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When resilience fails: household food insecurity and the livelihood dysfunction trap in Nigeria's oil-polluted communities

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Abstract
Background: Households in oil-polluted communities of Delta State, Nigeria, face chronic environmental degradation that disrupts food systems, yet how they experience food insecurity and mobilize resilience resources remains insufficiently examined. This study explores these experiences using the Resilience Index Measurement and Analysis framework and the livelihood dysfunction trap.
Methodology/Design: A qualitative case study design was adopted. Semi-structured interviews were conducted with 25 household heads and food preparers in oil-polluted communities. Participants were selected purposively, and data were analysed using thematic analysis. Trustworthiness was ensured through member checking, thick description, audit trails, and reflexive journaling.
Findings/Results: Food insecurity was experienced across all Household Food Insecurity Access Scale domains, from worry and inability to eat preferred foods to severe deprivation, with women bearing a disproportionate burden and having fewer options to escape the trap. Households mobilized all four RIMA pillars, but contamination, inadequate infrastructure, and the scale of pollution constrained these strategies. Adaptive capacity frequently took maladaptive forms, particularly transitions into artisanal refining, which generated income but intensified pollution and deepened the livelihood dysfunction trap.
Implications: Strengthening access to basic services and social safety nets should be prioritised. Addressing maladaptive adaptation requires alternative livelihood opportunities. Interventions should target women, who bear a disproportionate burden of food insecurity and have fewer resources to escape the trap.
Contribution/Originality: The study extends the RIMA framework to a chronic pollution context and refines the livelihood dysfunction trap by specifying the conditions under which adaptation becomes maladaptive and demonstrating its gendered dimensions.

Keywords: Food insecurity, resilience, livelihood dysfunction trap, oil pollution, Niger Delta

Introduction

India's tribunal system has repeatedly generated the same constitutional anxiety: bodies created to exercise judicial or quasi-judicial power have often remained administratively dependent on the executive departments whose decisions the niger delta region of nigeria represents one of the most extensively documented cases of petroleum-induced environmental degradation globally, with an estimated 9 to 13 million tons of oil spilled into the region's environment over the last six decades (obida *et al*., 2021). [19] oil spills have destroyed traditional livelihoods as contamination of farmlands results in a depreciation of soil nutrients and crop retardation, while spills in water bodies have led to a reduction in fishing yields (babatunde, 2023). [2] recent scientific assessments confirm that total polycyclic aromatic hydrocarbon concentrations in soils of oil-impacted communities exceed canadian agricultural soil guidelines by over 100 times, while surface water contamination surpasses who drinking water limits by more than 3,000 times (kalu *et al*., 2024). [16] these environmental conditions have created a systemic crisis that threatens the foundational systems sustaining human life in the region (o'farrell *et al*., 2025). [20] Within this degraded environment, food insecurity has become a pressing concern. Studies reveal that the consumption of tainted food and a decline in agricultural output are two major effects of oil pollution on local agriculture and food security, with food insecurity in the area made worse by the elimination of traditional farming livelihoods (Babatunde, 2023). [2] Soil damage and water contamination render the food basket unsustainable, affecting the health and food security of rural people living near oil facilities (Kalu *et al*., 2024). [16] The World Health Organization's recommended limits for drinking water are exceeded by more than 3,000 times in some oil-impacted communities, directly compromising household food utilization and health (Obida *et al*., 2021). [19] Understanding how households navigate such chronic food insecurity requires attention to the concept of resilience. The Food and Agriculture Organization's Resilience Index Measurement and Analysis (RIMA) framework operationalises resilience capacity through four pillars: access to basic services, assets, social safety nets, and adaptive capacity (FAO, 2016). [9] RIMA-II is uniquely suited to assessing current resilience to food security, treating food security as an outcome dependent on resilience capacity (FAO, 2016). However, existing applications of RIMA in Nigeria have focused primarily on climate-induced weather extremities, leaving the oil pollution context largely unexplored. The finding that adaptive capacity was negatively associated with food security in some contexts and that social safety

nets significantly reduced food security suggests that the relationship between resilience pillars and food security outcomes may operate differently under conditions of chronic environmental stress than in contexts of episodic shocks (Dessie, 2026). [8] Of particular concern is the possibility that some adaptation strategies may themselves be maladaptive, deepening rather than alleviating food insecurity. Jack (2025) [13] demonstrates through ethnographic research that the livelihood responses households in marginal farming and fishing communities rely on as ways of adapting to environmental degradation are palliative and unable to mitigate the long-term environmental effects of oil and gas extraction. This situation incenti*viz*es a gradual shift from farming and fishing to crude oil-based livelihood activities, particularly artisanal crude oil refining known as kpo-fire. The study foregrounds kpo-fire as a predominant maladaptive response which, despite being an economic alternative for many, exacerbates environmental pollution and results in a vicious circle emblematic of what the article refers to as the livelihood dysfunction trap (Jack, 2025). [13]Despite growing awareness of the negative environmental consequences of kpo-fire, community members approved of it, describing the practice as the means of surviving decades of pollution and benefiting from the oil wealth in their region (Jack, 2025). [13] Qualitative research on livelihood responses to oil pollution in the Niger Delta remains limited. Sobrasuaipiri (2016) [24] addresses this gap by analysing the ways in which rural households in Bodo have sought to adapt and rebuild their livelihoods, finding that social differences are critical in shaping vulnerability and capacity, and that patterns of disadvantage have become more entrenched not only as a result of oil spill but through the unintended consequences of institutional and household responses. Gender emerges as a particularly salient factor, with environmental degradation having a heavy impact on women's farming and shell fish collecting activities, damaging household economies and dismantling many of the social networks that formed around women's collective labour (Sobrasuaipiri, 2016). [24] However, this study was conducted in a single community and did not explicitly examine food security outcomes through the lens of the livelihood dysfunction trap. Existing research has not systematically examined how the livelihood dysfunction trap shapes household food insecurity experiences in oil-polluted communities. While Jack (2025) [13] identifies maladaptive adaptation as a core dynamic, that analysis is based on ethnographic methods and does not specifically explore food security outcomes or the gendered dimensions of entrapment. Quantitative studies using RIMA have not been applied to the oil pollution context in Delta State, and no study has qualitatively explored how households experience food insecurity in relation to the maladaptive adaptation pathways that characterize the livelihood dysfunction trap.

