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ORIGINAL ARTICLE

Performance of a municipal health secretariat in the face of the oil disaster-crime in Pernambuco

Atuação de uma secretaria municipal de saúde diante do desastre-crime do petróleo em Pernambuco

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ABSTRACT The 2019 oil disaster-crime is considered the largest disaster on the Brazilian coast. Given the frontline in disaster response, the municipal health secretariat is crucial in the disaster risk management process. This study aimed to analyze the performance of a municipal health secretariat in the metropolitan region of Recife, Pernambuco, regarding the 2019 oil spill, adopting a descriptive, qualitative case study. We performed content Analysis with the IRaMuTeQ software on interviews with health managers, and the results revealed four categories: municipal management in marine care; disaster risk governance and its absence; the COVID-19 syndemic and its impacts on the rehabilitation and recovery of oil disaster-affected communities; what to do if a disaster strikes again. In the municipality under study, we noted early organization of response actions, the lack of governance in the disaster-crime, and health management focus on COVID-19 syndemic, which were identified as difficulties and vulnerabilities in their actions, while continuing education and coordination with fishermen and shellfish gatherers were among the lessons learned.

KEYWORDS Disaster management. Disaster planning. Oil spill. Health surveillance. Vulnerability to disasters.

RESUMO *O desastre-crime do petróleo em 2019 é tido como o maior desastre ocorrido no litoral do Brasil. Considerada a primeira linha de enfrentamento de desastres no território, a gestão municipal de saúde é fundamental no processo de gestão de risco de desastre. Objetivou-se analisar a atuação de uma secretaria municipal de saúde da região metropolitana do Recife, Pernambuco, em relação ao derramamento do petróleo ocorrido em 2019. Foi realizado um estudo de caso do tipo descritivo com abordagem qualitativa. Foi realizada Análise de Conteúdo, com utilização do software IRaMuTeQ, das entrevistas com gestores da saúde, cujos resultados revelaram quatro categorias: gestão municipal na atenção com o mar; governança de risco de desastre e suas ausências; sindemia da covid-19 e impactos na reabilitação e recuperação das comunidades afetadas pelo desastre do petróleo; o que fazer se um desastre voltar a acontecer. No município em análise, houve a organização antecipada das ações de enfrentamento, a ausência da governança no desastre-crime e o enfoque da gestão em saúde na sindemia da covid-19, que foram apontados como dificuldades e vulnerabilidades na atuação, enquanto a educação permanente e a articulação com pescadores(as) e marisqueiras foram algumas das lições aprendidas.*

PALAVRAS-CHAVE *Gestão de desastres. Planejamento em desastres. Derramamento de petróleo. Vigilância em saúde. Vulnerabilidade a desastres.*

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Introduction

The 2019 Brazilian oil spill was considered the largest disaster-crime of its kind in the country. In this article, a disaster results from a natural or man-made threat that interacted with conditions of vulnerability of people, goods, and systems constantly exposed to disaster situations and with difficulties in the capacity for resilience, management, and prevention of disaster risks, causing significant harm to human beings and the environment[1,2].

The concept of disaster aligns with that of environmental crime when considering Law Nº 9.605 of February 12, 1998, which provides for several environmental crimes and establishes in Article 54 that "Causing pollution of any nature at levels that result or may result in harm to human health, or that cause the death of animals or the significant destruction of flora"[3(9)], is an environmental crime subject to criminal and administrative sanctions for both individuals and legal entities.

In this sense, the 2019 event was disastrous and criminal due to the material and immaterial losses and damages caused by approximately 5,000 crude oil tons, which affected 1,009 beaches and 55 conservation units from the country's northeast coast to the north coast of Rio de Janeiro[4]. This event adversely impacted tourism and fishing by small-scale fishermen and fisherwomen, and their physical and mental health[5,6], exacerbated by the State and private institutions' negligence in preventing foreseeable socioenvironmental risks, still unpunished after more than three years[7,8].

