties were assumed, such as in Stockholm in 1972, the World Climate Summit in 1979, the Sustainable Development Summit in 2012, and the Global Climate Summit in 2021^{1,2}. The need for articulation between production and consumption patterns to ensure the environmental-climate balance and the well-being of humanity for current and future generations^{3,4} has been observed in all these conferences.

However, the capitalist development project and the preservation of the environment clash since the ostensive consumption pattern is the main catalytic force of this system, implying socially determined environmental risks^{5,6}. The current model of capitalist production is founded on the exploitation of agricultural and mineral commodities, leading to intense environmental contamination and human exposure due to the consumption of pesticides and the exploitation of non-renewable and dirty energy sources, such as oil⁷⁻⁹.

The advance of capital over the environment places humanity in a setting where earthquakes, floods, acid rain, landslides, and pandemics will become increasingly frequent¹⁰. These events are, in part, a reflection of how society is reproduced, how wealth is distributed, and the consumption pattern². Climate change has been on the agenda of international organizations and scientists. However, government consensus still needs to be achieved on which courses to follow regarding alternatives to overcome its effects on the planet, mainly for its primary vector: using pollutant energy sources such as oil¹¹.

Oil production has highly polluting characteristics, from extraction, refining,

transportation, and consumption, which can cause health, social, economic, cultural, and environmental damage¹². In 2016 alone, the global estimate of oil consumption was approximately 36 billion barrels¹³. Nevertheless, oil spill disasters are among the events that cause substantial impacts on the environmental balance, aggravated by insufficient or non-existent government responses.

Significant accidents still occur despite the progressive reduction in oil disasters since 1970. These disasters are hardly known when they occur far from the coast. However, they impact populations and ecosystems and require immediate responses¹⁴ when they reach the continent. Thus, governments should establish forms, actions, and instruments in their territories to predict, minimize, and control oil sector-borne disasters.

The 2019 Brazilian coast oil spill, whose origin is unknown, rekindled a global alert about the responsibilities of national governments and their health systems regarding protecting the environment and the populations affected by these disasters. Noronha, Lima, and Machado¹⁵ argue that government macro-functions can be understood as: a) planning; b) financing; c) coordination, regulation, control, and evaluation; d) direct provision of actions and services. In social and environmental crisis settings, such functions must be articulated based on strategic thinking¹⁶. Therefore, responding efficiently, effectively, and with efficacy to society's demands, the complexity of disaster risks, and the health-disease process. However, even in these settings, what is seen, in practice, is still a form of government based on ideological, authoritarian precepts¹⁷ and negligible intersectoral articulation¹⁸.

Oil spills studies worldwide prioritize approaches that separately study health¹⁹⁻²¹, environmental^{22,23}, economic^{24,25}, and social²⁶ impacts. However, there is a lack

of knowledge vis-à-vis studies that systematize the decision-making of government authorities and can support policymakers, managers, health professionals, and civil society in developing appropriate strategic actions targeting comprehensive care and repairing affected populations and the environment²⁷. Therefore, this article aims to map the actions taken by governments in the face of social, environmental, and health impacts from oil disasters worldwide.

Material and methods

A scoping review study was conducted, a method proposed to synthesize evidence, map theories, further analyze concepts, and identify knowledge gaps that need further investigation²⁸, observing the methodological principles structured similarly to systematic reviews²⁹.

The Population, Concept, and Context (PCC, P=Governments; C=Coping; C=Oil disasters)³⁰ strategy was used in constructing the research question. The following is the central question of the review: How did governments act in the face of the social, environmental, and health impacts of oil disasters?

