

## Socioenvironmental vulnerabilities in small-scale fishing: challenges and achievements for Healthy and Sustainable Territories in Pernambuco

### *Vulnerabilidades socioambientais na pesca artesanal: desafios e conquistas para Territórios Saudáveis e Sustentáveis em Pernambuco*

Mariana Olívia Santana dos Santos<sup>1,2</sup>, Ana Catarina Leite Vêras Medeiros<sup>1</sup>, Evelyn Siqueira da Silva<sup>1</sup>, Rafaella Miranda Machado<sup>1</sup>, José Erivaldo Gonçalves<sup>1</sup>, Aline do Monte Gurgel<sup>1</sup>, Idê Gomes Dantas Gurgel<sup>1</sup>

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**ABSTRACT** This study adopted a theoretical-methodological perspective anchored in the Ecosystem Approach to Health, the Social Reproduction of Health, and the Social Determinants of Health to analyze the socioenvironmental vulnerability and health of populations exposed to crude oil during the COVID-19 pandemic and present pathways for comprehensive community reparation. We employed action research as a strategy for dialogic interaction with the subjects of the territories and the construction of emancipatory experiences in the struggle for health, the environment, and sustainable development. We presented a general outlook on the social determination of the health of small-scale fishing communities and the promotion of community-institutional dialogues. The results reinforce the need for environmental health studies that combine academic knowledge with the wisdom of water peoples in the pursuit of truth, justice, and reparation. To do so, it is necessary to unveil environmental injustice, racism, and conflicts, engaging in dialogue about the development model and neo-extractivism in society as essential challenges and opportunities for promoting Healthy and Sustainable Territories.

**KEYWORDS** Vulnerability to disasters. Health surveillance. Occupational health. Oil spill. COVID-19.

**RESUMO** Com o objetivo de analisar os processos de vulnerabilização socioambientais e em saúde das populações expostas ao petróleo bruto, no contexto da pandemia de covid-19 e apresentar caminhos para a reparação integral comunitária, este estudo assumiu uma perspectiva teórico-metodológica ancorada na Abordagem Ecológica em Saúde, na Reprodução Social da Saúde e na Determinação Social da Saúde. Recorreu-se à pesquisa-ação como estratégia para a interação dialógica com os sujeitos dos territórios e construção de experiências emancipatórias na luta por saúde, ambiente e desenvolvimento sustentável. Apresenta-se, de forma geral, o processo de determinação social da saúde das comunidades da pesca artesanal, a promoção de interlocuções comunitária-institucional. Os resultados reforçam a necessidade de estudos no campo da saúde ambiental que alie o conhecimento acadêmico e a sabedoria dos povos das águas à busca por verdade, justiça e reparação. Para tal, é necessário desvelar as injustiças ambientais, o racismo ambiental e os conflitos ambientais, dialogando sobre o modelo de desenvolvimento e o neoextrativismo na sociedade, enquanto importantes desafios e oportunidades para promoção de Territórios Saudáveis e Sustentáveis.

**PALAVRAS-CHAVE** Vulnerabilidade a desastres. Vigilância em saúde. Saúde do trabalhador. Derramamento de petróleo. Covid-19.

<sup>1</sup>Fundação Oswaldo Cruz de Pernambuco (Fiocruz Pernambuco), Instituto Aggeu Magalhães (IAM) – Recife (PE), Brasil.  
mariana.santos@fiocruz.br

<sup>2</sup>Universidade Federal do Rio Grande do Norte (UFRN), Departamento de Saúde Coletiva – Natal (RN), Brasil.



## Introduction

The relationship between the environment and human development is at the heart of the Global Agenda for confronting the environmental crisis, particularly the climate crisis, given the consequences imposed by the extractive neoliberal model. Promoting the development of Healthy and Sustainable Territories (HST) depends on understanding territorialized action based on identity and community. Therefore, HSTs are spaces where healthy living is facilitated through community actions promoting social participation and strengthening Black identities and public policies that interact with each other and converge in the territory<sup>1,2</sup>.

In recent decades, summits, conferences, and forums have discussed strategies for promoting HSTs and sustainable development to establish global planning<sup>3</sup>. The 2030 Agenda for Sustainable Development was approved in 2015 and comprises 17 global Sustainable Development Goals (SDGs) with implementation plans until 2030. SDG 14 is related to water life, stressing the need to preserve and sustainably use oceans, seas, and marine resources<sup>3,4</sup>.

However, the SDGs' goals are challenging to achieve even for economically developed countries, as they do not adequately consider the different characteristics and response capacities of each territory<sup>5</sup>, which can result in a limited focus on managing complex issues, depending on actions in the social, economic, political, and environmental dimensions, resulting in a reductionist view of the health-disease process.

Some challenges threaten the conservation of common goods, such as the oceans, due to the harmful effects of accelerated economic growth. They affect the most vulnerable populations, especially in Global South countries<sup>6</sup>. Production processes linked to agricultural and mineral exploration are predominant in these territories, emphasizing oil-related energy matrices, one of the leading causes of these threats<sup>7</sup>.

Over ten major ocean oil disasters have been reported worldwide since the 1970s, making marine ecosystems and fishing populations in these territories materially and symbolically vulnerable.<sup>8</sup> This model's adverse effects directly impact traditional communities' way of life, generating conflicts and reinforcing social injustice<sup>9,10</sup>.

The oil disaster-crime that affected the Northeast in 2019 engendered new injustice and environmental racism, expanding the contexts of vulnerability historically experienced by the fishing population in these territories<sup>10-16</sup>. People's exposure to oil and its derivatives is a severe public health problem, affecting the environment and the health of those exposed, with socioeconomic repercussions<sup>17,18</sup>.