The gendered nature of maladaptive adaptation, particularly women's roles in food provisioning and their engagement in the distribution and retailing of refined petroleum products, remains under-examined (Zibima *et al*., 2025). [28] The present study addresses these gaps by qualitatively examining experiences of food insecurity and household resilience in oil-polluted communities of Delta State, using the livelihood dysfunction trap as an analytical lens to explore how households navigate the tension between immediate survival and long-term food security in a context where adaptation itself deepens vulnerability.

Research Questions

Based on the background, research gap, and theoretical framework of the study, the following research questions are formulated:

RQ1: How do households in oil-polluted communities of Delta State experience and describe food insecurity in the context of chronic environmental degradation?

RQ2: How do households in oil-polluted communities of Delta State mobilize resilience resources (access to basic services, assets, social safety nets, and adaptive capacity) in response to food insecurity, and how do these strategies shape or perpetuate the livelihood dysfunction trap?

Theoretical Framework

This study draws on two complementary theoretical perspectives: The Resilience Index Measurement and Analysis (RIMA) framework and the livelihood dysfunction trap.

Resilience Index Measurement and Analysis Framework

RIMA provides the operational structure for conceptualising household resilience capacity through four pillars (FAO, 2016). RIMA-II defines resilience as the capacity of a household to cope with shocks and stressors and avoid long-term damage to food security (FAO, 2016). The four pillars are access to basic services, assets, social safety nets, and adaptive capacity (FAO, 2016). Access to basic services reflects connectivity to essential services. Assets comprise productive and non-productive holdings. Social safety nets measure access to assistance from relatives, friends, government, and non-governmental organisations. Adaptive capacity captures the ability to adjust livelihood strategies and respond to shocks (FAO, 2016).

Livelihood Dysfunction Trap

The livelihood dysfunction trap explains why adaptation in chronic pollution contexts frequently becomes maladaptive (Jack, 2025). [13] Households adopt coping strategies that are palliative and unable to mitigate long-term environmental damage, incenti*viz*ing a shift from farming and fishing to artisanal crude oil refining (kpo-fire), which generates income but intensifies pollution and deepens the trap (Jack, 2025). [13] The mechanism is self-reinforcing: pollution destroys traditional livelihoods, pushing households into kpo-fire, which further degrades the environment and forecloses return to previous livelihoods. These perspectives mutually provide the conceptual foundation for this study. RIMA supplies the four-pillar structure for examining how households mobilize resilience resources, while the livelihood dysfunction trap explains why adaptive capacity may fail to protect against food insecurity. Three propositions guide the inquiry: access to basic services supports food security; social safety nets contribute positively; and adaptive capacity may be negatively or weakly associated with food security.

Literature Review

Experiences of Food Insecurity in Oil-Polluted Communities

The Household Food Insecurity Access Scale measures the access dimension of food insecurity through nine occurrence questions that capture worry about food, inability to eat preferred foods, limited variety, consumption of undesirable foods, reduced meal size, reduced number of meals, and severe deprivation (Coates *et al*., 2007). [6] These domains provide a framework for synthesising what is known about how households in oil-polluted communities experience food insecurity.

Worry and uncertainty about food. Qualitative research in the Niger Delta reveals that households in oil-impacted communities live with persistent uncertainty about their next meal. A study employing focus groups in Bodo, Mugho and Umuechem communities found that oil exploration activities have caused environmental degradation, resulting in a devastating level of food insecurity characterised by limited access and availability of food (Ozor *et al*., 2023). [22] The destruction of traditional farming and fishing livelihoods means that households cannot predict whether they will have sufficient food from one week to the next. This uncertainty is compounded by the unpredictable timing of oil spills, which can destroy an entire season's harvest or fishing catch without warning (Babatunde, 2023). [2]

Inability to eat preferred foods. The shift from traditional foods to inferior substitutes is a recurring theme. Households that previously consumed fresh fish and locally grown crops now rely on processed foods of lower nutritional quality. Soil degradation and water contamination render the traditional food basket unsustainable, forcing households to purchase food rather than produce it (Kalu *et al*., 2024). [16] The inability to eat preferred foods is not merely a matter of taste but reflects the loss of cultural food practices and the erosion of dietary diversity.

Limited variety and consumption of undesirable foods. The HFIAS distinguishes between limited variety and consumption of undesirable foods, both of which are evident in oil-polluted communities. A study in Rivers State found that food insecurity is characterised by unstable prices, lack of physical access such as farm roads, and a huge drop in income and purchasing power (Ozor *et al*., 2023). [22] Households report consuming whatever is available rather than what is nutritionally adequate, often resorting to foods of unknown safety due to contamination concerns.

Reduced quantity and severe deprivation. The most severe HFIAS domains, reduced meal size and reduced number of meals, are documented in the region. The World Health Organization's recommended limits for drinking water are exceeded by more than 3,000 times in some oil-impacted communities, directly compromising household food utilization and health (Obida *et al*., 2021). [19] Households that cannot afford to purchase food may skip meals entirely or rely on emergency food assistance.

Gender dimensions of food insecurity. Women bear a disproportionate burden of food insecurity in oil-polluted communities. Environmental degradation has a particularly heavy impact on women's farming and shell fish collecting activities, damaging household economies and dismantling many of the social networks that formed around women's collective labour (Sobrasuaipiri, 2016). [24] Analysis of corporate social responsibility interventions reveals that women receive substantially less financial equivalent support than men, with about 46% of women receiving between $2 and $400 worth of interventions compared to 28% of men, while about 8% of men received above $1,000 compared to only about 3% of women (Uduji & Okolo-Obasi, 2021). [26] Despite these disparities, assistance extended to women has had a substantial impact on their role in achieving food security in the region (Uduji & Okolo-Obasi, 2021). [26]

Mobilization of Resilience Resources and the Livelihood Dysfunction Trap

The RIMA framework conceptualises resilience capacity through four pillars: access to basic services, assets, social safety nets, and adaptive capacity (FAO, 2016). This section examines how households mobilize each pillar in response to food insecurity and how these strategies connect to the livelihood dysfunction trap (Jack, 2025). [13]

