UNIVERSITY OF CAPE COAST

ALTERNATIVE LIVELIHOOD STRATEGIES OF FISHING FAMILIES AT MOREE

REBECCA ARHIN

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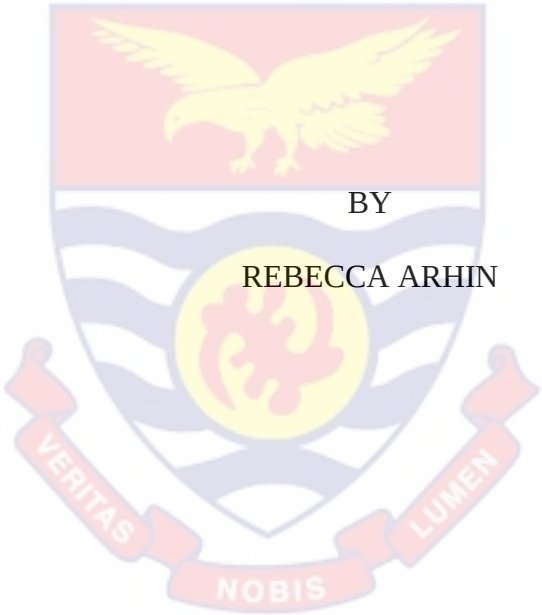

BY

REBECCA ARHIN

Thesis submitted to the Department of Vocational and Technical Education, Faculty of Science and Technology Education, College of Education Studies, at the University of Cape Coast in partial fulfilment of the requirement for the award of Master of Philosophy Degree in Home Economics

SEPTEMBER 2022

DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my original research and that no part of it has been presented for another degree at this university or elsewhere.

Candidate's Signature:..... Date:.....

Name: ……

Supervisors' Declaration

I hereby declare that the preparation and presentation of the thesis were supervised by the guidelines on supervision of the thesis laid down by the University of Cape Coast.

Principal Supervisor's Signature:..... Date:.....

Name:……

ABSTRACT

Fishermen and fishing communities have recognized the limitations of relying solely on fishing as their primary source of income and livelihood. Studies have shed light on the alternative livelihood strategies employed by fishing families to complement their fishing occupation and support their families in Ghana, but they did not provide insights into the range of strategies that fishing families and communities utilize. The purpose of the study was to explore different alternative livelihood strategies for fishing families in Moree. A descriptive study was employed to obtain responses on alternative livelihoods and activities used by the fishing families. A proportionally stratified and simple random sample (lottery method) was used to sample one hundred and fifty-four (154) respondents for the study. Descriptive statistics (such as frequency and percentage) and statistical test including binary logistics were used to analyse the data. Results showed that the alternative livelihood strategies used by the fishing families include borrowing, tailoring, grocery selling and retailing. The most determinant of alternative livelihood strategies of fishing families in Moree was low income. Binary logistics test of all the socio-demographic variables, income level was significant (p= 0.005). Based on these findings, it was recommended that the government should implement programmes that may support fishing families with financial services.

KEY WORDS

Alternative livelihood

Fishermen

Fishing

Families

Fishmongers

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DEDICATION

I dedicate this work to my family.

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ACRONYMS

SDGs Sustainable Development Goals

DFID Department for International Development

CHAPTER ONE

INTRODUCTION

Background to the Study

Globally, fishermen and fishing communities have adopted alternative livelihood strategies to complement their fishing occupation since the fishing occupation cannot singlehandedly cater for them and their families. For instance, in Tanzania and Kenya, no surveyed household depended solely on fishing for income (Suckall, Tompkins & Stringer, 2014). In Mozambique, Harper, Zeller, Hauzer, Pauly and Sumaila (2013) asserted that most fishing families combined fishing with farming for their survival. Brugère, Holvoet and Allison (2008) also identified that there are over 100 alternative livelihood strategies for generating income apart from fishing. Krishnan and Narayanakumar (2013) found that fishing families maintained their fishing activities alongside seaweed cultivation because seaweed farming was carried out to take care of themselves and their families.

In India, Coulthard (2012) identified that fishing families do have alternative livelihood strategies in addition to fishing. Moreover, fishing families were involved in collecting molluscs, shells and mangrove wood, processing fish and rearing chicken to complement their fish farming and it served as another source of income. Thus, fish farming alone in the coastal areas does not provide enough income for fishing families. So, they have to engage in other livelihood activities to fend for themselves and their families. According to Ibengwe and Sobo (2016); World Bank (2021), fishing activity accounts for an estimated 4 percent of GDP. Fish capture, processing, marketing and associated services constitute a very important source of

livelihood–certainly in coastal areas and around lakes and rivers, but in other areas too. Without a doubt, fishing continues to be a significant economic engine in coastal Ghana even if it is getting harder.

In many regions of the world, fishing is crucial to people's lives. This is because they may offer a wide range of services to people, supporting both the sustainability of the environment and people's way of life. Ninety-two percent of the world's inland fisheries harvests are said to originate in developing nations, the majority of which stem from small-scale fisheries (Ibengwe *et al.,* 2016). In the fishing sector, males catch fresh fish while women prepare it (Ferrer, Perez, Roxas & Avila, 2014). The supply of food via fishing also gives work opportunities, produces monetary income, and aids in the reduction of poverty in many developing countries (Allison, Perry, Badjeck, Neil Adger, Brown, Conway, & Dulvy, 2009). This demonstrates how impactful fish farming has been for people and the entire community and it keeps benefitting everybody.

Tiny fisheries record small catches per unit, but cumulative catches can surpass commercial and medium-sized fisheries (Coates, 2002). Fish account for the bulk of animal protein consumed in countries such as Laos, Bangladesh and Cambodia (Funge-Smith & Bennett, 2019). Half of Africa's fish-based diet comes from local, family-run fisheries (de la Croix, 2021). Whether they are fishermen or farmers who sell their catch at markets, poor families rely heavily on the fishery for both food and cash (Bene et al., 2009).

Bene *et al.* (2009) call fish a "bank in the water" because fishing can be a way for people to make money every day. Funge-Smith *et al.* (2019) say that inland fisheries are an important part of the growth of regional economies

because they create jobs. Ghana's fishery resources are experiencing significant pressure due to high demand, population growth, and a lack of alternative livelihood options for fishing communities, which has been linked to poverty. As more rivers are dammed, aquatic ecosystems that provide environmental and socioeconomic benefits are being threatened, notwithstanding the importance of fisheries to rural economies (Sembiring *et al.*, 2015). Based on their examination of natural resource-based occupational shifts and societal, economic and infrastructural development in East African coastal communities, Cinner and Bodin (2010) conclude that household-level specialisation in most occupational categories, including fishing and farming will increase. Dinner and Bodin (2010) say that infrastructure and growth have made the coastal rural economy more stable.

According to Prado, Seixas, and Berkes (2015), ecological deterioration and altered government policies are causing complex dynamics of change in many coastal towns in emerging countries. The livelihoods of coastal populations are threatened by several of these measures. As a result of a drop in profits, many fishing families have been forced to go elsewhere for work. People's means of subsistence, or livelihood, is their source of income (Schmidt, 2019). A person's or family's livelihood consists of their day-to-day actions, resources, and opportunities (Schmidt *et al.*, 2019). The concept of "livelihood" takes into account for the many ways in which individuals and households make a living. The covariate risk of a portfolio may be minimised by income diversification (Sills, 2015).

Finding new ways to make a living is one-way rural residents can adapt to a changing world (Sills *et al.*, 2015). Providing fishing communities

with other ways to earn money improves their flexibility and resilience in the face of market and resource volatility (Cline, Schindler & Hilborn, 2017). Martin *et al*. (2013) argued that giving people in rural areas more ways to make money did not cause fishermen to stop fishing altogether but instead made their overall portfolios stronger. In tropical areas, people do not depend on one mode of employment for survival but on varying areas of employment including farming, fishing and other economic activities as discovered by Cinner, McClanahan, and Wamukota (2010). Cinner *et al*. (2010) report small businesses, transportation, and mechanic work as examples of economic activities that are not farming or fishing. In Ghana, fishing families do have few assets and makes fishing families search for other livelihood opportunities (Bhowmik *et al., 2021*). There are also impoverished households of fishing families in Ghana with less income and because of that, they look for other livelihood opportunities.

Fishing has become the main source of income and livelihood for those living in the coastal areas (Prosperi *et al.,* 2019). Ghanaian fishermen have increased their fishing efforts by using more gear, making additional trips, and spending longer hours at sea. However, these practices place excessive pressure on fishery resources, leading to overexploitation. Weak regulation and ineffective management also contribute to the depletion of these resources. Introducing alternative income sources and coping livelihood strategies in fishing communities can help address the vulnerability of fishermen. This is because over the past decade, catches in the local Ghanaian waters have dwindled by over fifty percent (Amevenku, Asravor & Kuwornu, 2019). Fishing families in Ghana continuously grumble about less catch,

particularly in Moree. The media also have reported that for over 15 years, fish catch has gradually been going down, a situation experts claim will spell doom for the fishing sector if not checked (Business & Financial Times-News, 2018). The dwindling of fish stock in Ghana's waters has been largely attributed to illegal fishing activities, which include the use of explosives, chemicals, undersised fishing nets, use of light, bamboo and other fish-aggregating devices (Business & Financial Times-News, 2018).

As a result, studies have focused on the biological and economic aspects of fisheries in Ghana (Gougbedji, Detilleux, Lalèyè, Francis & Caparros Megido, 2022; Osei, Yankson, Obodai & Okyere, 2021; McConney & Charles, 2010), but few have assessed the vulnerability of fishermen and their coping livelihood strategies in Moree. Notwithstanding, existing studies have primarily examined profitability, wealth redistribution mechanisms, and profit optimization in specific fishing contexts (Cánovas-Molina & García-Frapolli, 2022; Yang, Owusu, Andriesse & Dziwornu Ablo, 2019). However, little is known about the alternative livelihood strategies used by the fishing families in Moree. In this light, this current study would explore the alternative livelihood strategies use by fishing families in Moore.

Statement of the Problem

Fishing sector has been very lucrative, providing opportunities to families and communities that fish (Belhabib, Le-Billon & Wrathall, 2020; Rees, Rodwell, Searle & Bell, 2013). Studies have noted that fishing sector contributes to about 4 percent of the global GDP (Work Bank, 2021; Cai, Huang & Leung, 2019; Rizal, Kusumartono & Zaida, 2019). Fishing sector is

known to influence Africa's GDP at 6.6 percent. In Ghana, studies such as Michael, Cai, Akwasi and Adele (2019); Owoo and Lambon-Quayefio (2018) hold that the fishing industry contributes to almost 4.5 percent of Ghanaian GDP.

In recent times, studies have shown the decline in fish catch and its potential dangers on economic growth and livelihood of people, particularly people in fishing communities in Ghana. In other words, the fishing industry in Ghana, particularly in Moree brings about less income for fishermen (Begum, Masud, Alam, Mokhtar & Amir, 2022; Business & Financial Times-News, 2018). Families and communities that depend on fishing in Moree always complain and sometimes engage in illicit acts all in the name of not getting enough finance to feed their families (Business & Financial Times-News, 2018). According to Begum *et al*. (2022); Business *et al.* (2018), if nothing is done about it, it will spell doom for fishing families and the fishery industry, the countries and non-fishing communities (Business & Financial Times-News, 2018).

A study by Amevenku et al. (2019) in Ghana explored the determinants of alternative livelihood of fishermen without paying attention to what kind of alternative livelihood strategies fishermen adopt. They showed that exploring the different livelihoods strategies used by fishermen is equally as providing alternative means for fishing families and communities to reduce social and economic issues related to low catches. Though Amevenku et al. (2019) recognized the importance of alternative livelihood strategies in addressing social and economic issues linked to low fish catches, they did not delve into the details of the actual strategies that fishermen employ to diversify their

sources of income. Further research is needed to fill this gap and provide a comprehensive understanding of the diverse alternative livelihood strategies that fishermen employ.

Previous studies have focused on the vulnerability and adaptive capacity of small-scale fishers in Ghana. The studies highlighted the decline in fish catch and its negative impact on the economic growth and livelihoods of fishing communities, the vulnerability and adaptive capacity of small-scale fishers in Ghana. However, there is limited research that specifically explores the various alternative livelihood strategies that fishing families in Moree employ to address these challenges. As a result, there is a gap in knowledge regarding the range of alternative livelihood strategies employed by fishing families in Moree, which could provide valuable insights into how these families navigate complex economic and social issues. This study, therefore, sought to fill the gap by exploring the alternative livelihood strategies of fishing families at Moree.

Purpose of the Study

The purpose of the study is to explore various alternative livelihood strategies of fishing families at Moree. However, the specific objectives are to:

1. explore the alternative livelihood strategies adopted by fishing families in Moree.
2. examine the determinants of alternative livelihood strategies of fishing families in Moree
3. determine the livelihood outcomes of fishing families in Moree.
4. determine the socio-demographic variables that predict the likelihood fishermen not able to provide for their families.

Research Question

The research was guided by the following questions:

1. What are the alternative livelihood strategies of fishing families in Moree?
2. What are the determinants of alternative livelihood strategies of fishing families in Moree?
3. What are the alternative livelihood outcomes of fishing families in Moree?
4. What socio-demographic factors predict the likelihood that fishing families are incapable of providing for their families?

Research Hypothesis

H_{01}: Socio-demographic factors do not predict the likelihood that fishing families are incapable of providing for their families.

Significance of the Study

The findings of the study will directly help fishing families by shedding light on alternative livelihood strategies available to them. By exploring and understanding different options beyond traditional fishing, the study would help empower fishing families to diversify their income sources and reduce their dependence on a single livelihood. This knowledge would help equip fishing families with the tools to make informed decisions about their economic activities, enhancing their resilience and overall well-being.

The findings of the study will help provide valuable insights to the government regarding the challenges and opportunities faced by fishing families at Moree. By understanding the dynamics of alternative livelihood strategies, the government can develop targeted policies and programmes to

support and promote these strategies. The findings of the study would enable the government to make informed decisions, allocate resources effectively, and implement measures that address the specific needs of fishing families in the pursuit of sustainable development.

The findings of the study would contribute to the understanding of the current status of fishing families and their activities. This knowledge would be valuable for the Ministry of Fisheries and Aquaculture, allowing them to better align their strategies and initiatives with the needs and realities of fishing communities. The study would serve as a resource for the ministry to develop informed policies and interventions that support the welfare and livelihoods of fishing families.

The study will help the local community by increasing awareness and understanding of the alternative livelihood strategies pursued by fishing families at Moree. This knowledge would foster a sense of solidarity and empathy within the community, encouraging support and collaboration in the implementation of these strategies. The study would help the community to recognise the importance of diversifying livelihoods, leading to increased employment opportunities, improved economic stability and reduced poverty levels within the community as a whole.

Delimitation

The study focused on the Moree fishing community and this was due to the prevailing issue of poverty among the majority of fishing families in that area. By concentrating on this community, the study aims to address one of the long-standing challenges faced by these families, providing targeted insights and potential solutions. The study specifically targeted fishing

families who heavily rely on fishing as their primary source of livelihood. This selection criterion allowed for a focused examination of the challenges and opportunities associated with traditional fishing practices in the Moree community. By narrowing the scope to fishing-dependent families, the study can explore the unique circumstances, needs, and aspirations of this particular group.

The age limit of 18 to 59 was chosen to align with the standard working age in Ghana. By including individuals within this age range, the study captures the active and productive segment of the population who are directly engaged in fishing-related activities. This age restriction ensures that the study's findings reflect the experiences and perspectives of those actively participating in the fishing economy. Furthermore, the study specifically focused on registered fishing families who are part of the Moree community. By targeting registered families, the study establishes a more comprehensive understanding of the challenges and opportunities faced by families recognized and acknowledged by local authorities. This approach allows for more accurate and reliable data collection, ensuring that the findings are representative of the fishing families within the community.

Limitations

The study focused solely on registered fishing families within the Moree community. This might introduce sampling bias and limit the generalizability of the findings to other fishing communities or unregistered families in the area. The experiences and challenges of unregistered fishing families could differ significantly from those included in the study.

The study restricted the age range of participants to 18-59, aligning

with the standard working age in Ghana. However, this age restriction excludes valuable perspectives and experiences from younger individuals below 18 and older individuals above 59 who may have unique insights into alternative livelihood strategies or face distinct challenges.

The study concentrated specifically on fishing families who heavily depend on fishing as their primary source of livelihood. This narrow focus might overlook the experiences and strategies employed by families with diversified livelihoods or those engaged in alternative income-generating activities alongside fishing.

Definition of Terms

Alternative livelihood in the context of this study comprises the range of activities fishing families are involved in to ensure their living and wellbeing.

Fishermen are people who catch fish and other sea animals for a living in lakes, seas, lagoons and rivers.

Fishing Families are those who usually live close to the sea and their lives revolve around the sea and fish.

Fishmongers are those who sell raw fish, smoked fish and seafood.

Organisation of the Study

The thesis is broken into five sections; the first one offers a background to the study, a statement of the problem, the aim and objectives of the study, research questions, and the importance of the study. Literature, concepts, and theories are discussed in Chapter 2. Information gathering, research methodology, and sample selection are the subject matter of Chapter 3. In Chapter 4, the results are shown and talked about and in Chapter 5, a summary, conclusions and suggestions are given.

CHAPTER TWO

LITERATURE REVIEW

Introduction

The study looked at alternative livelihoods for fishing families in Moree. The first chapter deals with the study background, the problem, the goal and the research questions. It emphasized research and phrase definitions. This contextualizes the study. This chapter provides an overview of relevant literature. The idea is to read what famous authors have said. The review used subheadings as follows: Theoretical Review, Conceptual Review and Empirical Review

Review of Relevant Theory

Sustainable Livelihoods Approach (SLA)

Sustainable Rural Livelihoods: Practical Concepts for the Twenty-First Century, a discussion piece for the Institute of Development Studies, was largely recognised as being the earliest to introduce the modern Sustainable Livelihoods Approach (SLA) (Amekawa, 2011; Munanura, Backman, & Powell, 2016; Woyesa & Kumar, 2021). Impoverished individuals make a living through a varied spectrum of enterprises, as per the Sustainable Livelihoods Approach, which provides them with an income by leveraging their many resources.

