



Article

A Qualitative Exploration of the Influence of Climate Change on Migration of Women in the Riverine Area of Bayelsa State, Nigeria

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Abstract: The riverine region of Bayelsa State, Nigeria, faces a critical issue as the impacts of climate change, including rising sea levels, extreme weather events, and disruptions to traditional livelihoods, disproportionately affect women. This qualitative study aimed to fill a gap in understanding by exploring the nuanced ways in which these environmental challenges influence the migration decisions of women who have fled floods, remain displaced, and have opted not to return to prevent potential negative experiences linked to future flooding in the region. The research delves into the interplay between climate change, gender dynamics, and community resilience. Employing an exploratory research design with purposive and snowball sampling techniques, the study selected 51 female participants. Through 24 in-depth interviews and three focus group discussions, the research captured the nuanced experiences of women grappling with the challenges posed by climate change. Thematic analysis was applied to analyze the collected data. The study unveiled that climate change significantly shapes the migration decisions of women in the riverine area of Bayelsa State. This influence manifests through disrupted livelihoods, flooding, water scarcity, diseases and health challenges, housing insecurity, increased environmental vulnerabilities, and uncertain future prospects. These findings underscore the pressing need for gender-responsive policies and community-based strategies to address the complex interplay between climate change impacts and women's migration experiences.

Keywords: climate change; migration; women; riverine area; Bayelsa State



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1. Introduction

In a momentous gathering in Dubai, global leaders convened for the 28th United Nations Climate Change Conference (COP28) from 30 November to 13 December 2023 (United Nations 2023b). This landmark event underscored the urgent need for a transition away from fossil fuels in energy systems, marking a significant step toward a just and equitable shift (Lodhi 2023). With concerns about a potential 2.7 °C temperature rise by 2100, COP28 recalibrated climate goals and strengthened commitments to limit long-term global temperature increases to 1.5 °C, as outlined in the Paris Agreement (United Nations 2022). The conference concluded with a groundbreaking decision on the world's first 'global stocktake', emphasizing the necessity for a 43% reduction in global greenhouse gas emissions by 2030 (United Nations 2023c). This underscores the pivotal role of international collaboration and stakeholder engagement in addressing climate resilience and emission reduction targets, factors contributing to forced displacement worldwide (Lodhi 2023; United Nations 2023a, 2023b).

The United Nations High Commissioner for Refugees (UNHCR) reports that an annual average of 21.5 million people face forced displacement due to sudden-onset weather-related hazards linked to the impacts of climate change (McAllister 2023; UNHCR 2016). A predictive model suggests that climate change could prompt nearly 3% of the population, totaling over 143 million individuals in Sub-Saharan Africa, South Asia, and Latin America,

to relocate within their respective countries by 2050 (Rigaud et al. 2018). This migration trend has predominantly been internal and increasingly urban, with many displaced individuals moving to urban areas (Ginsburg et al. 2021; International Organization for Migration 2017). Similarly, gender dynamics intersecting with climate change-induced migration have garnered increasing global attention as researchers aim to comprehend the nuanced experiences and vulnerabilities of women amidst environmental shifts. Studies in Southeast Asia, including Bangladesh (Rabbani et al. 2022), Indonesia (Pratiwi et al. 2017), and Vietnam (Ylipaa et al. 2019), underscore the disproportionate impact of climate change on women, revealing that increased flooding, cyclones, and rising sea levels disrupt traditional gender roles, prompting women to migrate to urban areas in search of alternative livelihoods.

Empirical investigations in Pacific Island nations, such as Fiji (Bertana and Blanton 2023) and the Solomon Islands (Birk 2014), illuminate how rising sea levels and extreme weather events disproportionately affect women's lives, leading to increased migration as a response to environmental changes. The literature emphasizes the imperative for gender-sensitive policies considering the unique challenges faced by Pacific Island women in the context of climate-induced migration. Research in Latin American countries like Mexico (Cohen et al. 2013), Guatemala (Howland et al. 2021), and Nicaragua (Bradshaw 2013) has explored how changing climate patterns impact agriculture and rural livelihoods, influencing migration trends of women who have chosen not to return to areas damaged by natural disasters. These studies reveal that women engaged in subsistence farming face heightened vulnerabilities as climate-induced stressors affect food security, with migration emerging as a strategy for women to secure alternative income sources and adapt to environmental changes.

Studies in Arctic regions, including Alaska (Shearer 2012) and Russia (Filippova 2020), illuminate the gendered impacts of melting ice and altered ecosystems, highlighting how indigenous women, who often bear the responsibility of household well-being and traditional knowledge transfer, face unique challenges due to climate change. In Sub-Saharan Africa, research in countries like Cameroon (Ntali et al. 2023), Ghana (Damte et al. 2023), and Zimbabwe (Chidakwa et al. 2020) underscores the intricate connection between climate change, gender inequalities, and migration patterns. These studies reveal that environmental stressors, including prolonged droughts and erratic rainfall, impact women's roles in agricultural activities, triggering migration as a coping strategy. In Nigeria, climate change-induced phenomena, including heightened heatwaves and unpredictable, prolonged rainfall, have led to extreme floods, deforestation, pollution, and food shortages, particularly impacting the Niger Delta region where Bayelsa is situated (Ahmed and Aliyu 2019; Balogun and Onokerhoraye 2022; Itaa et al. 2023).