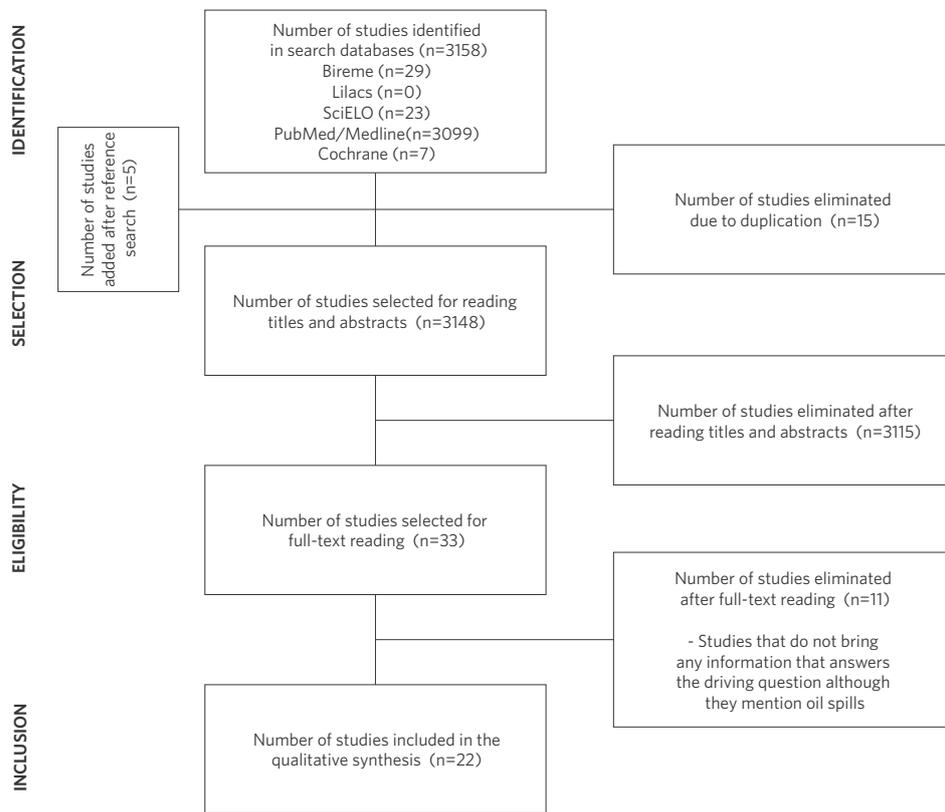
The electronic search was conducted from February to March 2022 in the following databases: Bireme, Lilacs, SciELO, PubMed (Medline), Cochrane Library/ Cochrane Database of Systematic Reviews,

and Embase, using as primary descriptors those referenced in the review of Euzebio et al.¹² referring to oil spills and their variations: Oil spill, Oil spill accident, Oil spill residues, Petroleum Pollution. We selected articles published from January 1, 1973, to December 31, 2021, considering that the 1972 Stockholm Conference was the first event with a predominantly environmental focus and resulted in the Declaration on the Human Environment².

Boolean operators were used as follows: (Oil spill) OR (Oil spill accident) OR (Oil spill residues) OR (Petroleum Pollution) AND (Oil spill effects) OR (Socioeconomic vulnerability) OR (Socioeconomic activities) OR (Economic impact) (Environmental impact) OR (Health impact) OR (Social impact).

Two independent researchers (R.C.S. and L.S.) performed the search, with the following eligibility criteria: a) inclusion: original works published in English, Spanish, or Portuguese; b) exclusion: book or book chapters, dissertations, monographs, and theses; technical, normative and related reports; and studies that do not provide any information that answers the driving question, although they mention oil spills. Disagreements were resolved by a third researcher (M.O.S.S.). The search process followed the precepts of the Joanna Briggs Institute³⁰, widely used by other reviews, as per stages described in *figure 1* to establish the research corpus.

Figure 1. Flowchart indicating the selection process of studies adapted from PRISMA



Source: Own elaboration.

The selected articles were tabulated in an Excel® table, extracting the information for analysis regarding the author/year of publication of the article, mentioned disaster and year of occurrence, disaster characterization, actions taken, and analysis of actions in each location.