This disaster-crime[7,8] confirmed the need for risk management measures, such as prevention of future risks, mitigation of existing risks, preparedness and response, rehabilitation of living conditions, and recovery and reconstruction of communities. All government levels must be involved in this process, and the municipal organization is crucial, as it must be the first line of response[9,10].

Disaster prevention and harm reparation strategies are premises for building Healthy and Sustainable Territories (HST) since they seek to promote healthier and more dignified relational spaces based on local action, strengthening governance, and systemic assessment of the impacts of regional public policies, and the UN 2030 Agenda of the Sustainable Development Goals (SDGs)[11].

In this same perspective, the Sendai Framework for Action was established in 2015 in Japan and is another UN initiative to curb disaster risks and develop the resilience of affected territories. Among this Framework's priorities is the fourth objective, improving disaster preparedness based on more effective responses to recover, rehabilitate, and reconstruct affected territories[12]. On the other hand, the lack of actions in the health sector that include planning and responses to disasters increases vulnerability and enhances the adverse impacts on the population and territories[4].

Despite the existence of studies involving spills in other countries and government responses to the disaster[13–19], only two analyses addressed the spill in Brazil from the perspective of the health management involved in dealing with the disaster[20,21], which shows the relevance of investigating the role of the health sector in this context. Thus, this article aims to present an analysis of the actions of a municipal health secretariat in the Metropolitan Region of Recife (RMR), Pernambuco, in response to the 2019 spill. We attempted to address the preparedness and response practices of the municipal administration, relating them to the actions of the state and federal administration and the impact of the COVID-19 syndemic on response actions, reflection on lessons learned, and paths for action in new oil spills. The proposal aims to strengthen the focus on risk and disaster management and highlight the importance of building public policies focused on HSTs.

Material and methods

This descriptive, qualitative case study was conducted in a municipality in the RMR selected from the context analysis and with recognized performance in the face of disaster-crime, oil exposure notifications[22], and for having a significant number of active small-scale fishermen (604)[23]. The interviews were conducted with professionals from the municipal health secretariat management who worked on spill mitigation actions, PHC management, the Health Surveillance superintendence, the coordination office of the Regional Occupational Health Reference Center, and the Health Surveillance and Occupational Health management, and were collected in January 2020 and March 2021. We adopted a roadmap on actions developed, stakeholders, hardships, strengths, and lessons learned.

We also used data and secondary sources of information on disasters involving oil spills in the municipality to understand better the event studied. To this end, a survey was conducted of the publicly accessible official municipal administration documents and articles published on the official website of the Municipality of Jaboatão dos Guararapes, both containing data or guidance on the municipality's health management coping actions.

The following Portuguese keywords (freely translated to English by us) were used for the search: "*petróleo*", "*derramamento*', "*óleo*". Seven articles from the communications department were identified. However, three were excluded because they did not fit into actions to address the health management's response to the spill. Thus, we analyzed four articles[24-27] from the communications department and a report from the Parliamentary Inquiry Commission (CPI)[23], forwarded to the House of Representatives.

We conducted a content analysis of the interviews and documents, organized into pre-analysis, material exploration, data processing, inference, and interpretation[28]. For the interviews, the free software Interface de R pour les Analyses Multidimensionnelles de Textes et de Questionnaires (IRaMuTeQ) was used for processing and statistical analysis of texts with two techniques: Lexicographic analysis and Descending Hierarchical Classification (DHC)[29,30]. The corpus of analysis of the interviews comprised the managers' statements, which had their content inferred after being analyzed, including the groups of ideas in the discourse and naming the classes generated[29,30].

This study was approved by the Research Ethics Committee of the Aggeu Magalhães Institute under the Certificate of Presentation of Ethical Appreciation—CAAE Nº 25398119.9.0000.5190 and Opinion Nº 5.037.340. It complies with Resolution Nº 466/12 of the National Health Council (CNS), which addresses the guidelines and regulatory human research standards.