In the serene riverine expanse of Bayelsa State, Nigeria, narratives unfold, intricately woven with the threads of climate change, human resilience, and gender dynamics (Elum and Snijder 2023; Tonye-Scent and Uzobo 2020). As climate change intensifies, its impacts reverberate through the delicate ecosystems and tight-knit communities of Bayelsa State, prompting a nuanced exploration of the unique challenges and strategies that shape women's migration decisions. Bayelsa State's riverine communities, marked by cultural richness and economic vibrancy, have long been shaped by the rhythms of the environment (Amadi et al. 2015; Raimi et al. 2021). However, the warming planet is altering its ecosystem, causing rising sea levels, erratic weather patterns, and increased flooding that challenge the very foundations of these communities (Ibrahim and Mensah 2022; Merem et al. 2019).

Women, as primary caregivers, food providers, and community stabilizers, often find themselves on the frontlines of these changes (Anugwa et al. 2023; Ngcamu 2023). Their experiences in the face of climate change and the decisions they make regarding migration are shaped by a complex interplay of cultural norms, socioeconomic conditions, and ecological shifts (Agwumafa et al. 2021; Fonjong and Zama 2023). In the context of climate change, the gendered dimensions of vulnerability become pronounced, with women in traditional societies, such as those in the riverine areas of Bayelsa State, bearing

a disproportionate burden of its impacts. This includes disruptions to their livelihoods, increased responsibilities for household resilience, and specific health challenges (Anik et al. 2023; Lelenguyah et al. 2022).

Understanding the intersection of gender and climate change is critical for unveiling the multifaceted drivers and consequences of women's migration (Itaa et al. 2023; Mcmichael 2023). This qualitative exploration seeks to illuminate the nuanced ways in which climate change influences the migration decisions of women who have fled due to a flood, remain displaced, and have chosen not to return, to avoid potential future flooding experiences in the riverine area of Bayelsa State. Employing a qualitative approach, the study aims to capture the narratives and lived experiences that often remain unseen in broader statistical analyses (Akukwe et al. 2023; Tan et al. 2022). By giving voice to the marginalized, this research aims to uncover the strategies, challenges, and aspirations that shape women's migration journeys.

The voices of women are essential in the dialogue on climate-induced migration, holding valuable insights for policymakers, practitioners, and researchers (Mugambiwa and Makhubele 2023; Sikiru et al. 2023; Vinke et al. 2022). By gaining a holistic understanding of how climate change interacts with gender norms and socioeconomic conditions, we can develop more effective and tailored strategies to support the resilience of women and their communities (Andersen et al. 2023; Michael and Odeyemi 2017; Nya et al. 2023). Additionally, this study contributes to a broader discourse on gender and climate change, bridging the gap between global trends and local realities (Akinbami 2021; Khan et al. 2023). As this study embarks on the qualitative research into the lives and stories of women in the riverine area of Bayelsa State, it recognizes the transformative potential of their experiences. By honoring their narratives, the study seeks not only to deepen comprehension of climate-induced migration but also to pave the way for context-specific interventions that empower women, foster community resilience, and ultimately contribute to a more sustainable and equitable future (Anugwa et al. 2023; Ntali et al. 2023; Praag et al. 2022).

2. Materials and Methods

2.1. Study Setting

The study was situated in the riverine area of Bayelsa State, Nigeria, a region characterized by a dense network of waterways, estuaries, and mangrove forests. Nestled in the heart of the Niger Delta, this area is crisscrossed by numerous rivers, including the Niger and Nun rivers, creating a unique and ecologically diverse landscape (Elum and Snijder 2023). The communities within this setting are predominantly dependent on riverine resources, engaging in activities such as fishing, farming, and trading (Nwokocho and Michael 2021). The topography of the riverine area is low-lying, making it particularly susceptible to the impacts of climate change, such as sea-level rise and flooding. The climate is tropical monsoon, characterized by high temperatures, humidity, and distinct wet and dry seasons. However, recent shifts in weather patterns, intensified by climate change, have brought about increased unpredictability in rainfall and heightened the frequency and severity of extreme weather events (Tonye-Scant and Uzobo 2020). Figure 1 displays the map of Bayelsa State showing the study area.