Within this scenario, the COVID-19 syndrome has deteriorated the oil disaster-crime's effects, impacting health, sovereignty, food security, and the guarantee of fundamental rights, aggravating the vulnerability of the affected traditional small-scale fishing communities. These problems were exacerbated by the arrival of people from outside the territories seeking isolation or quarantine, increasing the exposure of small-scale fishermen/fisherwomen to the new coronavirus<sup>10,19,20</sup>.

There is a need to think about the social determination of health, as it is integrated into the social arrangements of life in a broad, complex, and profound sense<sup>21</sup>. It is crucial to reflect on strategies to overcome the vulnerability of small-scale fishing communities, planning comprehensive, territorialized reparation actions, understanding the environment, its socio-ecosystem-based interactions, and their reverberations to preserve life<sup>17</sup>. Building participatory practices integrating communities and social movements is vital for implementing grassroots health surveillance promoting HSTs<sup>2,22,23</sup>.

This article presents the research results entitled 'Promotion of Healthy and Sustainable Territories and Reparation of small-scale Fishing Communities to Overcome

Socioenvironmental Vulnerabilities in the Context of COVID-19 in Pernambuco'. Rather than focusing on the details of each objective achieved, we aimed to make a general presentation, showing how action research allows for diagnoses on determining health, the promotion of community-institutional dialogues, and emancipatory experiences in the fight for health, environment, and development. Furthermore, we managed to identify the challenges and opportunities for promoting HSTs.

## Material and methods

This study was structured using social movements of water peoples and representations of health management, assuming a theoretical-methodological perspective anchored in the Ecosystem Approach to Health (EAH)<sup>24,25</sup>, the Social Reproduction of Health<sup>26</sup>, and the perspective of the Social Determination of Health<sup>21</sup> raised by Latin American critical epidemiology. Action research was used as a strategy for dialogic interaction with the territories' subjects and constructing emancipatory experiences in the fight for HSTs based on a mixed approach, with triangulation of quantitative and qualitative methods<sup>27</sup>. This methodological perspective enables more complete studies and participatory interventions for the

resolution/intervention of socioenvironmental problems.

The research was conducted with 21 researchers from February 2021 to May 2023. At the contextual level of observation, the study area comprised 16 municipalities on the coast of Pernambuco (Cabo de Santo Agostinho, Tamandaré, Ipojuca, Sirinhaém, São José da Coroa Grande, Barreiros, Rio Formoso, Ilha de Itamaracá, Goiana, Itapissuma, Paulista, Jaboatão dos Guararapes, Recife, Olinda, Igarassu, and Abreu e Lima). At the anchoring level, it consisted of the communities of municipalities that received the most significant amount of oil from Cabo de Santo Agostinho, Tamandaré, Ipojuca, Sirinhaém, and São José da Coroa Grande, with a significant representation of fishermen who suffered intense vulnerability resulting from both the crude oil spill and, subsequently, the repercussions on livelihoods caused by the COVID-19 syndemic.

Initially, we performed reconnaissance visits to the territory, participant observation, and meetings to discuss and define actions with local social movements. The study subjects were fishermen, representatives of social movements, and health managers (state and municipal level). The project was implemented considering seven specific objectives with methodological strategies developed during the action research (*table 1*).

Table 1. Project objectives and theoretical-practical-methodological aspects for the construction of Sustainable and Healthy Territories

Objective	Theoretical-practical-methodological aspects for the construction of Sustainable and Healthy Territories
Objective 1 – Characterize the population and the territory studied per sociodemographic, epidemiological, occupational, and environmental characteristics	– Cross-sectional observational epidemiological study, targeting small-scale fishing workers from 16 municipalities on the coast of Pernambuco, registered by the Secretariat of Environment and Sustainability (SEMAS) and distributed across 27 fishing colonies or associations. Data was collected via a structured questionnaire divided into 14 blocks and administered by trained interviewers using the Fiocruz HcMaps digital application. A final sample of 1,259 small-scale fishermen was obtained from the population of 12,472 fishermen, considering a 40% prevalence of health effects after oil exposure and a 4% error, proportionality by sex and region of residence and the inclusion criteria – being over 18, being a small-scale fisherman, active during the oil spill, and being registered in the SEMAS spreadsheet, and exclusion from the study – fishermen away from work at the time of the oil spill; death; neurological or psychiatric condition that hinders participation in the research; refusal, not responding to invitations, and not attending on the day of the interview. Descriptive statistics were used for analysis, by relative frequency distribution and measure of central tendency – mean.
Objective 2 – Identify the contexts of socio-environmental vulnerabilities related to exposure to crude oil and the COVID-19 pandemic in the study territories	– Review studies on the relationship between the production process and the illness of Brazilian small-scale fisherwomen; documentary research to characterize socio-environmental conflicts and health impacts resulting from oil using the method proposed by the Global Environmental Justice Atlas (EJAtlas). Open access documents made available by governmental and non-governmental organizations and publications from newspapers were analyzed; descriptive-analytical study of socio-environmental vulnerabilities in the oil disaster and the COVID-19 syndemic. For the descriptive-analytical study of socio-environmental vulnerabilities, the theoretical-methodological approach of social reproduction and health was used through an analysis matrix that represents the interrelationship and interdependence of reproductions in the Biocommunal, Consciousness and Conduct, Technoeconomic, Political, and Ecological dimensions.
Objective 3 – Identify early metabolic changes and the effect biomarkers related to exposure to environmental contaminants in oil-affected areas	– Environmental exposure assessment study to identify exposure indicators and effects on the bodies of fishermen in the municipalities most affected by the arrival of oil (Cabo de Santo Agostinho, Ipojuca, Sirinhaém, and Tamandaré). Venous blood samples were collected from 102 fishermen who had direct or indirect contact with oil in order to analyze biomarkers of oxidative stress, such as malondialdehyde (MDA), catalase and glutathione. After collection, the samples were stored in an ultra-freezer at -80 °C until analysis. The MDA samples were analyzed per standard operating protocol provided by Fiocruz-RJ using blood plasma. They were analyzed in triplicate using a spectrophotometric method and the absorbances were recorded. The MDA concentrations were calculated using a calibration curve generated from a commercial MDA standard, with $R^2=0.97$ .
Objective 4 – Analyze the subjects' perceptions about the dangers and damage to health and the environment resulting from the socio-health, environmental, and economic impacts of the crude oil spill	– Participatory Mapping: developed on the southern coast with people affected by the disaster-crime, in three stages: 1) pre-cartographic: prior visits for diagnosis, identification and coordination with community leaders; 2) cartographic: construction of social maps; 3) systematization and validation: data sorting and verification of internal coherence of the identified processes. The statements captured were analyzed based on the health, environment and socioeconomic thematic dimensions deriving from the participating subgroups and based on the Collective Subject Discourse; – Rapid Participatory Diagnosis: based on workshops and focus groups, a work flowchart was constructed to describe the small-scale fishing work process stages based on a semi-structured roadmap with questions related to stages of the work process; best time for fishing; travel means; resting time; meals; fish processing; work positive aspects; income; autonomy and dignity; and life-promoting aspects. Afterwards, the team experienced the work of the fisherwomen through ethnography, recording the information in a field diary and using audiovisual resources. Data were organized in the Critical Process Matrix based on critical epidemiology, characterizing the protective and destructive health processes, which are expressed in the dialectical movement in the general, particular, and singular domains. The results were systematized seeking to disseminate them with broad access, such as the booklet 'Water women's health' and the documentary 'The sea that lives in me'.
Objective 5 – Analyze and develop action research to structure the comprehensive community repair of health and living conditions in the territories of affected communities	– Participatory Action Research (PAR) through culture circles, a methodology that includes investigative methods, educational techniques and political action. It was conducted in Cabo de Santo Agostinho, in a community identified based on context analysis, documents with notifications about the oil disaster, the health-disease process and considering the listening of organizations and social movements. It involved two processes: a socio-environmental diagnosis and the matrix of demands for reparation, which were performed grounded on documentary analysis; epidemiological survey, field diary records, systematization of data on vulnerability to environmental risks and health conditions.