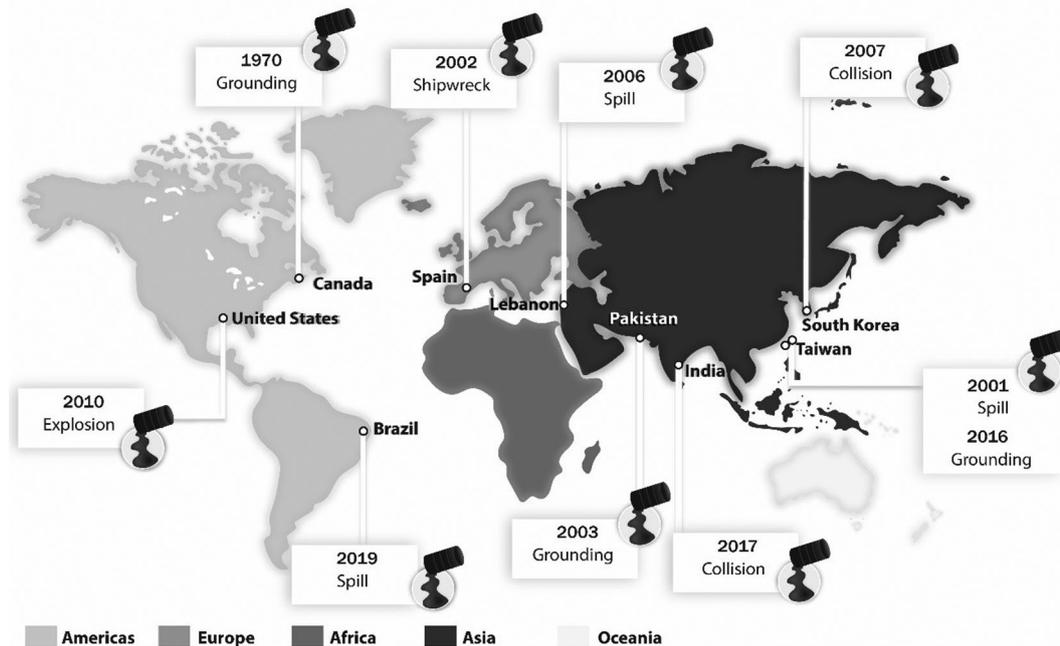
Results

Twenty-two articles on ten oil disasters worldwide mentioned government actions to face their impacts. Disasters were identified in Asia (6), the Americas (3), and Europe (1), whose causes were grounding (3), shipwreck (1), collision (2),

spill (3), and explosion (1) (figure 2). All articles characterized some government actions. Nine

mentioned the actions developed, and seven criticized these actions.

Figure 2. Oil disaster by cause, continent, and year of occurrence



Source: Own elaboration.

On socioeconomic and environmental damage: What do the studies say?

Environmental oil-borne contamination ranged from 75 tons in India to 626 thousand tons in the United States of America (USA), with a territorial extension of impact ranging from 3.5 km in Taiwan to 4 thousand km in Brazil, considered the largest spill in the world's tropical waters. Intensive contamination in the environment is observed in terrestrial and marine conservation units,

beaches, and fishing areas, such as Brazil, Taiwan, Pakistan, and Spain.

At least five studies highlight the social and economic damage caused by the disasters, which affected traditional fishing communities in various aspects, such as food, fishing activity, tourism, and local trade. An estimated 300,000 people were affected in Pakistan, with estimated damage ranging from US\$ 1.5 to US\$ 2 billion; employment declined by 28% in the region in the US; effects that can last a decade are also being reported in Brazil (table 1).