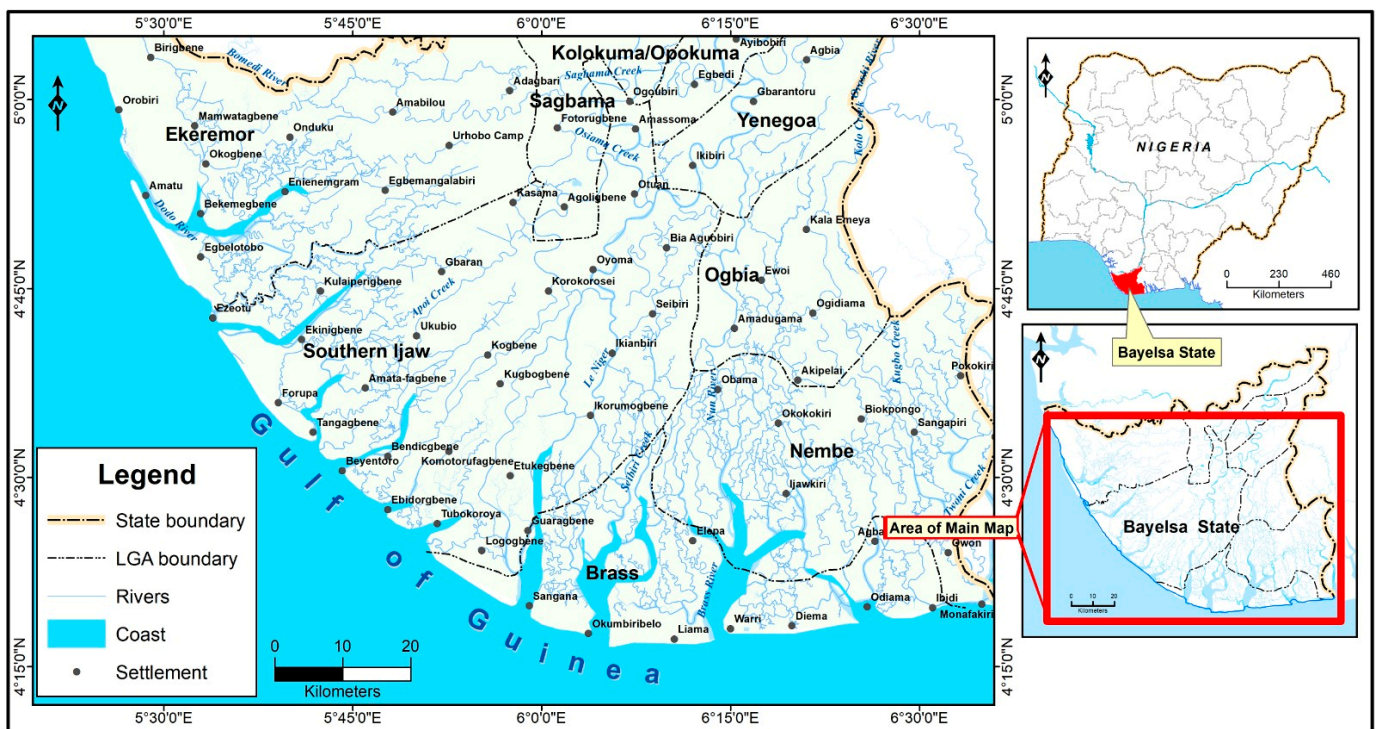


Figure 1. Map of Bayelsa State showing the study area.

2.2. Research Design

This qualitative study employed an exploratory research design to delve into the intricate relationship between climate change and women's migration in the riverine area of Bayelsa State. The exploratory approach allows for a deep and nuanced understanding of the experiences, perspectives, and narratives of women in the context of climate-induced migration (Swedberg 2020). In addition, this manuscript was guided by the Standards for reporting qualitative research (SRQR) (O'Brien et al. 2014).

2.3. Sampling and Participant Recruitment

A purposive sampling strategy followed by snowballing was employed to select 51 female participants. This strategy ensures that women with diverse experiences and backgrounds related to climate change and migration were included. Participants were selected based on criteria such as age, socioeconomic status, marital status, occupation, and migration history. The inclusion criteria comprised adult women aged 18 years and above who had been residents in the riverine areas for at least three years preceding the intense flooding, rising sea levels, and extreme weather events in the years 2021 and 2022, which submerged the entire riverine areas in Bayelsa State, compelling numerous individuals to migrate away from their homelands and communities. Specifically, the study focused on women who migrated during the 2021 or 2022 climate change flood-induced events to a different local government area called Yenegoa in Bayelsa State and who had not yet returned to their homelands before this study. The research was conducted six months after the 2022 heavy flooding incidence to capture the experiences solely of women who were directly affected by either the 2021 or 2022 flooding, rising sea levels, and extreme weather events in Bayelsa State. The researcher provided information to the identified participants regarding the study by guiding them through the informed consent form. Those who expressed a willingness to participate in the study were requested to sign the consent forms and were scheduled for interviews on their appointed dates.

2.4. Data Collection

In-Depth Interviews: Semi-structured in-depth interviews (IDIs) were the primary data collection method. These interviews allowed participants to share their personal experiences, perceptions, and insights related to climate change impacts, migration decisions, and adaptive strategies. Open-ended questions guided the interviews, enabling participants to narrate their stories in their own words. The principal investigator, along with two research assistants who were master's students with training in research skills, conducted the interviews. The principal investigator provided orientation to the research assistants regarding the study objectives and the study tools. The IDIs had a duration ranging from 45 to 60 min. A semi-structured interview guide, aligned with the research questions, was utilized for information collection. The guide was modified in subsequent interviews to explore new emerging themes identified in earlier interviews. Some of the questions included in the interview guide were: "In your opinion, what are the most significant climate change-related changes affecting the riverine area, especially in terms of flooding, erosion, or other environmental shifts? How have these climate change impacts influenced your daily life and the lives of other women in your community? Have you or anyone you know personally experienced migration due to climate change-related factors? If so, could you describe the circumstances that led to the decision to migrate?".

The guide was written in English and translated in Pidgin English, and the local language by experts. Also, the interviews were carried out in English, Pidgin English, and the local language, and were recorded using tape recorders. Later, the recorded interviews were transcribed verbatim. The principle of data saturation determined the total number of in-depth interviews (IDIs), concluding the data collection at 24 IDIs. The interviews conducted in Pidgin English and the local language were transcribed and subsequently translated into English. Audio records were securely stored, and access was restricted via key and lock. Transcribed data were securely stored on a password-protected computer.

Focus Group Discussions: Focus group discussions (FGDs) were conducted to capture collective perspectives and facilitate group interactions. These discussions encouraged participants to engage in conversations about their shared experiences, community dynamics, and the broader implications of climate-induced migration. Women formed the FGDs, which were led by the principal investigator with support from research assistants. The research assistants played a dual role, facilitating note-taking during the discussions. An unstructured FGD guide was employed for data collection, and this guide underwent revisions in subsequent FGDs to explore emerging themes.

The questions included in the guide were: "What was the major factors that prompted your migration to this area? How have you observed climate change affecting the riverine area in recent years, specifically in terms of weather patterns, flooding, and erosion? In your opinion, how have these climate change impacts influenced the roles and responsibilities of women in the community? From your perspective, how have changes in climate and environmental conditions affected traditional livelihoods such as fishing and farming, and what impact has this had on women's migration decisions in Bayelsa State?" The FGDs took place in both Pidgin English and the local language, with each session lasting between 60 to 80 min. These discussions were recorded and subsequently transcribed verbatim. The principle of theoretical saturation guided the process to capture all new information that emerged from additional discussions. The point of data saturation was achieved after conducting three FGDs. The discussions held in Pidgin English and the local language were transcribed and then translated into English.

