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ORIGINAL RESEARCH

VULNERABILITY TO VIABILITY: THE EMANCIPATION OF THE COOPERATIVE SOCIETIES OF MAGBON ALADE, IBEJU LEKKI, LAGOS STATE, NIGERIA

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Abstract:

Introduction: Recent industrial developments in Magbon Alade, Ibeju-Lekki, Lagos State, present challenges and opportunities for small-scale cooperative fishing societies in coastal areas. While pollution from nearby refineries and cement plants has introduced environmental stressors that affect fishing activities, food security, and health, it also highlights the resilience of these communities.

Aims: This study identifies stressors affecting fishermen in Magbon Alade and explores their coping strategies and aspirations.

Materials and Methods: This study employed a qualitative research design. Primary data were collected through key informant interviews and focus group discussions with the aid of an interview guide. Respondents included individuals in cooperative societies formed by fishermen.

Results: The findings highlighted the fishing gear used by the communities, such as boats, outboard engines (OBEs), and nets. Small-scale fishermen faced challenges that affected their income but responded by forming cooperatives and seeking financial assistance. Strong community leadership enabled effective decision-making to tackle these issues. While some governance advocacy efforts fell short, the fishermen remained resilient. They developed modern fish processing facilities, including a solar-powered freezer and cold storage. They also requested support for ocean-safe fishing trawlers to improve safety when fishing further offshore. This shows their commitment to enhancing their livelihoods, promoting sustainable fishing practices and transitioning from vulnerability to viability.

Conclusion: The fishermen faced threats to their livelihood and recognized the need for cooperation, unity of purpose, and funding to tackle environmental challenges.

To Keywords: Cooperative societies, coping strategies, small-scale fishing, stressors, vulnerability, viability.

All co-authors agreed to have their names listed as authors.

1. INTRODUCTION

Small Scale Fisheries (SSF), described as the capture of fish from coastal waters, creeks, lagoons, inshore water, inland rivers, streams, lakes, and ponds, are carried out by small-scale fisherfolks who use both traditional and modern fishing gear [1-4]. The terminology of small-scale fisheries is used interchangeably as artisanal fisheries, canoe fisheries, indigenous, traditional, or small boat fisheries in Nigeria [5]. Though it is assumed that the terminology small-scale fisheries, would draw better attention and recognition to the sector for government interventions, and national and international funding programs, it is yet to be officially documented as a better replacement for artisanal fisheries [5].

Small-scale fisheries are often the main drivers in the rural economy, accounting for nearly 50% of the global capture fisheries production, and cater primarily to direct human consumption and supply food for local, national, and global markets [5-7]. Small-scale fisheries also play major roles in social and economic benefits to communities including poverty alleviation, nutrition, food security, livelihoods, and supporting their local cultures [5,8]. The local fishermen and women carry out fishing activities on a full-time or part-time basis at the subsistence level and use different gear and techniques. (9), targeting exclusively freshwater, brackish water, and inshore pelagic fish stocks. Small-scale fisheries are heterogeneous, multi-species, multi-gear, multi-craft, and multi-technique nonindustrial fisheries that cover the activities of small-scale canoes [1-2,4]. The small-scale fisheries employ millions of fishers directly engaged in fishing activities [4,10]. Small-scale fisheries are an important source of employment, food and nutrition security, and income, particularly in the developing world. In Nigeria, it promotes rural development, poverty alleviation, manpower development, and foreign exchange and provides raw materials for the food and animal feed industries [4,11].

An estimated 90% of the 38 million people recorded by the FAO as fishers and fish farmers are small-scale. It is, therefore, said to represent a way of life for millions of people worldwide, who have constantly been adapting to changing social, environmental, and economic conditions [12-13]. The 100 million people, likely underestimated, were employed in other fisheries-associated occupations as millions of people who fish seasonally/part-time in coastal and inland waters were not recorded as fishers [10,14-15].

The living aquatic resources provide livelihoods and income for Nigerians, especially, those living along the isolated riverine and coastal communities [4,16]. The Food and Agriculture Organization of the United Nations (FAO) estimates that about 5.8 million fishers (about 20% of the total) can be considered poor, earning less than USD 1 per day [13]. In many least-developed countries of Africa and Asia, small-scale fisheries provide over three-quarters of the domestic fish supply, and fish accounts for more than 50% of the total animal protein intake [10,17]. In these countries, fish occupies a unique position, providing the cheapest source of animal protein consumed by the average individual, especially in Nigeria [4]. Small-scale fisheries provide essential ecosystem services comprising food, nutrient cycling in water, employment, income, enhancement of the socioeconomic development of urban and rural areas, support livelihood to millions of people, and generate foreign currency for the country[18]. It accounts for over 85% of Nigeria's domestic fish production producing over 600,000 metric tons and constituting a substantial portion of the 0.88% contribution of fisheries to the nation's agriculture GDP component [4,8]. This figure is said to not reflect its real value due to a lack of accurate landing catches data.