Table 1. Project objectives and theoretical-practical-methodological aspects for the construction of Sustainable and Healthy Territories

Objective	Theoretical-practical-methodological aspects for the construction of Sustainable and Healthy Territories
Objective 6 – Understand socio-technical vulnerabilities related to the care production process for those exposed during beach cleaning and strengthen PHC care lines in the territories	<ul style="list-style-type: none"> <li>- Scoping Review on oil disaster-crimes – Conducted in Bireme, LILACS, SciELO, PubMed, Cochrane Library and Embase, articles published from 1973 to 2021. The search resulted in 22 articles on 10 oil disasters around the world on three continents (Asia, America, and Europe), whose causes were grounding (3), shipwreck (1), collision (2), spill (3), and explosion (1). The actions developed were intersectoral, economic, environmental and health-related;</li> <li>- Investigation of the guidelines and actions developed by health management in addressing the 2019 oil disaster: an exploratory case study. Semi-structured interviews were conducted with 16 managers from the municipal and state health secretariats of Pernambuco. The analysis of the collective subject discourse revealed five thematic axes: managers' perception of the impacts of the oil disaster-crime in the territory, actions developed to mitigate the disaster's impacts, hardships endured by managers in the disaster mitigation process, evaluation of health management actions in the disaster's context, and preparation for future disasters;</li> <li>- Descriptive case study with a qualitative approach in a municipality. Content Analysis was performed using the IRaMuTeQ software of interviews with health managers, whose results revealed four categories: municipal management in attention to the sea; disaster risk governance and its absence; COVID-19 syndemic and impacts on the rehabilitation and recovery of communities affected by the oil disaster; and what to do if a disaster happens again.</li> </ul>
Objective 7 – Building strategies for the production of social technologies from an intersectoral perspective for Popular Health Surveillance	<ul style="list-style-type: none"> <li>- Analysis of the media discourse on the oil spill in the state based on documentary research with data from the Brazilian Institute of the Environment (IBAMA) and articles published by Jornal do Comércio (JC);</li> <li>- Formation of a communications, education, culture and health committee with representatives of social movements in the territories and a research team to methodologically conduct this objective;</li> <li>- Conducting training processes with different stakeholders such as health managers, social movements, community leaders and postgraduate students.</li> <li>- The conflicts raised in the characterization of Objective 2 were systematized and published in the EJAAtlas, whose objective is to support populations and groups affected by unsustainable and health-damaging projects and policies. The EJAAtlas maps environmental conflicts in locations around the world and allows collaboration in the identification and characterization of conflicts;</li> <li>- In conjunction with the research and the other objectives, different communication and training strategies were developed for participatory and community surveillance. Printed and digital information materials were produced, including health and environmental protocols, collaboration in the development of case reporting strategies, photos, booklets, posters, cards, press releases, and maps. Training processes such as courses, workshops, discussion groups and seminars were performed to promote the debate on access to information. The production of scientific articles, book chapters, dissertations, theses, and participation in congresses, round tables and conferences were also relevant constructions of these moments;</li> <li>- To create the photographic exhibition, a photography competition was staged with the production of digital photos taken by the community itself on themes that promote visibility of the realities of water peoples during the disaster-crime;</li> <li>- A website is being developed to systematize all of these materials. It will function as a project portfolio and will disseminate all the results. It is a way of sharing data and information on the productions of the water peoples and the project members.</li> </ul>

Source: Own elaboration, 2024.