The Sustainable Livelihoods Approach of Chambers and Conway (1992) was further adopted and developed by the Department for International Development (DFID) to improve the livelihood sustainability of the most underprivileged areas of the inhabitants by trying to promote: increased access to schooling, knowledge, technology, and top-notch training;

upgraded wellbeing and nourishment; a more unified and helpful social setting; unfettered access to secure and better managed natural resources; better access to elementary facilities; and a safer and more secure environment and more equitable access to competitive markets (Kamaruddin & Samsudin, 2014; Cherni & Hill, 2009; Yohannis, 2019).

The SLA also simplifies reality by reviewing: what assets these men and women rely on; what hazards they face in their surroundings; which institutions and organisations they are affiliated with; and which tactics men and women use to obtain achievements that better their lives. This study is relevant because it contributed to a better knowledge of the livelihoods of impoverished people, namely fishing families in Moree, Cape Coast. The SLA assisted in identifying the primary determinants affecting the livelihoods of fishing families as well as the relationships between these elements. Because the study is investigating the alternative livelihoods of Moree fishing families, SLA will seek to capture and give a way of understanding their livelihoods, particularly the causes and processes that shape these livelihoods (DFID, 2000). The study's use of SLA is acceptable because it recorded information regarding fishing families' fishing environments, assets, policies, institutions, and processes that impact the fishing community, fishing families' livelihood strategies, and the effects of these livelihood strategies.

In summary, the SLA is relevant to this research because it aids in understanding how Moree fishing households use their means of subsistence to affect livelihood patterns. The DFID and SLA framework is shown below (Figure 1).

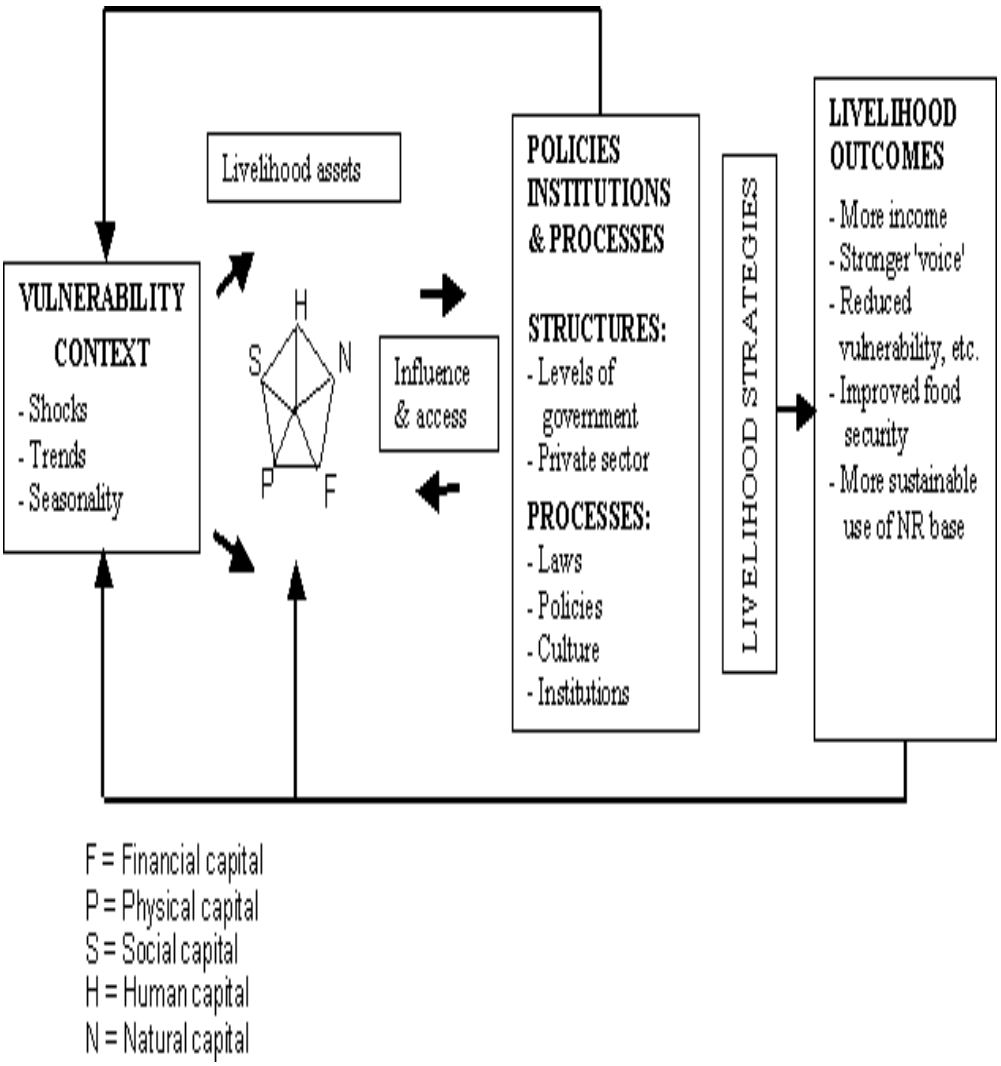

Figure 1: The DFID Sustainable Livelihoods Framework

Figure 1 depicts a crucial notion connected to livelihood sustainability: vulnerability. Shocks, trends, and seasonality are all part of it (Aazami & Shanazi, 2020; Blackmore, Rivera, Waters, Iannotti & Lesorogol, 2021; Yirga, 2021). Although not all vulnerabilities are bad, they can have a detrimental impact on the poor's possessions and livelihood options. Natural capital, human capital, social capital, physical capital, and financial capital are examples of assets from which individuals get their livelihoods (Garrigos-Simon, Botella-Carrubi, & Gonzalez-Cruz, 2018; Kry, Sasaki, Datta, Abe, Ken, & Tsusaka, 2020; You, Hu, Bie, & Zhou, 2019). Land, water, and

biological resources are examples of natural capital that people exploit to produce subsistence alternatives (Leach, Grigg, O'Connor, Brown, Vause, Gheyssens, & Jones, 2019; Gai, Poerwati, Maghfirah, & Sir, 2020).

Natural capital must be seen in a progressive light since it evolves through time and maybe enhanced by human activity as with agricultural activities capable of increasing the productivity of natural capital. When the ecosystem in which impoverished people reside becomes unable to provide for their survival owing to a lack of resources or deterioration of water/land quality, it is vital to assess the options for adaptability, which may include relocation or alternative livelihood choices.

To distinguish capital goods from consumables (Cameron, 2019; Fierros- González, Mora-Rivera, & Avila-Foucault, 2020), physical assets are defined as capital goods that can be public, such as roads or irrigation networks, or private, such as tools and machinery. Consumables, on the other hand, might be regarded as physical assets if they provide revenue (i.e., a rented house). The DFID believes albeit this is controversial that public commodities should only be used to aid in the construction of physical capital (public productive infrastructure, such as transport, water, energy, and communications) (Herr, Blum, Himes-Cornell & Sutton-Grier, 2019; Dadashpoor & Ahani, 2021).

The poor's most valuable asset is their labour (Ahmed, 2011), which is referred to as human capital, or asset. Education, employment credentials, and health all have a role. The issue of gender cannot be overlooked when it comes to human capital. Men and women are also influenced differently when it comes to job loads, tasks, rewards, social recognition, and needs (Jerneck,

2018; Glazebrook, Noll & Opoku, 2020; Fingleton-Smith, 2018). Many of the jobs performed by women are "invisible," in the sense that they are neither paid for nor compensated, even though they are critical to the human race's survival (Datta & Lund, 2018).

The money that relatives and friends can dispose of represents financial assets. Females are generally discriminated against when it comes to the use and ownership of financial resources (Demirgüç-Kunt, Klapper, & Singer, 2013; Ferdous, & Mallick, 2019). Savings and loans are not regarded as forms of capital in the economic sense, although they can be turned into other forms of capital or used for consumption (Cakmak, Lie & Selwyn, 2019; Wu, Chen, Pan, Gallant, & Zhang, 2020). Cattle, diamonds, or food stockpiles, for example, can be stored as savings and easily changed into cash for business or consumption (Lewis, 2018; Lybbert & Taylor, 2020). The value of monetary assets will be determined by their liquidity when they are not in cash form, as well as how well they retain their value during moments of emergency (i.e., cattle lose a lot of their value when sold in times of drought).

Social capital is made up of horizontal social groupings such as associations, clubs, and volunteer organisations that bring people together to achieve one or more goals in which they have an interest (Norris & Inglehart, 2013; Pillai, Pandey & Bhatt, 2021; Geisler & Potracki, 2021). Vertical connections (as in authority connections) and horizontal connections (as in volunteer groups) are both features of social capital, as are the trust and expectations that flow within such networks (Kurt & Kurt, 2020; Haveman & Watts, 2019). Moser describes it as a trust-based exchange among

communities and between families based on social relationships (Muringai, Naidoo, Mafongoya & Lottering, 2020; Escobedo, Zheng & Bhatt, 2021).

Figure 1: Structures and processes that are changing. "Process is made up of policy, legislation, culture, and institutions, and it is more like software," says the author (DFID, 1999, page 10). In the SL system, transforming structures and processes play a crucial role in determining livelihood assets and results. The accomplishments and objectives that livelihood strategies achieve are depicted in Figure 1. The method to evaluate livelihood sustainability is always through outcomes, and the scope of analysis is critical (Scoones, 1998). As a result, the researcher created a framework based on the DFID Sustainable Livelihoods

Framework (DFID, 2000) to fit the study's context. Figure 2 illustrates this.

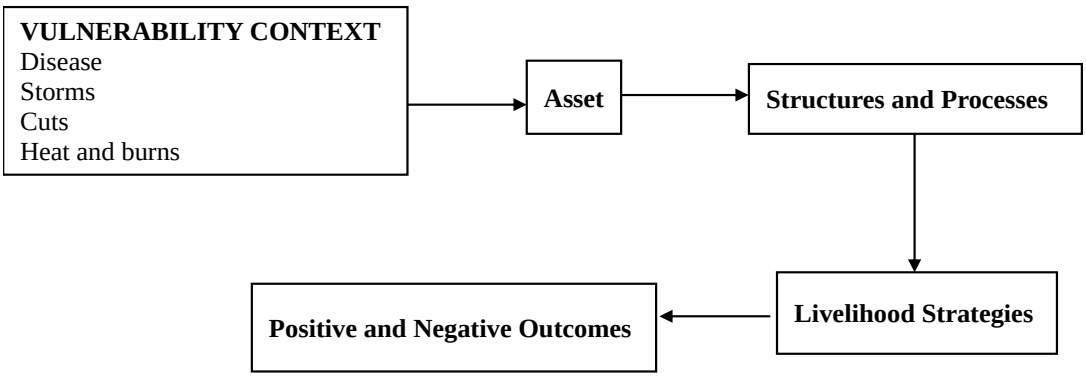

Figure 2: The Framework for Assessing Alternative Livelihoods of Fishing Families in the Context of the Study

Source: Adapted from DFID (2002)

To understand the figure, we must first understand that the natural resource utilised by fishing families in Moree is the sea, and it is from it that fishing families make a living. The resources comprise social, human, and

natural capital. To extract natural resources, capital is used—both physical and financial capital (sea). There is a chance that fishing families in Moree may be able to make the most of their natural resources by using networks, working together, trust, and connections to bigger organizations. The network of fishing families, which includes fishermen and fishmongers, is the social resource.

To properly harness this natural resource, human capital is also required. This refers to the skills, understanding, and capacity to work, as well as physical capability and good health, which empower individuals to follow various livelihood plans and ambitions. Human capital is a determinant of the quantity and quality of labour available to fishing families at the household level; this varies according to family size, skill levels, leadership potential, health condition, and the ability to leverage the labour of other household members, particularly women (DFID, 199).

To be successful, fishing communities need access to basic infrastructure. Transportation, energy, and communication systems are all part of this infrastructure. To do their jobs, fishermen need the current public transportation system to function. Financial resources, including loans, savings, and remittances, are critical to the success of the fishing industry, which is supported by the families of fishermen. Fishing families, on the other hand, are sensitive to shocks, trends, and seasonality. The vulnerability setting has an impact on livelihood assets.

Structures and processes that may be modified are inextricably related to the framework's livelihood assets. The structure and processes are in charge of improving the effectiveness of fishing families' jobs and livelihoods.

These structures and procedures include governments, institutions, non-governmental organisations (NGOs), and traditional and opinion leaders. These organisations are in charge of putting regulations in place to control and improve the operations of fishing families.

Finally, the livelihood strategies that fishing families will choose are linked to the structures and processes. These methods of subsistence will produce both positive and negative results. Improved fish populations, greater biodiversity, improved water quality, increased community empowerment, increased financial certainty for fishing families, and so on are some of the positive anticipated results. Alternative livelihoods have both good and bad consequences, such as excessive harvesting, harm to seabed ecosystems, loss of fishers' tacit ecological knowledge, loss of fisheries-based identity, and inequalities within fishing communities.

Conceptual Review of Ghana's Fishing History

During the 17th and 18th centuries, the Fante people of Ghana's coasts began ocean fishing (Samey, 2015; Enter, 2015; Kwasi, 2012). Ghana's 550 kilometres of coastline and 24,300 kilometres of continental shelf contribute to a substantial marine fishing industry. Ghana's many rivers support a substantial inland fishing industry (Dzidza, 2016; Enter, 2015). In the 1940s, Ghanaian fishermen travelled as far as Senegal and Congo (Abobi & Alhassan, 2015; Lucht, 2011). Ghana became a fishing power in West Africa in the 1950s because of its semi-industrial fishing in international waters (AttaMills, Alder & Rashid Sumaila, 2004; Ainoo, 2014).

However, as Ghana's economic situation deteriorated in the 1970s and in the 1980s, this rise in the fishing sector was halted (Over, 2011).

Ghana's coastal waterways, lagoons, estuaries, and rivers have always been part of an artisanal economy where fishing is done with old, inefficient tools and methods (Enter, 2015; Samey, 2015). The fish captured were mostly for home consumption, particularly in towns and cities. Exports to West African nations' neighbours were minimal. After gaining independence in 1960, the government included fishing as part of a ten- year economic development plan (Arthur & Friend, 2011; Spenceley & Rylance, 2019; Xu, 2020). As a result, between the late 1960s and early 1970s, the new administration engaged substantially in the seafood business, acquiring modern ships for distant industrial-scale fishing (Suuronen, Pitcher, McConnaughey, Kaiser, Hiddink, & Hilborn, 2020; Loomeijer, 2020; Brattland, Eythórsson, Wines, & Sunnan, 2019). The SFC was formed in 1961 to support local businesses in commercial fishing (Lawson, 2018). When the port of Tema opened in 1962, fishing became more mechanized. Large boats, inboard and outboard engines and other tools were used for fishing. Since opening in 1962, Tema Boatyard has manufactured wooden fishing boats up to 70 feet in length for the company (Dzidza, 2016; Mahama, 2016).

Most of these vessels use bottom trawls and purse seines. Entrepreneurs bought steel boats between 30 and 120 feet long so they could trawl and purse-seine for fish and shellfish (Bennett, 2002). Fishing rose dramatically in the 1960s, rising from 105,100 tonnes of marine fish captured in 1967 to 230,100 tonnes in 1971. (Sekyi, 2021; Awuni, 2020). There were a total of 234,100 tonnes of fish taken in during 1982, 199,100 tonnes of which were maritime species and 35,000 tonnes of which were freshwater fish from Lake Volta (Awuni, 2020). But fuel shortages, bad storage facilities, and the

bad economy of the 1970s and 1980s hurt the maritime sector (Acheampong, Ashong, and Svanikier, 2016; Nunoo, Asiedu, Amador, Belhabib, D., Lam, Sumaila, and Pauly, 2014).

From a high of 302,900 tonnes in 1977, yearly catches had dropped to 289,675 tonnes by 1991. (Subang, 2014). In all, 377,570 tonnes of marine fish and 74,500 tonnes of freshwater fish were hauled in the year 2000 (not including fish caught for a living). The catch was made up of an equal amount of European anchovy and Sardinella. In 2000, fish exports amounted to $78.5 million. Since the in the 1960s, landings have steadily gone up, giving artisanal fishing a better chance of success than semi-industrial fishing, which reached its peak in the 1970s and has been going down since then (Vasconcellos, Diegues, and Kalikoski, 2011; Nunoo et al., 2014). The waterways of neighbouring West African countries were opened to Ghanaian fishermen in the 19th century. This company prospered until several of these nations became free democracies (AttaMills et al., 2004; Over, 2001). As a result of these emergent administrations limiting the operations of Ghanaian fishers, Ghana's status as a regional fishing force began to dwindle. The negotiations for the United Nations Convention on the Law of the Sea (UNCLOS) and its adoption in 1982 also led to other African nations enforcing their exclusive economic zones (EEZ), thus cutting off fishing grounds formerly used by Ghanaian fishermen (AttaMills et al., 2004).

The 1970s and 1980s, when unpredictability in the economy and government, along with a lack of money and operational resources, stopped needed infrastructure upgrades (Over, 2001; Okafor-Yarwood, & Belhabib, 2020). The industry was impeded by the worsening economic issues of the

period and the prohibitive cost of travelling to remote fishing seas, despite the return of some political stability in the 1990s. At this point in history, the semi-industrial sector had already suffered greatly due to the widespread misuse of near-shore marine resources. Local fishing businesses that did well along the West African coast in the late 1960s and early 1970s, such as Mankoadze Fishing, Ocean Fisheries, Commodore, Obuorwe, and Obedru, have either shut down or shifted their focus to buying and selling fish (Clark, 2013). Despite this, the rise of the offshore tuna industry has kept harvests in the industrial sector stable, even though they are still fairly modest as a fraction of overall arrivals.