2.5. Data Processing and Analysis

Thematic analysis was employed to analyze the collected data. The data were transcribed, organized, and coded to identify recurring themes, patterns, and narratives. The analysis of transcripts utilized ATLAS.ti (version 23). Simultaneous data collection and analysis took place, with the researcher composing memos and reflections following each IDI or FGD. The transcript underwent multiple readings, wherein significant patterns were

identified, coded, and organized into themes and subthemes (Castleberry and Nolen 2018). This iterative process enables the extraction of meaningful insights and the exploration of connections between climate change, migration drivers, and women's experiences. The coding process commenced with the generation of initial codes, serving as succinct labels summarizing essential concepts within the data. Open coding was applied, involving the segmentation of data into meaningful units and the assignment of codes to these segments. Subsequently, relationships between codes were examined, similar codes were grouped into categories, and the primary theme was derived by selecting central categories and exploring their connections. Utilizing these categories, an overarching theme emerged, reflecting broader patterns and central ideas present in the data. Sub-themes were identified within these larger themes, offering in-depth insights. The themes underwent meticulous review, accompanied by detailed descriptions and narratives to foster a comprehensive understanding. A compiled thematic analysis report was then developed, encompassing the primary theme, sub-themes, descriptive narratives, and interpretive insights. The incorporation of direct quotes from participants added authenticity and resonance to their perspectives. Furthermore, peer review feedback from colleagues and subject matter experts was sought to reinforce the rigor of the analysis findings. Following the expert review and feedback mechanism, the themes were refined and finalized as displayed in this manuscript's results section.

2.6. Reflexivity

Reflexivity played a crucial role throughout the data analysis process, with the researcher consistently acknowledging and maintaining awareness of subjectivity and positionality (England 1994). This approach aimed at ensuring transparency and fostering a comprehensive understanding of the findings. The research team comprised TOM, an expert in sociology, demography, and gender, with practical experience in Nigeria and South Africa, along with two trained research assistants. Given TOM's background as a demographer with expertise in migration research in Nigeria, there was a recognition that it could potentially influence the interpretation of findings. To mitigate this, conscious efforts were made to set aside any pre-existing knowledge of riverine migration, allowing the researcher to present the participants' views rather than imposing personal biases. The goal was to uphold the principles of qualitative research by observing the genuine attitudes, motivations, and beliefs of the participants. During the research process, TOM introduced self as an academic researcher who worked in a different region of the country, emphasizing role as solely research-related. This approach aimed at creating a comfortable environment for participants to openly discuss their experiences. The identification of women participants was facilitated by a women migrant association; however, they were not permitted to be present during the interviews, ensuring that participants could freely express themselves without external influence. Additionally, guidance and support were provided by ET and SE, established researchers at the Niger Delta University in Bayelsa State. Their input extended throughout the study, including the design, data collection, and analysis phases. This collaborative effort aimed at enhancing the robustness and credibility of the research process.

2.7. Ethical Considerations

Ethical considerations were paramount throughout the research process. The study was conducted in accordance with the Declaration of Helsinki and approved by the Ethics and Research Review Board of Federal University Oye-Ekiti, Nigeria (Protocol: FUYOYE/SOC/ETHICS/005). Informed consent was obtained from all participants, ensuring they understood the purpose of the study, their rights, and the confidentiality of their information. Participants were provided with the option to withdraw at any point without repercussions. Data anonymization was practiced at all levels to protect participants' identities. All participants signed the informed consent form without any coercion.

2.8. Research Rigor and Trustworthiness

To enhance the rigor and trustworthiness of the study, triangulation was employed. This involves cross-referencing data from multiple sources (interviews and focus groups) to ensure the honesty and trustworthiness of findings. Member checking, where participants review and validate the researcher's interpretations, was also incorporated to enhance the credibility of the study (Rolfe 2006).

3. Results

3.1. Socio-Demographic Characteristics of Respondents

The study included a total of 51 participants, categorized into three focus group discussions (FGDs) and 24 individual in-depth interviews (IDIs). In FGD-1, participants aged between 20 and 45 years were represented, with diverse marital statuses including single and married. Their occupations primarily involved trading and fishing, and their migration history ranged from 6 to 24 months. FGD-2 comprised individuals aged 46 to 71 years, with participants reporting being single or ever married. Occupations included farming and trading, and their migration history also spanned 6 to 24 months. FGD-3 involved participants aged 27 to 58 years, with a mix of single and married individuals engaged in civil service or business occupations, and a migration history of 6 to 24 months. The IDIs covered a range of ages, marital statuses, occupations, and migration histories, providing a comprehensive perspective on the socio-demographic characteristics of the respondents as shown in Table 1.

Table 1. Socio-demographic characteristics of respondents.

No of Partakers (N = 51)	Interview Category	Age Range (Years)	Marital Status	Occupation	Migration History
10	FGD-1	20–45	Single/Married	Trading/Fishing	6–24 months
8	FGD-2	46–71	Single/Ever Married	Farming/Trading	6–24 months
9	FGD-3	27–58	Single/Married	Civil service/ Business	6–24 months
1	IDI-1	42	Married	Trading	18 months
1	IDI-2	23	Single	Civil service	7 months
1	IDI-3	21	Single	Trading	10 months
1	IDI-4	64	Divorced	Fishing/Farming	12 months
1	IDI-5	54	Married	Farming	6 months
1	IDI-6	34	Married	Not working	9 months
1	IDI-7	42	Separated	Trading	11 months
1	IDI-8	56	Married	Trading	21 months
1	IDI-9	58	Married	Not working	24 months
1	IDI-10	22	Single	Trading	20 months
1	IDI-11	63	Widowed	Trading	16 months
1	IDI-12	24	Single	Civil service	8 months
1	IDI-13	26	Single	Trading	23 months
1	IDI-14	32	Married	Trading	19 months
1	IDI-15	37	Married	Fishing/Farming	9 months

Table 1. Cont.