Concerning the quantitative approach, an epidemiological survey was conducted in 27 colonies/associations in the 16 municipalities, with the application of a questionnaire structured in 14 blocks related to oil exposure, health, income, quality of life, COVID-19, and mental health aspects, in a sample of 1,259 fishermen registered in the spreadsheet of the Environment and Sustainability Secretariat<sup>28</sup>. Afterward, 102 blood samples were collected from a subsample of the survey participants to assess environmental and occupational exposure to oil, following the criteria of longer exposure time in the territories

with the most considerable amount of oil collected (Cabo de Santo Agostinho, Ipojuca, Sirinhaém, and Tamandaré) to assess early exposure and effect indicators.

Participatory techniques, such as mapping, culture circles, focus groups, workshops, ethnographic experiences, rapid participatory diagnosis, individual interviews, and field diaries, were used in the qualitative approach. Literature review and documentary research in different databases were employed as secondary data. Communication/intervention-training-action strategies were produced in

a procedural and participatory way through workshops, documentaries, booklets, opinions, dialogue circles, seminars, and training.

A matrix was structured to systematize the objectives, the respective methods, and the results from the reading of all the results and products of the action research, which were analyzed according to the following categories: popular-institutional dialogues; emancipatory experiences in the fight for health; environment and sustainable development; sustainable development objectives; challenges and opportunities for promoting HSTs.

This study was approved by the Research Ethics Committee of the Aggeu Magalhães Institute of the Oswaldo Cruz Foundation under the Certificate of Presentation of Ethical Appreciation – CAAE n° 25398119.9.0000.5190 and Opinion N° 5.037.340.

## Results and discussion

The 2019 oil disaster-crime profoundly affected small-scale fishing communities in the social, environmental, economic, biological and cultural dimensions, with a knock-on effect on the lives of the communities, which suffered from the COVID-19 syndemic impact associated with the several barriers to access to the Unified Health System (SUS). The different aspects of vulnerability suffered are shown in *table 2*.

Table 2. Main results of action research by objective, popular-institutional dialogue, and emancipatory experiences in the fight for health, environment, and sustainable development

Obj.	Main results	Popular-institutional dialogue	Emancipatory experiences
1	Epidemiological study: socioeconomic characteristics: mean of 46 years, mostly female, self-declared Black or brown; married/common-law marriage; low schooling level and insufficient monthly income for family survival; work: began working in fishing, on average, at 14, mean fishing working time of 32 years, no fixed working hours, some worked in other activities to supplement their income and although they reported using Personal Protective Equipment (PPE), this equipment was often improvised; health: just over half reported worse or much worse health, compared to a year earlier, with cardiovascular, respiratory, endocrine, and arbovirus diseases. Most reported not having had COVID-19, but some had not been tested; impacts of the oil disaster-crime: it impacted the lives, income, and harmed the environment, with mobilization for support being done by volunteers or community organizations. They reported that their fishing equipment became dirty with oil and that they had to stop fishing, some for more than 30 days. They did not receive government financial support or staple food baskets and had to consume what they caught. In healthcare, around 70% of the workers found oil while working and some of these workers had contact with their skin but did not seek medical care. Around a third of them participated in the cleanup of oil residues even without any training. Some parts of the body were exposed and displayed symptoms such as severe headaches and joint pain, insomnia, and burning eyes. Around half of the workers met the diagnostic criteria for Post-Traumatic Stress Disorder (PTSD).	<ul style="list-style-type: none"> <li>- Social movements: Fishermen's colonies and associations, Pastoral Fisheries Council (CPP), National Coordination of Small-scale Fisherwomen (ANP), Suape Forum</li> <li>- Education institutions: Federal University of Bahia (UFBA), University of North Carolina (UNC), Federal University of Pernambuco (UFPE)</li> <li>- Municipal Health Secretariats (SMS) (RAS); Health Surveillance, Primary Care, and Family Health teams (eSF)</li> </ul>	<ul style="list-style-type: none"> <li>- Health cards for small-scale fishing workers delivered to traditional fishermen/fisherwomen;</li> <li>- International course on the impacts of the oil spill in Brazil: intersectoral coping strategies in the community context;</li> <li>- Health actions conducted with health teams.</li> </ul>

Table 2. Main results of action research by objective, popular-institutional dialogue, and emancipatory experiences in the fight for health, environment, and sustainable development