Access to Basic Services

RIMA defines access to basic services as connectivity to essential financial, market, health, and institutional services (FAO, 2016). In oil-polluted communities, access to basic services is severely compromised by contamination of water sources and degradation of healthcare infrastructure. The finding that access to basic services positively affected food expenditure but negatively influenced dietary diversity in Nigerian chicken-rearing households ($\beta = -0.046$) suggests that service access alone does not guarantee improved food security outcomes (Afolabi *et al*., 2026). [1] Households mobilize access to basic services by seeking alternative water sources, travelling to distant markets, and accessing healthcare when available. However, these strategies are constrained by the pervasive contamination of the environment. The livelihood dysfunction trap framework predicts that when basic services are compromised by pollution, households may adopt coping strategies that deepen their vulnerability rather than alleviate it (Jack, 2025). [13]

Assets

RIMA defines assets as productive and non-productive holdings, including land, livestock, and equipment (FAO, 2016). In oil-polluted communities, natural capital such as farmland and fishing equipment has been systematically destroyed or devalued through pollution. A study of cassava farmers in the Eneka community found that crude oil spills reduced technical efficiency, with affected farmers unable to maintain previous levels of production (Kalu *et al*., 2024). [16] Households mobilize assets by selling livestock, land, or equipment to purchase food. However, asset depletion undermines long-term resilience and may accelerate entry into the livelihood dysfunction trap. The trap framework explains that as traditional assets lose their productive value, households may be forced to adopt alternative strategies that further degrade their asset base (Jack, 2025). [13]

Social Safety Nets

RIMA defines social safety nets as access to assistance from relatives, friends, government, and non-governmental

organisations during times of need (FAO, 2016). In the Niger Delta, local institutions function as safety nets and sources of local insurance (Jack & Zibima, 2018). [14] However, the finding that social safety nets significantly reduced food security in Nigerian chicken-rearing households (β = -0.127) suggests that informal support mechanisms may be insufficient or may create dependencies that undermine long-term food security (Afolabi *et al*., 2026). [1] Households mobilize social safety nets by relying on extended family networks, community support, and remittances. However, when pollution affects entire communities, these networks are stretched thin.

The trap framework predicts that when formal and informal safety nets fail, households may turn to maladaptive strategies such as kpo-fire to survive (Jack, 2025). [13]

Adaptive Capacity

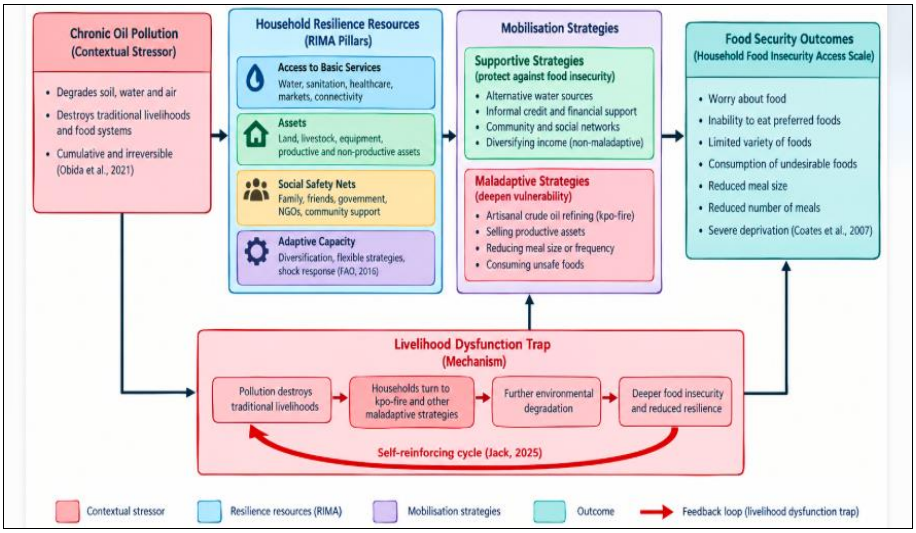
RIMA defines adaptive capacity as the ability to adjust livelihood strategies, diversify income sources, and respond to shocks (FAO, 2016). In oil-polluted communities, adaptive capacity frequently takes maladaptive forms. Jack (2025) [13] demonstrates that households shift from farming and fishing to artisanal crude oil refining (kpo-fire), which generates income but intensifies pollution and deepens the trap. Fishermen noted that regular contact with crude oil destroys their fishing nets, and they mitigate this by washing nets with kerosene, which reintroduces toxic contaminants to water bodies and poisons marine life, thereby reinforcing the hydrocarbon pollution they are responding to (Jack, 2025). [13] Some have abandoned fishing entirely and resorted to aquaculture in earthen ponds, but these are vulnerable to flooding. These ad hoc strategies have only palliative effects and are unable to mitigate the long-term environmental effects of oil and gas extraction (Jack, 2025). [13]

Synthesis and Research Gap

The literature reveals three key findings relevant to the research questions. First, food insecurity in oil-polluted communities is experienced across all HFIAS domains, from worry and uncertainty to severe deprivation, with women bearing a disproportionate burden (Ozor *et al*., 2023; Sobrasuaipiri, 2016; Uduji & Okolo-Obasi, 2021). [22] [24, 26] Second, households mobilize all four RIMA pillars in response to food insecurity, but these strategies are constrained by contamination and often prove inadequate (Afolabi *et al*., 2026; Kalu *et al*., 2024). [1, 16] Third, adaptive capacity frequently takes maladaptive forms, particularly transitions into kpo-fire, which generate income but intensify pollution and deepen the livelihood dysfunction trap (Jack, 2025). [13] Three gaps emerge from this review. First, no study has systematically examined how households in Delta State experience food insecurity across the full range of HFIAS domains, particularly the less severe domains of worry and food preference. Second, no study has examined how households mobilize all four RIMA pillars simultaneously in response to food insecurity or how these mobilization strategies interconnect. Third, no study has qualitatively explored how the livelihood dysfunction trap shapes food insecurity experiences or how gendered dimensions of entrapment operate. The present study addresses these gaps by qualitatively examining experiences of food insecurity and household resilience in oil-polluted communities of Delta State, using the livelihood dysfunction trap as an analytical lens to explore how households navigate the tension between immediate survival and long-term food security in a context where adaptation itself deepens vulnerability.