One cannot exclude the impact of huge poaching by international vessels in the Ghanaian seas, which has also considerably greatly added to the deterioration of fish populations in Ghana's up to 200 nautical miles of marine Exclusive Economic Zone (Debrah, Wiafe, Agyekum, & Aheto, 2018; Nolan, 2019). The most damaging species are marine bottom-feeding fish, whereas tuna stocks appear to be unscathed (Sobang, 2014). This is why the updated fishery regulation was enacted to reduce overexploitation and safeguard maritime assets (Justice, Mensah, Sandylove & Jeffrey, 2020; Ewedji, & Francis, 2019). Fishers are also restricted from capturing certain shellfish, and all fishing vessel operators must get authorization to function inside Ghana's jurisdictional seas (Nolan, 2019; Atindana, Fagbola, Ajani, Alhassan & Ampofo-Yeboah, 2020). The Fisheries Monitoring, Control, Surveillance, and Enforcement Unit, as well as a Fisheries Advisory Council, were established under the law (Tall & Failler, 2012).

Ghana is involved in the international fishing trade, which means that

the trade policies of its trading partners have affected its fishing industry given the country's reliance on fish export revenue. As a pioneering representative of the World Trade Organization (WTO), Ghana's involvement in the global fishing market is governed by WTO trade agreements (Daniels, Gutiérrez, Fanjul, Guerra, Matheson, & Watkins, 2016). Ghana's position as a regional fishing nation, which it has held since the 18th century is on the decline. This is because of bad barter laws, the internationalisation of the fishing industry, the dominance of foreign far-water fleets, the creation of exclusive economic zones (EEZs) by neighbouring West African countries, overfishing, and a lack of regulation (Samey, 2015). The exorbitant expense of accessibility agreements limited Ghana's access to remote water while overfishing and the use of destructive fishing practices harmed the nation's marine habitats (Akpalu, 2021; Belhabib, Sumaila & Le Billon, 2019; Belha, Lam & Cheung, 2016).

Causes of Conflicts in Ghana's Fishing

Most fights between artisanal and industrial fishing, especially between quasi-fishers, are caused by competition for fishing grounds and other resources that are shared (Belhabib, Cheung, Kroodsma, Lam, Underwood, and Virdin, 2020; Gómez, Lloret, Demetre, and Riera, 2006; Tall and Failler, 2012). Disputes happen as a result of accidents between fishing boats and ships, which can result in casualties (Tall & Failler, 2012). Conflicts also occur when commercial boats damage artisanal fishermen's nets, semi- and industrialised fishing vessels ignore the 30-meter-deep guideline that is off-limits to them, and canoes collide with commercial ships (OCEAN, 2015; Tall & Failler, 2012).

Canoe fishermen have reported commercial vessels as the major cause of equipment damage in over 60% of events during the last four decades, according to surveys and an inventory of at-sea accidents (El Ayoubi & Failler, 2012; Tall & Failler, 2012). When artisanal fishermen do not follow the rules set out in the Act, they and the Fisheries Administration get into a fight. Canoe fishermen vs. semi-industrial/industrial fishers Disputes involving industrial trawlers and canoes are mostly the result of a failure to comply with or implement maritime regulations intended for artisanal fishing (Ameyaw, 2017; de Graaf, Nunoo, Wiafe, Lamptey & Bannerman, 2015; OCEAN, 2015). Most nations along the coast of West Africa designate certain flat areas for canoe fishermen to use. License extensions and ownership transfers are two common areas of contention between authorities and the owners of inshore and industrial vessels and the fisheries administration (Mahama, 2016; de Graaf, Nunoo, Wiafe, Lamptey & Bannerman, 2015; OCEAN, 2015). Most ship owners deliberately ignore Section 3 of PNDCL 256, the Fisheries Law, which requires them to maintain current licences and insurance for their vessels and crew. The majority of ships do not quickly report ownership changes to maritime authorities. Inaccurate paperwork and records make it hard to manage a fleet (Mahama, 2016; de Graaf, G., Nunoo, Wiafe, Lamptey, and Bannerman, 2015; OCEAN, 2015).

Foreign officers on industrial ships, especially tuna bait boats, have gotten into fights with local officers because of their hasty actions, screams, and sometimes physical fights. This often discourages and undermines local authorities from taking on more responsible roles (Ameyaw, 2017; Cobbina, 2018; Eriksen, Akpalu & Vondolia, 2018. Additionally, there have been

significant disagreements about the use of fish aggregating devices (FADs) in tuna fishing (Taquet, 2013). Inland fleets have frequently grumbled about the loss of immature pelagic fish caused by tuna purse seiners' usage of FADs. The Ghana Fisheries Commission (Ghana) is now debating whether or not to abolish the practise after receiving petitioners calling for its elimination (OCEAN, 2015; Okalanwa, 2018).

Contribution of Fishing to Ghana's Economy

According to estimates, Ghana's fishing industry boosts GDP by 4.5 percentage points., agricultural GDP by 12% points, and employs 10% of the labour force (N'Souvi, Sun, Zhang, Broohm, & Okey, 2021; Michael, Cai, Akwasi, & Adele, 2019; Asiedu, Failler, & Beygens, 2018). Ghana is the single contributor to NTE exports, accounting for 14 per cent of total exports (O'Neill, Asare, & Auto, 2018; Virdin, Kobayashi, Akester, Vegh, & Cunningham, 2019). Women are employed in significant numbers in the Tema canneries (Jouffray, Blasiak, R., Nyström, M., stardom, Tokunaga, Wabnitz & Norström, 2021; Nyambura, 2015; Twumasi, Jiang, Danquah, Chandio & Asiamah, 2020).

Marine capture fisheries are expected to employ about 123,000 people, and their direct and extended families, together with the canoe builders, input suppliers, and administrative staff for industrial fleets, a total of over 2.2 million individuals (Mingle, Darko, Asare-Donkor, Borquaye & Woode, 2021; Ankrah Twumasi, Jiang, Addai, Ding, Chandio, Fosu & Agbenyo, 2021; Agyeman, Blanco- Fernandez, Steinhausen, Garcia-Vazquez & Machado-Schiaffino, 2021). Over 500,000 people are said to be employed in the fish processing industry (Amoah Agyapong, 2021).

Ghana is a significant seafood buyer. This discrepancy is expected to increase in the coming years, allowing for more fish imports and aquaculture expansion (Danquah, Roberts & Appiah, 2021; Ibrahim, 2017; Kassah, 2020). The GOG regulates fish imports and exports and requires a licence (Okalanwa, 2018; Yikpo, 2014). Imports of farmed fish, on the other hand, are forbidden. Fish imports peak between November and May because domestic supplies are low. When local fishing is plentiful, as it is from July to September, fewer seafood products need to be imported. According to the 2010 trade balance, imports totalled US$108 million and exports totalled US$65.8 million. Considering the magnitude of the trade gap, the GOG has adopted a policy of actively promoting high-quality aquaculture expansion, responsible fishing methods, effective resource management, and the creation of high-value fish and fisheries products (Boateng & Mahu, 2021). Goals for aquaculture in Ghana include producing 100,000 metric tonnes (MT) of fish by 2020 (Amenyogbe, Chen, Wang, Lin, Lu, Atujona, and Abarike, 2018; Adobor, 2020; Ameworwor, Asmah, Ofori-Danson, and Clottey, 2019). (Adobor, 2020; Ameworwor, Asmah, Ofori-Danson, and Clottey, 2019)

Channels in Ghana: The Main Fish Trade

Fish Trading

These intermediaries are referred to as "konkofo" or "fish mothers." To sell fish to companies in the fish value chain, the majority of which produce fishes smoked, they pay for fishing expeditions in advance and purchase fish from fishermen (OCEAN, 2015; Tawodzera, 2019; Okalanwa, 2018; Tall & Failler, 2012). Customers include private persons, "moon" processors, and vendors of fresh fish. The Konkohene, also known as the Queen Mother,

haggle with the first boat that shows up as they reach a little landing spot (Mingle, Darko, Asare-Donkor, Borquaye & Woode, 2021; Kassah, 2020).

At large potential locations like Sekondi Harbour, where fees are reputedly bargained on a boat-by-boat basis, this stance is allegedly no longer applicable (Shah, Chakraborty, Kumar, Sadawarte & KM, 2019; Tall & Failler, 2012). The fish mothers have the responsibility of selecting the konkohene. She will be in command perpetually, or until her superiors and fish mothers instruct her to relinquish control. However, at the point of purchase, where fish mothers and processors or customers often exchange information (nevertheless, as already said, fish mothers do periodically journey to large arrival locations to get fish), (Ibrahim, 2017; Hiheglo, 2008). In addition to serving as mediators at several fishing ports, fish mothers can play an important part in unofficial finance (Lauria, Das, Hazra, Cazcarro, Arto, Kay, & Fernandes, 2018; Torell, Owusu, & Okyere Nyako, 2015). They almost usually buy food, kerosene, gas oil, and gasoline in advance of fishing expeditions, giving them access to the catch.

Domestic Trade Channels

Yeji, Kpandu-Tokor, Buipe, Atimpoku, Agormenya, and Kete Krachi are some of the best places to buy fish and seafood near Lake Volta. Every year, about 40,000 metric tonnes of raw fish are successfully treated and sent from Ghana's rural areas to the main markets in the south (Samey, 2015; Mukunda, Lassen, Chachage, Kusiluka & Pasape, 2018; Antwi, 2021). Ghana's metropolis, Accra, serves as the country's most significant local marketplace and consumption centre. Kumasi, Tarkwa, Tema, and Sekondi-Takoradi are additional significant urban centres in Ghana. Since Ghana's

annual production of farmed fish items is so low— less than 20,000 tonnes— the country does not export either fish goods or fish seed. Oreochromis niloticus, Clarias gariepinus, and Heterotis niloticus tilapia are just a few of the fresh aquaculture items that the farm offers for sale. What doesn't sell is fried, salted, and dried before being put back on the market (Amoah, 2019; Asmah, 2008; Tall, A., & Failler, 2012). Fish "mammies" can also buy large quantities of fish from farms to sell in towns. It is unknown how much fried, salted, or dried fish was sold.

The Kadjebi Fish Farmers' Association (FFA) established a sales store in town and hired a salesperson associate to manage it (Amoah Agyapong, 2021; Boateng & Mahu, 2021). The organisations' immediate fish sales are an effort to eliminate the "mammies," who benefit handsomely by purchasing fish at a low cost from the farmer and reselling it to the community at a high markup. For example, tilapia costs around 15 000 (US $1.63) per kilogramme in remote regions, compared to 35 000 (US $3.800) per kilogramme in Accra (Twumasi, Jiang, Addai, Zhao, Chandio, Fosu & Agbenyo, 2021; Agyeman, Blanco-Fernandez, Steinhausen, Garcia-Vazquez & Machado-Schiaffino, 2021). The fish is offered to the market raw and as a whole product. If it needs to be transported from one town to another, it is placed on ice if ice is available.

Regional Trade Channels

Although most of the seafood sold stays inside national borders, some do cross into other countries. Denu is a market on the Ghanaian side of the Togolese border where products made in Shama, Cape Coast (Duakoro), and Elmina (Bantuma) are sold (Siaw, Jiang, Twumasi & Agbenyo, 2020; Owusu,

Ma, Renwick & Emunah, 2020). Fish baskets from a variety of manufacturers are loaded onto trucks, but only a few make it to Denu. They sell both their goods and the seafood of others. This collaboration is advantageous in other ways as well.

The processors of Duakoro and Bantuma have an unofficial pact to meet in Denu every other market day (periodic markets are held every fourth day) (Fuseini, 2020; Antoniadou & Varzakas, 2021). Traders along Ghana's borders often speak French and Ewe (though less commonly in the western and central regions). Togo, Nigeria, and Benin are among the countries that buy fish. It looks to be of greater quality than fish available in the US (Kassah, 2020; Amoah Agyapong, 2021). Smoked marine fish travels through Tamale during peak season, servicing both local and Burkina Faso markets (Ibrahim, 2017; Tall & Failler, 2012; Hiheglo, 2008). Some traders journey to Takoradi and Kumasi to get smoked fish, even though processors rarely visit those locations to sell their fish (Akua, 2020; Boateng & Mahu, 2021).

Fresh fish trade

Large public markets sell more than 10,000 tonnes of fresh fish every year, the majority of which comes from local lakes and rivers of more modest size (Quagrainie, Dennis, Coulibaly, Ngugi & Amisah, 2007; Sanoara, 2018; Onumah, Quaye, Ahwireng, & Campion, 2020). Inland fishing centres in faraway locations are difficult to reach from the main consuming centres (Ankrah Twumasi et al., 2021; Toiba, Hartono, Retnoningsih, & Rahman, 2021). This issue impedes both internal and intra-regional fish commerce. Fish distribution in Ghana is problematic due to poor roads connecting key fish-producing towns; Sankara,2018; Onumah et al., 2020). These limits raise the

price of inland fish products and cause quality to deteriorate throughout delivery.

Demand for fish, particularly raw seafood, increases in coastal and interior locales during the critical fishing season (Akuffo, Quagrainie & Obirikorang, 2020; Obirikorang, Sekey, Gyampoh, Ashiagbor & Asante, 2021). It's common for folks to stock up on smoked and frozen fish throughout the dry season (Otumfuo, 2008; Amenyogbe et al., 2018). Meaty seafood from the deep sea: Sardinella, anchovies, and mackerel are all small pelagic fish that may be found in abundance and at a reasonable price in Ghana. The wealthy also likes eating white fish, snappers, shrimp, lobster, grouper, and cuttlefish (Tall & Failler, 2012; Ibrahim, 2017).

Cured fish trade

While it is not uncommon for processors to work with fish market vendors, direct purchases from fishermen are uncommon. As local stocks dwindle, seafood processors may have to travel to far-flung ports to replenish their supplies. Women are overrepresented among the owners of micro, small, and medium-sized seafood processing companies. Fish is often smoked as a matter of course. Drying, salting, frying, and fermentation are some of the ways that food may be preserved (Adeyeye & Oyewole, 2016; Adeyeye, 2019; Adei, Braimah & Mensah, 2019). Examples of traditionally smoked fish include anchovies, sardinella, chub, and horse mackerel (Samey, 2015; Antwi, 2021; Asiedu, Afriyie & Amponsah, 2018). The vast majority of smoked fish is prepared at home, but there are several options for those who like it. In certain parts of the world, highly processed sardines are referred to as "ban" or "Amane" (Quaye, 2018; Nunoo, Asiedu, Kombat & Samey, 2015). Chorkor

kilns are made from fuelwood, bowls, basket nets, baskets, and grills (Tall & Failler, 2012). Ghana allows the smoking of a wide variety of fish. Seventy per cent to eighty per cent of America's smoked seafood comes from the nation's ocean and freshwater harvests (Holma & Maalekuu, 2013; Nunoo, Tornyeviadzi, Asamoah, & Addo, 2019; Asamoah, Nunoo, Addo, Nyarko & Hyldig, 2021).

As a country, Ghana has a disproportionate number of female fishermen. Women have crucial roles as merchants and middlemen in marine canoe fishing (Samey, 2015; Ameyaw, Breckwoldt, Reuter & Aheto, 2020). Fish is distributed to wholesalers and retailers by small processors through itinerant merchants. Smoked fish may be purchased by both end-users and wholesalers from the same suppliers. marketed to residents of the country. Some restaurants serve a wider range of fish, while others only serve smoked sardines. In the north and the countryside, dried anchovies are a staple (Otumfuo, 2008; Amenyogbe, Chen, Wang, Lin, Lu, Atujona, & Abarike, 2018). Most people who do not live near the ocean eat smoked fish (Okafor-Yarwood, 2019; Akuffo, Quagrainie, & Obirikorang, 2020).

Fishery Management Framework in Ghana

Fisheries Policy

The severe lack of fishing resources, disputes over regulatory authority, inadequate preservation and strategic planning efforts, and a significant increase in foreign fishing ships in Ghanaian fishery waters are all currently having negative effects on the nation's ability to meet its own needs, endangering fish food security and Ghana's economy (Agyeman et al., 2021; Danquah, Roberts, & Appiah, 2021). The current regulation controlling the

fishing industry is the Fisheries Act of 2002 (Act 625) (Akpalu & Eggert, 2021).

It modifies, unifies, and strives to simplify all current fishing legislation to solve long-standing and new challenges while remaining compliant with local and worldwide fishing resource development and management policies. According to a review of the Act, it seems to provide a rather solid foundation for protecting Ghana's marine ecosystems in the long run. This idea is being put into action by both the FASDP and a programme led by the World Bank (Tall & Failler, 2012; Kassah, 2020).

Fisheries Legislation

Act 625, is the most significant piece of law, and the Fisheries Regulation of 2010 is the legislation that puts the Fisheries Act into effect (L.I.1968) (Tanner, Mensah, Lawson, Gordon, GodfreyWood & Cannon, 2014; Owusu, 2019). The Act's purpose is to incorporate worldwide fishing treaties into Ghanaian state policy. It strengthens the Act that established the Fisheries Commission, emphasising its significance.

This Act governs the fishing industry in Ghana and is meant to combine and revise all existing decrees, statutes, and parliamentary papers (together with any additional or legislative legislation) relevant to or regulating the fishing sector (OCEAN, 2015; Tall & Failler, 2012). The Act contains provisions for the regulation and management of fisheries, the development of associated industries, and the efficient and ethical use of available resources. All fishing vessels operating within Ghana's maritime coast must be authorized, according to the Act. According to the GOG, this licensing and identity number will allow the authorities to construct a nationwide register for all fishing boats

and gather statistical facts on fish caught, fishing vessel numbers, including canoes, and fishing gear used (Addo, 2017; Boateng & Mahu, 2021).