No of Partakers (N = 51)	Interview Category	Age Range (Years)	Marital Status	Occupation	Migration History
1	IDI-16	70	Widowed	Farming	22 months
1	IDI-17	64	Married	Farming	12 months
1	IDI-18	51	Married	Civil service	10 months
1	IDI-19	69	Widowed	Farming	11 months
1	IDI-20	43	Married	Not working	14 months
1	IDI-21	28	Single	Fishing/Farming	16 months
1	IDI-22	25	Single	Fishing/Farming	8 months
1	IDI-23	33	Married	Not working	19 months
1	IDI-24	41	Married	Not working	17 months

FGD—Focus Group Discussion; IDI—In-depth Interview.

3.2. Climate Change Factors That Influence Women's Migration

In the riverine area of Bayelsa State, Nigeria, women's migration is influenced by a complex interplay of climate change factors that reshape their lives and communities. Below are the key climate change factors that impact women's migration decisions in the study area:

3.2.1. Theme 1: Flooding and Disruption of Livelihoods

Interviews with participants revealed that the riverine area is particularly vulnerable to increased flooding and erosion due to rising sea levels and changing rainfall patterns. Women who are responsible for managing households and ensuring the safety of their families are directly impacted by the destruction of homes and infrastructure. The threat of recurrent flooding and erosion prompts women to consider migration to safer areas for the well-being of their families. For instance, the interviewee, IDI-8, a trader, vividly recounts the distressing impact of climate change-induced flooding and erosion on her life and livelihood in October 2022. She described the profound losses suffered, encompassing her land, buildings, farms, and means of sustenance, emphasizing the crucial role of women in this societal context as caretakers of homes. The narrative reflected a recurrence of similar challenges faced in 2012 and 2017 due to floods and erosion, resulting in a loss of income-generating avenues. To escape the recurrent devastation caused by flooding, she made the difficult decision to relocate from Southern Ijaw to Yenagoa, settling in the highland area around Okaka. This testimony provides insight into the compelling reasons for climate-induced migration, depicting the resilience and adaptability required to navigate the aftermath of environmental disasters.

I had a lot of trouble with floods and erosion in October 2022. It ruined all of my land, buildings, farms, and ways of staying alive. You know that women are very important in this part of society for taking care of homes. . . I went through the same thing in 2012 and 2017 with floods and erosion. I lost all of my ways of making money. . . I had to move from Southern Ijaw to Yenagoa and live in the highland area around Okaka to escape having my property and ways of life destroyed by flooding. [IDI-8]

The excerpt from FGD-2 further illustrates the cascading effects of migration, with the interviewee describing her journey from Nembe to Yenagoa, detailing the loss of their homes and fishing business due to floods. Despite the initial hardships and challenges, she highlights her current employment, engaging in street vending by selling fish and roasted plantains, symbolizing a narrative of adaptation and perseverance in the face of climate-induced displacement.

Eight months ago, I took my kids and left Nembe for Yenagoa with only my clothes and N12,000 (about \$12) . . . Our homes and fishing business were destroyed by the floods. Three months ago, my husband joined us. . . During those days, I had to suffer and beg to eat. I have a job now. I sell fish and roasted plantains on the street. [FGD-2]

The participants revealed that climate change-induced disruptions to traditional livelihoods, such as fishing and farming, adversely affect women's roles as primary food providers. Unpredictable weather patterns and reduced crop yields lead to food scarcity and economic instability, compelling women to seek alternative sources of income in other locations. In the interview excerpts, for instance, the profound impact of climate change, particularly flooding, on the lives and livelihoods of individuals in the Bayelsa State region was poignantly conveyed. IDI-1, a 42-year-old married woman, described the challenges faced in Brass due to a town-wide flood, leading to scarcity of food and soaring prices of essential commodities. The economic strain forced the family to relocate to Azikoro town to seek a fresh start. Meanwhile, IDI-4, a 64-year-old divorcee, spoke to the adverse effects of unfavorable weather conditions on farming in the Burukiri, Nembe Local Government Area, prompting a transition from farming to running a small business in Opolo, Yenagoa Local Government Area. Both narratives underscore the multifaceted consequences of climate change, including economic hardship, food insecurity, and the necessity for adaptive strategies, compelling individuals and families to make the difficult decision to relocate for the sake of survival and livelihood.

The flood that submerged the whole town made it hard to get food and made money scarce in Brass. People with cash could not see any food to buy. . . The cost of a "Garri rubber" went up from N400 to N800, (which is about \$4 to \$8). My family was so hungry that we almost died. . . We had to move from Brass to Azikoro town to start over. [IDI-1]

The rain, weather and flooding have not been good for our crops. Initially, farming would give us enough food, but now there is either floods, heavy rain, or rising temperatures. . . I had to move because I had to quit my job as a farmer in Burukiri, which is in the Nembe Local Government Area. Now I run a small business in Opolo, which is in the Yenagoa Local Government Area. [IDI-4]

3.2.2. Theme 2: Water Scarcity, Diseases, and Health Challenges

Changes in precipitation patterns lead to water scarcity, affecting both household water availability and agricultural activities. Women bear the responsibility of collecting water for their families, and when water becomes scarce, their daily routines are disrupted. Additionally, water scarcity exacerbates health challenges, particularly for women responsible for sanitation and hygiene within their households. An interviewee in FGD-3 underscored the critical importance of water in their community, emphasizing its role as a life source. However, the water quality has deteriorated due to oil and gas pollution and environmental issues, leading to a steep increase in the cost of purified water, according to the discussants. This prompted the interviewee to narrate her decision to migrate from Diebu in Southern Ijaw to Yenagoa, where the cost of clean water is more affordable at N10 per sachet. The migration was driven not only by economic considerations but also by the necessity for access to clean and safe drinking water.

