



An Interpretative Phenomenological Study of Environmental Harm and Health Adaptation Among Coastal Community Members in Indonesia

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ABSTRACT

Environmental health research increasingly recognizes the social and psychological dimensions of pollution, particularly in communities exposed to long-term industrial activity. In coastal areas, residents face not only physical risks but also cultural and emotional disruptions caused by environmental degradation. However, little is known about how individuals subjectively experience and make sense of these conditions in their daily lives. This study asks: how do coastal community members interpret and respond to the impacts of industrial pollution on their health and well-being? Using an interpretative phenomenological approach, this study explores the lived experiences of affected individuals to uncover the meanings behind their responses. Data were collected through in-depth, semi-structured interviews with twelve residents (6 males and 6 females) of an industrial coastal area in Indonesia, each of whom had lived in the community for at least ten years, and analyzed using Interpretative Phenomenological Analysis (IPA). The findings reveal three core themes: embodied awareness of environmental harm, the tension between vulnerability and resilience, and everyday strategies of survival. These themes illustrate how individuals experience pollution not only as a threat but also as a source of adaptive meaning, shaped by cultural identity and community bonds. The study contributes to a more human-centered understanding of environmental health, offering insights that may inform future policy, health interventions, and qualitative research on environmental justice.



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INTRODUCTION

Industrial expansion along coastal regions has become a defining feature of modern economic development, particularly in low- and middle-income countries. While such growth often promises improved infrastructure and employment, it simultaneously introduces complex environmental challenges. In many coastal areas, the presence of manufacturing plants, waste disposal sites, and chemical processing facilities has contributed to escalating levels of air and water pollution, threatening the ecological integrity of these environments. Coastal communities—frequently dependent on natural resources for their livelihood—are disproportionately exposed to these environmental hazards.

Beyond its physical toll, pollution deeply affects the social and psychological well-being of individuals. For many residents, pollution is not simply an environmental issue—it is a lived reality that shapes daily decisions, family health, and long-standing cultural ties to the land and sea. As noted by Lopez and Cheng (2022), environmental degradation in urban coastal zones intersects with everyday life, producing experiences of distress, loss, and adaptation that are often underrepresented in policy discourse. Limited environmental literacy and inadequate institutional support further compound the impacts, leading to bodily discomfort, disrupted livelihoods, and emotional exhaustion (Nguyen et al., 2020; Arora & Singh, 2019).

Despite a growing body of environmental health research, there remains a gap in understanding how individuals internalize, interpret, and respond to the persistent presence of industrial pollution in their surroundings. Much of the current literature privileges quantitative measurements—air quality indices, epidemiological correlations, and environmental modeling—over the subjective narratives of those most affected. Yet, it is through these personal stories that the nuanced human dimensions of

environmental crises are revealed. As emphasized in phenomenological scholarship, the meaning of a phenomenon can only be fully understood by engaging with how it is experienced and made sense of by individuals in specific socio-cultural contexts.

Therefore, a phenomenological exploration of how coastal communities experience and respond to industrial pollution is urgently needed. Such inquiry provides a space for the voices of marginalized populations to be heard, and for the invisible burdens of environmental harm to be acknowledged. Through this lens, pollution is not merely quantified as particles or toxins—it is felt, embodied, negotiated, and adapted to in ways that reflect resilience, struggle, and meaning-making.

Research on lived experiences in the context of environmental degradation has increasingly gained traction, particularly within disciplines such as environmental health, social ecology, and public health. Scholars have begun to recognize that beyond measurable impacts, environmental phenomena—especially pollution—are deeply personal, embodied, and culturally mediated experiences. In coastal communities affected by industrial activity, these lived experiences reveal how individuals not only suffer the consequences of ecological harm but also develop meaning, coping strategies, and adaptive responses rooted in their socio-cultural contexts (Kim & Park, 2021; Yusuf & Andika, 2023).