Small-scale fisheries have been the dominant source of local fish production in Nigeria over the years [19], however, like many fisheries worldwide, it receives little attention for its contribution to food and nutritional security [2]. In Nigeria, the informal roles of traditional institutions in fisheries and their management system are the most effective in the communities. They have recognition as traditional fisheries managers by the federal and state Departments of Fisheries. There are no formal policies to affirm the devolution of fisheries management to them by the Government [4,20]. The governance position and influence of the district head and head fishermen are powerful by the existing traditional norms, culture, and values [4,20]. The SSF also provides cultural identity, reflected in oral history, songs, cuisine, and other artistic expressions, for rural communities worldwide [21-22].

Vulnerability is said to be the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt [13,23]. [24] has opined that a general definition of vulnerability is the susceptibility of SSFs to diverse drivers of change or disturbance and have limited capacity to cope with those disturbances [25-27]. The natural, social, economic, and governance systems associated with SSF are experiencing a broad array of pressures, issues, and challenges that can lead to vulnerability [24,28-29].

Small-scale fisheries are often characterized as vulnerable, and their viability is a key issue in fisheries governance, given their diverse contributions to the economy, environment, and society [24,30-32]. The vulnerability of small-scale fisheries (SSF) may result from various threats and stressors, including biophysical risks, environmental variability, unstable political situations, and weak governance, amongst others, and the complex interactions between them [24]. The challenges facing SSF are complex and dynamic. Overfishing, competition with industrial fleets, habitat destruction, and unsustainable urban and industrial development are common challenges facing SSF [21,24]. Therefore, communities that depend on small-scale fisheries are at risk [5,7].

The Magbon Alade situation is a classic example of a stressor outside the commonly listed ones that have created challenges in the fishing environment of the fishermen's communities. As rightly pointed out, some of the stressors are related to an increase in the influence of an external factor on the conditions of a social-ecological system (SES), such as extreme weather/climate events that result in cyclones, floods, droughts, sea-level changes, coastal erosion, and temperature and rainfall fluctuations [24,33]. However, as is the case under review, small-scale fisheries are experiencing a wide range of conditions that exacerbate their vulnerability and highlight potential transitions towards greater viability [24].

All hopes are not lost for the SSF. The endorsement of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries in the Context of Food Security and Poverty Eradication (SSF Guidelines) by FAO member states in 2014 is a significant milestone when considered from the governance perspective [21]. The declaration of 2022 as the International Year of Artisanal Fisheries and Aquaculture, by the United Nations has helped to boost the global recognition of SSF [34]. The knowledge about SSF vulnerability will help inform tailored management strategies and policies to reduce SSF marginalization and promote viability, aligning, therefore, with the goal of the Voluntary Guidelines for Securing Sustainable Small-Scale Fisheries [24]. Economic viability which is the achievement of nonnegative net benefits to society over time, is often mistakenly equated with financial viability, and profitability is the sole goal [13]. In complex and dynamic systems, such as small-scale fisheries, social, ecological, and governance aspects also play essential roles [13,35]. In the present situation of tenacity, creativity, and determination to navigate and circumvent difficult situations, the fishermen in Magbon Alade confirm that economically viable small-scale fisheries are likely much better prepared to face global changes in climate, technology, and markets [13,35].

2. MATERIAL AND METHODS

2.1 Area of Study

This study was carried out in Magbon Alade, a coastal community located along the coastal plain in Lagos state, between Eleko town and Lekki Free Trade Zone. It is 8.69km from Eleko town and is predominantly occupied by the Yorubas, other ethnic groups, and people from other parts of the world, especially Ghanaians. The research was to document the impacts of the Dangote refinery and Dangote Fertilizer plant within the coastal communities and Piling activities by the Dangote industry in the coastal waters of Ibeju Lekki since 2013 on the environment and fishing activities.

2.2 Data type and collection procedure

Primary data was used for this study and the data was collected using an interview guide. The methodology employed was a qualitative approach. This was done using Key Informant Interview (KII) and Focus Group Discussion (FGD). Key informants were the leaders of the cooperative societies, the President, the Secretary, other community leaders, fishermen, women in the community, and state fisheries officers.

3. RESULTS AND DISCUSSION

3.1 Economic activities in the community.

The main economic activity of this community is coastal fishing which has been the traditional occupation practiced over the years. Fishing has been the major source of economic income for the development of the town. The settlement is so popular for its fishing activities that people come from different parts of Lagos

state to buy fish from there. The intensity of the fishing activities has attracted people from other countries to Magbon Alade especially Ghanaians, who also contribute to the volume of fish production and development of Magbon Alade. Socially, the foreign fishermen have settled down in the community and have lived peacefully with the indigenous for many years. Magbon Alade has both primary and secondary schools but with no health facility. The closest one to the community is about 40 minutes away at Akodo town by car. Other major activities in the community included smoking of fish and drying of crayfish. These activities are carried out around the clock. Other sideline activities included fish farming, net production and mending, and boat construction.