Results and discussion

The general corpus of data analysis consisted of four texts, separated into 606 Text Segments (TS), using 459 TS (75.74%). A total of 20,428 occurrences emerged, of which 2,317 were distinct words, and 1,853 had a single occurrence.

Reinert's analysis allowed the categorization into four classes: Class 1, 117 TS (25.49%); Class 2, 64 TS (13.94%); Class 3, 124 TS (27.02%); and Class 4, 154 TS (33.55%). The four classes are shown in two branches of the total corpus. The first branch, called 'Preparedness and response', presents the discourses of Class 1 ('Municipal management in caring for the sea') and Class 2 ('Disaster risk governance and its absence'), addressing actions by the municipal secretariat coping with the disaster-crime and the impact of state and

federal management on the conduct. The second branch, 'Vulnerabilities and Lessons Learned', contains the discourses corresponding to Class 3 ('COVID-19 syndemic and its impacts on the rehabilitation and recovery of oil disaster-affected communities') and Class 4 ('What to do if a disaster strikes again'). The content published in the four articles on the Municipality website and the CPI report highlighted the management's actions. Thus, the analysis was consolidated in Class 1 ('Municipal management in caring for the sea').

Municipal management in caring for the sea

The statements and documents express the actions of the municipal administration in preparing for and responding to the spill. The content published in the Municipality articles[24–27] (*table 1*) disseminated health education actions for bathers and merchants by distributing leaflets on the city's waterfront, calling for and training volunteers to remove the material from the beaches, training network professionals, and donating staple food baskets to fishermen/fisherwomen in the municipality.

Table 1. Summary of the content of the reports on the oil spill in the municipality of RMR, Pernambuco

Story title	Posted on	Content
Municipality advises the population on how to address oil spills	24/10/2019	Campaign to educate citizens about oil spills on the beach. Leaflets on the city's waterfront provided guidance on how to avoid contact with the material and informed that the city government should be contacted if oil was found in the area. Volunteers were also called in to clean the beaches. The volunteers received training and Personal Protective Equipment (PPE).
Municipality trains health professionals on the correct handling of oil stains	31/10/2019	Training of healthcare professionals on the oil's health effects, measures to be taken in case of contact with oil, case reporting and protocols for treating exposed individuals. The training was provided by a Toxicologist.
Municipality delivers staple food baskets to fishermen	13/12/2019	The action was conducted in partnership with the Public Labor Prosecutor's Office as a result of the municipality's rapid action in collecting oily waste and was staged at the Fishermen's Association. The delivery benefited 160 fishermen and shellfish gatherers.
Municipality delivers another 460 staple food baskets to fishermen in the municipality	18/12/2019	Distribution of 460 staple food baskets to fishermen in the municipality. Report of the drop in seafood sales in the market due to fears of possible contamination, even after the recommendation to avoid the consumption of only two types of fish (Xaréu and Sapuruna).

Source: Prepared by the author based on data from the Municipal Health Secretariat of Jaboatão[24-27].

The report aimed to respond to the demands of the Oil Parliamentary Inquiry Committee (CPI)[23]. It described the municipality's activities regarding disaster crime, linking them to the National Rural, Forest, and Waters Comprehensive Health Policy, which concerns "[...] reducing health risks resulting from work processes and agricultural technological innovations and improving health indicators and quality of life"[31(7)].

Some of the activities reported were the training of health professionals, registration and training of volunteers, distribution of Personal Protective Equipment (PPE) to those involved in oil collection, monitoring, beach cleaning, establishing of notification,

and educational campaign[23]. The managers' statements also portray the preparation and monitoring when the first oily residues were identified on the coast of the neighboring states of Paraíba and Bahia.