Conceptual Framework

The framework shows how chronic oil pollution in Delta State affects household resilience resources and food security. It explains how households use supportive strategies to protect food access, while maladaptive strategies, such as artisanal crude oil refining, may deepen environmental damage and food insecurity. The livelihood dysfunction trap illustrates this self-reinforcing cycle, in which environmental degradation weakens traditional livelihoods, increases vulnerability, and reduces households' ability to achieve food security (FAO, 2016; Coates *et al*., 2007; Jack, 2025). [6, 13] Figure 1 presents the construct



Source: Author's Construct, 2026

Fig 1: Conceptual Framework Linking Chronic Oil Pollution, Household Resilience Resources, Mobilization Strategies, and Food Insecurity in Nigeria's Oil-Polluted Communities.

Methodology

Philosophical Consideration

The study is anchored in the interpretivist paradigm, which holds that reality is socially constructed and that understanding human experience requires attention to the meanings people attach to their actions and contexts (Creswell & Creswell, 2018). [7] Ontologically, the study adopts a relativist position, acknowledging that experiences of food insecurity and resilience are multiple and context-dependent (Guba & Lincoln, 1994). [11] Epistemologically, it is subjectivist, recognising that knowledge is co-constructed through interaction between researcher and participants (Creswell & Creswell, 2018). [7] Axiologically, the study acknowledges that the researcher's concern for environmental justice in the Niger Delta shapes the research purpose and interpretation (Lincoln & Guba, 1985). [17]

Research Design

The study adopts a qualitative case study design, appropriate for exploring how households experience food insecurity and mobilize resilience resources within a specific context (Yin, 2018). [27]The case is defined as oil-polluted communities in Delta State, Nigeria. This design permits in-depth exploration of the lived experiences and meaning-making processes that quantitative approaches cannot capture (Stake, 1995). [25]

Population and Sample

The target population comprises households in oil-polluted communities of Delta State. A purposive sampling technique was used to select participants who have direct experience of food insecurity and resilience mobilization (Patton, 2015). [23] A sample size of 30 was targeted, and 25 participants responded and were interviewed, achieving a response rate of 83 percent. The sample included household heads and food preparers, with attention to gender balance. Sample size was determined by the principle of data saturation, where no new themes emerged from additional interviews (Guest *et al*., 2020). [12]

Data Collection

Data were collected through semi-structured interviews with 25 participants. The interview guide explored experiences of food insecurity across the Household Food Insecurity Access Scale domains (Coates *et al*., 2007) and the mobilization of resilience resources across the four RIMA pillars (FAO, 2016). [6] Interviews lasted between 45 and 60 minutes and were audio-recorded with consent. Semi-structured interviews were chosen because they allow flexibility to probe emergent themes while maintaining focus on the research questions (Kallio *et al*., 2016). [15]

Trustworthiness

Trustworthiness was ensured using Lincoln and Guba's (1985) criteria. [17] Credibility was established through member checking, where participants reviewed summaries of their interviews, and through prolonged engagement in the communities (Birt *et al*., 2016). [3] Transferability was enhanced through thick description of the research context and participant characteristics (Geertz, 1973). [10] Dependability was ensured through an audit trail documenting all methodological decisions (Nowell *et al*., 2017). [18] Confirmability was addressed through reflexive journaling, where the researcher documented personal assumptions and their potential influence on interpretation (Olmos-Vega *et al*., 2023). [21]

Data Analysis

Data were analysed using thematic analysis following Braun and Clarke's (2006) six-phase approach: familiarisation, initial coding, searching for themes, reviewing themes, defining themes, and reporting. This approach was chosen because it is theoretically flexible and suitable for exploring how participants make meaning of their experiences (Braun & Clarke, 2021). [4, 5]

Ethical Considerations

Participation was voluntary, and informed consent was obtained. Confidentiality and anonymity were assured. Ethical approval was obtained from the relevant institutional review board. These procedures align with established ethical standards for qualitative research involving human participants (Creswell & Creswell, 2018). [7]

Results

Demographic Profile

The majority of participants were female (60.0%), reflecting the disproportionate burden women bear in oil-polluted communities and their central role in household food provisioning (Zibima *et al*., 2025). [28] Most participants were between 30 and 39 years (32.0%), followed by 40 to 49 years (28.0%), indicating that the sample is predominantly in economically active years. Married participants accounted for 68.0%, while divorced or widowed participants represented 20.0%, highlighting the vulnerability of households without spousal support (Sobrasuaipiri, 2016). [24] On educational level, 36.0% had primary education, 32.0% had secondary education, 16.0% had tertiary education, and 16.0% had no formal education. Household size was predominantly 4 to 6 members (48.0%), followed by 7 to 9 members (24.0%) and 1 to 3 members (20.0%). Farming was the dominant occupation (28.0%), followed by fishing (24.0%) and trading (24.0%). Artisanal refining accounted for 16.0%, reflecting its emergence as a maladaptive adaptation strategy (Jack, 2025). [13] The presence of artisanal refiners in the sample is particularly relevant to the study's focus on the livelihood dysfunction trap. Most participants had lived in their communities for 11 to 20 years (40.0%) or above 20 years (32.0%), indicating long-term exposure to chronic oil pollution and its cumulative effects (Obida *et al*., 2021). [19] These demographic characteristics provide the context for interpreting the qualitative findings presented in the following sections. The predominance of women, the concentration in economically active years, the reliance on farming and fishing, and the long-term residence in affected communities all shape how participants experience food insecurity and mobilize resilience resources.

RQ1: How do households in oil-polluted communities of Delta State experience and describe food insecurity in the context of chronic environmental degradation?

This section addresses the first research question, which explores how households experience and describe food insecurity in the context of chronic environmental degradation. The analysis identified five themes: worry and uncertainty about food, inability to eat preferred foods,

limited variety and consumption of undesirable foods, reduced quantity and severe deprivation, and gendered experiences of food insecurity.