Table 1. Oil disasters by country, year, characterization and study authors

Country	Disaster, year	Characterization	Authors
Brazil	Unknown spill, 2019	Largest oil spill in tropical waters in the world, with 5,000 tons of oily waste dumped, 4,000 km of coastline, 1,009 beaches in 11 Brazilian states and 55 conservation units affected. More than 40 marine protected areas and two of the largest environmental protection areas in the South Atlantic and other tropical ecosystems unique for their biodiversity were affected. It has social, economic and environmental impacts that can last for a decade.	Silva et al. ³¹ ; Ladle ³² ; Pena et al. ³³ ; Soares et al. ³⁴ ; Magalhães et al. ³⁵ ; Zacharias et al. ³⁶ ; Soares et al. ³⁷
India	Ships collision, 2017	Spill caused by the collision of two cargo ships about 2 miles off the coast of Chennai. About 75 tons of heavy fuel oil were released into the Bay of Bengal.	Han et al. ³⁸
Taiwan	Shipwreck, 2016	Grounding of the TS Taipei freighter 400 meters off the coast, causing the spill of about 417 tons of diesel oil. The incident occurred close to important and sensitive coastal environments, fishing and tourist areas and two water collection stations of a nuclear power plant.	Fan et al. ³⁹
USA	Deepwater Horizon drilling rig explosion, 2010	Largest oil spill in US history. Oil platform explosion, releasing approximately 626,000 tons of crude oil approximately 1,500 meters below the sea surface. The disaster forced the shutdown of commercial fishing in the state of Louisiana, resulting in an estimated 11% reduction in fishermen's income, 23% in commerce, which impacted a 28% decline in employment for all sectors associated with this industry. It brought serious damage to tourism, food and fishing communities in the region.	Ylitalo et al. ⁴⁰ ; Simon-Friedt et al. ⁴¹ ; Lubchenko et al. ⁴² ; Osofsky, Osofsky ⁴³ ; Birkland, DeYoung ⁴⁴
South Korea	Hebei Spirit collision, 2007	Collision of the Hebei Spirit vessel with a crane barge off the coast of Taean County, causing the worst oil spill in Korea and the second largest in the world, with the spill of 290,000 tons of crude oil over 375 km across the south coast, polluting and affecting fishermen, restaurant owners, and residents of the region.	Hur ⁴⁵
Lebanon	Jiyeh plant oil spill, 2006	Large oil spill from coastal Jiyeh plant caused by bombing in the Lebanese-Israeli war. Released 15,000 tons of fuel oil into the Mediterranean Sea.	Takshe et al. ⁴⁶
Pakistan	Tasman Spirit grounding, 2003	Ship grounding, releasing approximately 31,000 tons of crude oil into the sea, causing extensive environmental damage along the coast of Karachi, affecting 270 km ² of seabed, impacting marine ecosystems and coastal areas. Approximately 300,000 people may have been affected, with damage estimated between US\$ 1.5 and US\$ 2 billion.	Mian, Bennett. ⁴⁷
Spain	Prestige shipwreck, 2002	Prestige shipwreck, an oil tanker carrying 77,033 tons of heavy fuel. It affected the northwest coast of Spain, 400 km off the coast, which is home to one of the main fishing communities in the European Union.	Carrasco et al. ⁴⁸ ; Surís-Regueiro et al. ⁴⁹ ; Salomone ⁵⁰

Table 1. Oil disasters by country, year, characterization and study authors

Country	Disaster, year	Characterization	Authors
Taiwan	Amorgos spill, 2001	Spill from the Greek freighter Amorgos off the coast of the Kenting Peninsula, with about 35,000 tons of ore. About 1,300 tons of fuel oil are estimated to have leaked, contaminating 3.5 km of coastline along the Long Kun Ecological Conservation Area.	Chiau ⁵¹
Canada	Tanker grounding, 1970	Grounding of old tanker SS Arrow, carrying 14,700 tons of fuel oil, in Chedabucto Bay, on the east coast of Nova Scotia, Canada. About two-thirds of its cargo was released into the bay's waters due to weather conditions.	Lee et al. ⁵²

Source: Own elaboration.

Between actions and criticism: courses undertaken by governments

From a broader perspective and based on the possible harm caused by oil-related disasters, we stratified government actions into intersectoral, economic, environmental, and health-related (*table 2*).

We identified measures that guided intersectoral coping actions, such as interministerial commissions, social mobilization, and scientific advisory committees in six disasters in five countries, emphasizing the investment of approximately US\$ 60 million in the US for research on the Gulf of Mexico disaster.

Economic actions were found in three disasters (Brazil, Spain, and South Korea), and establishing emergency aid for the affected

population was common to all. Besides the aid, Spain offered a special credit line for fishing production and tourism.

Environmental actions, such as cleaning the affected areas, were undertaken in seven disasters. The territory's military or population was the workforce performing the cleanup. In some of these disasters, committees were set up to monitor the environmental cleanup and recovery measures.

Concerning health actions, banning fishing was the most frequent measure used in disasters in Brazil, the US, Spain, and Pakistan as a food exposure precautionary measure. Other actions include analyzing food samples, community surveillance, information dissemination, and epidemiological survey.