> *Before arriving in the city, around 15 days before, the mayor here had already organized himself and the entire team, the people from the Environment, urban planning, health, cleaning, expecting the arrival, monitoring with boats on the high seas, and already on the watch.*

> *Upon the arrival of the oil, I think there were three or four boats, motorcycles, jet skis, and drones. They set up an operation, and it was like this: there was a 24-hour shift so that it couldn't arrive. So, the fishermen also stayed 24 hours.*

> *It reached the municipality, and there was a plan; an Intersectoral plan was initiated. [...] They created this committee on October 15. They set up this crisis committee.*

> *However, we trained the team and the entire health network before the oil arrived. So, we trained all the professionals for the arrival of the oil, and we did not wait for it to arrive to do it.*

> *We did this training, monitored, and registered everyone from the Z25 fishing colony and the fishing association. We mapped all of the people. Only 15 went to the high seas, but none were exposed to the oil.*

The authors point out that one strategy of the contingency plan should be to anticipate the spill's trajectories based on the analysis of currents and winds to make pertinent decisions to protect sensitive environmental areas and the population of potentially affected locations[32]. The statements also highlighted fishermen/fisherwomen as active subjects in monitoring and identifying waste on the municipality's beaches. Silva et al.[33] highlighted a similar active participation regarding Ceará fishermen/fisherwomen.

Social participation through local leaders is vital in management due to their knowledge of the territory, contributing to monitoring and mapping affected areas and vulnerable groups, being a management-community link, and an essential tool in strengthening HSTs[34].

Other highlighted points were the organization of the Crisis Management Committee, creating an intersectoral contingency plan, and training network professionals on correctly handling oil waste. The clinical management flowchart for users exposed to oil and the relevance of reporting cases were also highlighted. The managers highlighted the registration of fishermen/fisherwomen to monitor exposure cases.

Crisis committees should be established at all government levels in coordination with leaders of the affected communities, who are responsible for managing the emergency/disaster from the preparedness stage to recovery. The team should closely monitor the evolution of the effects produced to plan the necessary for an effective and timely response, ensuring that decision-making is based on evidence, technical knowledge, and social participation[34].

In this sense, the actions identified in the managers' discourse were also highlighted in the reportages[24-27] and the Oil CPI report[23] concerning the psychosocial support offered to fishermen/fisherwomen by the Executive Secretariat of Social Assistance with support from the Occupational Health Reference Center (CEREST) and partnership with research institutes, to qualify the information and the short, medium and long-term harm to the exposed population and affected ecosystems.

We can observe that the health management analyzed adopted immediate and coordinated actions focusing on risk mitigation to promote and protect the Environment and the municipality's population. Such actions align with the SDGs for the promotion of HSTs, specifically with SDG 3, which seeks to ensure healthy lives and promote well-being, and SDG

14, which seeks to preserve and sustainably use the oceans, seas, and marine resources[35]. However, the actions of the municipality under analysis differed from those of other municipalities in the RMR. According to Alves[20], most municipal managers did not anticipate the spill, and the differences in the municipalities' preparation and actions affected the state administration's conduct based on the territories' specific doubts. This difficulty led the state administration to attempt to standardize the information to avoid response deficiencies.

Strengthening disaster risk management only occurs with prospective management that analyzes the territory's future risk, exposure, and vulnerability and with consolidated risk governance involving the sectors necessary for adequate response[36].

Disaster risk governance and its absence

Although municipalities were the first line of preparedness and response to the oil spill, resolving this disaster required the organization of systematic and coordinated measures involving different government levels[9]. However, municipal managers reported a lack of action by the state and federal governments:

> *The State remained silent, not to mention the Ministry of Health.*

> *The federal government did not. We did not receive any support. The state government only had this issue in this first training session, some people from the State Secretariat came, but the municipality took over when we did all this monitoring, cleaning the beaches, and educating fishermen.*

> *We could have had more effective participation from the Ministry of Health, providing better subsidies and support to the states and municipalities. We are very much like during the pandemic: each one does it in their way. We miss this coordination and provide a direction. It is necessary.*

Decision-making is delicate in the face of this highly complex event as it is influenced by the manager's technical capacity to perform complex analyses in a timely manner[37]. Ferguson[38] emphasizes that cooperation between federated entities and the coordination of guidelines that support decision-making on when and how to implement measures to combat a disaster must be the axis of the democratic governance adopted.