Sections 11 (1), (2), and (3) of the Fisheries Regulations, 2010 (LI 1968), prohibit anyone from employing any A method of catching fish by herding them together, such as pair trawling, pyrotechnic fishing, the use of bamboo for aggregation, or the use of toxic compounds (Akpalu & Normanyo, 2014; Silva, Pennino & Lopes, 2021). The Act 625 is also in charge of aquaculture development (Amadu, Armah & Aheto, 2021; Eggert, Anderson, Anderson & Garlock, 2021). For aquaculture activities, the following permissions are necessary by law:

1. The Environmental Protection Agency has authorised an Environmental Impact Assessment report.
2. A permit to use water from the Water Resources Commission (WRC) is also required. The Director of Fisheries' consent is also required.
3. The chief and the people of the region (community) must sign a letter of approval or no opposition to the project.
4. There are no objections from the community's District Assembly.
5. Permission from the Volta River Authority to establish a fish farm on Lake Volta.
6. The Food and Drugs Act of 1992 forbids the sale of unwholesome, toxic, adulterated, or unnatural substances and imposes penalties for violators.

Institutions Involved in Fishing Management

The Ministry of Food and Agriculture (MOFA)

Originally established by statute under the Fisheries Commission Act (625, 2002), the FC is now more commonly known by its former name, the Fisheries Regulations (L.I. 1968). Literature backs up this interpretation (Ofosu, 2019; Birner, Schiffer, Asante, Osman, & McCarthy, 2005). It is responsible for the administration, control, and exploitation of Ghana's fishing assets, based on the authorities granted by the Fisheries Law (Tall & Failler, 2012; Yikpo, 2014). The Fisheries Act 625 (L.I., 1968/2010) established a more powerful FC, which was formed by combining the former FC with the Department of Fisheries (Tall & Failler, 2012). Because of how important of the important role the fishing commission plays in the management and development of Ghana's fisheries resources. Understanding its composition and the rules established for it under the Fisheries Act is equally essential.

According to Section 2 of the Act, the Fisheries Commission was established so that it could "control and regulate the utilization of Ghana's fishing assets and integrate plans associated with them" (Agyeman et al., 2021; Yikpo,2014). Because of the interconnectedness of the many parts and the relevance of the fishing industry in the development of the nation (economically), the Commission's membership must comprise the sector's most indispensable partners. As a result, Section 4(1) creates the Commission's composition as follows: Ghana’s president, along with the Council of State, is in charge of choosing the people who will fill the chairman positions. One person from the Ministry of Transportation;

1. One delegate from the Ministry of Defense in charge of defence
2. One member of the Ministry of the Environment's delegation;
3. The Ghana Marine Fishing Officers Association's representative;
4. Two representatives from the Water Research Institute; one from the Water Research Institute; and one from the Water Research Institute.
5. One official from Ghana's Irrigation Development Authority;
6. One was a representative of the National Fisheries Association of Ghana, another was an owner of an industrial fishing vessel, and the third was an artisanal fisherman.
7. A third individual with experience in fishing or natural resource management; and
8. The Commission's Executive Director

Several commission bureaus are created under the Act's section 15, which may be found here. According to this Act, the Commission is at liberty to create any secretariat departments that it thinks are necessary for the fulfilment of its objectives and the performance of its duties. The Department of Marine Fish and Wildlife.

1. Division of Inland Fisheries
2. Marine Fisheries Division
3. Division of Fisheries Research;
3. Division of Monitoring (observe and check the progress of Marine Department), Control (power of influence), and Surveillance (close observation); and Management Fiscal Affairs

By ensuring the full participation of all relevant parties in the fisheries sector, the Fisheries Act satisfies the UNCLOS-mandated obligation of a

coastal state regarding the discovery and use, preservation, and ecological sustainability, the moral or legal obligation to preserve resources that help people live and feel comfortable, shipping protection, and marine scientific research (transportation, environment, defence, research, fisheries, etc.). Additionally, the Fisheries Act makes sure that everyone involved in the fishing industry is accountable for their activities (Agyeman et al., 2021).

Coastal Fishery Classifications

The coastal fisheries of Ghana have been majorly classified into four; the canoe fleet, the inshore fleet, the industrial fleet, and the tuna fleet. These four categories of fishing fleets are explained below.

Canoe Fleet

It is, to a large measure, Ghana's most extensive and diversified fleet category. It is made up of all the resource sectors' canoe "fishery" harvest. Drift gillnets, hook and line gear, small pelagic fish and beach seine gear are used by this fleet, as well as set nets and beach seines for demersal wildlife (Lin & Pussella, 2017; World Bank, 2017; Haputhantri & Bandaranayake, 2015). The canoe fleet has been divided into categories based on size, groups, and the type of gear used.

Classification by Size

Tiny or "one-man canoes" are used inshore for line fishing, small gill net gear, and casting nets. They are generally 4-5 meters long (particularly in lagoons), (Finegold, Gordon, Mills, Curtis & Pulis, 2010; Owusu, 2019; Agyekum, 2016). Only 5% of the canoe fleet examined was made up of them. Livelihood fishing, specifically in lagoons, is rarely included in landing statistics since vessels are often driven by paddle or sail.

Mid-sized canoes are typically used for line fishing, drifting and floating/drifting gill nets, and range in length from 6 to 11 meters (Owusu, 2018; Ayifli, Adom-Opare & Kerekang, 2014; Kpoor, 2015). Some people work with smaller beach seine nets as well. A team of two to eleven fishermen often works with them. Smaller canoes of this type may be propelled by a sail/paddle or an 8hp outboard, whereas larger canoes usually use 40hp (sometimes 25hp) outboards. Large boats are 11 to 17 metres long and have a crew of 10 to 25 people. This vessel's size can be partitioned once more. The largest boats in this group are usually Ali/Poli/Watsa (APW) canoes; Gordon, Pulis & Owusu-Adjei, 2011). They get their name from the fishing gear they used in the past. A gill net made of traditional fibres was known as the "Ali" net. Purse seines include poli and water nets. Over the last century, several gear types have changed dramatically. Large drift nets are used in these boats as well (such as the so-called "life-of" net). Large beach seine vessels make up the second subcategory. When working in the surf, these boats usually feature high planking at the bow to keep heavy waves off the deck. A 40-hp outboard motor powers the majority of big canoes.

The Inshore Fleet

The "inshore" fleet of locally built, planked wooden-hulled vessels ranges in length from 8 to 30 meters and is propelled by inboard diesel engines of 90 to 400 horsepower (Yang, Owusu, Andriesse & Dziwornu Ablo, 2019; Nolan, 2019). During the major and minor upwelling seasons, these vessels utilise both trawling and purse seine gear to collect demersal fish (Nolan, 2019; Hasselberg, Aakre, Scholtens, Over, Kolding, Bank & Kjellevold, 2020). Smaller vessels are usually underpowered for trawling, and

with the advent of light-fishing in the off-season, purse seining has become more popular. The majority of purse seine nets are 400–800 m long, 40–70 m deep, and have a mesh size of 25–40 mm, while bigger vessels may deploy nets up to 2 km long (Finegold et al., 2010). The first of these ships was built in 1948, and manufacturing quickly ramped up until the early 1970s. Following a large fall, vessel numbers have just surged, signalling an increase in effort. The adoption of light fishing and the year-round availability of the little pelagic supply that goes along with it are most likely responsible for this.

Industrial Fleet

The industrial fleet is made up of huge, metal western ships that are distinguishable from the nearshore fleets by their capacity to freeze fish at sea and, therefore, their proclivity to remain at sea for extended durations of time (Okusu, 2020). Besides the tuna fleet (examined in this section here), the industrial fleet nowadays mostly participates in demersal trawling. A shrimp-targeting sub-fleet existed in the 1990s with an optimum of 22 active ships, but just two functional trawlers have been documented after 2002 (Adusah-Karikari, 2015; Owusu, 2019).

Two commercial boats hauling a trawl net between them make form a pair trawling sub-fleet, which is another sub-fleet. When pair trawling began in 2000, the fleet grew to 20 ships until being outlawed in 2008. (Obeng-Odoom, 2014; Adusah-Karikari, 2015). Even though it was planned for pair trawlers to be converted to single trawlers following prohibition, some may have been operating in groups, setting out from ports separately and coming together at sea. Another new "fishery" is the conveyance of "garbage fish" (reduced, tiny, or damaged fish) from trawlers to specifically adapted

paddles intended to convey vast quantities of fish at sea (Finegold et al., 2010; Penney, Wilson, & Rodwell, 2017). These fish are subsequently sold in the typical shoreline marketplace, which boat anglers may reach. This is a unique illustration of collaboration between micro and major businesses.

Types of Fishing

Commercial Fishing

The catching of fish for commercial reasons is known as "commercial fishing." Those that practise it are frequently forced to hunt fish far out into the ocean in difficult situations. Commercial fishers gather practically all water creatures in diverse fisheries for these species, from tuna, cod, and salmon to shrimp, krill, lobster, clams, squid, and crab ("Commercial fishing-Wikipedia," 2021). Employing enormous nets and sea-going processing units, commercial fishing practices have grown extremely productive. Individual limits and worldwide conventions aim to limit the species and quantities of fish taken (Nicolae, 2014).

A commercial fishing operation can range from a single individual with a tiny boat and a few pot traps to a large fleet of trawlers harvesting tonnes of fish per day. Weights, nets (e.g., purse seine), seine nets (e.g., beach seine), trawls (e.g., bottom trawl), dredges, hooks and line (e.g., long line and handline), lift nets, gillnets, entangling nets, and traps are all examples of commercial fishing gear (Cashion, Al-Abdulrazzak, Belhabib, Derrick, Divovich, & Pauly, 2018; Zeller, & Pauly, 2019). Total world catch fishing production was 86 million tonnes in 2000, according to the UN's Food and Agriculture Organization (FAO, 2018; Zhou, Ring, Olsen & Song, 2018).

The People's Republic of China (minus Hong Kong and Taiwan), Peru,

Japan, the United States, Chile, Indonesia, Russia, India, Thailand, Norway, and Iceland were the top producers in that order (Asche, Bellemare, Roheim, Smith & Tveteras, 2015; Tveteraas, 2015). These countries produced more than half of the world's output, with China alone accounting for a third of global output. Over 90% of that production was maritime, with less than 10% being inland (Song & Fabinyi, 2022; Dao, Axiotis, & He, 2021; Blasco, Ferraro, Cottrell, Halpern, & Froehlich, 2020). The bulk of the world's fisheries is supported by a limited number of species. Herring, cod, anchovies, tuna, flounder, mullet, squid, shrimp, salmon, crab, lobster, oysters, and scallops are some of these species (Kim & Pallela, 2012). Except for the final four, all contributed to a global capture of well over a million tonnes in 1999, with herring and sardines generating a combined harvest of more than 22 million metric tonnes (Agyeman et al., 2021). Many different creatures are fished in reduced quantities too.

Artisanal Fishing

Artisan fishing refers to small-scale, low-technology commercial or subsistence fishing practices (Lloret, Cowx, Cabral, Castro, Font, Gonçalves, & Erzini, 2018; Lewin, Weltersbach, Ferrer, Hyder, Mugerza, Prellezo, & Strehlow, 2019; Said & Chuenpagdee, 2019). This word refers to coastal or island ethnic communities who use conventional fishing technologies such as rods and gear, arrows and harpoons, throw nets and drag nets, and traditional fishing vessels (Adewumi, Ayinde, Adenuga & Zacchaeus, 2012; Tilahun, Alambo & Getachew, 2016; Osondu, 2015). It does not normally involve the notion of fishing for sport, although it may be used when discussing the tensions between large-scale contemporary commercial fishing methods and

traditional ones, or when aid programmes are explicitly focused on fishing or near survival levels.

Artisan fishing is frequently, but not necessarily, less intensive and less damaging to fish populations than current commercial fishing methods (USAID GHANA, 2018; Artisan fishing Wikipedia, 2022). Due to insufficient investment in refrigeration and processing facilities, it has challenges in the export process. Nonetheless, home consumption is the most significant purpose of artisanal fishing, as it is frequently a vital supplier of affordable and available nourishment in disadvantaged coastal communities.

Recreational Fishing

Sportfishing, often known as recreational fishing, is fishing for enjoyment or competition (Fennell et al., 2016). Commercial fishing (McIntyre, Liermann, & Revenga, 2016; Arlinghaus, Alós, Beardmore, Daedlow, Dorow, Fujitani, & Wolter, 2017) is fishing for profit, whereas subsistence fishing is fishing for survival (McIntyre, Liermann, & Revenga, 2016). A rod, reel, line, hooks, and any of a variety of baits are used in the most common kind of recreational fishing. Other gadgets, known as terminal gear, are also employed to modify or complement the bait's presentation to the intended fish (Baruah & Sarma, 2018; Larashati, Ridwansyah, Afandi & Novianti, 2020). Weights floats, and swivels are examples of terminal tackle. Bait is regularly replaced with lures. Certain anglers create their handmade gear, like plastic lures and artificial flies. Angling is the sport of capturing or attempting to capture fish with a hook.

Guinness fisheries development constraints an Opportunities

Institutional Constraints

Ghana's fishing industry continues to benefit from the GOG in diverse ways, including fuel subsidies for outboard motors, licencing to control large trawlers, laws mandating Ghanaians to hold a majority of fishing companies that land their catch there and initiatives to increase capital investment in fishing-related infrastructure (Tall & Failler, 2012; Twumasi et al., 2021). As required by the Fisheries Act 625 of 2002, the majority of tuna vessels are run as joint ventures, with Ghanaians owning at least half of the stocks. (Mantey, 2019; Asidu, Failler, & Beyens, 2016). These rules have been subjected to fraud and abuse, and they are difficult to put in place. Commercial and semi-industrial vessels have cooperated since the experiment started in 2010, but craft boats have not. (Kassah, 2020; Danquah, Roberts, & Appiah, 2021).

The Fisheries Monitoring, Control, Surveillance, and Enforcement Unit, as well as a fishing advisory council, are established under the law (Fanning, Mahon & McConney, 2011; Dunn, Stewart, Bjorkland, Haughton, Singh-Renton, Lewison, & Halpin, 2010). The GOG purchased a vessel surveillance system in November 2005 to combat illicit fishing in Ghana (Young, 2016; Denton & Harris, 2019). Sadly, the observation, regulation, as well as enforcement of applicable fishing legislation, are lacking, making it impossible to determine the extent of illegal fishing (Gephart, Deutsch, Pace, Troell, & Seekell, 2017; Belhabib, Sumaila, Lam, Zeller, Le Billon, Abou Kane, & Pauly, 2015). Protection against restrictions is not nearly enough; the establishment of FIAs is not directly addressed by any legislation or regulations; the only place it is mentioned is in a footnote in Section 93 of Act 625 (Twumasi

et al., 2021; Agyeman et al., 2021).

Sanitary Constraints

The Food and Veterinary Office (FAVO) of the European Union (EU) published a report in September 2010 in which the Inspection and Quality Assurance Agency (FVO) examined Ghana's fish inspection and quality system (Tall & Failler, (Mingle et al., 2020; 2012). Research has shown that Ghana continues to breach the export requirements developed by the Europeans. The authorities put in place to manage and ensure competency as well as compliance only provide limited assurances about the hygienic conditions of fisheries product manufacturing for EU exports (Tall & Failler, 2012; Danquah, Roberts, & Appiah, 2021; Ibrahim, 2017).

Moreover, studies have shown that the levels of PAH in exported smoked fish are over the regulatory limits (Afé et al., 2021; Anihouvi et al., 2021). The main challenges in developing realistic HACCP programmes are cost constraints, laboratory certification bodies, and operational safety assurance skills.

Constraints in Implementing MCS

The major problems with MCS activities in Ghana include the lack of waterway patrol personnel, the lack of well-equipped personnel, the lack of a complete database of boats operating in the sub-region, and the vulnerability of the WTCWG and the RFMOs (Tall & Failler, 2012; Addo, 2017; Okalanwa, 2018). Even though these difficulties are being addressed, the MCS's ability to perform successfully in Ghana and other African nations may be hampered. Despite this, there is a good chance of significant improvement if treatments are focused on the following areas:

1. Finance
2. Capacity building (especially of technical staff, i.e. inspectors and observers)
3. Expanding coverage, improving and enforcing vessel monitoring system requirements.
4. Improving land-based enforcement including port state control
5. Establish and maintain a permanent inter-agency collaboration for MCS
6. Expand and make maximum use of observer programs
7. Seek and establish international collaborations, especially with immediate neighbouring states and RFMOs in the West African sub-region if Ghana's MCS situation is to improve, these areas are of pressing concern and should be attended to first.

Environmental Constraints

1. Species of fish that are already in danger of extinction as a result of overfishing are beginning to experience the consequences of the increased demand in the regional economy (Delgado, Wada, Rosegrant, Meijer & Ahmed, 2020; Zilia, Bacenetti, Sunni, Matarazzo & Orsi, 2021). Self-sufficient fishermen are putting the nation and the subregion at risk of going hungry because they have lost their jobs.

2. There are many dangers to biodiversity, not just in the fishing industry. Species diversity in Ghana is rapidly declining (Tall & Failler, 2012; Twumasi et al., 2020; Mingle et al., 2021). Ghana is building a VTMIS to track and record the movements of all ships (Asiamah, 2018; Kokoro & Datla, 2020) to stop piracy and armed robberies at sea.

Inadequate marine protected areas do not exist in the rivers of Ghana, making their preservation impossible (MESTI, 2016; ATLAFCO, 2012; UNESCO, 2013). Twenty-five percent of Ghana's population lives in the six coastal districts, which make up less than 7% of the country's total land area (Tibu, 2017; Asiedu, 2020). Instability in food and income, population growth, and environmental degradation have all contributed to the devastation of this coastal region (FAO, 2017; Tibu, 2017). Rapid expansion in industries like fishing, farming, mining, and oil extraction is creating problems that local governments are ill-equipped to address (USAID, 2011; Twumasi, et al., 2021). Coastal and marine ecosystems are threatened by a variety of human behaviours, including:

1. Migration and fast population growth are two factors that contribute to increased urbanisation.
2. Infrastructure development along the coast, as well as industrialization.
3. Increased economic activity, contributes to the availability of transportation options such as huge road networks, rail, air, and sea.

Livelihoods

A "livelihood" is defined as the talents, assets (including both material and social resources), and activities necessary for a way of life (Rakodi, 2014; Connolly- Boutin, & Smit, 2016; Tacoli, 2012). A livelihood is sustainable when it can withstand and recover from stresses and shocks, as well as preserve its capabilities and assets in the present and future, without jeopardising the natural resource base (Mowforth & Munt, 2015; Mason, 2020). The term "livelihoods" can have varied connotations based on the word "improved," "diversified or supplemented," or "alternative" (Abdullah, 2019;

Katikiro, Macusi & Deepananda, 2015).