In our town, water is life. . . Our water isn't good for drinking anymore because of oil and gas pollution and environmental problems, and a sachet of 'pure water' costs N30 to N40. . . I had to move from my town in Southern Ijaw, Diebu, to Yenagoa, where a sachet of water costs N10. [FGD-3]

In the excerpt, IDI-20, a 43-year-old married woman, articulates the hazards of residing in Agoro community in the Ekeremor Local Government Area. The community faces challenges of an inhospitable atmosphere, air pollution, lack of clean water for daily activities, and a significant health risk with reported cases of skin and lung diseases, according to the respondent. The dire situation compelled the interviewee and their family to move, highlighting the urgency of ensuring basic sanitation and environmental safety for the

well-being and survival of residents. These narratives shed light on the multifaceted factors influencing climate-induced migration, ranging from economic pressures to environmental health concerns.

It is dangerous to stay in a place where cleanliness and sanitation are not guaranteed. . . Agoro community in the Ekeremor local government area does not have a peaceful atmosphere, clean air to breathe, good water for cooking or washing dishes, or good health. . . The water that people drink is also polluted. We have record of skin diseases, and lung diseases. . . My family and I had to move so we wouldn't all die of sickness. [IDI-20]

The participants reported that climate change contributes to the spread of vector-borne diseases like malaria and waterborne diseases in the study area. According to the respondents, women, as caregivers and nurturers, are disproportionately affected by the increased health risks associated with these diseases. The need to protect their families' health and well-being drive women to consider migration to areas with lower disease prevalence. For instance, IDI-24, a 41-year-old married woman, discussed the prevalent issue of malaria in the Kolokuma/Opokuma Local Government Area, exacerbated by heavy rains in 2019 and 2020 and worsened by floods in 2022. The recurring illnesses within the family, likely a consequence of the environmental conditions, led them to relocate to Yenagoa after the floods. In FGD-1, a participant from Asamabiri in the Sagbama Local Government Area detailed the constant health challenges faced, including water-borne diseases like diarrhea, cholera, dysentery, and skin diseases. The decision to move away from Sagbama was associated with a notable decrease in infectious diseases, emphasizing the critical role of environmental factors in shaping health outcomes and the necessity for migration as a response to health risks posed by changing environmental conditions.

In the Kolokuma/Opokuma local government area, where I live, malaria is very widespread. Almost every week, my family treats malaria. . . Either my husband, my children, or I are sick. It rained a lot in 2019 and 2020. The floods in 2022 made things worse for us. . . We have not been back to our home town since we moved to Yenagoa after the floods. [IDI-24]

At Asamabiri in the Sagbama local government area, my children and I were always getting sick from water-borne diseases. . . It was either diarrhoea, cholera, dysentery, or skin disease. The number of infectious diseases my family gets has gone down since we moved away from Sagbama. [FGD-1]

3.2.3. Theme 3: Housing Insecurity and Loss of Homes

Rising sea levels and increased flooding pose a significant threat to housing security in riverine areas. According to the participants, women, who often bear the responsibility of maintaining the household and ensuring its safety, are directly impacted by the loss or damage of their homes. Migration becomes a strategy to find more secure housing and protect their families from the dangers of environmental instability. The IDI-11, a 63-year-old widow, for an example, emphasized the responsibility of being the sole parent in ensuring the safety of the family in Peremabiri, Southern Ijaw LGA. The loss of their house to a flood became a breaking point, prompting the decision to move to Yenagoa to escape the frustration, suffering, and repeated losses. In IDI-2, the interviewee from Kassama echoed a similar sentiment of annual loss of homes due to floods, expressing the frustration of having to endure such hardships regularly. The decision to move to the city was driven by the necessity to break free from the cycle of yearly losses and seek a more secure and stable living environment. These narratives collectively underscore the deep emotional and practical toll of climate-induced displacement, compelling individuals to make life-altering decisions to protect their families and create a more sustainable future.

Since I'm the only parent, it's up to me to keep my family safe in our home. . . We lost our house in a flood in Peremabiri, which is in Southern Ijaw LGA. When the flood began, we couldn't get our books, valuables, and property out of the way. . . I didn't want to go

through so much frustration, suffering, and loss anymore. We had to move to Yenagoa. [IDI-11]

All of our homes in Kassama were wrecked by the flood. . . We lose our homes and other things we own. It's too bad that I have to lose my house every year. . . We had to move to the city. [IDI-2]

3.2.4. Theme 4: Family Ties and Social Networks

According to participants, women's migration decisions are also influenced by family ties and social networks. If other family members, such as spouses or children, have migrated due to climate change impacts, women also consider joining them to maintain family cohesion. Similarly, community dynamics and the experiences of neighbors and friends influence their decisions. For instance, in IDI-17, the interviewee explained how the need to escape the regular destruction of homes, farms, and businesses by floods in Ukubie prompted them to relocate to Yenagoa, following the husband's move. FGD-3 recounted a similar story of displacement after the 2022 flood, with the family moving to Yenagoa to live with the brother as their belongings in Okiki, Ogbia Local Government Area, were not spared. FGD-2 provided insight into the interconnected social dynamics of migration, where the decision to stay in Yenagoa is influenced by observing friends who had previously migrated and found stability after the 2012 flood. These narratives collectively illustrate the disruptive and enduring consequences of climate change-induced floods, forcing families to make the difficult choice to migrate to more stable environments in Yenagoa for the sake of safety, security, and the preservation of their ways of life.