Regarding the government of Pernambuco, information in the report of the Oil CPI of the analyzed municipality shows that the Civil Defense Coordination of Pernambuco (CODECIPE) provided the PPE used in cleaning up the slicks[23]. The state health management's actions were based on requests from each territory through technical notes, situational reports, and difficulties in decision-making. Furthermore, monitoring and guidance to municipalities occurred due to a lack of prior knowledge about addressing oil disasters[20].

The country had the National Contingency Plan (PNC) for oil pollution incidents in waters under national jurisdiction. However, in 2019, the federal government was slow to activate and apply the PNC[21] actions.

Decree Nº 10.950 of January 27, 2022[39], was enacted after the disaster-crime, reviving and updating the PNC. Among the measures is the remodeling of the organizational structure by establishing the National Authority (Minister of State for the Environment) responsible for coordinating the PNC proposals, a Monitoring and Assessment Group (GAA) that must monitor oil pollution incidents, and an integrated action network to streamline decision-making[39].

Besides these measures, the PNC includes instruments to be activated in oil incidents: the Area Plan and the Individual Emergency Plan, developed by facilities in the organized port area, such as the Port of Suape in Pernambuco[22]. However, the polluter was not identified in the 2019 spill, so the federated entities were responsible for response and mitigation actions[39].

According to the respondents, the municipality developed an Intersectoral Contingency Plan. Specifically, managers pointed to the document's construction in the health sector based on evidence from other countries that have previously faced oil disasters.

> *We studied many other countries that had had it. [...] We observed what they did and prepared ourselves based on that.*

> *We start from the principle of good health practices from this evidence. So, if there is evidence somewhere else, we have to do it [...] it already existed in the Gulf of Mexico and other places: why would we just wait for time to pass?*

The Oil CPI report[23] of the municipality in question also includes the preparation of the Clinical Management Flowchart for the Oil-exposed Population based on the study and adaptation of the clinical-laboratory management classification of workers exposed to benzene at fuel stations[40] and guidelines for preparing a study to assess the risk to human health due to exposure to chemical contaminants[41] for organizing and implementing health actions.

Building evidence-based knowledge is encouraged in health, and its use, aligned with the manager's ability to evaluate and adapt different settings to their reality, effectively enhances actions to confront important public health events[42].

COVID-19 syndemic and its impacts on the rehabilitation and recovery of oil disaster-affected communities

The concept of syndemic is used to broaden contextual horizons since it considers the potential for interaction between epidemic events and physical, socioeconomic, and environmental profile issues, interfering in the living conditions of individuals, increasing the cumulative effects of events, and exacerbating their consequences[43,44]. Thus, this category addresses the relationship between disaster-crime and the COVID-19 syndemic for health management. We should note that, in this study, although the statements mention 'pandemic', the discussion is expanded with the support of the literature under syndemic terms. Such statements by the managers interviewed evidence the perception of this context.

> *We were still working on oil, and the pandemic hit us. That really messed things up because we couldn't meet with them [fishermen and shellfish gatherers] anymore. The many planned activities had to be rescheduled to avoid crowds and avoid exposing them to the coronavirus. So, it was hard for us because it was one thing on top of another.*

> *Because 2019 was the oil problem. We faced it, and I looked crazy [...] Then COVID-19 came upon us, which was a completely different virus, you know. I left the oil thing and started getting involved in the vaccine, COVID-19, testing, and stuff, and it's not easy.*

In chronological terms, the first oil spills were identified at the end of August 2019, and the Brazilian Institute of Environment and Renewable Natural Resources (IBAMA) started to demobilize emergency actions involving the spill[4,22] only in March 2020. Also, at the end of 2019, the first alerts for COVID-19 were issued by the World Health Organization (WHO), with the confirmation of the first infection in Brazil on February 26, 2020[45-47].