Enhanced Livelihoods

Improvements to people's livelihoods tend to centre on time-honoured professions (Pomeroy, 2013; Clifton & Foale, 2017; Harkness, 2020). Cities and partners further up the value chain both benefit from steady economic activity that brings in more and more money (Creative Associates International, 2022). Beekeepers, for instance, may benefit from a value-added programme that instructs them on how to transform raw honey into a finished product and how to sell it (Torell et al., 2018; Cetas & Yasué, 2017).

Financing the expansion of product manufacturing; specialised support to improve crab fattening and marketing, or fish drying and marketing; connecting products to markets to increase opportunities to sell sustainably harvested or produced goods (i.e., value chain); and promoting a more environmentally sensitive use of local assets for income-generating activities (such as mangroves) are all additional activities (FAO, 2018; USAID, 2013). If the "better livelihood" strategies are already being used in the community's economy, people are more likely to accept them.

Supplemental and Diversified Livelihoods

Fishing or coral harvesting are examples of complementary and diversified vocations that are designed to reduce family dependency on a single source of cash and nutrition (Ellis & Allison, 2004; Masud, Othman, Akhtar & Rana, 2021; Ahmadi, Ghanbari Movahed, Gholamrezaie & Rahimian, 2022). A diversification strategy may include elements such as strengthening current vocations and introducing "supplementary" measures (to make current practices more sustainable) (Nyawade, Were-Kogogo, Owiti, & Osimbo,

2021; Finkbeiner, Bennett, Frawley, Mason, Briscoe, Brooks & Crowder, 2017). This method is less risky than other vocations (detailed below), but it requires more investment than just enhancing current subsistence activities (FAO, 2018).

Complementary or diversified employment has the potential to reduce demand for natural resources (DFID, 2022; USAID, 2013). Even though fishermen continue to fish, if they can supplement their income with another source of money, they may reduce their fishing effort (USAID, 2013). Auxiliary income might also be used to help you move to a new job. Examples include new, resource- Independent alternatives (e.g., mat weaving or other craft production, the introduction of seaweed production, and so on).

Auxiliary or diversified livelihoods typically offer the extra benefit of making basic subsistence safer, healthier, more effective, efficient, and risk-free, and eventually result in better results (Wongbusarakum, Gorstein, Pomeroy, Anderson & Mawyer, 2021; Harkness, 2020). Supplemental living standards are particularly well-suited to the CTI approach because they provide revenue streams that encourage compliance with other CTI initiatives such as improved habitat protection in unique coastal habitats, the establishment of locally-managed marine areas or community-based resource management, and the expansion of no-take zones in MPAs and MPA networks (Pomeroy, Ferrer & Pedrajas, 2017; Harkness, 2020).

Alternative Livelihoods

The help of the government, society, and the commercial sector is required to establish and sustain alternative means of subsistence. Government

involvement is critical, particularly in the establishment and management of extension and outreach programmes, due to the increased time and money necessary. The establishment of alternative livelihoods has the potential to reduce resource consumption. This is the hardest choice because it means you have to change how you make a living (Epstein, Alexander, Marschke, Campbell, & Armitage, 2022; Roe et al., 2015; Wright et al., 2016).

Moving between different sectors might be considered a dangerous move. Teams may try to persuade fishermen to leave overfished areas in order to try something new; however, studies show that the majority of those fishermen eventually return to fishing. This is although teams may attempt to persuade fishermen to try something new (FAO, 2014). Fish are less stressed as a result of her efforts (USAID, 2013). It has been shown that fishermen have generally been pleased with their line of work in the past. Because of this, fishermen don't stop fishing (or collecting coral), even though people have tried to get them to do something else (Lee, Siebeneck, Benedict, Yabe, Jarvis, and Ukkusuri, 2022; Hoang, 2022).

It is to one's advantage to have many sources of income coming from inside their house (Abay, Asnake, Ayalew, Chamberlin & Sumberg, 2021; Tadele, 2021). The objective of developing revenue portfolios with minimal covariate risk is to increase the amount of revenue generated (Asfaw, Scognamillo, Di Caprera, Sitko & Ignaciuk, 2019; Quandt, 2018). Many researchers (Ashagrie, 2021; Karki, 2021; Darkwa & Atsriku, 2021; Wale & Chipfupa, 2021; Kanayo, Ndlovu, & Agholor, 2021) have concluded that having multiple sources of income is a good way to make more money and make sure you can live comfortably.

Although this is often the case, there are exceptions. In rural (farming) families, for example, those who start poor in terms of property and capital instruments face greater challenges in overcoming barriers to entry and investment in non-farm activities and thus remain trapped in a "poverty trap" (Dimova, Halvorsen, Nyyssölä, & Sen, 2021; Dinku, 2018). This is similar to the activities of small-scale fishermen.

According to IMM (2003), diversification options do not benefit every member of a fishing household equally. This is especially true when a household participates in activities about fishing, such as preparation and selling (Martin & Lorenzen, 2016; Onyango, 2021). However, one distorted impression of fishermen is that they are mistakenly connected with impoverishment and discrimination (Gibson, 2021; Sene-Harper, Duffy, & Sarr, 2021), rendering fishing the last resort occupation. This will make it difficult for fishermen to engage in "positive" diversification activities as a method of escaping impoverishment.

Lifestyles Along the Coasts of Least-Developed Countries

Since it includes the greatest variety of marine life, the coastal sea is the marine environment's most efficient bioregion. Coral reefs, marine life, and fisheries all contribute to the economy in some way, and they are all examples of the biological variation that is present in the ocean (Blomberg, Palmer, Montagna & Pollack, 2018; Nguyen, Jolly & Nguelifack, 2018). The US Commission on Ocean Policy, on the other hand, cautions that coastal population growth, pollution, and overfishing pose severe threats to the environment (Dupont, 2021; Wright, Moghimehfar & Woodley, 2019). The pressure, anxiety, and heightened danger experienced by coastal communities

are all made worse by the rapid growth in coastal development. Since the turn of the century, the number of people living in coastal areas has grown at a very fast rate. Only three of the world's 17 megacities are inland. There are 11 major metropolitan areas in Asia (Creel, 2022).

Furthermore, two-fifths of the globe's main cities with populations of one to ten million people are situated near coasts (Rahmasary, Robert, Chang, Jing, Park, Bluemling & van Leeuwen, 2019; Haces-Fernandez, Li, & Ramirez, 2021). Habitat degradation is especially severe in poorly maintained coastal regions. When assessing the threat human activities pose to sea life in the southern part of America and the Caribbean, (Charriez, Lemos, Carrazana, Eirin-Lopez, Hauser-Davis, & Quinte, 2021), it was discovered that digging, land revitalization, quarrying of soil and granite, depositing of taints, runoff from building projects, sewage outflow from human communities, unchecked tourist activities, poorly planned and executed. Because of the dynamic character of the beaches, coastal towns are obliged to adapt to frequent environmental changes (Lulijwa, Rupia, & Alfaro, 2020; Ahmed & Turchini, 2021).

This is especially noteworthy for the impoverished who endanger their lives to make a living in ocean areas and dwell on the edges of the land. While the coastal environment's dynamic aspects endanger their lives and livelihoods, they also provide regions of possibility for the underprivileged (Munanura, Sabuhoro, Hunt & Ayorekire, 2021; Agyeman, Yeboah & Ashie, 2019). The impoverished in coastal areas have access to a shared pool of beach riches, which are emerging tactics that provide a variety of chances for the underprivileged. For instance, many women and children work to harvest

raw prawn seed for hatcheries that feed prawn fry to the growing aquaculture business (Phornprapha, 2020; Pham, 2019).

Asia consumes more than half of the product (Kyne, Jabado, Rigby, Gore, Pollock, Herman, and Dulvy, 2020; Hossain, Ahmed, Ojea, and Fernandes, 2018). Tidwell and Allan (2015) found that fish are the primary supplier of macronutrients for both sealand and upland communities in Asia (Miranda-Andrades et al., 2019). Many of these coastal regions in underdeveloped nations have limited income or belongings, and their reliance on environmental assets renders them susceptible to fluctuations in economic conditions (Ferguson, Solo-Gabriele & Mena, 2020; Uddin, Haque, Khan, Doberstein & Cox, 2021; Hossain, Gain, & Rogers, 2020).

Coastal habitat deterioration, exploitation of seaside fish populations, and excessive fishing capacity are the major causes of resource shifts (White, 2021; Desai & Shambaugh, 2021). Trawl fishing was a popular choice among newcomers. The reason for the greater combing, according to Morgan et al. (2005), is the increasing need for seafood in countries like the United States and Germany. The bottom trawler, which is characterized by "plunder and push on," is presently considered as one of the most harmful types of fishing in the world (Morgan et al., 2005). Almost all major seamounts with tops shallower than 1,000 meters have been significantly impacted by commercial fishing (Eero et al, 2015). Currently, most fisheries in both emerging and established nations, as well as along all coasts, are categorized as being overfished or excessively fished (Arlinghaus, 2023).

Small-Scale Fisheries in Developing Countries

Small-scale fishing is an essential aspect of a global fishing community. Small-scale fishing (SSF) refers to artisanal or traditional fishing in its fullest sense. This typically involves entire towns, little funding, little energy consumption, the use of tiny fishing boats, or nothing at all (UN, 2000). Nevertheless, the phrase is interpreted differently based on the context and nation. As a result, the FAO Working Group on SSF determined that creating a "universally applicable definition" of SSF was inappropriate (UN, 2000).

According to UN (2000), small-scale fisheries are a dynamic and growing industry that exploits offshore and onshore water fishing resources through labour-intensive harvesting, processing, and distribution methods. These sub-operations, whether full-time, part-time, or seasonal, are frequently focused on delivering fish and fisheries products to local and domestic markets, as well as for sustenance use. Export-oriented output, on the other hand, has expanded in many small-scale fisheries throughout the last one to twenty years as markets have become more integrated and globalised. Women are known to participate in relatively close harvesting operations whereas men are typically involved in fish marketing and distribution. Men typically engage in fishing while women prepare and market seafood.

In maritime and inland fishing towns, supplementary enterprises such as the making of fishing nets, construction of boats, maintenance and servicing of engines and the rest can provide extra jobs and financial entitlements. Small-scale fisheries are organized into a variety of tiers, spanning from self-employed individuals to unofficial micro-enterprises to formal sector

corporations. This sub-sector is not uniform within and between nations and regions as a result, and when formulating strategies and policies to strengthen its commitment to food and nutrition security and poverty reduction, this reality should be taken into consideration.

Fishing at Moree

The Fante ethnicity makes up the majority of Moree's population. For decades, the Fantes of Ghana have relied on seafood as a source of income. Moree's major vocations are still fishing and seafood processing. The two main industries of Moree are still fishing and seafood processing (Carter & May, 1998). One of the most notable fishing settlements in the country is Moree, the sole fishing hamlet in the Abura-Asebu-Kwamankese (AAK) District. Understanding the biophysical characteristics of Moree's coastal waters is essential because they affect the where, when, how, and what of Moree fishermen's activities. Seasonal upwelling is a phenomenon that affects the Gulf of Guinea, which encompasses coastal Ghana and Moree (the region in West Africa that is between Côte d'Ivoire and the Republic of Benin) (Ellis et al., 2000).

Sea surface temperatures in the Gulf dip during particular periods of the year, forcing cold, nutrient-rich water to come to the surface. There is a lot of biological activity during this upwelling. Phytoplankton and zooplankton production skyrockets and fish spawns, resulting in higher seasonal fish availability during the upwelling period. In Ghana's coastal waters, upwelling generates many distinct fishing seasons: two off-seasons, one lengthy from February through June and another shorter from October through November, as well as a key fishing period from July to September, a minor fishing season

in December and January, and so on (Rahman, Tazim, Dey, Azam, and Islam (2012).

Sardinella and other small oceanic or surface-dwelling fish are the mainstay catch for Moree fishermen since they are plentiful throughout the major fishing season. As a result of the air mass mechanism, the underlying accessibility of fish populations varies throughout the shore throughout the year for reasons other than human activities, such as fishing. The seasonal abundance of fish during the upwelling phase also influences the movement habits of Moree fishermen. The fishing boat used by fishermen in Moree and all of West Africa is the dugout canoe. The design is lovely, double-ended, and made from a single log of Ghanaian Wawa wood, a delicate kind of wood.

A tiny piece of wood is used to construct the canoe, then topside planking is added to increase its depth and width. Canoes may use some propulsion techniques and generally range in size from around 3 to 18 meters in length and 0.5 to 1.8 meters in width. Larger canoes are driven by outboard engines with an average horsepower of 40 hp, whilst smaller canoes may utilise a sail or oars. Depending on the size of the canoe, the team manning the set and drift nets is typically between 4 and 10 persons (Carter et al., 1998). There may be personnel of greater than 20 persons on some enormous canoes. Whilst purse seines and beach seines are also employed, setting nets or drifting nets are often mounted on canoes. The organization of fishing activities and the impact of the various net techniques utilized in Moree varies. At different times of the year, different nets are utilized, requiring different-sized personnel and boats and producing different kinds of harvests. One notable recent gear change that has been anecdotally noted in our study is that

some fishermen have started using smaller boats in conjunction with the new monofilament net since Ghana's structural reform process began in the 1990s.

The fact that fishing in Moree is a business rather than a source of subsistence is another characteristic that sets it apart. Furthermore, it is mostly a family company. In the fishing industry, reliance on immediate progeny plays a key role in labour recruiting. Whilst their women or female relations ready a percentage of their capture for selling and transportation outside of Moree, typically at huge marketplaces in Accra, Kumasi, and Techiman, boat owners may recruit a sizable number of men family members as workers. The processing, trading, and transportation of fish from the shore is primarily dominated by Moree's female population. Women can buy frozen fish that has been transported abroad (even from Europe) for preparation throughout the off-season, whenever fish is less readily accessible in Moree. Rahman et al. (2012) go into great depth about the gender divide in fishing labour in Moree, as well as women's role in fish processing, trading, and distribution.

Commercial fishing trawlers from other nations, such as Korea, share the seas with Moree fishermen. Off the coast of Moree, cuttlefish have developed into a significant species, and commercial fishing vessels are pursuing them. Surprisingly, industrial fishing in Moree has provided new prospects for small-scale fishermen. By-catch from commercial fishing fleets is becoming a source of income for some canoe operators. This practice is carried out using "Seiko" canoes at Moree and other fishing places in Ghana's Western Region (such as Elmina and Sekondi/Takoradi) (Overa, 1998).

On the other side, commercial ships provide difficulties for Moree fishers. Small-scale fishers regularly engage in conflict with commercial

fishing fleets over the damage to their nets and border claims when they fish (illegally) in shallow seas where small-scale fishers also fish (Marquette, Koranteng, Over & Aryeetey, 2002). These disagreements have even influenced fishermen on the use of gear and catch in the community. Small-scale fishermen have abandoned the use of the lobster harvesting net called 'Kotor-bua) because trawlers demolish them most of the time.

Empirical Review

Alternative Livelihood Strategies of Fishing Families

Studies have revealed that fishing families do get involved in other occupations to generate extra income to fend for themselves and their families. Fishermen are of the view that engagement in these occupations helps curb poverty (Ellis et al., 2000; Carter et al., 1998). Some of these livelihoods of fishermen include farming, poultry, fish processing, breeding, harvesting, the raising of fish, factory work, and construction.

A study was conducted by Rahman et al. (2012) to investigate the alternative livelihood opportunities available and accessible to the fishermen community of Nijhum Dwip under Hatiya Upazila of Noakhali district in Bangladesh. A household survey was used to collect primary data, and PRA tools such as focus group discussions (FGD) and cross-check interviews (CI) with key informants were used to collect secondary data. The most common alternative livelihood-generating activities (ALGAs) identified by the fishers were: poultry (22%), livestock (21%), crop farming (19%), boatman (13%), non-farm day labourer (9%), small business (6%), handicraft/swing (5%), crab catching and fish farming (1%) and others (3%). This result is an indication that fishermen do engage in other livelihood activities to sustain their lives.

It was discovered by Asong, Mabunay, Aure, Seraspe, Braganza, and Corda (2002) that several fishermen and fishmongers in the region are employed by governmental organisations or private companies in Iloilo City or serve as barangay authorities. People in the neighbourhood tend to work for themselves. Others depend on personnel or pump-boat work (locally referred to as "sailors"). Some residents of the barangay work in the service industry, while others grow poultry and swine, purchase and sell animals (goats, swine, cows, and poultry), sell agricultural goods in the "Mercado," and own sari-sari businesses for the local community.

Fishermen in Tota-Bengre, India have taken advantage of their location near the city by investing in more powerful boats and equipment and establishing new businesses in the fishing industry (Kafka, 2019). As a result, they have benefited from the accumulation approach of diversification. The author explains how fishermen in Tota-Bengre, India is making the most of their economic situation. The author claims that fishermen in Tota-Bengre have easy access to everyday markets. Fishermen in Tota-Bengre (India) earn a good income due to the proximity of several marketplaces to their docks. Kafka et al. (2019) claims that industrialization is now making fishermen in Tota-Bengre (India) more money than ever before. Fishermen in Tota-Bengre practise diversification by amassing possessions. The city is home to a large number of migrant workers as a result of its growing industrial sector and fishing industry. This enables fishermen from Tota-Bengre to recruit members for their crews. Companies that prepare fish, bidding halls, and export icing factories can all be found at Mangaluru harbour, which is located in India. The facilities in the area are beneficial to

the fishermen of Tota-Bengre. Fishermen from Tota-Bengre can make more money because of Mangaluru's seafood market. While fishermen are being held at the port of Mangaluru, they can talk to possible partners inside and outside of the city. These findings suggest that fishermen in Tota-Bengre (India) have alternative livelihoods. Their livelihoods are within the fishing industry, and they do not necessarily leave fishing for other occupations. The reason why fishermen may remain and not leave is that the fishing community is in the city, where they have easy access to a lot of people and connections without stress.