Obj.	Main results	Popular-institutional dialogue	Emancipatory experiences
2	<p>Review: substandard working conditions involving inhospitable and polluted fishing sites, physical overload, inadequate postures and strenuous work rhythms. High prevalence of Musculoskeletal Disorders, Repetitive Strain Injuries, and Work-Related Musculoskeletal Diseases.</p> <p>Mapping: characterization of the oil spill and identification of the socioeconomic, health and environmental impacts that were published in the EJAtlas. Social reproduction matrix – biocommunal: improvised or inadequate PPE used in oil clean-up; possibility of physical illness; cases of PTSD; food insecurity and COVID-19 syndemic; self-awareness and conduct: organizations and solidarity networks affected, with cultural and symbolic territorial transformations and ruptures; technical-economic: impact on tourism; fishing ban, unemployment, and livelihood insecurity.</p> <p>Ecological: several damages to the ecosystems of the affected territories; political: weak government mitigation response, lack of plans to address tragedies and policies to support small-scale fishing. As a result, increased vulnerability of water people was evidenced, influencing the social determination of the health-disease process; the unsustainability of the current development model, and the need for remedial measures in oil spill disasters.</p>	<ul style="list-style-type: none"> <li>– Social movements: Fishermen’s colonies and associations, CPP, ANP, Suape Forum</li> <li>– Education institutions: UFBA, UNC, UFPE, Institute of Environmental Science and Technology of the Autonomous University of Barcelona (ICTA-UAB)</li> <li>– SMS (RAS): Health Surveillance, PHC, and eSF</li> </ul>	<ul style="list-style-type: none"> <li>– Description of socioenvironmental conflicts in the northeastern macro context;</li> <li>– Structuring research based on ecosystem approaches in health;</li> <li>– Support the development of a pilot project for intervention in municipal health management;</li> <li>– Promote training processes on the health issues of water peoples.</li> </ul>
3	<p>Metabolic alterations: mean concentrations of malondialdehyde (MDA) (in <math>\mu\text{M}</math>) by municipality: Tamandaré=8.7; Cabo de Santo Agostinho=20.2; Porto de Galinhas=9.3; Barra de Sirinhaém=11.6. These results are well above the reference values of 3.31 <math>\mu\text{M}</math>. Despite this, this phenomenon cannot be attributed solely to exposure to oil, since this same population is exposed to other conditions that can alter enzymes such as MDA.</p>	<ul style="list-style-type: none"> <li>– Social movements: Fishermen’s colonies and associations</li> <li>– Education institutions: UFBA, UFPE, UNC, Catholic University of Pernambuco (UNICAP)</li> <li>– SMS: Health Surveillance, PHC</li> </ul>	<ul style="list-style-type: none"> <li>– Feedback on exams for ESF and participants;</li> <li>– Strengthening of laboratory surveillance;</li> <li>– ESF training;</li> <li>– Basis for studies and creation of protocols for care and monitoring of fishermen’s health.</li> </ul>
4	<p>Participatory Mapping: health: symptoms of poisoning, mental distress, lack of knowledge of the impacts and late use of PPE, mostly inadequate, for cleaning the beaches, and lack of a monitoring plan for those exposed; environment: pollution throughout the region, impact on fish sales and consumption by the population, government’s inertia; socioeconomic: government’s negligence towards more impoverished areas, environmental racism, lack of media coverage of discussions on socioenvironmental and health vulnerabilities, impacts on income, with a severe reduction in sales and low coverage of state financial aid. Rapid Participatory Diagnosis: destructive processes in the General domain, socioenvironmental injustice and vulnerabilities such as the economic development model, the Suape Port Industrial Complex, the 2019 oil disaster-crime, the COVID-19 syndemic, difficulty in accessing public policies, loss of local biodiversity and real estate speculation in the region; in particular, exhausting working hours and work overload, use of rudimentary equipment and tools for work and storage, low-cost product marketing, generating the need for supplementary income, and unequal gender, class, and race relationships; in the singular, physical and mental illnesses and deaths. The study highlighted central issues, giving visibility to the reality of water women.</p>	<ul style="list-style-type: none"> <li>– Social movements: Fishermen’s colonies and associations, CPP, ANP, CPP, Suape Forum, Center for Comprehensive Care and Development (CADI), Anglican Church of Gaibu, ‘All to the Sea’ women’s group (TPM).</li> </ul>	<ul style="list-style-type: none"> <li>– Collective construction of social maps about the impacts;</li> <li>– Appreciation of the work and way of life of water women;</li> <li>– Promotion of health care moments (medical care and integrative and complementary practices);</li> <li>– ‘Water Women’s Health’ booklet;</li> <li>– Documentary about the work process of shellfish gatherers on the southern coast of PE;</li> <li>– Film debates in the territory, education institutions, and festivals.</li> </ul>

Table 2. Main results of action research by objective, popular-institutional dialogue, and emancipatory experiences in the fight for health, environment, and sustainable development

Obj. Main results	Popular-institutional dialogue	Emancipatory experiences
5 Structuring processes for comprehensive community reparation of health and living conditions in the territories: the measures taken have been incipient since the incident in 2019, and urgent actions are needed to restore the dignity of these populations. Rehabilitation: declare a state of emergency; adopt urgent health measures (assistance and monitoring); investigate and monitor people affected by the spill; provide specialized and equitable care for fishermen; promote mental health care. Restitution: develop research and ongoing monitoring to restore the territory's biodiversity and fishing territory. Compensation: emergency benefit for the spill; guarantee of social assistance benefits; government incentives for income generation. Satisfaction measures: create and guarantee the functioning of the Permanent Monitoring and Action Committee to address spills with the participation of small-scale fishermen; media visibility. Non-repetition guarantee: ensure compliance with environmental laws and hold those responsible for the spill accountable.	<ul style="list-style-type: none"> <li>- Social movements: Fishermen's colonies and associations, CPP, ANP, CPP, Suape Forum, CADI, Anglican Church of Gaibu, and TPM.</li> </ul>	<ul style="list-style-type: none"> <li>- Culture circles;</li> <li>- Promotion of a moment to receive and listen to participants;</li> <li>- Matrix of Critical Processes of the social determination of health;</li> <li>- Care with integrative and popular practices in health.</li> </ul>
6 Review studies: criticisms of the control, mitigation, or prevention of immediate and future damage resulting from disasters, which is an open agenda for social movements in the fight to guarantee a healthy and sustainable environment. Actions to address oil disasters in different countries appear to have been incipient, revealing government incapacity in the face of these situations. Interviews: health management weaknesses (at the state and municipal levels) in disaster mitigating actions, resulting from the lack of preparation of health services and professionals. The lack of instruments and the lack of coordination between federated entities escalated the difficulties, generating disastrous situations in the territory. There is a need to build instruments that guide more efficient and effective actions in these situations. The municipality analyzed had advance organization of the actions to confront the disaster, but the lack of governance in the disaster-crime and the focus of health management on the COVID-19 syndemic were highlighted as difficulties and vulnerabilities in the actions. Continuing education and coordination with fishermen and shellfish gatherers were some of the lessons learned.	<ul style="list-style-type: none"> <li>- Social movements: Fishermen's colonies and associations</li> <li>- Education institutions: UFBA, UFPE, CEPEDES/ENSP Fiocruz-RJ</li> <li>- State and Municipal Health Secretariats: Health Surveillance, PHC, and health teams</li> <li>- State Workers' Health Network: State and regional worker health center</li> <li>- Ministry of Fisheries</li> </ul>	<ul style="list-style-type: none"> <li>- 'Waters' Health' Intervention Project: pilot project for a health program for water people in partnership with a SMS and small-scale social movements;</li> <li>- Continuing education plan built from health needs;</li> <li>- Technical cooperation agreement between Fiocruz and the Ministry of Fisheries.</li> </ul>
7 A timeline was created linking the arrival of oil on the newspaper articles, analyzing the narratives considering the environmental, socioeconomic and health impacts, where health topic had low visibility of the damage, making it necessary to think about communication practices. Training and popular strengthening processes: Free course on community communication for healthy and sustainable territories; international course on the oil spill impacts in Brazil: intersectoral coping strategies in the community context; course for popular water health workers; workshop on partial results with the small-scale fishing social movement; workshops on the Rural, Forest, and Water Health Policy with health workers; continuing education workshop on water people's health; creation of 'Among Us: Network of Popular Communicators'; health cards for small-scale fishing workers; rapid participatory diagnosis/work flowchart; 'Seminar on the Oil Disaster-Crime on the Coast of Pernambuco and the Water People's Health'. Academic and scientific dissemination materials: recording and publishing of conflicts in EJAtlas; production of the documentary 'The Sea that lives in me'; poetry - 'Nameless stain that doesn't go away'; photography contest 'I who inhabit the sea'; 'Water Women's Health' booklet; production of four published scientific articles, three book chapters in press, three course completion monographs, 10 master's dissertations, and four doctoral theses in public health, eight submitted articles,	<ul style="list-style-type: none"> <li>Social movements: Fishermen's colonies and associations, CPP, ANP, Suape Forum, Community Communicators Network, Cabo de Santo Agostinho Women's Center, Anglican Church of Gaibu, CADI, TPM</li> <li>- Education institutions (UFBA, UNC, UFPE, and ICTA-UAB)</li> <li>- Municipal Health Secretariats (RAS): Health Surveillance, Primary Care</li> <li>- Regional and State CERESTS</li> <li>- National and international education institutions</li> <li>- Ministry of Fisheries</li> </ul>	<ul style="list-style-type: none"> <li>- Conducting training processes in the communities</li> <li>- Publishing conflicts on the EJAtlas platform;</li> <li>- Creating a network of popular communicators;</li> <li>- Conducting courses organized collaboratively with social movements;</li> <li>- Conducting workshops and seminars to disseminate results and developing strategies to improve the health of water peoples;</li> <li>- Producing materials collaboratively with different social stakeholders.</li> </ul>