After leaving Ukubie, I had to follow my husband as he moved from the village to Yenagoa. . . We moved because our homes, farms, and businesses in Ukubie were often destroyed by floods. [IDI-17]

Before my family got there, my brother parked away from Okiki in the Ogbia local government area and went to Yenagoa. Nothing we owned was saved from the 2022 flood, so my family and I had to move in with him. . . We've lived in Yenagoa ever since. [FGD-3]

When our homes were flooded in 2012, about three of my friends from the Gbaran-ama village left for Yenagoa before me. . . When I saw that they were doing well after the 2022 flood destroyed everything we owned, my family and I chose to stay in Yenagoa from then until now. [FGD-2]

3.2.5. Theme 5: Access to Resources and Uncertain Future Prospects

Participants revealed that climate change disrupts women's access to essential resources such as clean water, nutritious food, and healthcare. Women's roles in securing these resources for their families make them acutely aware of the challenges posed by environmental changes. According to the participants, migration is seen as a way to access better resources and improve their families' overall well-being. The IDI-8, a 56-year-old trader, for instance, discussed the significant impact of poor healthcare in Igbedi, exacerbated by the destruction of a healthcare center due to floods. The scarcity of healthcare resources, compounded by the distance to accessible facilities, became a pressing concern, prompting the interviewee to relocate to Yenagoa for better healthcare opportunities. In IDI-13, the interviewee from Nembe highlighted the adverse effects of pollution on livelihoods, particularly in fishing and agriculture. The degradation of resources in Nembe prompted the individual to move to Yenagoa to continue their business and escape the detrimental effects of pollution. Both narratives underscore the pivotal role of access to essential resources, such as healthcare and sustainable means of making a living, in shaping migration decisions. The move to Yenagoa represents a response to the challenges posed by resource limitations and environmental degradation, reflecting the complex interplay between access to resources and individuals' decisions to secure a more certain and sustainable future.

Poor health care was a problem in Igbedi. The healthcare centre we had was destroyed by a flood. . . We rarely have access to health care these days. . . Distance health care kills some people. I had to leave for Yenagoa as soon as I had the chance. [IDI-8]

People in Nembe have limited access to ways to make a living because oil, water, and soil pollution have made it impossible for us to fish and grow. . . I went to Yenagoa to continue my business and to avoid so much pollution. [IDI-13]

The uncertainty associated with climate change impacts, including unpredictable weather patterns and intensifying natural disasters, create a sense of insecurity about the future. Women who are responsible for ensuring the welfare of their families perceive migration as a strategy to escape this uncertainty and seek more stable environments. The interviewee in IDI-23 articulated the profound impact of environmental pollution, stemming from oil, water, and gas emissions, on the community of Odioma in Brass. The lack of hope for a clean environment and peace in Odioma serves as a driving force for the decision to migrate to Yenagoa. The primary motivation behind this move was the desire to secure a better future for the children through improved access to education. The interviewee recognized that a clean and conducive environment is essential for the well-being and educational prospects of their children. This narrative reflects the intricate relationship between environmental degradation, educational aspirations, and the pursuit of a better quality of life. The decision to move to Yenagoa is rooted in the pursuit of opportunities that can break the cycle of environmental challenges and provide a more promising and sustainable future for the family.

We don't have any hope for a clean environment and peace in Odioma in Brass because of pollution from oil, water, and gas emission. . . I moved to Yenagoa so that my children could get a better education and have a better future. [IDI-23]

4. Discussion

The present study illuminates the multifaceted impact of climate change on women's migration within the riverine region of Bayelsa State, Nigeria. Within this context, a complex interplay of climate change factors significantly shapes the lives and decisions of women who have fled floods, remain displaced, and choose not to return to prevent potential negative experiences linked to future flooding in the region. Notably, the study revealed that the escalating threats of flooding and erosion, intensified by rising sea levels and evolving rainfall patterns, directly jeopardize women's homes, farmlands, and overall survival strategies. Respondents vividly recount the destruction of their properties, compelling them to relocate to safer highland areas to shield their families from recurrent environmental disasters. This contrasts sharply with a study conducted in Bangladesh, where participants engaged in non-migratory decision-making, influenced by material assets, social relations, and psychological dimensions of place relations (Rabbani et al. 2022). Consistent with the current study's findings, a previous study conducted across the Global South emphasized the severe destruction of vulnerable populations' livelihoods, particularly women, due to climate change impacts, exacerbated by socio-economic and political inequalities (Ngcamu 2023).

The present investigation discloses that climate change disruptions extend to traditional livelihoods, especially fishing and farming, crucial for women as primary food providers. Unpredictable weather patterns and reduced crop yields contribute to food scarcity and economic instability, prompting women to seek alternative income sources in different locations. Aligning with our findings, a study in Nigeria underscores the heightened vulnerability of women to climate change impacts on agriculture and food security, identifying education, age, and land access as contributing factors (Anugwa et al. 2023). Another study across sub-Saharan Africa established a significant correlation between adverse shocks related to food scarcity and agricultural productivity due to climate changes and increased emigration from developing countries (Mugambiwa and Makhubele 2023).