A study was conducted by Hossain, Miah, Pervin, Hosen, and Haque (2015) to evaluate the livelihood status of the fishing community of the Punorvaba River under Dinajpur Sadar Upazila during the period from January to August 2013. The authors revealed that 45% of the income came from fishing activities, and the lowest income came from livestock at 4%. 15% comes from various types of agricultural activities, and 28% comes from day labouring. This is an indication that fishermen do engage in livelihood activities for sustenance. However, in the Ghanaian context, the alternative livelihood of fishermen may differ from the livelihood status of people in Bangladesh. That is why the researcher further wants to explore the livelihood strategies of fishermen in Ghana.

A study done by Ofori-Danson, Sarpong, Sumaila, Nunoo, and Asiedu (2013) study how poor small-scale fishing communities in Ghana are using FGT techniques and the Sumaila Relative Poverty Indices. The results of the study showed that the poverty headcount index of the community ranged between 33.5% and %0% whiles making use of the local poverty line and up

to 80% using the international poverty line. In terms of vulnerability, irrespective of the main fishing activity, community (rural or urban), and habitat of fishery resources (freshwater or marine), fishers were facing identical sources of vulnerability. Marginalization indicators were relatively better in the urban fishing communities (90%) than in the rural fishing communities (50%- 80%). From this study, it can be concluded that poverty is significantly higher in rural areas than in urban areas in both habitats (i.e., inland and coastal). Since poverty among fishermen in rural areas is higher, it can logically be said that fishermen are likely to adopt alternative livelihoods. However, in the study of Ofori-Danson et al. (2013), nothing was revealed about the alternative livelihood of fishermen. Due to poverty, the researcher's decision to explore alternative livelihoods for fishermen has been influenced.

Asok and Saranya's (2016) study was on the income and expenditure patterns of fishermen in the Veerapandianpattinam area in India. This study is confined to the Veerapandianpattinam area. The study is based on a field survey conducted with the help of a well-structured questionnaire and interviews with the respondents. The secondary data was collected from books and journals. The primary data sets were used in this study. The primary data was gathered through direct personal interviews with the assistance of an interview schedule. Among them, 150 fishermen were selected through a convenience sampling method. The study revealed that most fishermen's source of living is through borrowing. It is revealed that 50 per cent of the fishermen have borrowed from money lenders, 22 per cent of fishermen have borrowed from commercial banks, 18 per cent of fishermen have borrowed from their friends and relatives, and 10 per cent of fishermen

have borrowed from middlemen to run their fishing business, which in the end will help them sustain their livelihood. However, if such borrowing continues, fishermen will be forced to adopt other livelihood strategies to help them sustain their families.

However, empirical research on diversified fishing households is limited compared to the amount of research on animal and crop producers (Asravor, 2017; Eneyew, 2012). Martin, Lorenzen, and Bunnefeld (2016) conducted studies in Laos to examine problems of poverty, fisheries, and livelihood diversification. According to the findings of Martin et. Al (2016), there is a positive relation between fishing as a profession and the number of occupations in a region. Their results are listed in this article. Based on their research, Martin et al. (2016) concludes that other sources of income in rural areas are unlikely to persuade fishermen to abandon fishing but instead add to the portfolio by increasing its overall value. People in low-income coastal areas often rely on fishing as their main source of income, employment, and food security.

A study was conducted by Hossain, Sathi, and Hossain (2020) to assess the livelihood status of fishermen in the Sunamganj district in Bangladesh. The authors randomly collected data based on a questionnaire from 425 fishermen during April

2018. It was found that found that most of the fishermen belonged to the middle age group and had a middle-class family size. It was revealed that the majority of fishermen were involved in borrowing. According to the authors, 56.3% of fishermen received bank loans, while only 3.1% received loans from non-governmental organisations (NGOs). This resulted in the

financial condition of fishers being very poor as the land owned by them was decreasing day by day.

Similarly, Welke and Cahaya (2015) conducted a study on fishermen's poverty and survival strategies in Indonesia. This study was done on poor fishing households. The authors' study revealed the survival strategy of fishing households. These survival strategies used by fishermen were:

1. Doing different types of business
2. Involve the whole family.
3. Take two meals and diversify the types of food you eat.
4. There is a high sense of solidarity and trust among neighbours.
5. They borrowed money and rice when their fellow neighbours were in need.

Research on "Informal" credit systems in fishing communities: Issues and Instances from Vietnam were conducted by Ruddle, Volkova and Bülthoff (2011). A survey comprising 403 saltwater fishing operators in five districts of Vietnam shows that fishing households are dependent on the unofficial finance structure because they lack leverage that is suitable for the legal sector. For the most part, institutional and informal sources of credit are combined to fund fishing vessels and businesses. This suggests that to operate, the fishing business requires financial support. This might be the cause of the fact that many fishermen borrow money from their neighbours to pay for their employment.

In the article by Pearson, Phillips, Loranty, Beck, Damoulas, Knight and Goetz (2013) titled, "Making a livelihood at the fish-landing site: exploring the pursuit of economic independence amongst Ugandan women," it is revealed that when faced with economic difficulties, women in fishing

communities often turn to tailor shops, restaurants, and market stalls. The authors state that a 31-year-old woman sed her background in sewing to build a successful business near the landing site. With her knowledge and help, this woman was able to recover from the shock. In other cases, women who lacked this education or experience took a unique approach to starting businesses. Some people had farms where they grew food for themselves as well as for local markets and restaurants. This shows that fishmongers have turned to tailors and other businesses to make a living since the fishing industry has gone downhill.

Damasio, Peninno and Lopes (2020) conducted a study on promoting non-fishery livelihoods in small-scale fishing communities in Sri Lanka. The authors revealed the vocational training programme for youth in fisher communities. The authors revealed that the vocational training programme was focused primarily on skills development for young people to help them enter the job market and to help diversify income-generating activities for small-scale fisher households in the project area. The industrial demand and the social demand in fisher communities needed to be factored into activity design for the development of appropriate vocational training programmes for target groups in the fisher communities of the project area. It was revealed that fishers' communities do engage in livelihood activities such as hairdressing, production of home-based garments and dressmaking.

Asiedu and Nunoo (2013) did a study on how to keep fishing in Ghana in a sustainable way. They looked at other ways to make money. This study addresses this question in the case of Ghana by conducting interviews and key informant discussions with Ghana's small-scale fishers and fisheries

managers. This study indicated that over 73% of fishers interviewed were willing to switch jobs, with 27% indicating that they would not consider it. It was revealed that 4% of fishers in London were into:

1. Crop farming,
2. Auto mechanic, carpentry
3. Block moulding,
4. Teaching
5. Research station.

In Kpong, 20% of respondents (fishers) worked in alternative occupations, such as:

1. Livestock rearing,
2. Aquaculture

- corn mill operation,

1. Commercial car driving
2. seasonal, poultry, and restaurant immigrants.
3. and private security.

In Ahwiam, Asiedu and Nunoo (2013) revealed that 6% of fishers do engage in other livelihoods, such as:

1. Crop farming,
2. Livestock
3. Rearing,
4. Salt mining,
5. Commercial car driving

Lastly, in Elmina, the authors revealed the alternative livelihood employed by fishers. They were:

1. Crop farming,
2. Livestock
3. Rearing,
4. Trading in nonfarm items.
5. Teaching

This result implies that fishers do engage in other livelihood strategies and activities for survival in their respective communities.

A study was conducted by Manjur, Amare, Haile Mariam, and Tekle (2014) on "Livelihood diversification strategies among men and women in rural households: Evidence from two watersheds of Northern Ethiopia." The essential data was collected from 182 farm households. Descriptive statistics and a Binary Logistic Regression Model (BLGM) were deployed to analyze the data. Three groups of livelihood strategies with eight sub-livelihood strategies were identified in the study areas, including farming, off-farm, and non-farm. The result of the study revealed that gender affects diversification options, and the choice of income-generating activities due to culturally defined roles, social mobility limitations, and differential ownership of working capital and access to assets. Based on the present study, it is possible to infer that the constraints of rural households in choosing livelihood strategies that will lead them to achieve their food security goal should not be put aside since food security problems cannot be overcome by simply concentrating on the farm sector alone; inter-sectoral issues and farm and non-farm linkages need to be addressed as well. Moreover, the contribution made by off-farm and non-agricultural sectors to rural households is significant; obviously, these activities are targeted for survival.

Determinants of Alternative Livelihood Strategies of Fishing Families

Numerous writers' studies have indicated various drivers of fishermen's alternative livelihood options. Amevenku, Asravor, and Kuwornu (2019) investigated the many methods that fishing families in Ghana's Volta Basin use to make a living. The research was carried out in Ghana's coastline administrative districts. North, Central, and South Tongu, Ada East, Asuogyaman, and Lower Manya are among the districts involved in the LV1, LV2, and LV3 segments. Stratum VII, which includes the Pru district in the Brong Ahafo area, was also sampled for this study. The fishing homes were sampled using a multistage sampling approach. The Volta Basin includes Greater Accra, Volta, Eastern, and Brong Ahafo. First, districts in these areas were sampled. The districts were chosen because they were known to contain a large number of fishing communities and households and hence are impacted by any activity in the Volta Basins. The second stage involves using a basic random sample approach to select the numerous settlements that can be found in these specified districts once they have been purposefully selected. At first, the district assemblies were asked for a list of all the villages in each district so that representatives from each could go to each village and get samples from the people who lived there. The multinomial logit regression results revealed that the main parameters of strategies for livelihood included the marital status of the people, the yearly experience of food shortage in months by a household, the number of months particular household experiences, access to loans, access to additional help, distance to regular, how far the main market is, and district capital markets and district capital, and fishing experience were the major determinants of livelihood strategies.

Amevenku et al. (2019) discovered important drivers of fishermen's livelihood methods. However, because the authors' research region (Volta Basin) differs from the present study area (Moree), it is appropriate to perform a study to learn about the determinants of livelihood strategies as well. Furthermore, the variables affecting fishermen in the Volta Basin may differ from those affecting fishermen in Moree.

Gebru, Ichoku, and Phil-Eze (2018) investigated the factors that impact livelihood diversification strategies in Ethiopia's Eastern Tigray Region. The research sites and 485 sample respondents were chosen using a multistage sampling procedure. Data was triangulated utilising information from focus group talks and key informant interviews to produce a qualitative conclusion. According to the authors' research, the majority of farmers (83.1 per cent) were able to diversify their livelihoods into off-farm, non-farm, or combined income activities, whereas 16.91 per cent of households were unable to diversify their livelihoods, often due to a lack of financial resources to engage in any form of income-generating activity other than agricultural activities. The multinomial logistic regression model uncovered that households' level of education, access to credit, income, membership in cooperatives, land size, and farm input use influenced their decision to diversify their livelihoods, whereas age, dependency ratio, family size, access to extension services, distance to market, livestock ownership, and agro-ecology influenced their decision to diversify their livelihoods negatively. Even though this study focuses on farmers, the diversification drivers are comparable to those that apply to fishers. As a result, the literature is pertinent to this research.

Kamwi, Chirwa, Graz, Manda, Mosimane, and Kätsch (2018) investigated the livelihood activities and skillsets accessible to rural families in Namibia's Zambezi Region. The research looked at three main issues: What are the main sources of income in rural areas? (ii) Are there any demographic considerations linked to these activities? (iii) What steps can be taken to diversify and sustain income from these subsistence sources? Semi-structured interviews with 424 families were utilised to gather data to answer these questions. The questionnaire asked about (1) human assets, (2) financial assets, and major sources of income, (3) physical and natural assets, and (4) social assets, all of which were relevant to the sustainable livelihood framework. To determine the influence of the variables on livelihood activities and skills, a series of logistic regressions were fitted, from which the estimated odds ratios (y) were calculated. The level of non-independence or relationship between binary data values was measured using odds ratios. According to the Kamwi et al. (2018) survey, just 5% of respondents had a single source of income, while 95% had a mix of agricultural and non-farming activity. Limited skills, big family size, availability of possibilities, seasonal nature of agricultural products, attractive desire for goods and services, or a mixture of these, were among the grounds given by the majority of respondents for expanding into other occupations. Furthermore, the findings revealed that gender, age, job title, and education all had a significant (p 0.05) impact on a household's skill selection. The study indicates that better livelihoods in the study region have resulted from a mix of rural family activities and skills affected by several variables. The geography of the study is the difference between this and the present study. The Kamwi et al. (2018) study took place

in Zambia, whereas the present research will take place in Ghana. As a result, the factors that impact fishermen in Zambia may be different from those that affect fishermen in West Africa (especially in Ghana). So, it is important to look into the things that affect Ghanaian fishermen so much that they decide how to make a living.

Previous studies of small-scale fishermen's incomes elsewhere have been based on fishing inputs as well as socioeconomic or demographic factors (Ocheiwo, 2004; Tzanatos, Dimitriou, Papaharisis, Roussi, Somarakis, & Koutsikopoulos, 2006; Agimass & Mekonnen, 2011). These factors could be as diverse as the application of good fishing practices, knowledge gained from extension services, or the geographic location of the fishermen. An investigation in Ghana is required due to the complexity of the elements involved. The goal is to find out what makes up their income, which in turn affects their standard of living and job prospects. Moreover, understanding the social, demographic, cultural, and economic situation in a particular area is crucial to fisheries management and planning (Villareal, 2004). Since these socioeconomic factors can determine the income of fishermen, they will have an impact on their livelihoods. By world standards, when an individual's income is affected, their livelihood will be affected as well.

Literature has shown that the income of fishermen can be attributed to several reasons that can be accounted for the level of income of fishermen. Such variations can arise for several reasons, such as the number of fishermen in each region, the number and distribution of the villages in each region, the sharing of the resources between regions, the nature of the seabed in different regions, fishing habits of fishermen, available fish species, offshore

distance to be travelled, market infrastructure, consumer habits, equipment used in fishing, availability of ice and fuel, activities of the extension service departments, the age and experience of the fishermen, the socioeconomic conditions of fishermen, types and nature of preferred buyers, and the availability of market outlets have the potency of affecting fishermen's income (Ocheiwo, 2004; Tzanatos et al., 2006; Belwal, Tamiru, & Singh, 2012). Since these factors enumerated by the authors do affect the income level of fishermen, it can be logically said that fishermen whose income dwindles as a result of the factors aforementioned are likely to adopt other occupations to fend for themselves and their households. For some of these reasons, the researcher wants to explore the determinants of alternative livelihoods of fishermen.

Anyanwu (2014) conducted a study titled "Marital status, household size, and poverty in Nigeria: evidence from the 2009/2010 survey data." The author used the Harmonized Nigeria Living Standard Survey (HNLSS) data from 2009/2010. The authors' logit results show that monogamous marriage, divorce/separation, and widowhood are negatively and significantly correlated with the probability of being poor. This means that the above factors do reduce poverty. However, monogamous marriage has the largest probability of reducing poverty in Nigeria. Anyanwu (2014) also found that household size matters in determining poverty in the country: a one-person household negatively and significantly reduces poverty, while the addition of members to the household progressively increases the probability of being poor. This is an indication of the fact that a small household size does reduce poverty, whereas a large household size increases poverty.

A research was performed by Lartey (2015) which was titled "The Effects of Plastic Pollution on Inshore Marine Fishing Activities: Insights from the Elmina Coastline in the KEEA Municipality." A marine and fisheries expert were also consulted, along with 150 fishermen, three fishmongers, two officials from the Komenda Edina Eguafo Abirem (KEEA) and the Cape Coast Metropolitan Assembly (CCMA), and the researcher herself. Fish in Elmina are mostly immune to the effects of plastic marine garbage, but it may jam the pedals of outboard engines and even ruin fishing nets. Plastic pollution has a greater effect on artisanal and deep-sea vessels than on coastal fisheries. Their very survival is at stake if nothing is done. As the fishing business changes, fishermen need to change how they do things to stay in business.

Another awful experience is the use of destructive explosives in fishing. A study was done by Munyi (2009) titled "The social and economic dimensions of destructive fishing activities on the south coast of Kenya. “The author researched hazardous fishing factors and their frequency. The research aims to eliminate dangerous fishing methods, so he wants to examine the cultural and socioeconomic aspects that support them. A total of 29% of respondents reported using beach seines; 32% utilised spearguns; 5% used ringlets; 3% employed microscopic mesh size nets; 1% employed small mesh size basket traps, and 1% employed explosives or conventional plant poison. Approximately 70% of fishermen admitted to hurting the environment while fishing. About half of all migrant fishermen are thought to be involved in harmful activities. Of the irresponsible fishermen, 48% are between the ages of 18 and 35; 17% are between the ages of 36 and 53, and 5% are between the ages of 54 and 71.

The availability of cheap yet deadly equipment in the market and the perceived efficacy of damaging mechanisms are the key drivers of hazardous fishing practices. Also, factors such as younger fishermen with dangerous equipment progressively outnumbering older fishermen, and the "I don't care" attitude of migrant fishermen contribute to hazardous fishing practices. Poor fishing conditions have made a lot of fishermen sad. They have also made it harder for the general public to learn about potentially dangerous fishing gear and accept it.

Another determinant that may likely lead fishermen to adopt different livelihoods may be their inability to save money via fishing. A study was conducted by Hidajat (2015) on the analysis of financial literacy and household saving among fishermen in Indonesia. The purpose of this study was to examine their financial literacy and the relationship between financial literacy and household saving. From January to June 2014, the study's data was gathered by the use of questionnaires sent to a community of fishermen aged 25-50 in the Localities of Brebes, Tegal, and Pekalongan in Central Java, Indonesia. This study's factors were financial awareness and family saving. The findings from 258 samples reveal that financial awareness is connected to family savings. Eighty-five per cent of fishermen were illiterate, and the majority did not have a savings account.