Table 2. Main results of action research by objective, popular-institutional dialogue, and emancipatory experiences in the fight for health, environment, and sustainable development

Obj. Main results	Popular-institutional dialogue	Emancipatory experiences
one book in preparation with results of the project; technical report 'Analysis of the inclusion of health in the Environmental Impact Study of ExxonMobil – Offshore Drilling of Oil Wells in the Sergipe/Alagoas Basin'; technical document 'General recommendations for the health sector in risk management in crude oil spill contexts'; continuing health education plan for health professionals and managers focusing on Water People; 'The Pernambuco Charter' and virtual platform for publishing the products and results of the project on the institutional website.		

Source: Own elaboration, 2024.

## Overview with main action research results

Crude oil hit the entire coastline of the Northeast region, devastating the lives of thousands of small-scale fishermen and causing negative impacts on fauna and flora, and triggering several vulnerability events, which significantly affected the living conditions, health, the environment, the economy, and the social reproduction of this population. Oil has resurged in several locations after all these years<sup>12,16</sup>. Fishermen reported environmental damage due to oil permeating vegetation, mangrove mud, marine animals, and coral reefs. Given the magnitude of the event and the difficulties experienced, they believed that another disaster was imminent. Socioeconomic repercussions and interrupted fishing activities<sup>13,29</sup> occurred even in municipalities with few or no oil sightings.

Communities that were socioeconomically dependent on the marine ecosystem struggled to adapt to the reality imposed by the disaster, as they had fewer tools to react to the changes and lower physical, financial, and human capital<sup>30,31</sup>.

Many fishermen were away from work for more than 30 days. They faced hardships in receiving financial assistance and staple food baskets, which directly affected the income of these communities, compromising food sovereignty and security. The disaster-crime

damaged a traditional structure of community economic organization around small-scale fishing<sup>10,12,13,15,29,32</sup>. During the disaster-crime, fishermen were exposed to oil while fishing, collecting the produce, handling contaminated instruments and animals, and consuming the fish retained due to the difficulty in selling it.

Concerning health, many fishermen were unaware of the oil impacts, leading to exposure and poisoning. Personal Protective Equipment (PPE) was not used initially, was inadequate, or was even inappropriately used. Most of those who participated in the cleanup of oil residues did so without training.

The ocular and inhalation mucosa were exposed and there was dermal contact with the oil, generating irritation, redness, burning in the eyes, insomnia, headaches, joint pain, and Post-Traumatic Stress Disorder (PTSD), as mentioned in other studies<sup>10,18</sup>.

When analyzing the government's actions to manage the disaster-related damages, it became clear that the government was inactive or inert, neglecting the impact on the lives of fishermen/fisherwomen. The government's actions focused strictly on financial compensation, which was insufficient because it limited the benefit to those who had the General Fishing Registry, the issuance of which had been interrupted for years, and because it historically excluded women. It was also limited to the presence of oil for the eligibility of municipalities. Community support

actions were conducted mainly by volunteers and organizations from the communities<sup>19,33,34</sup>. There was little visibility in the media, with a failure to listen to the affected people and traditional communities<sup>10,30</sup>.

The research highlighted the lack of action in most municipalities in health activities, with failures in the coordination of care and surveillance, revealing a lack of preparation of professionals to act in disaster situations and public health emergencies<sup>35</sup>. Furthermore, we observed scattered initiatives of care, surveillance, and healthcare, most of which were taken up belatedly by state and municipal managers and occurred in other countries with oil spills<sup>8</sup>. In this context, only one of the municipalities created an advance action plan despite the lack of support from the federal sphere.