Thus, actions to address the oil disaster occurred when the syndemic became the primary demand for health management. This change in focus directly interfered with the rehabilitation and recovery measures of the municipality's fishing and shellfish-gathering communities.

> *[...] It was a very social issue because they could not go to sea for some time. COVID-19 came immediately after, and people forgot about their situation. They went back to sea, and many stayed for months and months, starving. They didn't go hungry because of the staple food baskets we managed to provide. However, many were left with nothing to eat and nothing to feed their children on.*

The COVID-19 syndemic consequences merged with those of the disaster-crime, deteriorating the vulnerable situation of the communities and increasing the inevitable social distancing, food insecurity, illnesses, and deaths in the territories. Another sensitive point was decreased income due to compliance with health recommendations, such as the interruption of fishing and circulation on the beaches, the principal place where their products are sold, which underestimates the living conditions in these communities[19,48,49]. These impacts became even more significant due to the slowness of government management in offering solutions, especially regarding financial and food vulnerability[19,50].

The health-disease process is complex, cross-sectionally incorporated into the stages and social conditions experienced by individuals and communities, considering the simultaneous life dimensions. These interactions result in the social determination of health and highlight the need to observe the singularity and how these populations address the Environment and how it contributes to their subsistence[51,52].

The syndemic context shows that diseases do not occur individually and interact powerfully in the context of socioeconomic inequality, exacerbating their effects, even when the problems occur in isolation, maximizing vulnerabilities[53]. The public authorities' confrontation is necessary and requires State action to strengthen public policies and overcome the logic of historical abandonment and environmental racism[54].

What to do if a disaster strikes again

The experience of working in an event of such magnitude and relevance for public health as the 2019 disaster-crime leads to specific lessons learned and reflections on possible paths if something similar were to occur in the region[20]. The climate change impacts will escalate and expand existing problems in large urban centers, such as heavy rains with flooding, floods, landslides, and the spread of diseases, especially those transmitted by vector mosquitoes[55]. For those interviewed, the importance of ongoing education on disasters was one of the lessons learned.

> *It's training and education. You have to be prepared for this type of disaster.*

> *[...] At the time, there was much training regarding disasters. Continuing Education also worked, and there were UNA-SUS courses, which I remember we signed up for at the time and were made available to professionals as well.*

In a technical report on lessons learned from the 2019/2020 spill, IBAMA also pointed to training as a category chosen by management representatives, mainly involving the PNC[56]. Freitas and Peres show that the lack of preparation for addressing the 2019 disaster-crime placed continuing education from the perspective of disaster risk as a central aspect in debates among managers[57]. A necessary reflection on continuing education in health in Brazil is that this ongoing process has been hampered by professional staff turnover, especially in public health management, where positions are strongly linked to political decisions[20]. Another lesson listed was the relevance of coordinating with fishermen/fisherwomen in the region.

> *[...] During this period, we discovered the fishermen's association because we only knew about the fishermen's colony, and we discovered the fishermen's association at the time of the disaster. Getting to know the workers in the municipality better is also something we learned as a lesson.*

The authors emphasize that it is impossible to produce relevant and priority information on health problems and practices in the fishing territory without the participation of the central subjects of this discussion[58].

While coordination with small-scale fishermen is highlighted as a lesson learned from the

oil disaster, we can observe their invisibility in daily management. Fragile public policies for small-scale fishermen are a historical process that became even more evident in this socioenvironmental disaster since policies targeting traditional communities have been dismantled from 2016 onwards, exacerbating their vulnerability[50].