3.2 Common fish species caught by the fishermen.

The common fish species caught by the fishermen are - Bonga fish (Agbodo)-*Ethmalosa fimbriata*; Sardinellas shawa (Herring) - Two species *Sardinella maderensis* and *Sardinella aurita;* - Croaker (Apo) Pseudotolithus– Many species *Pseudotolithus senegalensis* – short-neck croaker *Pseudotolithus elongatus* – Broke-marriage *Pseudotolithus brachygnathus* – *Pseudotolithus typus* – Long-neck croaker; Mackarel - Kote – *Scomberomorus tritor;* Dasiatis Ray (Apatamaja) Guitar fish - *Dasyatis margarita;* Sole -Abo – Many species from different families -Tongue soles Family Cynoglossidae – *Cynoglossus spp* Family – Bothiidae – *Bothus podas africanus;* Grunter – *Pomadasys* spp.; Red Snapper.*Lutjanus* spp; Marine Catfish – many species *Arius* spp; Shrimps – Many species *Penaeus notialis* – pink shrimp, *Penaeus kerathurus,* Tiger shrimp -*Penaeus monodon*; Octopus – *Octopus vulgaris;* Lobster - *Panulirus regius* –; Marine Crabs – *Callinectes* spp [3,36].

3.3 Fishing equipment and ownership arrangements

The fishing equipment used in the community is the fishing boats, Outboard Engines (OBE), and nets. There are two types of nets which are the Fatuka net, which is dragged at Sea by 2 or more people, and the Ghana net. This is an encircling net that is operated by up to 50 people. The Outboard Engines have capacities ranging between 25 to 40 Horsepower. The ownership of fishing boats in this community is either through hire purchase, by which an agreement is made between the seller and the fishermen for the repayment of the cost of the vessel over an agreed period. The fishing boats can also be owned renting. Under this arrangement rental fees per day, month, or a particular period are fixed, and the term of rentage before the boat is released to the fishermen. Lastly, the boat is owned by what was described as ‘investing in the fisherman.’ This is done by an investor purchasing the boat and fishing inputs for the fisherman on the condition that the fisherman would return the fish catches to the investor as his form of payment for the boats.

3.4 Landing data

The landing data was only available for the year 2017. The average total catch for 2017 was 553.39kg. The mesh size of the net commonly used is not less than 2 fingers.

3.5 The role of women in the community

The women also are a formidable force involved in the processing and marketing of the fish. Most of the women were wives of the fishermen and they were the distributors/ marketers of the fish caught by their husbands. They also are financiers and investors who purchase boats for fishermen to fish and the fish caught are sold by these women as fresh, chilled, and smoked products.