We also observed pre-existing vulnerability in the territories, permeated by gender, class, and race issues<sup>36</sup>. Working conditions are precarious, with rudimentary work tools and equipment, long working hours, and overload due to the fish's low added value<sup>36-38</sup>. Several fishermen reported that their health was worse or much worse than the previous year, with cardiovascular, respiratory, endocrine, and arbovirus diseases.

In 2020, subsuming these processes, they were revictimized in the face of late and disjointed government action, besides the global public health emergency from the COVID-19 syndemic. A state ban on marine animal capture sites was even adopted as a preventive measure against contamination by the virus during social distancing, prolonging losses and economic harm<sup>19,20</sup>. We see an outlook with different health problems, which are compounded and increase the burden of diseases and are exacerbated by socioenvironmental vulnerabilities, aggravating problems in the territory and configuring a syndemic<sup>20,39,40</sup>.

We observed a fragile bond and belonging to the primary health units, resulting in the low demand for health services during and after the oil disaster crime. This was primarily due to the distance between the professionals and

the social reality of the population<sup>41</sup>, which harmed the notifications of poisoning cases and the understanding of issues associated with the disaster crime.

### **Popular-institutional dialogue and emancipatory experiences in the fight for health, environment, and sustainable development: potential for HSTs**

Activities were developed in the context of social, health, and environmental issues, implying constructing a fieldwork plan that considers the overlapping of vulnerabilities and socioenvironmental injustice associated with the oil spill and the COVID-19 syndemic. In these circumstances, collective constructions and knowledge exchanges between the work team and interagency workers were fundamental to understanding the social reality and the collective search for emancipatory alternatives targeting community reparation.

Several spaces for sharing knowledge about the affected territory were considered while developing the project, valuing the participation of social fishing movements, non-governmental organizations, educational and research and SUS institutions, management, and professionals of the Health Care Network (RAS), mainly Primary Health Care and health surveillance, given the importance of working in the territories. The popular institutional coordination generated is crucial in strengthening and expanding the struggles to construct HSTs and strengthen the SUS.

These discussions highlight the importance of exchanging and valuing the knowledge of those involved, giving voice and visibility to small-scale fishermen/fisherwomen, and enabling broader debates on the intersections of gender, class, and race. This action corresponds to a participatory research perspective that seeks to generate changes in the territories, an essential characteristic of action research<sup>22</sup>.

The production and use of audiovisual languages within the project – such as the booklet

‘Water Women’s Health’, the documentary ‘The Sea that Lives in Me’, the activities of the course ‘Free Community Communication for Healthy and Sustainable Territories’, and virtual platforms, such as the ‘Atlas of Environmental Justice’ (EJAtlas) – broadened the discussion, in an accessible way to different audiences, which renewed knowledge production methodologies targeting social transformation through interdisciplinary and intercultural coordination actions and dialogues, in a logic of resistance to the oppression of capitalism, colonialism, and patriarchy<sup>42</sup>.

Participatory strategies, such as creating and implementing the ‘health card for small-scale fishing workers’, were developed with social movements and small-scale fishermen. They reinforced the need for care, greater knowledge about their health conditions, and exchange with regional health teams. Other strategies developed in some Municipal Health Secretariats (SMS) involving the RAS, SUS managers and workers, were healthcare and education actions and the ‘Water Health Intervention Project’, which enabled dialogues and care offers, besides strengthening management performance with the creation of continuing education plan based on the health needs of fishermen and community training. These practices are highly relevant to raising the awareness of service professionals regarding the needs of the territories of small-scale fishing communities<sup>41</sup> and reinforce the importance of responsibility, especially of PHC, as the care organizer.

The presence of an interdisciplinary research group enabled the development of differentiated care practices, such as the use of Integrative and Complementary Health Practices (PICS), underscoring the relevance of research using this approach. Academic practices in health and SUS management must contribute to understanding the particularities of communities, the effects on the environment, and the life reproduction conditions of traditional peoples and groups. Thus, it is possible to address the problems associated with capitalism, racist

colonialism, and heteropatriarchy, which mainly affect the Global South<sup>43</sup>.

Coordination also expanded knowledge and exchange with other research and teaching institutions, enhanced by the participation of social movements and health teams, with experience and reflection based on the territories and reality of these traditional communities.

In this sense, the ‘International course on the oil spill impacts in Brazil: intersectoral coping strategies in the community context’, the continuing education activities with Family Health teams (eSF) from some municipalities participating in the research, the documentary’s film debate, the workshops for methodological organization and presentation of the results, the ‘Seminar on the Oil Disaster-Crime on the Pernambuco Coast and Water People’s Health’, the production of diagnoses and technical opinions on collective health at the request of social movements, the participation of representatives of the movements and health management in defense panels for academic works linked to the project, and the use of differentiated methodologies were crucial strategies, enabling reality-based actions<sup>44</sup>.

The perspective of popular health surveillance materialized from the encouragement of fishermen’s participation in order to strengthen the popular organization and the incidence of subjects to overcome socio-environmental and health vulnerabilities<sup>20</sup>. Other emancipatory practices were developed, such as free courses for popular water health workers and community communication for HSTs, the creation of ‘Between us: popular network communicators’, the contribution to holding the Free Conference on the Health of Water Peoples and the production of the ‘Pernambuco Charter’, which resulted from collective construction and shares recommendations to be implemented in government agendas based on the vulnerability of small-scale fishing territories in Pernambuco, in order to promote, protect, and care for the health and lives of these people and prevent future associated events.