Table 2. Government post-oil disaster actions

Disaster/Country/ Year	Author	Intersectoral actions	Economic actions	Environmental actions	Health actions
Spill with unknown source. Brazil, 2019.	Silva et al. ³¹	Not Identified (NI)	Emergency aid for R\$ 1,996.00 (2 minimum wages in 2019, equivalent to US\$ 472), paid in two installments, to around 66,000 professional small-scale fishermen registered in the General Registry of Fishing Activity (RGP) and residing in an area affected by the environmental disaster.	NI	Fishing ban for fear of contamination; food sample analysis.
Deepwater Horizon drilling rig explosion. USA, 2010.	Ylitalo et al. ⁴⁰ ; Simon-Friedt et al. ⁴¹ ; Lubchenco et al. ⁴² ; Osofsky, Osofsky ⁴³ ; Birkland, DeYoung ⁴⁴ .	Establishment of an investigative commission into the causes and damages of the spill and a scientific response committee; articulation between government, academia and private sectors; investment of US\$ 11 million for immediate investigations into the spill and US\$ 500 million over 10 years.	NI	Cleaning with chemical dispersants; analysis and monitoring of the impacts of cleaning actions on the environment; establishing protocols and safety standards for detecting contaminants in fauna and flora; provision of training to expand the workforce's capacity in cleaning up and recovering the affected areas.	Food sample analysis; fishing ban; mental health care; meeting to plan community responses to prevent health risks.
Tanker grounding. Canada, 1970.	Lee et al. ⁵²	Establishment of a scientific committee for consultancy and coordination of actions; intersectoral articulation between government and universities to create responses and promote monitoring of the situation; funding research on spillage.	NI	Appointment of military agents to manage cleanup activities.	NI
Shipwreck of the Prestige. Spain, 2002.	Carrasco et al. ⁴⁸ ; Surís-Regueiro et al. ⁴⁹ ; Salomone ⁵⁰ .	NI	Financial aid for fishing industry workers, such as shellfish gatherers and fish sellers; tax benefits for companies, preferred line of credit; coverage of expenses involving material and repair of vessels that collaborated with the cleaning operation.	Cleaning by mechanical methods such as sand removal or using high pressure water jets to clean rocks.	Fishing ban; epidemiological inquiry; dissemination of information to the population about the risks of oil exposure and the need to use Personal Protective Equipment (PPE) for cleaning activities.
Ships collision. India, 2017.	Han et al. ³⁸	NI	NI	Cleaning with pumps to extract floating oil; hundreds of workers were used to scoop up the floating oil using plastic buckets	NI

Table 2. Government post-oil disaster actions

Disaster/Country/ Year	Author	Intersectoral actions	Economic actions	Environmental actions	Health actions
Collision of the Hebei Spirit. South Korea, 2007.	Hur ⁴⁵	Social mobilization of residents of the region; government support for voluntary actions; establishment of communicative strategies; interministerial and intersectoral articulation; request for international assistance.	Emergency aid	NI	NI
Amorgos spill. Taiwan, 2001.	Chiau ⁵¹	Establishment of an intersectoral and intergovernmental crisis committee with universities; creation of Taiwan's national "Ocean Suffering Day" in an ongoing effort to raise public awareness of marine pollution.	NI	Environmental protection department monitoring the situation; military engaged in cleanup.	Training of the population for cleaning actions and community surveillance.
Shipwreck of a vessel. Taiwan, 2016.	Fan et al. ³⁹	Interdepartmental cooperation between government agencies and the private sector.	NI	Establishment of an emergency response center to direct cleanup and coordinate follow-up actions and procedures; application of advanced technologies in the cleaning process, monitoring and assessment of the situation such as: helicopters, unmanned aircraft systems, and radar.	NI
Tasman Spirit grounding. Pakistan, 2003.	Mian, Bennett ⁴⁷	Search for national and international experts to conduct the response.	NI	Use of containment barriers, oil dispersants, heavy machinery for digging and removing oil from beaches; mobilization of military agents for cleanup activities.	Fishing ban.

Source: Own elaboration.