A study was done by Yizengaw, Okoye, and Beyene (2015) on the determinants of livelihood diversification strategies: the case of smallholder rural farm households in Debre Elias Woreda, East Gojjam Zone, Ethiopia. The goal of this investigation is to identify the factors that have an impact on people's willingness to try new methods of making a living in the study's

geographical context. Information was gathered from both primary and secondary resources. For this study, we randomly selected 160 family heads in two stages. With the use of the descriptive data, we were able to pinpoint the resources and livelihood practices that contribute to economic security. Many rural families in the study region engage in both farming and non-farming occupations, the survey found. As a whole, this figure was 61%. Using a multinomial logistic model, we looked at the variables of households' means of subsistence. In this light, the econometric analysis revealed that only seven out of the total sixteen variables included in the model were significant at the 10% probability level or lower. These variables included land area, livestock holding size, sex of household head, media exposure, market proximity, annual household income, and urban connectivity. All of these things were taken into account: the size of the land; the number of animals; the gender of the head of the household; access to mass media; the distance to a market; the yearly income; and the closeness to cities.

Another factor influencing fishermen's alternative livelihood is the high cost of equipment and other items that facilitate fish farming. A study was conducted by Ocloo (2015) on fishing activities and their challenges in James Town, Ghana.

The study investigated the methods of fishing, productivity, and challenges of fishing activities in James Town. The James Town fishing port was the venue for the information collected. The data used in this study was qualitative and quantitative. Data were collected through the administration of a questionnaire to fishermen and other related workers in James Town. A cross-sectional research design was used in this research work. Data from the

Ministry of Fisheries and other related institutions and the James Town Fishermen's Union were used. The analysis showed that there was a decline in the output or catch of fishermen in James Town over the years. This was caused by several factors. Upon investigation, it was found that the major reasons for the reduction in productivity (in fishing) were:

1. Outboard motors are expensive and scarce.
2. The price of premix fuel and fishing nets is exorbitant.

For these reasons, fishermen may consider other livelihoods if outboard motors and premix fuel continue to be expensive.

Summary

The chapter evaluated related literature on fishing families' alternative livelihood alternatives. The approach to sustainable livelihoods was subjected to a theoretical evaluation. This method will be useful in the study since it will aid in understanding fishing families' livelihoods as well as the causes and processes that influence them. The literature analysis revealed that poultry, livestock, small companies, buying and selling animals, borrowing from money lenders, and other forms of alternative income for fishermen and fishmongers were the most prevalent. The research also found that alternative livelihoods were influenced by the head of household's marital status, distance from normal markets and the district capital, degree of education, vocational variety, and other factors. The study questionnaire will be easier to create if these results from the literature are taken into account. It will allow researchers to determine whether Moree fishing families' experiences were similar to those in other parts of the world.

CHAPTER THREE

RESEARCH METHODS

Introduction

This chapter presents research method as well as research design, study area, population, sampling strategy, research instrument used in data collection and data analysis processes.

Research Design

Various approaches were used in the study to understand the alternative livelihood options of fishing families. These included deductive, inductive, and abductive methods, each contributing unique perspectives (Mitchell, 2018; Maarouf, 2019; Fredagsvik, 2022). The deductive method involved drawing conclusions from known premises or accepted facts (Dunstone & Caldwell, 2018; Evans, 2019), while the inductive method sought patterns in observations to develop hypotheses (Business Research Methodology, 2022; Hoddy, 2019; Clarke, 2021). Abductive reasoning, a blend of deductive and inductive approaches, was also employed (Janiszewski & van Osselaer, 2021; Garbuio & Lin, 2021).

A quantitative research design would be utilized to collect data on the various alternative livelihood strategies pursued by fishing families in Moree. Specifically, the researchers utilised a descriptive survey with a cross-sectional design to explore the alternative livelihoods strategies use by the fishing families. The primary objective was to gather relevant and accurate data, providing a snapshot of the population's characteristics at a specific point in time. The study would make use of this design because it would provide valuable insights into the alternative livelihood strategies of fishing families in

Moree, their determinants, outcomes, and factors influencing economic vulnerability. Moreover, the researcher sought to understand the alternative livelihood strategies of fishing families in Moree, which may have broader implications beyond the specific sample studied. By using a quantitative design, the researchers could collect data from a representative sample and draw conclusions that are potentially applicable to the larger population of fishing families in the area.

Quantitative methods, which focus on numerical data and statistical measurement, were chosen to facilitate systematic data collection and analysis (Mobolaji et al., 2021). A survey questionnaire would be administered to a representative sample of fishing households in the area, capturing information on the specific alternative income-generating activities they engage in apart from fishing. Data would be analyzed using descriptive statistics to identify the most common alternative livelihood strategies in the community (Creswell, 2012). Through the descriptive survey approach, the researchers could describe the existing situation, establish benchmarks, and address inquiries about variables or current situations (Berewot & Fibra, 2020; Al Riyami, 2015; Kisaka & Mwewa, 2014). By extrapolating findings from a sample to a larger population, the study drew conclusions about the characteristics of the entire group (Coy, 2019; Mathis, 2021; Okorie & Musonda, 2020). Thus, this design would help minimise the potential for researcher bias during data collection and analysis. Standardized survey questionnaires and predefined response options reduce subjective interpretations, ensuring more objective results.

However, the cross-sectional design also had limitations. Ensuring clear and unbiased survey questions was essential to minimize potential bias in the responses (Celik et al., 2013). Additionally, stimulating participants to provide thoughtful answers and ensuring sufficient data presented challenges that the researchers had to address (Fraenkel et al., 1993). To overcome these concerns, the study implemented measures to formulate clear and straightforward survey questions and encouraged participants to provide thoughtful responses (Celik et al., 2013). This methodological consideration aimed to enhance the validity and reliability of the quantitative findings on fishing families' perspectives regarding alternative livelihoods.

Study Area

Moree is a town located in the Central Region of Ghana. Moree, a district within the Central Region, was established in 1988 under Legislative Instrument, LI 1381, originating from the former Mfantsiman District Council, with its capital located in Abura Dunkwa. Moree is a populated place for city, town, village, or other agglomeration of buildings where people live and work. Its neighbouring districts include Assin South District, Mfantsiman Municipal, a 5 km stretch along the Gulf of Guinea, Cape Coast Metropolitan, and Twifo-Heman-Lower Denkyira District, situated to the north, east, southeast, south, and west respectively (Kivilu et al., 2002). It is situated along the country's coastline, approximately 20 kilometres west of Cape Coast., Moree is positioned between 5°7'60" N and 1°12'0" W in DMS (Degrees Minutes Seconds) or 5.13333 and -1.2 (in decimal degrees) (Celik et al., 2013).

As at the 2021 census, the town of Moree had a population of 7,070, consisting of 49.8% females and 50.2% males. More than half of the people

are illiterate (Bellerose & Mirrlees-Black, 2023). The inhabitants usually engage in fishing, farming and trading. However, Moree is known for its beautiful beaches and historical significance, as it was once an important trading centre during the colonial era. The district's topography features a combination of flat and hilly landscapes, with altitudes ranging from 20 to 80 meters above sea level. When Moree fishermen gaze out to sea, the prominent mountains visible are Aburabura and Katakyi. The region is home to both deciduous and evergreen forests. Moree experiences approximately twice the average precipitation compared to other areas (Okorie et al., 2020). The rainy season commences in April, extending through May and June, before concluding in July. Rainfall is also observed from October until mid-December, with December being a particularly rainy month. On average, the southern and coastal savannas surrounding Moree receive 100 to 110 centimetres (cm) of rainfall per year, while the northern savannas receive 110 to 170 centimetres (cm), resulting in an average annual rainfall of 190 centimetres (Okorie et al., 2020).

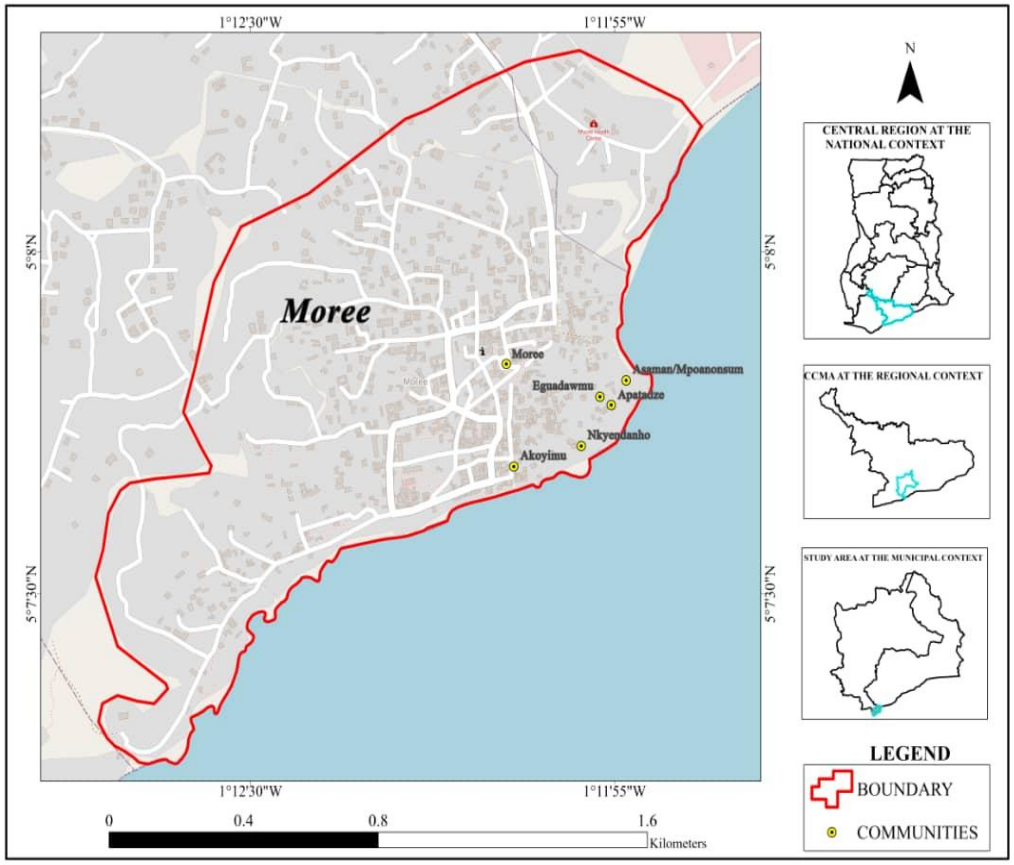

Figure 3: Map of the Study Area

Population

The study population would include all of the families in Moree who were reliant on fishing. The study population would consist of fishing families who reside in Moree, registered fishermen and fishing families who are still participating in fishing. That is, fishing families or individual families who are not in this category would be excluded from taking part in the study.

The study made use of this population because it helped provide valuable insights into the challenges and opportunities for diversifying livelihoods in a fishing community. By including registered fishermen and fishing families actively participating in fishing, the study captured the experiences and perspectives of those directly involved in the fishing industry. These individuals were likely to have first-hand knowledge of the

challenges faced and the potential alternatives available to them. Obtaining data from the chief fisherman in Moree, who likely had a comprehensive understanding of the fishing community, provided valuable and reliable information. This direct source of data collection could reduce potential biases and enhance the accuracy of the findings.

The inclusion of both men and women among the fishing households ensured a more comprehensive understanding of the dynamics of alternative livelihood strategies within the community. It allowed the research to explore potential gender differences in approaches to diversifying income sources. The chosen population of fishing families in Moree was practical and feasible for data collection and analysis. By focusing on a specific geographical location and a well-defined occupation, the research could more effectively manage the study's logistics and resources. However, the data from 201 fishing households was obtained from the chief fisherman in Moree. There were 140 men and 61 women among them.

With data collected from 201 fishing households, the study had a reasonably large sample size, which could increase the precision of the results and improve the statistical power of the analysis. In summary, the study population of fishing families in Moree was appropriate as it aligned with the research objectives, provided a representative sample of the target group, and allowed for in-depth exploration of alternative livelihood strategies within the fishing community.

Sample Size

Krejcie and Morgan (1970) calculated that 201 respondents were required to achieve a 95% confidence level and an 80% precision, which

resulted in a sample size of 134. Because some questionnaires were not returned, the sample size could be increased to about 10% of the required number. As result, 154 respondents were used for the study.

Sampling Procedure

In this study, the researcher used proportionate stratified random sampling and simple random sampling (particularly the lottery method) for sampling fishing families. Proportionate stratified random sampling required that the size of each stratum be proportionate to the population size of the strata when examined across the entire population (Stat Trek, 2020; Hayes, James & Beer, 2021). The percentage of strata sampled was the same across all categories. There was no discernible difference in accuracy between a proportional stratified sample and a randomly selected one. The formula (sample size/population) x (size of stratum) gives a stratified random sample that is proportional to the whole. By using this formula, the sample size for each stratum for both males and females was determined (see Table 1). After determining the representative sample for each stratum for both males and females, simple random sampling was used to select respondents from each population because the researcher desired to give the subjects an equal chance of being selected.

In simple random sampling, the lottery method was used. The researcher wrote the required number for "yes" and "no" on the remaining pieces of paper. The pieces of paper were crumpled and placed in a basket, and the researcher shook vigorously before the respondents were asked to pick one paper each. The researcher asked all those who picked "yes" to stand on one side (they were considered for the study) and the rest were asked to leave. This

was done to give all the fishing families an equal chance of being selected.

According to Alvi (2016), there were some disadvantages associated with simple random sampling. That is, it needed a lot of effort, especially for a large population. It was costly and time-consuming, especially in those cases when the participants were widely spread geographically and it was difficult to approach. Simple random sampling was employed for the investigation despite its drawbacks because there is a minimal possibility of sampling bias. The sample was a good representative of the population.

Table 1 presents the sample size distribution of fishing households across strata in Moree. This is accomplished using a simple formula: (total sample size) x (total population).

Table 1: Distribution of Sample Size of Fishing Families

Fishing Families	Population	Sample size
Fishermen (Males)	140	107
Fishmongers (Females)	61	47
Total	201	154

Source: Field survey, Arhin (2020)

For extrapolating to the whole population, a sample size of between 5% and 20% of the population is adequate (Abaidoo, Amoako, Mahama & Edward, 2021). Since the population was made up of 201 people, a sample size of 154 was enough to extrapolate.

Data Collection Instrument

Based on a study of the relevant literature, respondents were asked to fill out a 30-item questionnaire. The fishing family's questionnaire had four sections (A–D). Section A elicited background information from the fishing families, that was, age, gender, marital status, income level, household size

and educational level. Six questions make up Section A. Section B provided questions on the alternative livelihood strategies and activities of fishing families in Moree. Ten items were used in this part to answer the first research question. On a Likert scale of 1 to 4, strongly agree was assigned a score of 4, agree was assigned a score of 3, disagree was assigned a score of 2, and strongly disagree was assigned a score of 1.

Section C provided questions on the determinants of alternative livelihood strategies of fishing families in Moree. Section C answered question 2 with 13 items. The following numbers were used to rate alternative strategies: 4 indicates strong agreement, 3 indicates agreement, 2 indicates disagreement, and 1 indicates strong disagreement. Section D provided questions on the alternative livelihood outcomes of fishing families in Moree? This settles the third question. It has been left open in this section.

The mean and standard deviation of each item on a four-point Likert scale were analyzed. The highest mean was four, while the lowest mean was one. 2.5 was a Likert scale item. Parts with a mean of 2.5 or less were deemed low, whereas any component with a mean of 2.5 or more was regarded as high relative to the midpoint of 2.5.

Reliability and Validity

Families involved in fishing in Elmina were picked for the pilot study because they also participate in other activities. Because of their fishing history, they could relate to the questions on the questionnaire. Twenty fishing families participated in the trial program. According to Sudman, as reported by Burr (1993), pilot testing requires a minimum of 12 to 50 people. Therefore, the use of thirty samples were reasonable. The Cronbach's Alpha for the second

section of the questionnaire which contained items on alternative strategies and activities for making a living was .774 and the third section of the questionnaire, which contained questions about the factors that influence alternative strategies and activities for making a living, had a Cronbach alpha value of.798. the whole questionnaire had a Cronbach Alpha value of 0.872. It has been suggested by some researchers that an alpha of 0.7 or above is necessary for a standardized questionnaire to be considered reliable. Therefore, it was concluded that the calculated Cronbach alpha values were valid.

The goals of the pilot study were to determine whether the research instruments were adequate, make any necessary adjustments, or develop completely new equipment; develop a research protocol to guide the investigation; and evaluate the feasibility of the technique. The purpose of the pilot study was to: establish the sampling frame and techniques used in the study; identify logistical problems with the proposed methods; estimate variability in outcomes to help determine sample size; gather preliminary data; establish what resources (financial and otherwise) are needed for the main study; assess the proposed data analysis techniques to uncover potential problems, and confirm with a research question and research hypothesis.

To make sure the final instruments are as clear as possible, they were put through a series of tests with pilot participants. The time it took for individuals to respond and the efficacy of the coding system was also evaluated. Cronbach's alpha was used in pilot testing to establish the questionnaire's internal consistency. A scale with a Cronbach alpha coefficient of over 0.7 is considered reliable. However, Cronbach's alpha values are highly dependent on the total number of scale elements. In general, Cronbach's

alpha values tend to be fairly low for short scales (e.g., scales with less than 10 elements).

To better understand this situation, it may be helpful to provide the average correlation between the components. Inter-item correlations should be between 0.2 and 0.4, as suggested by Briggs and Cheek (1986). It's important to keep in mind that the sample size utilised to evaluate a scale's dependability may make a big difference. This means you need to make sure your scales hold up with your specific sample. Before testing reliability, items on a scale that are worded in a negative way, which is common in psychological testing, should be "flipped."

Data Collection Procedures

After receiving approval from the responsible ethics committee, the researcher presented the purpose of the study and addressed any further ethical concerns to the fishing families who would participate in it. The families involved in the fishing gave their informed permission after receiving ethical approval.

Before the collection of data, the researcher introduced herself by writing an introductory letter to fishing families and then sent it to the heads of each fisherman's family. This granted the researcher permission to collect data. Before sharing the questionnaires, rapport was established with respondents through a brief introduction about the researcher. This helped to build a cordial relationship with the participants. It also ensured that participants were relaxed before answering the questionnaire. Each respondent was well-informed about the purpose of the study through an interactive section between the researcher and the respondents.