Theme 1: Worry and Uncertainty about Food

All 25 participants described persistent worry about whether their households would have enough food. This worry was continuous rather than episodic, reflecting the chronic nature of oil pollution. Participants explained that the unpredictability of oil spills meant they could never plan with confidence, as a single spill could destroy an entire season's harvest or fishing catch. One participant explained: "Every day I wake up thinking about what my children will eat. Sometimes we have food, sometimes we don't. We cannot plan because we do not know when the next spill will come and destroy everything." Another participant described: "Before the oil spills, we knew we would harvest and have food. Now we just wait and see. The worry is always there, even when we have food today because we do not know about tomorrow." A third participant noted: "I worry most at night. When I cannot sleep, I think about how I will feed my family. The water is not good, the farm is not good, and the fish are gone. What will we do?"

Theme 2: Inability to Eat Preferred Foods

Participants described a shift from traditional foods to inferior substitutes. Before pollution, households consumed fresh fish, locally grown crops, and a variety of foods. Now, many rely on processed foods of lower nutritional quality, purchased rather than produced. One participant recalled: "We used to eat fresh fish from the river every day. Now the fish are gone. When we buy fish, it tastes like oil. We eat it because we have no choice, but we know it is not good for us." Another participant explained: "I miss eating the food from our farm. The cassava, the vegetables, everything tasted better before. Now we buy food from the market, but it is not the same. It is not enough, and it is not safe." A third participant stated: "We used to eat what we grew. Now we eat whatever we can find. Sometimes it is not what we want, but we cannot afford to choose."

Theme 3: Limited Variety and Consumption of Undesirable Foods

Participants described reduced dietary variety and the consumption of foods they considered undesirable. The HFIAS distinguishes between limited variety and consumption of undesirable foods, both of which were evident in the accounts. One participant explained: "We eat the same thing every day. There is no variety. We cannot afford different foods, and the market does not have what we used to eat. We eat what is available, not what we want." Another participant noted: "Sometimes we eat food that we know is not good. The water is contaminated, and the food is contaminated. But we have to eat something." A third participant stated: "Before, we had many different foods. Now we have only one or two things. It is not healthy for the children, but we have no choice."

Theme 4: Reduced Quantity and Severe Deprivation

The most severe domains of food insecurity, including reduced meal size, reduced number of meals, and severe deprivation, were also evident. Participants described skipping meals, reducing portion sizes, and going entire days without food. One participant explained: "There are days when we eat only once. Sometimes the children eat and the adults do not. We have to make sure the children have something, even if we go without." Another participant described: "When there is no food, we drink water and sleep. We have learned to manage with very little. Sometimes we go two days without eating properly." A third participant stated: "The worst times are when the river is polluted and the farm is destroyed. We have no food at all. We have to beg from neighbours or go to the market and ask for credit."

Theme 5: Gendered Experiences of Food Insecurity

The analysis also revealed a gendered dimension to food insecurity. Women described bearing the primary responsibility for managing food insecurity and often sacrificing their own consumption to feed their children and husbands. One female participant explained: "It is the woman who suffers most. When there is no food, I am the one who must find a way. I skip meals so that my children can eat. Sometimes I do not eat for a whole day." Another female participant stated: "My husband does not know how we manage. I sell small things in the market to buy food. If I do not do it, the family will go hungry." A male participant acknowledged: "The women carry the burden. They are the ones who worry about food. We men try to find work, but the women are the ones who make sure the family eats."

RQ2: How do households in oil-polluted communities of Delta State mobilize resilience resources (access to basic services, assets, social safety nets, and adaptive capacity) in response to food insecurity, and how do these strategies shape or perpetuate the livelihood dysfunction trap?

This section addresses the second research question, which explores how households mobilize resilience resources and how these strategies connect to the livelihood dysfunction trap. The analysis identified five themes: mobilizing access to basic services, mobilizing assets, mobilizing social safety nets, mobilizing adaptive capacity, and the livelihood dysfunction trap.

Theme 1: Mobilizing Access to Basic Services

Participants described strategies for accessing water, sanitation, healthcare, and markets in the context of contamination. They sought alternative water sources, travelled to distant markets, and accessed healthcare when available. However, these strategies were constrained by pervasive pollution and inadequate infrastructure. One participant explained: "We cannot drink the water from the river or the well. We have to buy water from the market, but it is expensive. Sometimes we walk far to find clean water, but it is not always available." Another participant stated: "The health centre is far, and there are no medicines. When we are sick, we use local herbs. We cannot afford to go to the hospital." A third participant noted: "We travel to the next town to buy food because the market here has nothing. The road is bad, and the transport is expensive. Sometimes we cannot go, and we have no food."

Theme 2: Mobilizing Assets

Participants described selling assets, including livestock, land, and fishing equipment, to purchase food. While these strategies provided short-term relief, they depleted the asset base needed for long-term resilience. One participant

explained: "I sold my goats to buy food. It was the only thing I could do. Now I have nothing left. If we have another problem, I do not know what I will do." Another participant stated: "We sold some of our land to buy food. We did not want to, but we had no choice. Now we have less land to farm, and the land we have is not good because of the oil." A third participant noted: "My husband sold his fishing nets. Now he cannot fish. We thought the money would help, but it finished quickly. We are worse off now."

Theme 3: Mobilizing Social Safety Nets

Participants described relying on extended family, community networks, and informal credit to access food. While these networks provided critical support, they were stretched thin by the scale of pollution and the poverty of entire communities. One participant explained: "When we have no food, we go to our family. They help if they can. But they also have problems. Sometimes they cannot help." Another participant stated: "We borrow from the market women. They give us food on credit, and we pay when we can. But sometimes we cannot pay, and they stop giving us credit." A third participant noted: "The church sometimes helps with food. But it is not enough for everyone. We cannot depend on the church for everything."

Theme 4: Mobilizing Adaptive Capacity

Participants described adapting to food insecurity through livelihood diversification, migration, and in some cases, entering artisanal refining. While some adaptations were supportive, others were maladaptive, deepening the trap. One participant explained: "I started selling small things in the market to buy food. It is not much, but it helps. I also do some farming, but the soil is not good." Another participant stated: "My son went to the city to find work. He sends money sometimes. But it is not enough, and we miss him." A third participant described entering artisanal refining: "We had no choice. The farm is destroyed, the fish are gone. The only way to get money is to work in the refining. We know it is dangerous and it pollutes the environment, but we need to eat." A fourth participant explained: "My husband started working in the refining. The money is better than farming, but the air is bad, and the water is worse. We are all sick now. But what can we do?"