Although governments have developed the actions exemplified in *table 2*, authors have criticized the courses undertaken in managing seven disasters, shown in *table 3*, to systematize the setting of the unusual event globally. In general, subnational entities were unable to articulate jointly, and political disputes,

substandard national infrastructure, slow and bureaucratized measures to control and reduce impacts, exposure of the population to chemical agents due to lack of protection materials, limited financing of actions, lack of participatory and communication processes were observed.

Table 3. Disaster and criticism of the articles regarding the actions taken

Disaster, Country, Year	Criticism of actions	Authors
Spill with unknown source. Brazil, 2019.	Few fishermen benefited from emergency aid; lack of community and government articulation; little dissemination of information and environmental analyses to certify the quality of water and food for the population; little consensus on the dietary risks of fish in the region; health crisis office unavailable; little intersectoral articulation; lack of financial subsidy to strengthen a specialized laboratory network that could assess and monitor fish quality; lack of transparent guidelines; and inappropriate actions for the context, such as: science budget cuts and the dismantling of environmental policies. Delayed, slow, and uncoordinated response, making local governments, universities, and NGOs responsible for initial mobilization for cleanup and research.	Silva et al. ³¹ ; Ladle ³² ; Pena et al. ³³ ; Soares et al. ³⁴ ; Magalhães et al. ³⁵ ; Zacharias et al. ³⁶ ; Soares et al. ³⁷
Ships collision. India, 2017.	The local government did not have a contingency plan to manage large oil spills; volunteer workers received little or no training, and many of them did not have access to any PPE protection.	Han et al. ³⁸
Deepwater Horizon drilling rig explosion. USA, 2010.	Lack of dialogue with the population; little confidence of the population in the government; decentralized coordination between subnational governments insufficient, slow, confusing and bureaucratic.	Simon-Friedt et al. ⁴¹ ; Osofsky, Osofsky ⁴³ ; Birkland, DeYoung ⁴⁴ .
Collision of the Hebei Spirit. South Korea, 2007.	Disarticulation between government agencies; political conflicts between the central government and subnational entities; little articulation with academia; lack of PPE; little transparency in the disclosure of health-related information; the bureaucratization of decisions caused delays and escalated the impacts; little control of voluntary actions that exposed the population to the imminent risks of contact with crude oil chemicals and dispersants.	Hur ⁴⁵
Jiyeh plant oil spill. Lebanon, 2006.	Fragmented and poor capacity of the Lebanese government in dealing with pollution, enforcing pollution control legislation, and developing intersectoral strategies.	Takshe et al. ⁴⁶
Tasman Spirit grounding. Pakistan, 2003.	Bureaucratized decision-making, delaying immediate responses; interagency conflict over cleanup accountability; lack of coordination between governments; limited resources for actions and strategies; shortage of trained personnel; lack of temporary storage facilities for oily waste; lack of PPE for cleanup workers; unclear and poorly guiding laws on the responsibilities of national entities.	Mian, Bennett ⁴⁷
Amorgos spill. Taiwan, 2001.	Lack of trained personnel, technology and appropriate equipment; lack of experience and integration of Government institutions; poor articulation with non-governmental organizations.	Chiau ⁵¹

Source: Own elaboration.

Discussion

The oil disasters described in this study showed that countries were affected by several consequences in which their social protection systems had to reorient themselves to respond to the impacts involved. Actions needed to be coordinated in Brazil³³⁻³⁷, the USA⁴⁴, South Korea⁴⁵, Taiwan⁵¹, Pakistan⁴⁷, and Lebanon⁴⁶, with the integration of government agencies or robust intersectoral strategies, diverging from the necessary recommendations that this episode demands for exceeding local response capacity^{53,54}.

Implementing contingency plans for disasters in a hierarchical, shared, agile, and specific way, considering the technical, administrative, and political aspects that the situation implies and the attributions of each entity and government agency⁵⁵, is what should occur. When such articulation does not occur, the response that emerges from the setting may be the result of legal clashes, such as in Brazil, where the Federal Public Prosecutor's Office filed public civil actions in several states in the Northeast, as well as a joint action involving all states in the oil-affected region,

To ensure, in order of priority, human life safety, the protection of the environment, and the integrity of properties and installations threatened or affected by the oil spill⁵⁶⁽⁷²⁾.