The current study identified water scarcity, exacerbated by changes in precipitation patterns, as impacting not only household water availability and agricultural activities but also amplifying health challenges. Women, in their roles as caregivers and nurturers, bear the brunt of increased health risks associated with vector-borne and waterborne diseases. The imperative to safeguard their families' health and well-being becomes a primary motivator for considering migration to areas with lower disease prevalence. This echoes a study in Kenya, where livelihood risks from disease outbreaks were closely linked to climate variability and change (Lelenguyah et al. 2022). Similarly, a study in Bangladesh attributed challenges from scarce drinking water sources and health risks to climate change, identifying cholera, diarrhea, and malaria as prevailing in the studied vulnerable groups (Anik et al. 2023). A study in Cameroon emphasized how climate change contributes to scarcity of water sources, affecting women's productivity (Fonjong and Zama 2023). Another Cameroon study noted that water scarcity is associated with diseases, perpetuating poverty (Nya et al. 2023).

The rising sea levels and increased flooding identified in the current study also threaten housing security in the riverine area, directly impacting women responsible for maintaining households. Loss or damage to homes prompt migration as a strategy to find more secure housing and protect families. A study across Asia, Africa, and the Pacific supports the current findings, linking climate change impacts such as sea-level rise and extreme weather events to increased and altered human migration (Mcmichael 2023). An earlier study in the Niger Delta region of Nigeria established an association between livelihood assets, socio-economic factors, and flood hazards (Agwumafa et al. 2021).

Additionally, family ties and social networks emerge as crucial factors in women's migration decisions. When family or community members have already migrated due to climate change impacts, women are more likely to consider joining them to maintain family cohesion. A similar finding was noted in a study in South Africa, which highlighted the significant influence of prior migrant networks on migration, modifying the association between climate variability and migration flows (Xiao et al. 2022). The present study also underscores how climate change disrupts women's access to essential resources, including clean water, nutritious food, and healthcare. The uncertainty associated with climate change creates a sense of insecurity about the future, compelling women to perceive migration as a strategy to escape this uncertainty and seek more stable environments for their families. This aligns with findings which establish a correlation between observed climate change impacts and prevailing health conditions in selected slum communities (Damte et al. 2023). Participants reported linkages between climate-induced weather events and increased prevalence of diseases such as malaria, diarrhea, cholera, dysentery, skin diseases, and lung diseases. A study in Kenya found that changes in rainfall and temperature variability trends negatively impact pastoralists' livelihoods (Lelenguyah et al. 2022). In Lagos, Nigeria, a study found a relationship between disaster vulnerability and poverty among women residents, noting flooding as the most frequent disaster experienced within their study localities (Ogunleye et al. 2023). Additionally, a study in Niger State, Nigeria, noted the effects of flooding on internally displaced persons (Dauda and Kolo 2022).

While migration is often considered a potential adaptation strategy, a study challenges this notion, particularly for people in climate-vulnerable settings who lack other options (Vinke et al. 2022). These findings underscore the urgent need for targeted interventions to address the challenges faced by women in vulnerable communities, emphasizing the intricate relationship between climate change and women's migration decisions.

4.1. Strengths and Limitations

This research sought to offer a comprehensive exploration of the impact of climate change on women's migration in the riverine area of Bayelsa State. However, it is crucial to recognize certain limitations inherent in the study. One limitation is the potential for bias in participant selection, a common challenge associated with purposive sampling. Additionally, the inherent subjectivity of qualitative research introduces another layer of

limitation. Despite these constraints, the study's findings provide valuable insights into the intersection of gender, climate change, and migration, offering meaningful contributions to the broader discourse. These insights have implications for informing policy, guiding practice, and inspiring further research in this field.

4.2. Implications for Research and Policy

The qualitative exploration of the influence of climate change on women's migration in the riverine area of Bayelsa State, Nigeria, holds significant implications for policy, practice, and further research. The study sheds light on the unique vulnerabilities faced by women in the context of climate change and migration. Policymakers should integrate a gender-responsive approach into climate adaptation and disaster risk reduction strategies. This entails considering women's specific needs, roles, and experiences to ensure that interventions effectively address their challenges. The findings highlight the importance of supporting women's livelihood diversification strategies. Policies that enhance women's access to training, resources, and credit for alternative income-generating activities can help mitigate the impact of climate-induced disruptions to traditional livelihoods. Community-level interventions should focus on enhancing resilience through women's participation. Promoting women's involvement in decision-making, disaster preparedness, and adaptive initiatives can strengthen community responses to climate change impacts. Addressing women's specific health and hygiene needs is crucial. Efforts to provide access to clean water, healthcare services, and education on disease prevention can improve women's well-being and contribute to sustainable development. The study underscores the importance of knowledge sharing and capacity building. Communities can benefit from learning about climate change impacts, adaptive strategies, and best practices from other regions, helping women make informed migration decisions and implement effective resilience measures. Governments and organizations should invest in comprehensive data collection that captures gender-disaggregated information on climate change impacts, migration patterns, and women's experiences. These data can inform evidence-based policies and interventions that consider the diverse realities of women in the region.

5. Conclusions

The riverine area of Bayelsa State, Nigeria, stands at a crossroads, where the effects of climate change intersect with the lives and aspirations of its women. Through a qualitative lens, this study has unveiled the intricate ways in which climate change factors influence women's migration decisions. The narratives of these women echo the urgency of addressing the interconnected challenges of environmental shifts, gender dynamics, and community resilience. As rising sea levels and changing weather patterns continue to reshape landscapes and livelihoods, the study's findings underscore the necessity of gender-sensitive approaches in climate adaptation strategies. By recognizing women's roles as caregivers, community leaders, and economic contributors, policymakers can craft interventions that empower women and safeguard their well-being. Ultimately, this study contributes to a broader understanding of the complex web of factors that drive migration in the face of climate change. It serves as a call to action, urging stakeholders at local, regional, and national levels to collaborate on initiatives that prioritize women's agency, build community resilience, and pave the way for a sustainable future where the challenges of climate-induced migration are met with empathy, innovation, and inclusivity.

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