However, methodological challenges continue to hinder a full understanding of these subjective dimensions. Dominant research paradigms often rely on quantitative instruments such as surveys, environmental monitoring data, or epidemiological statistics. While valuable, such approaches rarely capture the emotional, existential, and interpersonal effects of environmental exposure. As noted by Arora and Singh (2019), residents' fears, frustrations, and evolving health beliefs are frequently omitted from policy-relevant knowledge because they are difficult to quantify and generalize.

These limitations have contributed to a research landscape that privileges external measurement over internal meaning. Consequently, the essence of how pollution is perceived, embodied, and resisted by affected communities remains largely obscured. Conventional methodologies, although scientifically rigorous, are ill-equipped to grasp the richness of individual narratives, the depth of sensory perception, and the complexity of socio-environmental interdependence that define these lived realities. A phenomenological approach is thus not only methodologically appropriate but essential for illuminating these often-overlooked dimensions.

Conventional responses to industrial pollution in coastal areas have largely emphasized technical and policy-oriented solutions, such as environmental monitoring systems, public health interventions, and regulatory frameworks. While these practical measures are essential, they often overlook the lived realities of those most directly affected. Existing research tends to rely on structured surveys or statistical analyses that reduce complex personal experiences to generalized indicators, thereby failing to capture the nuanced ways individuals perceive, interpret, and adapt to environmental harm (Nguyen et al., 2020; Tan et al., 2021).

These approaches, though effective in measuring environmental exposure or health outcomes, fall short in illuminating how pollution is experienced from within—through the senses, emotions, memories, and cultural meanings that define everyday life in polluted environments. As Lopez and Cheng (2022) highlight, the psychological and existential dimensions of environmental risk often remain invisible in mainstream environmental health discourse.

Given these limitations, there is a clear need for an alternative lens that foregrounds the subjective dimension of environmental exposure. A phenomenological approach offers this opportunity by shifting the focus from external metrics to internal meanings, and from generalized patterns to individual voices. Through phenomenology, the essential structures of experience—how pollution is felt, understood, and responded to—can be uncovered in their full complexity, providing a richer and more human-centered understanding of environmental crises in coastal communities.

Previous research has explored how environmental degradation impacts human lives, particularly in marginalized or high-risk communities. Studies by Kim and Park (2021) and Arora and Singh (2019) have shown that individuals living in polluted environments often experience anxiety, helplessness, and frustration, yet these feelings are rarely reflected in environmental policies. Most of these studies, however, relied on structured surveys or general interviews without deeply examining the

meaning behind individuals' responses. This has resulted in limited insights into how people internalize and adapt to environmental harm. To fully understand this experience, it is necessary to engage directly with the subjective realities of those affected.

This study adopts an interpretative phenomenological approach to explore how coastal residents experience industrial pollution and develop adaptive responses to protect their health. Phenomenology was chosen because it focuses on lived experience and allows a deeper exploration of meaning beyond surface-level observations. Through this lens, the study responds to the knowledge gap by centering personal narratives and uncovering the ways individuals interpret and respond to the environmental conditions around them. It aims to reveal how meaning is constructed through experience, not only measured through statistics. The method is appropriate for capturing the complexity of human interaction with polluted environments.

This article is structured as follows: the introduction presents the background, problem, and rationale for the study. The next section details the social and ecological context of the coastal community under study. This is followed by the methodology, including participant selection, data collection through in-depth interviews, and analysis using interpretative phenomenological analysis (IPA). The results section presents the thematic findings with direct quotations from participants. The discussion and conclusion reflect on the implications of the findings and suggest directions for future research and practice.

RESEARCH METHODS

Study Design

This study employed an interpretative phenomenological approach to explore the lived experiences of coastal community members affected by industrial pollution. As a qualitative research design, phenomenology focuses on understanding how individuals perceive, interpret, and make meaning of a particular phenomenon through their subjective experiences. The interpretative strand, influenced by Heideggerian philosophy, was chosen due to its emphasis on uncovering the existential meanings embedded within personal narratives, particularly those shaped by historical, cultural, and social contexts. This design was considered appropriate for capturing the depth of participants' responses to ongoing environmental challenges and their adaptive health behaviors.