In the disasters of Brazil^{31,33}, the USA^{41,43}, and South Korea⁴⁵, contrary to what the World Health Organization⁵⁷ postulates for the communication of risks in public health emergencies, the governments did not move towards a reliable, timely, and transparent communication strategy that would allow decision-making regarding individual, family, and community protection.

However, as Bueno⁵⁸ points out, a communicative action through radio, television, internet, and other means guided by health management would be relevant besides

considering facts and circumstances of the event, neutralizing dissonance and political and business interference, and facing biased media coverage. In this context, the media would play a vital role during and after the disaster to provide subsidies to the population about the safety and integrity of the actions and means and measures to assist people affected⁵⁹.

Although oil and its derivatives have a high capacity to pollute water, soil, fauna, and flora^{12,22,23}, we should highlight that disaster management in Brazil³³, Lebanon⁴⁶, India³⁸, and Pakistan⁴⁷ was also characterized by a lack of or inefficient crisis office at the national level, non-compliance with control legislation, and even the non-existence or non-activation of a contingency plan, which would be a national responsibility. As a result of this poor environmental damage mitigation, we could mention the aggravated historical environmental injustice since its harm is not shared homogeneously among individuals, where traditional populations are the most affected, especially fishermen and shellfish gatherers^{60,61}.

Particularly in Brazil, authors mention that this lack of crisis centrality and orientation established a despairing setting in which volunteers, primarily fishermen, defended their territories without knowing the dangers. These individuals immediately worked to remove oil from beaches and mangroves without Personal Protective Equipment (PPE)s, even diving into contaminated waters^{33-35,37}.

Suppose a health policy can be considered State action or omission before society's demands⁶². In that case, the organization of health management in times of crisis, such as in oil disasters, will reflect coping in its technical aspects. The recognition or not of health's social value in its broader context, where the territory where one is born, lives, falls ill, and dies, typical of the water populations, such as fishermen and seafood^{63,64}, are determinants and conditions.

The articles highlighted that civilians or military personnel were engaged in the cleanup protocols in the mapped disasters. However, Pakistan⁴⁷, South Korea⁴⁵, India³⁸, and Brazil³³ were criticized for lack of PPE or loss of control of volunteers exposed to chemical contaminants, which is particularly troubling, because the literature points to the association between exposure to oil components and various acute and chronic effects on human health, such as acute poisoning, cancer, and endocrine changes⁶⁵⁻⁶⁸.

For example, the Brazilian and international regulatory framework has recognized a vital oil component, benzene, on toxicological aspects, occupational and environmental exposure, and risk assessment⁶⁹. From this perspective, every individual who came into contact with the substance or minimally with the contaminated areas should be evaluated, adopting follow-up measures and health monitoring due to the likely late/chronic effects⁷⁰. An increase in acute respiratory and neurological symptoms was observed among workers cleaning the contaminated areas through inhalation and dermal exposure^{71,72} in the case of the Deepwater Horizon oil rig disaster that caused an oil spill in the Gulf of Mexico.

In another oil spill disaster in Chennai, off the coast of India, researchers identified that Polycyclic Aromatic Hydrocarbons (PAH) can be highly resistant to climate variations, in which the PAH levels detected on the sixth day of the spill were similar to those identified on the 62nd day³⁸, pointing to the dangers inherent to its exposure.

In this sense, it would be urgent to establish health actions, as observed in Brazil³¹, USA⁴⁰⁻⁴⁴, Spain⁴⁸⁻⁵⁰, Taiwan⁵¹, and Pakistan⁴⁷, whether in the analysis of seafood and other fish to ascertain food quality and safety or in the epidemiological mapping of the affected or exposed population for developing programs and policies and readjusting health services in the care of these specific populations.

On the other hand, the measures in these

same countries were also the target of criticism for the lack of coordination and consensus between agencies and subnational governments in their implementation or for the inefficient dissemination of surveillance, health promotion, and damage prevention information, which may not have generated the expected protective effect in Brazil³¹⁻³³ and the USA^{41,43}.

Recent research has revealed several criticisms of the lack of availability of baseline health data captured before, during, and on an ongoing basis after a disaster, pointing out that health monitoring is essential to reduce and manage the health impacts of future disasters and that it is also necessary to establish an observation and care system⁷³. The Unified Health System (SUS) is internationally recognized for its ability to realize extensive monitoring of human health regarding disasters and may be an example to be followed by other countries^{73,74}.