It is imperative to seek to build resilient communities, investing in socioeconomic development, health, and education to counter this vulnerability. Communities can act as watchdogs, identifying situations that could characterize a disaster early. Working with local administrations, they can develop strategies to prevent these events or minimize their impacts on the territory[59].

Besides the lessons mentioned, the good practices identified were outlined in the table below (*table 2*) to highlight management learnings, those pointed out by managers and those not explicitly stated in the statements but detected by the authors during data analysis. Alves[20] believes these actions conducted prospectively prevented the population from coming into contact with oil, avoiding more significant harm to health, which did not occur in most affected municipalities. This fact highlights the relevance of conducting disaster risk management.

Table 2. Summary of good management practices for addressing the oil spill in a municipality in the RMR, Pernambuco, 2019-2020

• Early preparation, identifying the trajectory of the spilled oil.
• Immediate organization of the Crisis Management Committee.
• Proactive action to develop the Intersectoral Contingency Plan and identify responses developed in other countries affected by other oil spills.
• Coordination with fishermen and shellfish gatherers in the municipality.
• Appreciation and implementation of continuing education actions for professionals in the network to qualify them to act in the event of an oil disaster.
• Development of a protocol for assisting users exposed to the material.
• Implementation of health education actions in the territory.

Source: Prepared by the authors.

Promoting good practices is crucial and is illustrated in *table 2*. Moreover, it is vital to learn from the successful experiences of other countries that have stepped up their efforts and approaches to oil spills after disasters. A notable example is the Deepwater Horizon oil rig disaster, which exploded in 2010 off the Gulf Coast of the United States. In this case, researchers, fishermen, and government agencies are actively involved in understanding this event. This collaboration occurs intersectorally, with government funding supporting research initiatives conducted by several study centers to deepen the understanding of the spill's consequences, especially regarding health, the Environment, and the strengthening of preventive measures[60].

Furthermore, research strengthens active collaboration with the community, enabling it to conduct grassroots surveillance and disseminate information comprehensively on outcomes associated with risks and prevention of future events. Thus, they prepare for effective and rapid responses, requiring an interagency infrastructure and the participation of local stakeholders in environmental monitoring and health surveillance in search of alert models and systems[61]. By observing and understanding the valuable lessons learned from the Brazilian case and other nations, there is much to be done to prevent new environmental disasters

and ensure that responses are conducted as efficiently as possible.

Final considerations

The results indicate that the municipality successfully prevented and protected the population by training its professionals and establishing an intersectoral and interagency network to face the damages of the disaster-crime with evidence-based planning. Joint action with the affected population was a notable strength.

The vulnerabilities identified were the lack of risk and disaster governance, which resulted in the non-systematized measures adopted and the feeling of state and federal governments' negligence towards the municipality. The COVID-19 syndemic and the need to switch the focus of health management hindered rehabilitation and recovery measures for the affected communities, exacerbating the impact on this group.

This issue needs to be discussed continuously and intersectorally on the agenda of health managers. Besides the oil disaster-crime, Brazil has also experienced other disaster situations, such as the collapse of iron ore dams in Brumadinho and Mariana, which resulted in 289 deaths and adverse consequences for the physical and mental health of survivors. These events reveal the lack of preparation of local management in the prevention process and the negligence of the agencies responsible for monitoring such activities.

A fluid institutional network between the different spheres of the health sector is required to support future disaster processes. Given the Brazilian system's universal and decentralized nature, the SUS has the potential for this coordination. To this end, the theme of health service work in the face of disasters should be strengthened within professional training and continuing education.

The main lessons learned include the qualification of professionals to address disasters and the importance of working with fishermen. These lessons show the need to deepen study risk management and healthcare for people exposed to oil. Management can encourage such action with ongoing education and basic university training of new professionals. The results of this research are expected to contribute to future analyses of the regions affected by the spill, national disaster risk management, and the challenges of establishing HSTs in Brazil.

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Collaborators

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