Participants

Participants in this study were residents of a coastal region located near an industrial area known for recurrent environmental pollution. A purposive sampling strategy was used to select individuals who had lived in the area for at least five years and had firsthand experience with the environmental and health consequences of industrial activity. Inclusion criteria required that participants be adults aged 18 years or older and demonstrate an ability to articulate their experiences in relation to the research focus. Individuals with severe cognitive impairments or those who had relocated within the last year were excluded to ensure data relevance and depth. A total of twelve participants were involved, comprising seven females and five males, with ages ranging from 28 to 62 years. Most were engaged in traditional livelihoods such as fishing, small-scale farming, or informal trading.

Data Collection

Data were collected through in-depth, semi-structured interviews conducted face-to-face in locations chosen by participants to ensure comfort and privacy. Each interview lasted between 45 to 90 minutes and was guided by a flexible set of open-ended questions that allowed participants to freely express their thoughts and experiences. Interview prompts focused on perceptions of environmental change, health-related experiences, and personal or communal coping strategies. All interviews were audio-recorded with permission and supplemented by field notes taken during and after the sessions. The interview protocol was developed based on existing phenomenological literature and adapted to the local context following a pilot test with two community members.

All interviews were conducted in the local language and later transcribed verbatim before being translated into English. To ensure the accuracy and cultural fidelity of translation, a rigorous validation process was employed. This included back-translation by an independent bilingual researcher who was not involved in the initial transcription. Discrepancies between the original and back-translated versions were reviewed and resolved collaboratively by the research team. Furthermore, intercoder agreement was established during the coding process by involving a second qualitative analyst to code a subset of transcripts independently. Differences in interpretation were discussed and reconciled to maintain analytical reliability.

Data Analysis

The data were analyzed using Interpretative Phenomenological Analysis (IPA), a method suited to capturing how participants make sense of their lived experiences. The analytical process involved several iterative steps, beginning with immersive reading of each transcript to identify significant statements and meaning units. These were then coded and clustered into emergent themes that reflected both shared and unique aspects of participant narratives. The themes were organized into superordinate categories that conveyed the essence of the phenomenon under investigation. NVivo software was used to assist in organizing codes and tracking thematic development, while maintaining the centrality of interpretative engagement with the data. Constant comparison across transcripts ensured coherence and depth in the thematic structure.

Ethical Considerations

Ethical approval for this study was obtained from the relevant institutional research ethics committee. Written informed consent was obtained from all participants prior to data collection, following a clear explanation of the study's purpose, procedures, potential risks, and their right to withdraw at any time. Anonymity and confidentiality were ensured through the use of pseudonyms and secure storage of all data materials. The study adhered to the ethical guidelines set forth by the Declaration of Helsinki and applicable national standards for social science research involving human participants.

RESULTS

This section presents the thematic findings derived from in-depth interviews with members of coastal communities affected by industrial pollution. Using interpretative phenomenological analysis, three central themes emerged that capture the essence of participants' lived experiences: (1) Embodied Awareness of Environmental Harm, (2) Struggles Between Vulnerability and Resilience, and (3) Everyday Strategies of Survival and Adaptation. Each theme is supported by direct quotations from participants to preserve the authenticity and depth of their subjective experiences.

Embodied Awareness of Environmental Harm

Participants conveyed a deep and often visceral awareness of the environmental degradation surrounding them. This awareness was not abstract but closely tied to physical symptoms, changes in daily life, and disruptions to traditional livelihoods. The pollution from nearby factories—particularly airborne emissions and water contamination—had become a tangible part of their bodily and emotional reality.