Theme 5: The Livelihood Dysfunction Trap

The analysis revealed that mobilization strategies often perpetuate the livelihood dysfunction trap. Participants described a self-reinforcing cycle: pollution destroys traditional livelihoods, pushing households into artisanal refining, which generates income but intensifies pollution and forecloses return to traditional livelihoods. One participant explained: "We know the refining is bad. It pollutes the air and the water. But we have no choice. If we stop, we will not eat. If we continue, the environment will be destroyed. There is no way out." Another participant stated: "My husband used to fish. Now he works in the refining. The fish are gone because of the refining. We created the problem, but we cannot stop." A third participant noted: "The young men are all going into the refining. They make money, but the farm is dying. The water is dying. We are killing ourselves to survive."

Discussions

RQ1: Experiences of Food Insecurity in Oil-Polluted Communities

The first research question explored how households experience and describe food insecurity in the context of chronic environmental degradation. The findings reveal that food insecurity is experienced across all HFIAS domains, from worry to severe deprivation, with women bearing a disproportionate burden. These findings confirm the theoretical expectation that when resilience resources are compromised by chronic pollution, households experience food insecurity across multiple dimensions, and they extend the theoretical framework by showing that this experience is gendered and shaped by the failure of all four RIMA pillars to provide protection.

Worry and Uncertainty about Food

The finding that all 25 participants described persistent worry about food aligns with the HFIAS domain of worry and uncertainty (Coates *et al*., 2007). [6] However, the chronic nature of this worry distinguishes the oil pollution context from episodic shock contexts. In flood or drought contexts, worry is heightened during the shock and diminishes during recovery. In oil-polluted communities, worry is continuous because the stressor is continuous. This finding connects to the RIMA framework by showing that when access to basic services is compromised and assets are destroyed, households cannot achieve the stability that resilience requires (FAO, 2016). The inability to plan with confidence reflects the failure of resilience resources to provide the predictability that underpins food security. Participants described an inability to plan because a single spill could destroy an entire season's harvest or fishing catch, illustrating that worry is not merely a psychological response but a rational reflection of the failure of all four RIMA pillars to provide protection. This finding confirms the theoretical proposition that access to basic services is compromised in chronic pollution contexts, limiting its protective value (Obida *et al*., 2021). [19] Inability to Eat Preferred Foods The finding that participants shifted from traditional foods to inferior substitutes aligns with the HFIAS domain of inability to eat preferred foods (Coates *et al*., 2007). [6] This finding connects directly to the RIMA pillar of assets. Natural capital, including farmland, fishing grounds, and mangrove resources, has been systematically destroyed or devalued through pollution (O'Farrell *et al*., 2025). [20] The inability to eat preferred foods reflects the depletion of natural capital assets that traditionally supported food production. Participants described the loss of fresh fish and locally grown crops, which is consistent with studies documenting the destruction of traditional food systems in the Niger Delta (Babatunde, 2023; Ozor *et al*., 2023). [2, 22] The finding also connects to the RIMA pillar of access to basic services. When markets are distant and transport is expensive, households cannot access the foods they prefer even if they can afford them. This finding extends the theoretical framework by showing that the failure of assets and access to basic services is experienced not only as reduced quantity but as the loss of culturally preferred foods and dietary diversity.

Limited Variety and Consumption of Undesirable Foods

The finding that participants experienced reduced dietary variety and consumed undesirable foods aligns with the HFIAS domains of limited variety and consumption of undesirable foods (Coates *et al*., 2007). [6] This finding connects to the RIMA pillar of access to basic services. Limited variety reflects the absence of functioning markets and distribution systems that would otherwise provide

diverse food options. Participants described eating the same foods repeatedly and consuming foods they knew to be contaminated. The finding also connects to the RIMA pillar of assets. When natural capital is destroyed, households lose the ability to produce diverse foods and must rely on whatever is available in the market, regardless of quality or safety. This is consistent with studies documenting the narrowing of dietary diversity in oil-impacted communities (Kalu *et al*., 2024). [16] This finding confirms the theoretical proposition that social safety nets are insufficient when entire communities are affected, as households cannot rely on traditional food-sharing networks to supplement their diets when all households are experiencing the same shortages (Afolabi *et al*., 2026). [1]

Reduced Quantity and Severe Deprivation

The finding that participants experienced reduced meal size, reduced number of meals, and severe deprivation aligns with the most severe HFIAS domains (Coates *et al*., 2007). [6] This finding connects to the RIMA pillar of social safety nets. When households lack access to informal credit, remittances, or community support, they have no buffer against severe deprivation. Participants described skipping meals, reducing portion sizes, and going entire days without food. The finding also connects to the RIMA pillar of assets. When all productive assets have been sold or destroyed, households have nothing left to exchange for food. This is consistent with existing research on food insecurity in the Niger Delta, which documents severe deprivation in oil-impacted communities (Ozor *et al*., 2023). [22] This finding extends the theoretical framework by showing that when social safety nets and assets fail simultaneously, households experience the most severe forms of food insecurity, including going entire days without food.

Gendered Experiences of Food Insecurity

The finding that women bear a disproportionate burden of food insecurity connects to all four RIMA pillars. Women have less access to basic services because they are more likely to be responsible for water collection and food provisioning, tasks that become more difficult when water sources are contaminated and markets are distant. Women have fewer assets because land and productive resources are often controlled by men. Women have weaker social safety nets because they are less likely to have formal employment or access to credit. Women have less adaptive capacity because they face constraints on mobility and livelihood options. This finding is consistent with literature on gender and food insecurity in the Niger Delta (Sobrasuaipiri, 2016; Zibima *et al*., 2025). [24, 28] Women described bearing the primary responsibility for managing food insecurity and often sacrificing their own consumption to feed their children and husbands. The finding that male participants acknowledged women's burden suggests that gendered food insecurity is recognised within communities, even if it is not addressed by formal interventions. This finding extends the theoretical framework by showing that the experience of food insecurity is not uniform across households but is shaped by gender, with women experiencing more severe deprivation because they have less access to all four RIMA pillars.