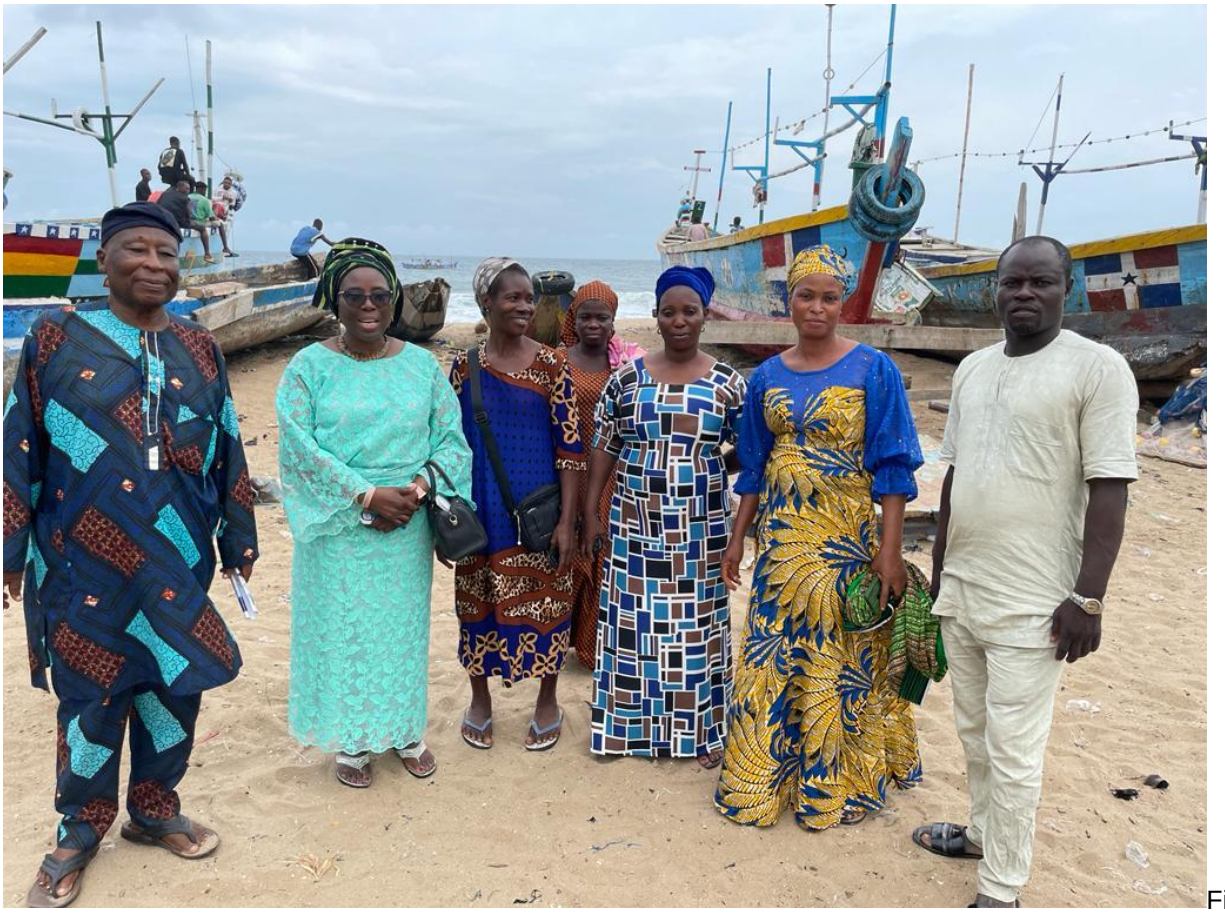

Fig 1: The leadership of the Cooperatives societies and women leaders in the Magbon fishing community.

3.6 Causes of conflicts within the fishing operations

Several issues do cause conflicts within the fishing communities and in their fishing operations. One of these is a fisherman who is already fishing in an area where he has found plenty of fish, and another man now comes to the same area to take out of the stock knowing fully well that the other fisherman was there before him. This usually results in conflict between the fishermen at sea. Also, the ownership arrangements for fishing boats and inputs are not without their inherent problems creating conflicts within the community.

Some fishermen who acquired boats by hire purchase or renting would sell the catches at sea or exchange the fish for foreign exchange. This is contrary to the law of the country, which prohibits transshipment at sea under The Sea Fisheries Act S.I 19 No 71 of 30th November 1992. Section 14 of the Sea Fisheries (Fishing) Regulations capS4 states that 'All fish caught by a motorboat within Nigeria's territorial waters or its exclusive economic zone shall be landed at a Nigerian port and no part of it may be exported or shipped away from Nigeria at sea. The fishermen also illegally transfer fish caught to other fishermen or users of the sea for keeps and to be landed at shore. This is to deceive the financiers that the catch for the day was poor while secretly benefiting from the sale of the illegally transferred fish. These activities when revealed cause serious conflicts between the fishermen and the financiers within the communities. The elders which are the community leaders and other key officers such as the secretary of the association and women leaders in the cooperative societies are called upon to resolve these issues and sanctions are issued against the offending parties.

3.7 Role of the Lagos State Government in the Small-Scale Fisheries Sector

The Lagos State Government carries out the following activities in the state for all the small-scale fishers, which are to register fishermen and fish processors for inclusion in their database and planning, to collect fish catches and sales data, to build the capacity of fishermen and fish processors, to encourage fishermen and fish processors to form Cooperative Societies through which they can benefit from government interventions and programs, to disseminate Government policies and programs to Fishermen, processors, and relevant stakeholders and to have enough time-series data to be able to introduce and implement off-season fishing activities to fishermen.

3.8 The causes and major stressors resulting in vulnerability

The establishment of the Dangote refinery and Dangote Fertilizer plant has resulted in environmental challenges and what the fishermen described as climate change. They have noted this since the beginning of the project in 2013. This is secondary to the piling activities by the Dangote industry, which has been reported to cause environmental pollution that drives fish away from the coastal waters closer to the shore. Before 2013, the fishermen were able to navigate these waters easily before, with the type of engines and boats they had available for their use. However, with the noise pollution and water pollution caused by the disruptions to the coastal bed and environment, the fishermen are forced to move deeper into the sea to find fish to catch. There are limitations to fishing further into the sea secondary to the small sizes of their boats and engines. These have seriously reduced the volume of their fish catch. In desperation, the fishermen reportedly sought an audience with the Dangote Group of Companies which was not granted. Next, they wrote letters of appeal in which they acknowledged the development efforts of the company before stating the effects on their operations and the requests for assistance to purchase fishing trawlers that would enable them to fish further in the deep sea to increase their catches. At the time of writing the letter, their catch had greatly decreased. Next, they also pleaded with the Dangote Group of companies for consideration not to lose their source of primary livelihood which has also been their traditional occupation handed over to them through generations. Several letters all to no avail, and most unfortunate was that the letters were never acknowledged nor replied.