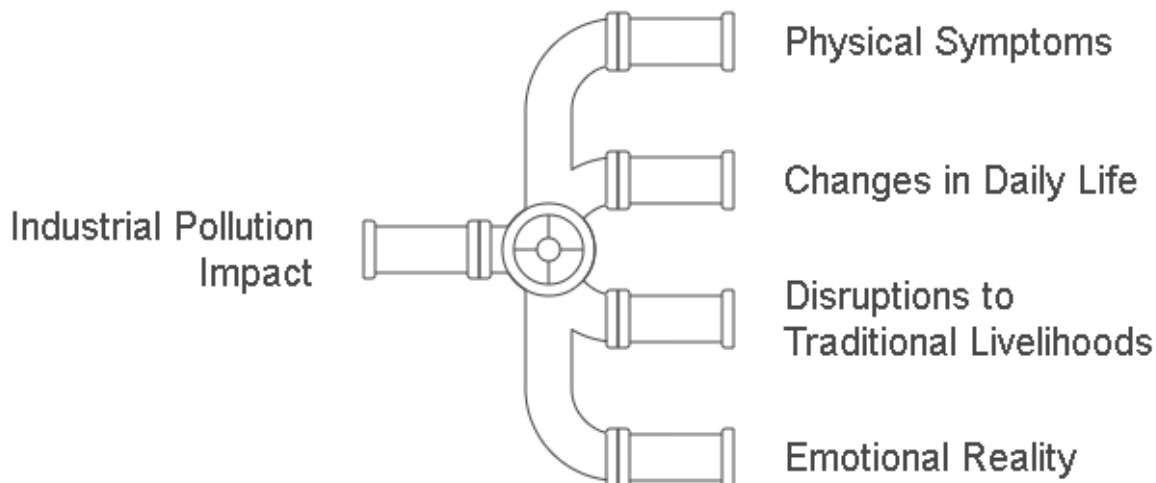
“The air smells different now. There's this burning scent that never used to be there. Sometimes I wake up with headaches or my chest feels tight... we all feel it, especially when the wind comes from the factory side.” (Participant 3)

Several community members linked the pollution directly to rising cases of respiratory illness, skin irritation, and changes in fish availability—indicating an embodied and multisensory engagement with their environment.

“Even my child has rashes, and the doctor said it might be from the water. But what water can we use? Everything around here is tainted.” (Participant 7)

This theme illustrates how the coastal population does not only perceive industrial pollution as an external issue, but rather as an intrusive element that permeates their bodies, homes, and everyday routines.

The Multifaceted Impact of Industrial Pollution



Struggles Between Vulnerability and Resilience

Participants described a complex interplay between feelings of helplessness and the internal strength to persist. The sense of vulnerability was fueled by limited access to clean water, healthcare, and political voice. Yet, this was counterbalanced by a strong cultural identity rooted in place and community solidarity.

“We’ve complained to the local authorities so many times. But it’s like our voices disappear. Still, we stay here because this is our home, our ancestors’ land.” (Participant 1)

The emotional toll of being exposed to constant environmental hazards was profound, yet many participants expressed a deep attachment to their land and community as a form of resistance.

“Leaving is not an option. Where would we go? At least here, we have each other. We help when someone gets sick; we survive together.” (Participant 5)

This theme emphasizes the dual reality of being both exposed and empowered—fragile due to systemic neglect but resilient through collective identity and relational coping mechanisms.

Everyday Strategies of Survival and Adaptation

In the face of persistent pollution and health risks, community members adopted a variety of adaptive strategies—both traditional and improvised. These included filtering drinking water with local materials, adjusting fishing routes, limiting outdoor activities, and relying on herbal remedies when formal medical care was inaccessible.

“We boil the water, then strain it with cloth, sometimes we use charcoal... it’s not perfect, but it helps. The kids need to drink something.” (Participant 4)

Participants also expressed increased reliance on community knowledge and informal networks for information and support.

“When someone tries something that works—like a way to avoid the itchy skin—we tell each other. That’s how we survive.” (Participant 2)

These strategies reflect the agency and ingenuity of a community under environmental stress, highlighting the ways in which local knowledge and adaptive behavior mitigate harm in the absence of institutional support.

The lived experiences of coastal residents reveal a deeply embodied, emotionally charged, and socially embedded response to industrial pollution. While the environmental degradation imposes significant physical and psychological burdens, community members navigate this adversity through shared resilience, local adaptation, and a profound connection to place. These findings illuminate the need to recognize and amplify the voices of affected communities in shaping environmental and public health interventions.