RQ2: Mobilization of Resilience Resources and the Livelihood Dysfunction Trap

The second research question explored how households mobilize resilience resources and how these strategies connect to the livelihood dysfunction trap. The findings reveal that households mobilize all four RIMA pillars, but these strategies are constrained by contamination, inadequate infrastructure, and the scale of pollution. Adaptive capacity frequently takes maladaptive forms, particularly transitions into artisanal refining, which generate income but intensify pollution and deepen the trap. These findings confirm the theoretical proposition that adaptive capacity may be negatively or weakly associated with food security and extend the framework by showing how the failure of all four pillars produces entrapment and how entrapment is gendered.

Mobilizing Access to Basic Services

The finding that participants sought alternative water sources, travelled to distant markets, and accessed healthcare when available aligns with the RIMA pillar of access to basic services (FAO, 2016). However, the finding that these strategies were constrained by pervasive pollution and inadequate infrastructure challenges the assumption that access to basic services invariably supports resilience. Participants described walking far to find clean water, travelling to distant markets, and relying on local herbs when healthcare was unavailable. This finding is consistent with studies documenting the contamination of water sources and the inadequacy of healthcare infrastructure in oil-impacted communities (Obida *et al*., 2021). [19] It also supports the livelihood dysfunction trap by showing that when basic services are compromised by pollution, households are forced to adopt coping strategies that are time-consuming, expensive, and often inadequate (Jack, 2025). [13]This finding confirms the theoretical proposition that access to basic services is compromised in chronic pollution contexts, limiting its protective value. Gender shapes access to basic services. Women are primarily responsible for water collection and food provisioning. When water sources are contaminated, women must walk further to find clean water, adding to their time burden and reducing the time available for income-generating activities. Women also face greater constraints on mobility, making it more difficult to travel to distant markets or healthcare facilities. This gendered dimension of service access is consistent with literature on women's disproportionate burden in oil-polluted communities (Zibima *et al*., 2025). [28] This finding extends the theoretical framework by showing that the mobilization of access to basic services is not only constrained by pollution but also shaped by gender, with women bearing a greater burden of service access.

Mobilizing Assets

The finding that participants sold assets to purchase food aligns with the RIMA pillar of assets (FAO, 2016). However, the finding that these strategies depleted the asset base needed for long-term resilience challenges the assumption that assets invariably support resilience. Participants described selling productive assets and having nothing left for future needs. This finding is consistent with studies documenting asset depletion as a coping strategy in food-insecure households (Afolabi *et al*., 2024). It also supports the livelihood dysfunction trap by showing that asset mobilization, while providing short-term relief, accelerates entry into the trap (Jack, 2025). [13] This finding extends the theoretical framework by showing that assets are not simply resources to be mobilized but resources that

are systematically devalued and destroyed in chronic pollution contexts. Gender shapes the mobilization of assets. Women have fewer assets to sell because land and productive resources are often controlled by men. When households sell assets, women may lose access to the resources they rely on for food production and income generation. Women may also be more likely to sell personal assets, such as jewellery or small livestock, which are not counted in conventional asset measures but are critical for household survival. This gendered dimension of asset mobilization is consistent with literature on women's vulnerability in oil-polluted communities (Sobrasuaipiri, 2016). [24] This finding extends the theoretical framework by showing that asset depletion is gendered, with women losing access to critical resources when households sell assets to cope with food insecurity.

Mobilizing Social Safety Nets

The finding that participants relied on extended family, community networks, and informal credit aligns with the RIMA pillar of social safety nets (FAO, 2016). However, the finding that these networks were stretched thin by the scale of pollution challenges the assumption that social safety nets invariably support resilience. Participants described family members who could not help, market women who stopped giving credit, and churches that could not meet the need. This finding is consistent with studies documenting the limitations of informal safety nets in contexts of widespread poverty (Afolabi *et al*., 2026). [1] It also supports the livelihood dysfunction trap by showing that when entire communities are affected by pollution, the networks that traditionally provided support are overwhelmed (Jack, 2025). [13] This finding confirms the theoretical proposition that social safety nets are insufficient when entire communities are affected. Gender shapes the mobilization of social safety nets. Women rely more heavily on informal networks, including family, friends, and community groups. When these networks are stretched thin, women lose a critical source of support. Women may also have less access to formal credit because they lack collateral or formal employment. The finding that women described borrowing from market women and relying on the church is consistent with literature on gendered survival strategies in oil-polluted communities (Zibima *et al*., 2025). [28] This finding extends the theoretical framework by showing that the failure of social safety nets is gendered, with women losing a critical source of support when informal networks are overwhelmed.

Mobilising Adaptive Capacity

The finding that participants adapted through livelihood diversification, migration, and artisanal refining aligns with the RIMA pillar of adaptive capacity (FAO, 2016). However, the finding that some adaptations were maladaptive challenges the assumption that adaptive capacity invariably supports resilience. Participants described entering artisanal refining because they had no choice, knowing that it pollutes the environment but needing to eat. This finding is consistent with Jack's (2025) [13] analysis of the livelihood dysfunction trap and with the adaptive capacity paradox documented in the literature (Dessie, 2026). [8] This finding confirms the theoretical proposition that adaptive capacity may be negatively or weakly associated with food security when adaptation takes maladaptive forms. Gender shapes adaptive capacity. Women have fewer options for livelihood diversification because they face constraints on mobility and access to resources. Women are less likely to enter artisanal refining because it is physically demanding and dominated by men. However, women may be involved in the distribution and retailing of refined petroleum products, which exposes them to health risks and reinforces the trap. The finding that women's adaptive capacity is constrained by gender norms and power dynamics is consistent with literature on gendered entrapment (Zibima *et al*., 2025). [28] This finding extends the theoretical framework by showing that adaptive capacity is not only constrained by pollution but also shaped by gender, with women having fewer options for adaptation and being more vulnerable to entrapment.