The youths in the community were no longer able to enter the age-old occupation of their communities to become fishermen. It was said that before now, it was a thing of pride and a sign of thriving fish business and wealth for all the male youths in the community to marry second wives. The loss of their fishing grounds to polluted waters because of effluents described as chemical in nature from the factories and the pilling activities were said to have led to the fish migrating from the otherwise accessible fishing grounds. The volume of the catches was no longer commensurate with the fishing efforts. The fishermen also did not get a response to the several letters of appeal for the company to provide them with mini trawlers for their activities. This according to them would have assisted them to go further into sea for better catches. For now, they were faced with the probable loss of their fishing gear and the possibility of losing their lives whenever there was a storm in their pursuit of better catches with the present sizes of boats being used.

Other stressors to their operations made the fishermen in the community vulnerable. These included the lack of a proper landing site, lack of cold storage facilities, and incessant attacks by armed robbers at gunpoint at sea. The fishermen sometimes experienced postharvest losses because of inadequate volume of cold storage facilities. They were forced to bury their catches or throw them back in the waters when they were unable to sell all the catches or store them. This resulted in pollution of the water with dead fish, the appearance of these dead fish in future catches and operations. At sea, harvested fish were stolen at gunpoint. The Nigerian Navy was notified but there has been no response. Other challenges encountered by these fishermen include dredging and creating hollows on the seabed which later become shelters for the fish. The fish in these shelters are no longer within the reach of the fishermen. The fishermen also complained about oil pollution in their environment. The fishermen said that fishing operations are stopped and not allowed each time they observe any form of pollution from oil or chemicals in the fishing environment. This is because they would not want to waste their efforts fishing polluted fish with poor quality. The concern was also on the health of the consumers and themselves as a community.

The community never had a proper landing site to berth their crafts and offload their catches. On arrival from sea, the big fishing boats acquired through collaboration and partnerships could not berth at the landing site. A smaller boat is used to evacuate the fish to the shore. The youths in the community were also made to pull the boats to the shore. It is mandatory and an offence for a youth, who is a member of the community, to not participate in this exercise whenever the need arises. There were organized rules and regulations that ensured all fishermen conformed to a level of discipline within the community. However, the elders are concerned with the fact that the youth are gradually moving out of the community for other occupations outside of fishing. They are even being employed by the Dangote group and carrying out activities that negatively affect their traditional occupation, their community, and their home. The elders therefore decided to look for ways of confronting the challenges they are facing in the community to remain in the fishing busy which they consider as their heritage and pride and which they were ready to defend from going into extinction.

3.9 Efforts at transiting from vulnerability to viability

3.9.1 Group Formation

The decision for this bold initiative was by Elder Rauf Atobajeun, who used to be the vice chairman of the Lagos State Fishermen Cooperative and former Chairman of the Nigeria Fishermen Cooperative Society. The fishermen and other fishmongers in Magbon Alade are members of well-organized cooperative groups. This comprises both men and women as well as the youth group. There are over 30 number of cooperatives in Magbon Alade. Each of these cooperatives has a maximum of 20 members.

3.9.2 Establishment of partnerships and blast and cold storage facility

Under the leadership of Elder Rauf Atobajeun the leader of cooperative societies in Magbon Alade fishing community, the fishermen got together. Using private funds and partnership arrangements they took the bold step to better the lives of the fishermen, and indeed the community. It was a decision to move from vulnerability to viability, as there was no response from the company that had greatly contributed to the challenges they were facing. The fishermen of Magbon Alade town, from the sourced funds, acquired a large expanse of land near the shore and commenced the construction of a twenty-ton capacity Blast and Cold room facility. This facility is also powered by Solar energy. The fishermen through the leadership of the conglomerate of cooperative societies considered the expected benefits while setting up such a huge complex that also has an office space, modern conveniences, blast freezers, and cold storage. The benefits of the solar-powered Blasting and cold room facilities to the fishing communities include amongst others, the production of iced blocks to preserve the fish at sea, during sales, and transportation to other distributors and consumers outside of the community. It was part of the marketing strategy to eliminate the involvement of middlemen who end up making better profits than the fishermen. The plan was to be able to maximize the profit by selling directly to end users and outside of the community. The facility has helped to reduce post-harvest losses and the inappropriate disposal of waste fish into the coastal waters. It has facilitated the ease of supply of fish to other parts of the country as the quality of the fish is preserved and guaranteed from the established cold chains. The fishermen can readily make available and supply varieties of fish species for different cuisines and purposes directly to restaurants and hotels. This has helped in the creation of jobs along the value chains, especially for the youth. This facility will formally commence operations before the end year 2023. There are plans to acquire processing facilities that would be installed in the empty land space behind the complex.