However, very little of the health potential represented by the SUS was used in Brazil through its primary care units in the territories affected by the oil spill. This system was experiencing funding setbacks, degrading its ability to action⁷⁵. Some authors have reflected on the contributions of Primary Care in this setting^{76,77}. Although this level of care can collaborate to provide health care during the disaster and monitor the acute and chronic conditions triggered in these situations, in general, professionals are unprepared, this level of care is not adequately recognized, and its performance is not prioritized, disregarding its power and territorial capillarity^{78,79}.

The literature is consonant with the global deficiencies in preparing health systems to face disasters, especially from the viewpoint of human resources⁸⁰⁻⁸². When looking at health professionals, inadequate, segmented, and variable training on these unusual events persists, which may have direct implications for the care and healthcare of the affected populations⁸², which makes measures and proposals that consider a robust and consistent training of workers in this field urgent.

The economic and symbolic losses of all fishing production and tourism identified^{24,25,31,33} – particularly of traditional peoples due to their relationship with the sea and the territory – were also found to generate illness, with outcomes in mental health, alcohol, and other drug abuse^{12,83}, which requires the implementation of mental health care measures for those affected, something that emerges as a strategy for coping with the disaster only in the USA⁴³.

Financial compensation through emergency aid in Brazil³¹, Spain⁴⁹, and South Korea⁴⁵ was an important step towards repairing the affected population, given the installed financial losses and food insecurity situation⁶¹. However, the scope of emergency aid, edited by Provisional Measure N° 911, which allocated resources to a restricted portion of those affected by the disaster, thus undermining the compensatory capacity of this emergency aid³¹, was criticized in Brazil. According to Beristain⁸⁴⁽¹⁷³⁾,

Reparation refers to measures to restore rights, improve the situation of victims, and promote political reforms that prevent the recurrence of violations.

However, the mapped articles have evidenced negligible control, mitigation, or prevention of instantaneous or future damages from oil disasters, which is still an open agenda for social movements in the struggle to ensure a healthy, health-promoting environment that preserves all its biodiversity⁴.

Each disaster mapped here is immersed in a different social, economic, political, and historical context, characteristic of the affected country, besides the existing conception of health^{85,86}. Thus, the actions developed to face the impacts abided by the environmental and health perspectives valued in each context and are more or less equitable, guided by the social, medical-hegemonic, or market-oriented determination⁸⁷, justifying the governmental priorities in crisis management and the State operating logic⁸⁸.

Finally, two assumptions observed in this review are striking. The first is that most of the reported disasters are in the so-called developing countries, which shows a need to “develop an ethical, legal framework and a funding mechanism to conduct research responses”⁸⁹⁽¹²⁴⁾ about the social, environmental, economic, and health impacts, promoting their sharing among different nations, in a mutual aid of prevention and solidarity.

The second is that only some studies address government actions and the role of health management in coping with the impacts of oil disasters, especially when looking at decision-making. Our results should serve as a warning for a gap in the literature that needs to be suppressed in future research, given the growing and intense number of environmental and health disasters endured by humanity, with generalized and complex consequences that need to be interpreted in the light of policy, planning, management, and assessment in health⁸⁹⁻⁹¹.

Final considerations

Actions to face oil disasters in different countries seem incipient, revealing a governmental inability to guide the confrontation of this unusual event’s intersectoral, economic, environmental, and health impacts.

The world has lived with meetings of global leaders, treaties, plans, and international policies that guide environmental protection for the entire human existence for 50 years. However, the agreements still have low capillarity within the very national governments, leading to the establishment of tools, norms, and directive agencies that induce and coordinate actions to defend the environment.

Using energy matrices based on fossil fuels such as oil, the hegemonic development model in the capitalist world requires that national health systems integrate a larger project of coordinated, integrated, and effective responses

to environmental disasters and health crises that will be increasingly more frequent.

The limitations of the present study are the lack of political, social, and economic context of the different countries and their disasters, which could help interpret the findings about the courses undertaken in managing each crisis, requiring further analysis.

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