The Livelihood Dysfunction Trap

The finding that mobilization strategies often perpetuate the livelihood dysfunction trap provides empirical support for Jack's (2025) [13] theoretical framework. Participants described a self-reinforcing cycle: pollution destroys traditional livelihoods, pushing households into artisanal refining, which generates income but intensifies pollution and forecloses return to traditional livelihoods. The finding that participants felt trapped with no way out illustrates the trap's self-reinforcing character. This finding extends the theoretical framework by showing that the trap operates at the household level and is experienced as a condition of entrapment with no viable exit. The trap emerges from the failure of all four RIMA pillars. When access to basic services is compromised, assets are depleted, social safety nets are stretched thin, and adaptive capacity takes maladaptive forms, the result is entrapment. The failure of one pillar reinforces the failure of others. For example, when assets are sold to buy food, households have fewer resources to invest in alternative livelihoods, which increases reliance on social safety nets, which are already stretched thin, which increases pressure to enter artisanal refining, which intensifies pollution, which further depletes assets. This interconnected failure of all four pillars is what produces the trap and makes it self-reinforcing. This finding extends the theoretical framework by showing that the trap is not simply the result of individual adaptation choices but the product of systemic failure across all four pillars. Gender shapes entrapment. Women are more likely to experience severe food insecurity and less likely to have the resources needed to escape the trap. Women's limited access to assets, credit, and alternative livelihoods makes them more dependent on maladaptive strategies and more vulnerable to the consequences of pollution. The finding that women bear a disproportionate burden of food insecurity and have fewer options for escape is consistent with literature on gendered entrapment (Zibima *et al*., 2025). [28] This finding extends the theoretical framework by showing that entrapment is gendered, with women experiencing more severe food insecurity and having fewer resources to escape the trap.

Conclusion

This study examined how households in oil-polluted communities of Delta State experience food insecurity and mobilize resilience resources in response to it, using the RIMA framework and the livelihood dysfunction trap as analytical lenses. The findings reveal that food insecurity is

experienced across all HFIAS domains, from persistent worry and inability to eat preferred foods to limited variety, reduced quantity, and severe deprivation. Women bear a disproportionate burden, sacrificing their own consumption to feed their children and husbands. Households mobilize all four RIMA pillars, namely access to basic services, assets, social safety nets, and adaptive capacity, but these strategies are constrained by contamination, inadequate infrastructure, and the scale of pollution. Adaptive capacity frequently takes maladaptive forms, particularly transitions into artisanal refining (kpo-fire), which generate income but intensify pollution and deepen the livelihood dysfunction trap. The study confirms the three propositions of the theoretical framework. First, access to basic services was expected to support food security, but contamination and inadequate infrastructure compromise this pillar in ways that limit its protective value (Obida *et al*., 2021). [19] Second, social safety nets were expected to positively contribute to food security, but informal networks are stretched thin when entire communities are affected (Afolabi *et al*., 2026). [1] Third, adaptive capacity was expected to exhibit a negative or weak association with food security, and the finding that adaptation frequently takes maladaptive forms confirms this prediction (Jack, 2025). [13] The study extends the theoretical framework in three ways. First, it shows that food insecurity in oil-polluted communities is experienced across all HFIAS domains and that this experience is gendered. Second, it shows that the mobilization of resilience resources is shaped by contamination, poverty, and the scale of pollution. Third, it shows that the livelihood dysfunction trap operates at the household level, with households recognising the maladaptive nature of their strategies but feeling trapped with no viable exit. These extensions contribute to resilience theory by specifying the conditions under which resilience resources fail to protect against food insecurity and by demonstrating the gendered dimensions of entrapment.

Implications

Theoretical Implications

The study extends the RIMA framework to a chronic pollution context, demonstrating that the four pillars operate differently under conditions of irreversible environmental degradation than under episodic shocks. The finding that assets and adaptive capacity fail to protect against food insecurity challenges the assumption embedded in RIMA that all four pillars invariably contribute positively to resilience. The study also refines the livelihood dysfunction trap by specifying the conditions under which adaptation becomes maladaptive and by demonstrating the gendered dimensions of entrapment. The integration of RIMA and the livelihood dysfunction trap into a single explanatory framework shows how the failure of all four pillars produces entrapment and how entrapment is experienced and reproduced at the household level.

Policy Implications

Four policy implications follow from the findings. First, strengthening access to basic services should be a priority in oil-polluted communities, given its critical role in supporting food security. This includes investment in water treatment infrastructure, healthcare delivery, and sanitation facilities. Second, policymakers should address the root causes of maladaptive adaptation by providing alternative livelihood opportunities that do not intensify environmental degradation. This requires identifying households engaged in artisanal refining and providing them with viable alternatives such as sustainable aquaculture, agro-processing, and skills training programmes. Third, interventions should target female-headed households and women, who bear a disproportionate burden of food insecurity and have fewer resources to escape the trap (Zibima *et al*., 2025). [28] This includes providing access to credit, land rights, and extension services tailored to the needs of women. Fourth, environmental remediation and compensation mechanisms should be implemented to restore farmland, fishing grounds, and mangrove ecosystems, and to provide affected households with the resources needed to rebuild livelihoods (O'Farrell *et al*., 2025). [20]

Practical Implications

For development practitioners and humanitarian agencies, the study provides qualitative insights into the lived experiences of food insecurity in oil-polluted communities. These insights can inform the design of culturally appropriate and context-sensitive interventions that address the root causes of food insecurity rather than merely treating its symptoms. The finding that households recognise the maladaptive nature of their strategies but feel trapped with no viable exit suggests that interventions must address the structural constraints that limit alternative livelihood options. For affected communities, the study offers an opportunity for their experiences and voices to be documented and recognised, contributing to advocacy efforts for environmental justice and improved living conditions in the Niger Delta.

Limitations of the Study

The sample of 25 interviews in one region limits generalisability to other oil-polluted communities. Self-reported data may be subject to recall and social desirability bias. The cross-sectional design limits the scope for examining change over time. The perspectives of children and youth were not captured. The study did not quantitatively measure food insecurity or resilience capacity.

Suggestions for Future Research

Longitudinal research is needed to examine how food insecurity and resilience mobilization change over time. Comparative research across different extractive contexts would assess generalisability. Quantitative research using validated measures could complement the qualitative findings. Research capturing the perspectives of children and youth would provide a more complete understanding. Intervention research could test whether programmes strengthening basic services and social safety nets, while providing alternative livelihoods, reduce food insecurity and facilitate escape from the trap.

Data Availability: The data that support the findings of this study are available from the corresponding author upon reasonable request.

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