DISCUSSION

The findings of this study reveal that coastal residents living near industrial zones experience pollution not as an abstract condition but as an embodied, emotional, and socially embedded phenomenon. The participants' narratives show how industrial pollution infiltrates their daily lives, alters their health behaviors, and evokes both vulnerability and resilience—providing a rich answer to the central research question concerning how individuals make sense of and respond to environmental harm.

These findings offer a unique contribution to the research question by foregrounding how residents internalize pollution as a lived experience rather than merely an environmental condition. Instead of viewing health risks through clinical or epidemiological lenses, the study reveals how pollution is understood through sensations, cultural identity, and social memory. The adaptive responses—ranging from collective coping to improvisational survival strategies—demonstrate the capacity of marginalized communities to generate meaning and maintain agency despite systemic neglect. This phenomenological insight expands the scope of environmental health research by incorporating lived meaning as an essential dimension of understanding community resilience.

In relation to existing literature, the results are consistent with prior studies that highlight the psychological and social toll of environmental exposure (Kim & Park, 2021; Lopez & Cheng, 2022). However, this study extends those findings by capturing the existential and embodied nature of pollution, as experienced in a coastal context where environmental degradation intersects with cultural attachment to place. The narratives reflect what Nguyen et al. (2020) identified as a gap in digital or quantitative environmental literacy—where understanding pollution requires not just awareness but lived insight. The findings also support Heideggerian phenomenology, which emphasizes being-in-the-world, as participants describe their sense of place not only as geography but as a lived environment infused with both harm and meaning.

The implications of these findings extend beyond the immediate community studied, offering valuable insights for environmental health practitioners, policy makers, and scholars concerned with ecological justice. The lived experiences of participants underscore how environmental harm is not only a biological or ecological crisis but also a deeply social and existential one. These narratives highlight the importance of integrating local voices into environmental decision-making processes, especially in communities disproportionately affected by industrial activities. Recognizing the embodied and emotional dimensions of environmental exposure can lead to more culturally sensitive and community-responsive health interventions. Furthermore, the adaptive strategies shared by participants offer a valuable foundation for designing grassroots-based environmental resilience programs.

Despite its contributions, this study has several limitations. As a phenomenological inquiry focused on a specific coastal community, the findings are not intended to be generalized across all contexts or populations. The sample size, though sufficient for phenomenological depth, was relatively small and shaped by purposive selection criteria. Additionally, the cultural and linguistic nuances of participants' expressions may have introduced interpretive constraints, despite efforts to ensure fidelity through careful transcription and translation. These limitations point to the need for further research that includes diverse geographic and socio-economic settings to enrich the understanding of similar phenomena.

Future research could build upon these findings by exploring how lived experiences of environmental harm differ across gender, age, or occupational groups within coastal regions. Comparative studies across countries or ecosystems may also reveal how cultural, policy, or economic

differences shape adaptive responses to pollution. Longitudinal phenomenological studies could further capture how experiences and meanings evolve over time, especially in communities facing chronic environmental degradation. Ultimately, this research opens the door to a more human-centered approach in environmental studies—one that prioritizes meaning, voice, and lived reality as critical components of knowledge production.

CONCLUSION

This study explored the lived experiences of coastal community members facing industrial pollution and their adaptive responses to associated health risks. Using an interpretative phenomenological approach, the research revealed that pollution is not only a physical threat but also a deeply embodied and emotional experience that affects daily life, cultural identity, and social resilience. The findings highlight how residents perceive environmental harm through sensory awareness, collective memory, and adaptive behavior, which are often overlooked in conventional environmental health research. By foregrounding these subjective dimensions, the study contributes novel insights into how environmental harm is interpreted and negotiated within localized socio-cultural frameworks—insights that are underrepresented in current environmental justice and health adaptation literature. This approach enriches existing models by integrating experiential knowledge into the discourse on environmental vulnerability and resilience.

Moreover, the findings suggest practical implications for policy by advocating for integrative frameworks that recognize lived experience as a basis for action. Specifically, policies should prioritize participatory environmental monitoring, culturally informed health communication, and community-driven adaptation planning that align with local perceptions and capacities. Future studies may expand this approach across different ecological and cultural contexts to deepen our understanding of environmental adaptation and resilience.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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