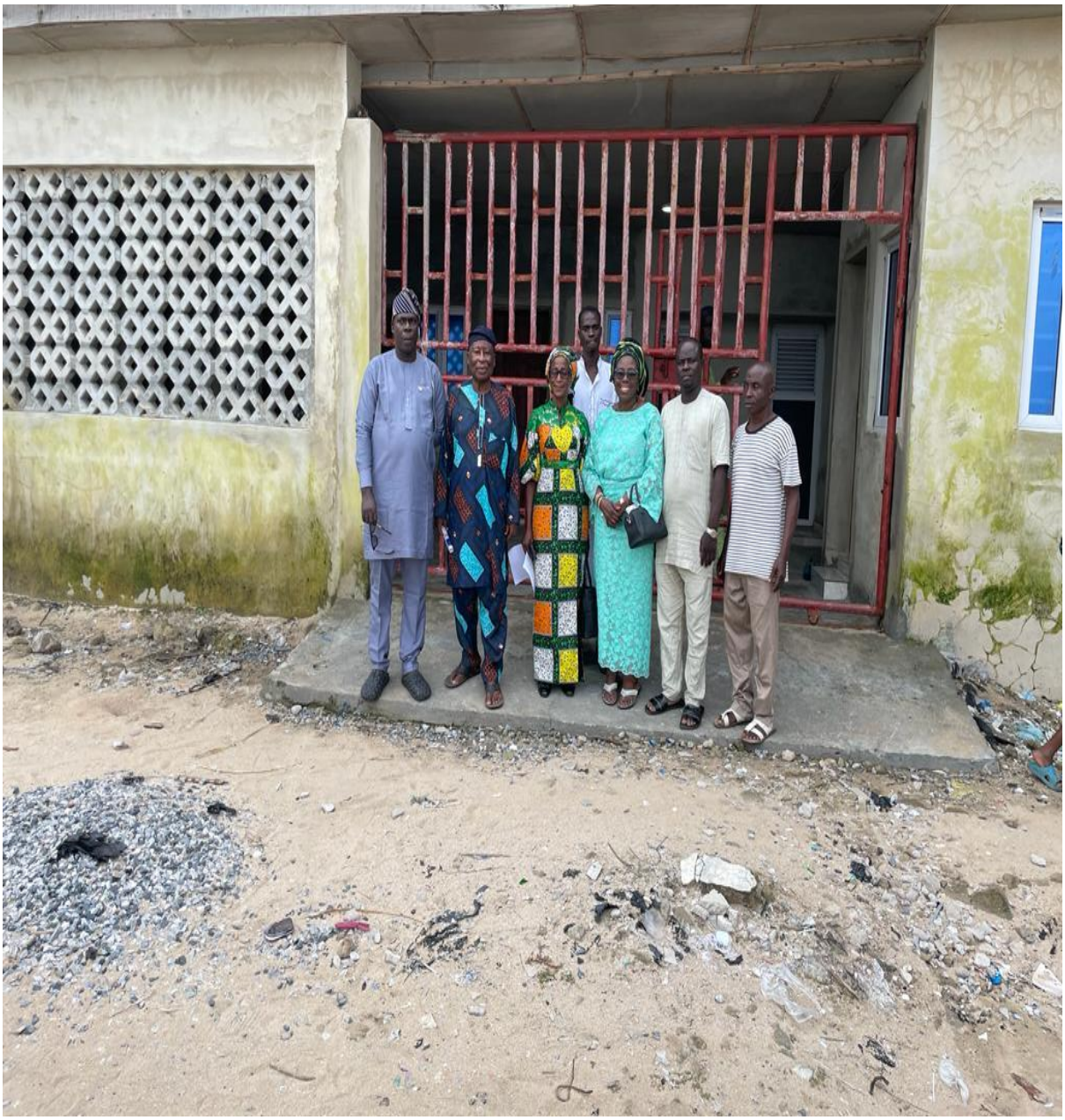

Fig 2: The frontage of the blast freezer/cold room complex

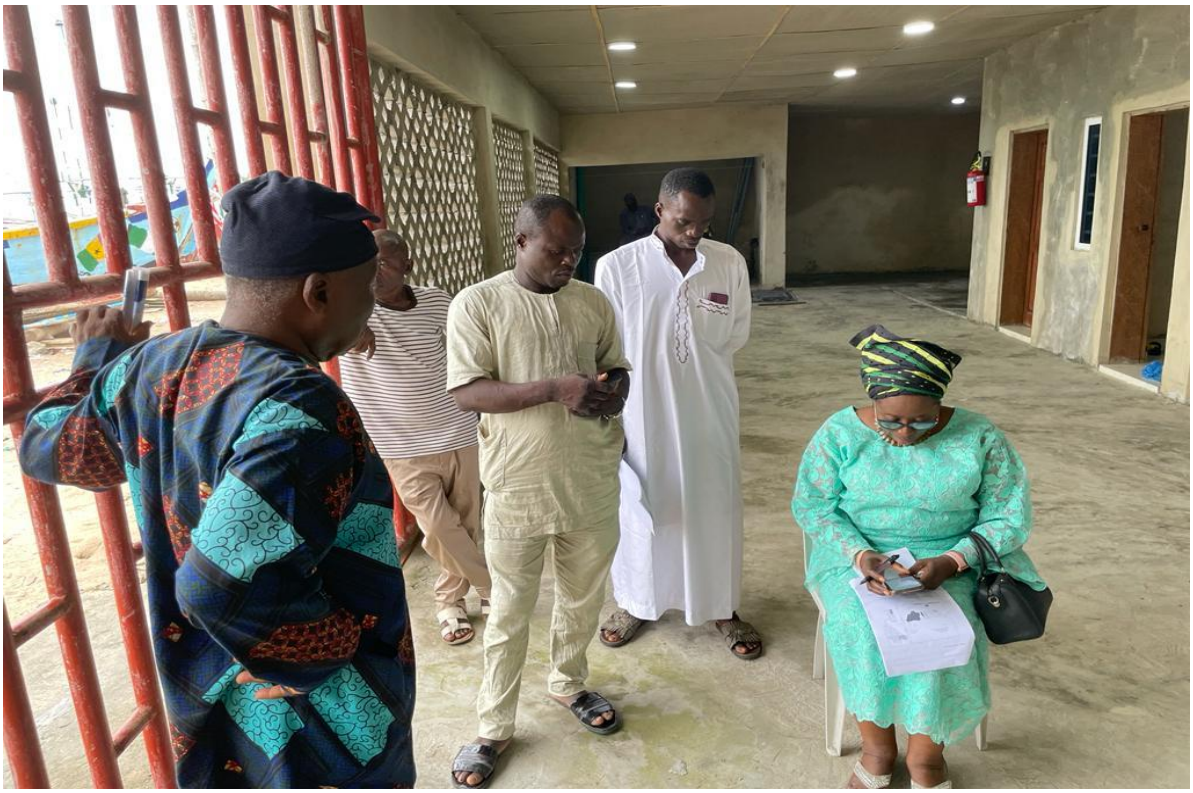

Fig 3: The inside of the Facility complex showing the cold room, blast freezer and office spaces.

Fig 4: The cold room and the blast freezer

Partnership to acquire better ocean-going boats with fishermen from neighboring coastal countries.

The fishermen, being faced with the limitation to fish far from the shores, went into partnership and collaboration agreements with other fishermen with bigger boats that could fish further into the sea. The partnership also became necessary to maximize the utilization of the acquired solar blasting and freezing facilities. Some of the vessels bear the flags of other countries, such as Ghana. The small-scale fishing boats in Nigeria have not been registered at the national level. However, the Lagos state government has taken the initiative to register the small-scale fishermen at a Two Thousand Naira (N2000) annual registration fee. They are thereafter issued with a tax receipt and a certificate that recognizes them as Lagos State fishermen. The state also has a scheme in place by which fishermen are expected to pay Two Hundred Naira (N200) per trip per day. The scheme is to further separate fishermen from Lagos state from those from other states of the country or other countries who fish with mini trawlers in the exclusive non-trawling zones for the small-scale fishers and who also use nets of small mesh sizes to scoop the fish indiscriminately.