## Challenges for achieving HSTs in small-scale fishing communities

The material and symbolic losses resulting from the vulnerability, exacerbated by the oil disaster-crime and the COVID-19 syndemic, bring about the need for investments and organization of the different government sectors in effective reparation actions<sup>33,39,40</sup>. Coordinated actions between the State and the affected communities are required to strengthen territorial sovereignty and preservation, ensuring sustainability for individuals and the environment for an inclusive, safe, healthy, and sustainable territory<sup>21,45</sup>. The implementation and strengthening of reparation strategies that focus on the dimensions of compensation, rehabilitation of damages, satisfaction measures, and promotion of guarantees of non-repetition of violations are essential in these contexts of inequalities and socioenvironmental vulnerabilities<sup>33,34,46</sup>.

Risk management involving the oil disaster-crime is insufficiently structured in the Brazilian context, with insufficient investment in risk and capacity assessments, territorial surveillance, planning of prior and immediate actions, preparation of different emergency teams for response and health services, and health sector representation in disaster risk management<sup>8,34,35,47</sup>.

There is a need for a health system capable of operating in these territories, with a vision close to the reality of these communities, understanding social reproduction and social determination of health and their vulnerability. Ensuring the right to health of these populations is a challenge for public health, especially when considering the occupational health surveillance<sup>36</sup>. Therefore, we underscore the relevance of implementing training processes such as continuing education in health, in which the reality of the territory in which professionals work is considered, in order to interfere in the change of work processes, broaden understanding of health, facilitate the overcoming of the challenges of quality in the

healthcare provided, and qualify professionals to act based on their working context<sup>44</sup>.

Health practices must encourage social participation and consider the voice of those involved in the health-disease-care complex, incorporating popular knowledge in gathering technical knowledge from academia and the State's demands with popular needs in a contextualized and participatory fashion. In this context, they need to involve the stakeholders and authors in their decisive processes of preserving life and confronting the vicissitudes that arise from environmental, social and health injustice subsidized by capital and advances in the small-scale fishing territories.

Furthermore, its most significant incidence is at the societal level, affecting other dimensions of life and overdetermining political and health actions that reflect and imply the power of transformation in communities. The free conference on water peoples' health was an example of coordination and reinforcement of struggles involving federal, state, and municipal government entities, with the participation of social movements and individuals in educational and research institutions and other non-governmental organizations<sup>48</sup>.

Small-scale fishermen should participate more in class organizations and social movements and strengthen the dialogue between social movements and the fight for healthier and more sustainable territories. This would reinforce the guarantee of rights established in the National Rural, Forest, and Waters Comprehensive Health Policy (PNSICFA)<sup>49</sup> and enable the protection of small-scale fishing territories<sup>36</sup>.

Other diagnoses should be structured to promote actions to care for and promote the health of small-scale fishing communities, associating the most visible communication practices, especially in disasters and public health emergencies. The media should consider the voices of the territory's subjects, confronting the model that predominantly considers institutional voices, characterized by a communication practice limited to the

transfer of information, belittling the population's knowledge and skills<sup>50</sup>.

By understanding communication as an instrument of denunciation in the face of inequalities and constant violations of rights experienced by small-scale fishing communities, the research revealed the need to develop strategies using emancipatory theoretical-methodological perspectives, such as popular education, the pedagogy of alternation<sup>51</sup>, and popular and community communication<sup>52</sup>, promoting diverse voices and enabling the story of the disaster-crime to be told by the people who first witnessed the arrival of the oil, and who also took to the sea to clean up and protect this ecosystem: the small-scale fishermen, as seen in the photos of the photography competition 'I who inhabit the sea', held to make visible the fishermen's perspective on the disaster-crime.

The aim is to expand dialogue and access to all audiences and give greater visibility to these communities, which creates a virtual platform to act as a repository of information on studies carried out in fishing territories and their respective developments. All these strategies can inspire innovative co-presence, co-creation, and co-production practices, which seek to renew knowledge production methodologies aimed at social transformation, providing new ways of circulating information<sup>42</sup>.

## Final considerations

The activities developed facilitated the establishment of a bond with the territory, familiarizing with the subjects and promoting healthcare movements focusing on quality of life and community empowerment to foster sustainable development among small-scale fishing workers. Despite the challenges to their implementation, we showed the importance of establishing popular institutional coordination, whether with social movements, non-governmental organizations, SUS, or teaching and research institutions.

The oil disaster-crime caused distress, impunity, and fear of a repeat of the incident among those most affected. This fear reinforces the desire to strengthen the social organization of the water peoples in search of justice and implement public policies targeting these communities, combining academic knowledge with the wisdom of the water peoples in the search for truth, justice, and reparation. It is crucial to strengthen the PNSICFA and establish it as a management priority, considering the relevance of traditional communities for the country's food sovereignty and respecting their ways of life.

Furthermore, it is necessary to develop more studies that make socio-environmental injustices and racism visible to discuss the development model and extractivism/neo-extractivism, using participatory methodologies, to promote HSTs. To this end, it is necessary to develop actions within the scope of strengthening, deepening, and qualifying the political influence of these communities with the formation of new leaders, particularly young people.

Promoting, valuing, and qualifying managers and professionals in the health sector is also necessary. Strengthening PHC and health surveillance and respecting social participation in the SUS is also essential. It is vital to have popular, community, and equitable communication that encompasses all the accents, colors, and stories expressed in Brazilian diversity to ensure participation.

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## Collaborators

Santos MOS (0000-0002-2129-2335)\*, Medeiros ACLV (0000-0001-7093-9556)\*, Silva ES (0000-0003-4367-9263)\*, Machado RM (0000-0002-0365-9834)\*, Gonçalves JE (0000-0003-1311-7550)\*, Gurgel AM (0000-0002-5981-3597)\*, and Gurgel IGD (0000-0002-2958-683X)\* contributed equally to the design, data collection, analysis and interpretation, and the final manuscript version's drafting and approval. ■

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\*Orcid (Open Researcher and Contributor ID).

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