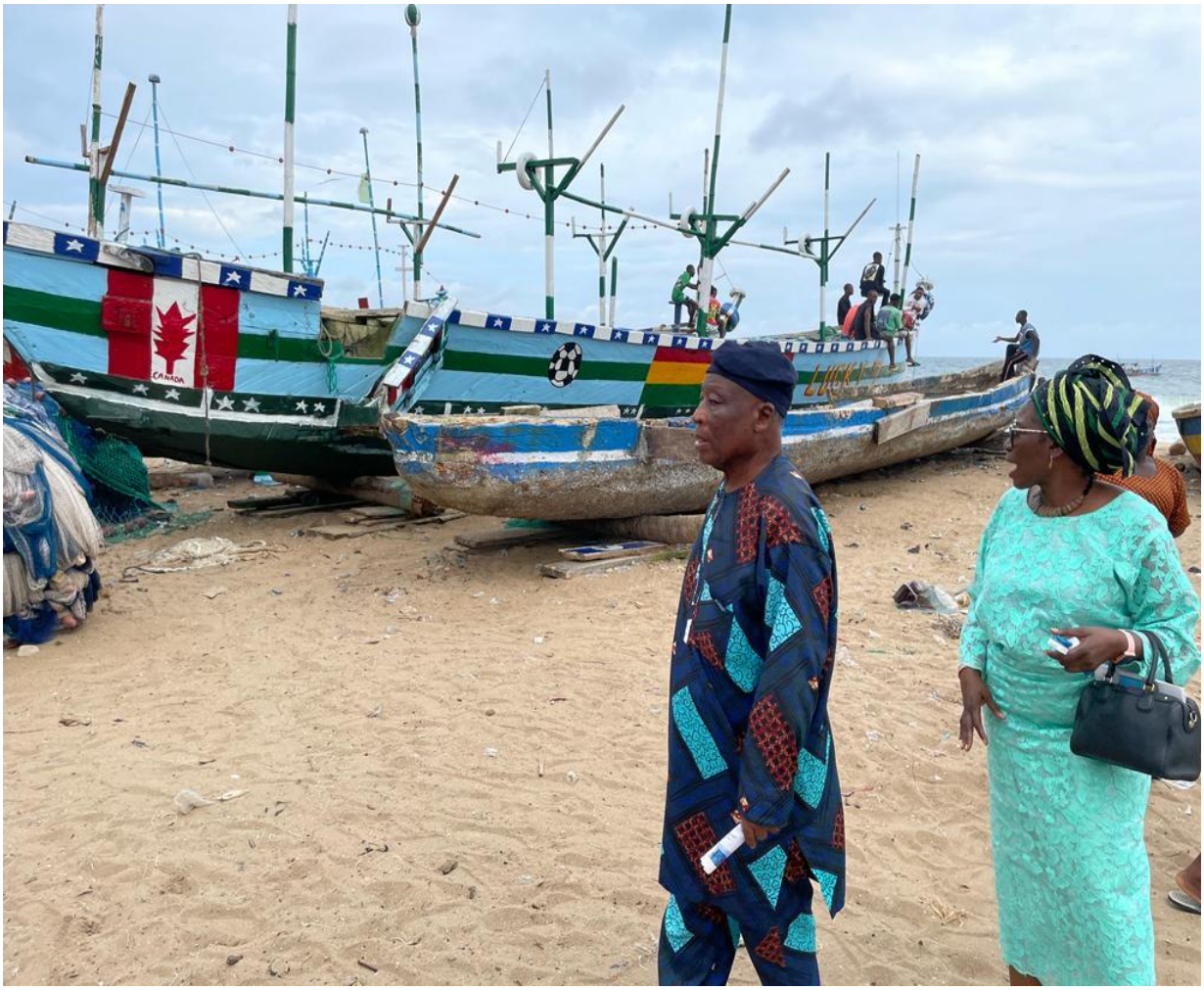

Fig 5: Fishing boats at the jetty flying foreign flags.

4. CONCLUSION

The small-scale fishermen faced many stressors that affected fishing activities, income, and general well-being. The fishermen were faced with a situation that nearly led to the total collapse of their source of livelihood. It is important to note that the fishermen went through the process of seeking redress in a civilized manner. They wrote letters and attempted visits to the company, intending to find a mutually beneficial solution to the situation at hand. The company did not respond to them. The fishermen sought adequate consideration for the disruptions to the environment in which they have operated for years, and which was handed over to them by their forefathers. The fishermen pursued every available opportunity to seek redress and be supported to overcome the challenges faced at the very onset of 2013. When those routes failed, the fishermen were able to forge ahead because of the leadership in the community and the existing collaboration between the fishermen for making joint communal decisions in confronting their plights. There was also the opportunity to form cooperative societies under their supervisory agency — The Department of Fisheries and Cooperative in Lagos state.

To remain in business, they formed functional cooperative groups and sought financial support and collaboration to confront the resultant effects of the stressors that they faced. The thrust of their efforts was

that cooperation, unity of purpose, and finances were needed to overcome any form of natural, and environmental challenges within their small-scale fishing community. The project is in an advanced stage and the women involved are convinced that they would be able to command optimum prices for their products with the new development and the plan to have processing facilities (especially smoking kilns) within the complex. This is a very encouraging example of a group of fishermen's tenacity to overcome the stressors that did not come from the natural occurrences, or effects of climate change (flooding), or the common human activities along the Lagos coastal region which is dredging. Ten years down the line they remain optimistic that there is a greater hope to better their fishing activities in the future.

Based on the findings, there should be a way to document the probable ways by which the activities of other developmental programs in other economic sectors along the coast could have negative effects on the ecosystem, the fish, and the fishermen who depend on the fish for their livelihood. The small-scale fishermen need to be recognized for their role in fish production, and fish food security in the country. It is also time to have a compensation program in place that is mandatory for any activity that impacts SSF negatively within their operating spaces. The small-scale fishermen deserve to have a voice — a combination of themselves and the supervisory authority that would be there to defend and support them whenever any situation arises.

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COMPETING INTERESTS

The authors have declared that no competing interests exist.

AUTHORS' CONTRIBUTIONS

Areola, F.O. designed the study and was involved in the data collection, desk review, data analysis, report writing, and manuscript correction and proofreading. Akintola, S.L. was the overall supervisor of the study and was involved in manuscript correction and proofreading. Fakoya K.F. was the second supervisor and was involved in manuscript correction. Oropo, S.O. was involved in data collection. Oladosu, M.A. was involved in data collection and report writing**.** All authors read and approved the final manuscript.

ETHICAL APPROVAL (WHEREVER APPLICABLE)

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