The researcher provided the respondents enough time to consider whether or not they wanted to share sensitive information before requesting it. Respondents took not more than 30 minutes to fill out a single questionnaire. The completed questionnaire was collected and packed into sealed envelopes. This ensured confidentiality and safekeeping. Two months were used for data collection. The collection of the data was done after fishing families were back from fishing.

Data Processing and Analysis

The questionnaires were assigned consecutive numbers to facilitate identification and coding. Responses on the four-point Likert scale were assigned scores of 4, 3, 2, and 1, corresponding to "strongly agree," "agree," "disagree," and "strongly disagree," respectively. Negatively worded items were reverse-coded. The data was analyzed in the 22nd version of the Statistical Package for the Social Sciences (SPSS). SPSS was utilized to input the data for each item. Descriptive statistics were employed to examine the socio-demographic characteristics in relation to Research Questions 1 and 2.

For the fourth research question, logistic regression was employed, which was appropriate due to the categorical nature of the dependent variable (Pallant & Manual, 2010). Logistic regression can also assess the predictive capability of a set of variables and evaluate the relative contribution of each variable. Since this study aimed to investigate the influence of socio-demographic variables on the likelihood of providing for their families, logistic regression was an appropriate analytical approach.

Top of Form

Ethical Consideration

Prior to their involvement, fishing families were provided with verbal consent to participate in the study. They were informed that they had the option to decline participation if they so desired. McDermid, Peters, Jackson, and Daly (2014) emphasized the importance of anonymity in research ethics as it safeguards the respondents' identity. To ensure respondent confidentiality, no names or identifying information were used, thus preventing potential repercussions for sharing controversial responses or participating in the study. The respondents' answers were treated confidentially, and their participation in this comprehensive investigation and analysis of a subject or situation remained undisclosed.

Summary of the Chapter

The methods of research, collection of relevant data, and analysis of that data are all discussed in this chapter. The researcher was interested in learning about the attitudes, beliefs, and worries of fishing families towards other forms of employment and leisure activities, so a descriptive survey was suited for the study. All registered fishing families and fishmongers were the total population for this research. Proportionate stratified random sampling (proportionate stratified sampling is a method of sampling in which a population is divided into subgroups called strata with each having similar characteristics, and proportional numbers of units are sampled from each stratum) was used to sample respondents for the study. Binary logistic regression was used to test research question four.

CHAPTER FOUR

RESULTS AND DISCUSSION

The study was aimed at exploring various alternative livelihood strategies of fishing families at Moree. Moree fishermen and fishmongers were surveyed using this method. The data was analysed to answer the questions posed. Frequencies, percentages, standard deviation, and the mean were used to examine the socio-demographic variables in the first, second, and third study topics, respectively. Binary logistic regression was used to test a research hypothesis. The study's overall sample size was 154 participants.

Socio-Demographic Information

This section of with the background information of respondents selected for the research. Included in these factors are age, gender, family size, income, education, and marital status.

Table 2: Demographic Distribution of Respondents

	Demographic Features	F	%
Gender	Male	107	69.5
	Female	47	30.5
	Total	**154**	**100**
Age Range	18-34	45	29.2
	35-45	58	37.7
	46-55	40	26
	56 above	11	7.1
	Total	**154**	**100**
Household Size	Large (6+)	100	64.9
	Small (1-5)	54	35.1
	Total	**154**	**100**
Income level	Low (500 GHC)	146	94.8
	Medium (1000 GHC)	8	5.2
	High (1500 GHC+)	0	0
	Total	**154**	**100**
Educational Level	No School	125	81.2
	Primary/JHS	28	18.2
	Senior High School	1	0.6
	Tertiary	0	0
	Total	**154**	**100**
Marital Status	Single	20	13
	Married	115	74.7
	Divorced	19	12.3
	Total	**154**	**100**

Source: Field Survey, Arhin (2020)

According to Table 2, 37.7 percent of the respondents were between the ages of 35 and 45, 29.2 per cent were between the ages of 18 and 34 and 26.0 percent were between the ages of 46 and 55. There were 11 participants (7.1%) who were 56 or older. It follows that the majority of respondents were between the ages of 35 and 45. As can be seen in Table 2, there were 107 male respondents (69.5%) and 47 female respondents (30.5%). As can be observed, the vast majority of research participants were males.

According to table 2, 100 respondents representing 64.9% had a large household size. On the other hand, 54 respondents representing 35.1 % had a small household-size. It could therefore be concluded that most of the respondents had large family sizes. It can be seen from Table 2 that 146

respondents representing 94.8% income level were low whereas 8 which represents 5.2 % had medium income levels. It can therefore be concluded that the majority of respondents had a low level of income. This was confirmed by Ewusi, Mensah, Frimpong, Essiaw, Yeboah and Enchill (2021) who found that many fishermen living around the coastal areas have low level of income.

According to the data in Table 2, 125 (81.2%) respondents did not attend high school, whereas 28 (18.2%) did. For every 100 participants, 1 (or 0.6%) has a high school diploma or above. Not a single respondent had completed any kind of post-secondary education. Table 6 shows that the vast majority of people surveyed did not have any formal education. Table 7 shows 115 (74.7%) of the respondents were married. Twenty were unmarried and 19 were divorced (13%). Therefore, most research participants were married.

Research Question One: What are the alternative livelihood strategies and activities of fishing families in Moree? In analysing the first research question, descriptive statistics were used to obtain the mean (central tendency value that can be calculated from a group of values) and standard deviations (a measurement that quantifies the degree to which individual data points in a dataset vary from the mean). A four-point Likert-type scale was used to rate the items, with a score of 4 denoting strong agreement and a score of 1 indicating strong disagreement. Table 8 lists the alternative livelihoods and activities of fishing households in decreasing order.

Table 3: Alternative Livelihood Strategies and Activities of Fishing Families in Moree (N= 154)

Statements	M	Std
Fishermen do borrow to sustain their livelihood	3.42	0.57
Dressmaking is an added livelihood strategy in this community	3.31	0.6
Fishermen's wives are into food selling to support the livelihood	2.84	0.4
Wives of fishermen have shops to support the family's livelihood	2.82	0.42
Fishing families are into small businesses in this community	2.75	0.43
Fishing families sell agricultural products for sustenance	2.64	0.52
Fishing families engage in livestock farming	2.47	0.5
Fishing families add poultry to their occupation	2.45	0.52
Fishermen engage in masonry work	2.32	0.58
Fishermen are into furniture making	2.24	0.49

Source: Arhin (2020)

On a scale from one to four, responses were given to the questionnaire (strongly agree, agree, neutral, disagree, strongly disagree). While "Some fishermen produce furniture" has the lowest mean (2.24) and highest standard deviation (0.49), "Some fishermen borrow to live" has the highest mean (3.42) and highest standard deviation (0.57). The alternative sources of income for Moree fishing families are shown in Table 3. In decreasing order, Moree engaged in four different livelihood strategies and activities.

It can therefore be concluded that in Moree, most alternative livelihood strategies and activities of fishing families were borrowing, dressmaking, food selling, storekeeping, small businesses and selling of agricultural products. The study revealed that borrowing was one of the major alternative strategies of fishermen in the Moree community. This result is supported by the findings

of Asok and Saranya (2016), Hossain, Sathi, and Hossain (2020), Welke and Cahaya (2015) and Ruddle (2011), who revealed that the majority of fishermen do borrow and it was one of their alternative livelihood strategies. This finding implies that fishermen will continue to incur debt and losses. Karuppusamy and Karthikeyan (2018) also find borrowing is part of the habits of fishermen in dealing with alternative way to survive. Since fishermen at Moree do borrow for survival, it can be logically said that many of these fishermen may not be able to pay. This may lead to seeking different occupations to do.

The study also revealed dressmaking to be the second alternative livelihood strategy for fishing families at Moree. This result is consistent with studies were done by Pearson et al. (2013); Okalanwa, (2018) found that fishing families do engage in dressmaking as an alternative livelihood. fishermen do engage in alternate professions, including food sales and storekeeping. These authors found that fishing families are into businesses and storekeeping. The current result also revealed that fishing families do sell agricultural products as an alternative livelihood strategy. This result is consistent with Hossain, Miah, Pervin, Hosen and Haque (2015); Martin et al. (2013), who also revealed that some fishing families do divert and engage in selling agricultural products.

From the results, it can be concluded that fishing families (fishermen/fishmongers) at Moree have adopted several alternative livelihood strategies, however, borrowing was the main alternative strategy they resorted to followed by dressmaking, food selling and so on.

Research Question Two: What are the determinants of alternative livelihood strategies of fishing families in Moree? The mean (central tendency value that can be calculated from a group of values) and standard deviations (a measurement that quantifies the degree to which individual data points in a dataset vary from the mean) were used to do a descriptive analysis of the second research question. A four-point Likert- type scale was used to rate the items, with a score of 4 denoting strong agreement and a score of 1 indicating strong disagreement. Table 9 shows, in decreasing order, the parts of other ways for fishing families to make money.

Table 4: Factors Influencing Alternative Livelihood Strategies

Statements	M	Std
Low income has made some fishermen left the fishing industry to other occupation	2.93	2.49
Large household size in this community influence fishing families to adopt alternative livelihood	.75	0.52
Awful experience in the fishing industry causes people to do other jobs	.73	0.51
Inability to save enough with fishing business make fish farmers consider other source of livelihood	.72	0.49
Distance to regular market propels fishing families to engage in alternative livelihood.	.72	4.03
People in the finishing industry aspire to be in other jobs and this influence members in fishing families to consider other job	.69	0.5
An increment in fuel prices is one of the reasons some fishermen consider other livelihood	.58	1.65
Lack of capital compels one to find another occupation	.58	0.53
Expensive fishing equipment demotivates fishermen to continue in their fishing business	.52	0.5
Not getting support from the government influence fishing families to migrate onto other occupation	.33	0.47
Food shortages in this community make people to consider another livelihood.	.12	0.4

Source: Arhin (2020)

On a scale from one to four, responses were given to the questionnaire (strongly agree, agree, neutral, disagree, strongly disagree). From Table 4, it

could be seen that the mean (2.99) and standard deviation (2.49) are both highest for the statement "Low income has made some fishermen leave the fishing industry for other occupations," while the mean (2.12) and standard deviation (0.40) are lowest for the statement "Food shortages in this community make people consider another livelihood". Table 4 reveals that there are several determinants of alternative livelihood strategies of fishing families in Moree. However, in an order of relevance, the most determinant alternative livelihood strategies of fishing families in Moree was “Low income has made some fishermen left the fishing industry to other occupation” (Mean= 2.93, SD= 2.49) followed by “Large household size in this community influence fishing families to adopt alternative livelihood” (Mean= 2.75, SD = .52), “Awful experience in the fishing industry causes people to do other jobs” (Mean= 2.73, SD = 0.51), “Inability to save enough with fishing business make fish farmers consider other source of livelihood” (Mean=2.72, SD= .49), “Inability to fend for the family is one of the reasons fishing families consider other livelihood” (Mean=2.72, SD=.49), “Distance to regular market propels fishing families to engage in alternative livelihood” (Mean=2.69, SD= 4.03), “People in the finishing industry aspire to be in other jobs and this influence members in fishing families to consider other job” (Mean=2.58, SD= .50), “An increment in fuel prices is one of the reasons some fishermen consider other livelihood” (Mean=2.58, SD= 1.65), “Lack of capital compels one to find another occupation” (Mean=2.52, SD= .53) and “Expensive fishing equipment demotivates fishermen to continue in their fishing business” (Mean=2.51, SD=.50).

It can therefore be concluded that determinants of alternative livelihood strategies of fishing families in Moree were high level of education, low income, large household size, awful experience, inability to save enough, inability to fend for the family, distance to the regular market, aspiration into another job, an increment in fuel prices, lack of capital and expensive fishing equipment.

The current result has revealed low income to be the highest determinant factor of alternative livelihood strategy. This agrees with Kassah, (2020); Belwal et al. (2012). These authors revealed that the major area of fishermen that has been affected is their finances. That is, most fishermen have low-income levels and this was not different from the people at Moree. Fishermen having low income was agrees with Kamwi et al. (2018), who revealed that 5 % of fishermen obtained income from only one source. The implication of this is that many of these fishermen having low income may either stop fishing abruptly or combine other livelihood strategies to be able to fend for themselves and their families.

The large household has been revealed by the current study as a determinant of alternative livelihood. Anyanwu (2014) found that household implications side fishing communities either become poor or rich. The authors revealed that large household sizes become poor as compared with small household sizes. The implication of this is that it will make fishing families with large household sizes consider other livelihoods. Asiedu *et al* (2013) also identified that there are many other alternative livelihood strategies for generating income apart from fishing.

Awful experiences have been revealed to be a determinant factor of alternative livelihood. This result is in similitude to Lartey (2015). Emunah, (2020) revealed that plastic pollution was an awful experience for fishermen. Machado-Schiaffino, (2021) revealed in the literature that the use of explosives was an awful experience for fishermen. The authors state that as a result of these activities, fishing productivity decreased and fishermen became desperate. The implication of Lartey's (2015) and Agyapong (2021) study was that many fishermen were likely to leave fishing and venture into other livelihood strategies. This may be the reason why many fishermen at Moree currently are of the view that awful experiences at fishing are one of the determinants of alternative livelihood strategies.

Distance to the regular market has been revealed by the current study as a determinant of the alternative livelihood of fishermen at Moree. This fits with what Gebru *et al*. (2018); Amevenku *et al.* (2019); Yizengaw *et al*. (2015) found in their study. These authors revealed that the distance to the regular market causes fishermen to adopt alternative livelihoods. Similarly, the current result is similar to studies done by Wabnitz & Norström, (2021); Broohm, & Okey, 2021and Belwal *et al*. (2012), who revealed that one of the factors that affect the income level of fishing families was the distance they travel to market. This finding implies that since travelling to the market regularly affected the income level of fishermen, they may adopt different livelihood strategies. Nothing was said that the distance to the regular market affected fishermen at Moree. However, since they are of the view that it was one of the determinants of alternative livelihood, it can be logically said that the distance to the regular market is a challenge to fishing families at Moree.

It was also revealed that high fuel prices, lack of capital and expensive fishing equipment cause fishermen to either continue or think of another livelihood. This finding is consistent with the findings of Ocloo (2015) who revealed that many fishermen exit and consider another alternative livelihood because of expensive outboard motor and premix fuel hiking. This may be one of the reasons why fishermen at Moree consider another alternative livelihood.

From, the results, it can be concluded that fishing families at Moree do consider other livelihood strategies due to factors such as:

i. low income
ii. large household size
iii. awful experience
iv. inability to save enough
v. inability to fend for the family
vi. distance to regular market
vii. aspiration into other job
viii. an increment in fuel prices
ix. lack of capital and expensive fishing equipment

Research Question Three: What are the alternative livelihood outcomes of fishing families in Moree? Research question three was pictorially presented on a pie chart.

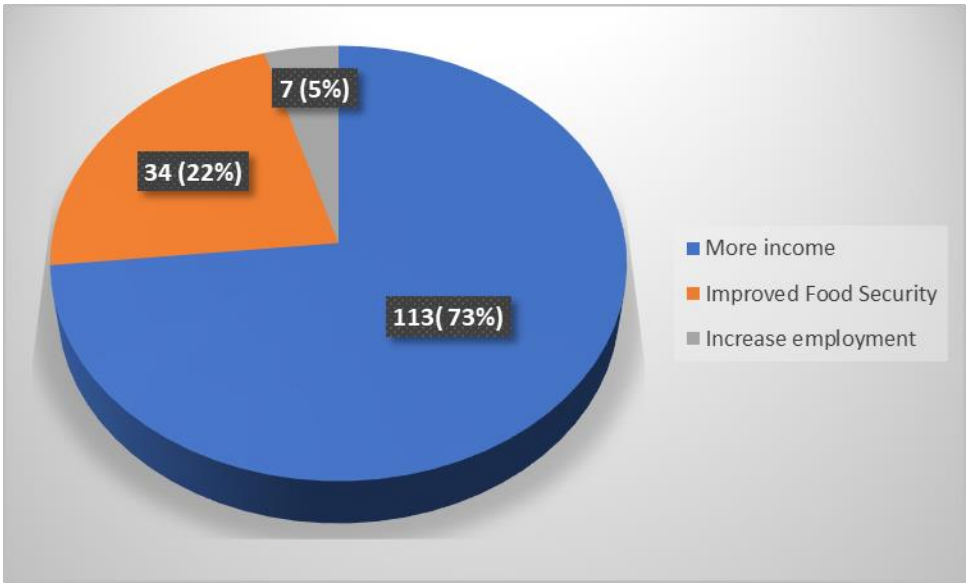

Figure 4: Alternative Livelihood outcomes for Fishing Families

Figure 4 reveals the alternative livelihood outcomes of fishing families. It can be seen from the pie chart that more income was the most alternative livelihood outcome; followed by improved food security and increase employment. It can be concluded that the most alternative livelihood outcome for fishing families in Moree was more income.

Research Question Four: What socio-demographic factors predict the likelihood that fishermen are not able to provide for their families?

Research question four was analysed using binary logistic regression. Binary logistic regression is presented in Table 9, Table 5, Table 6, Table 7 and Table 8.

Table 5: Omnibus Tests of Model Coefficients

		Chi-square	df	sig.
Step 1	Step	16.748	5	0.005
	Block	16.748	5	0.005
	Model	16.748	5	0.005

Table 5 is the Omnibus Tests of Model Coefficients. This test gives an overall indication of how well the model performs. For this set of results, we want a highly significant value (the Sig. value should be less than .05). From Table 5, the value .005 (which means that $p < 0.05$), with a chi-square value of 16.748 and 5 degrees of freedom indicates that the model performs well.

Table 5: Model Summary

Step	-2log-likelihood	Cox & Snell R square	Nagelkerke R square
1	171.058[a]	.103	.146

a. Estimation terminated at iteration number 5 because parameter estimates changed by less than .001.

Table 6 reveals the model summary of the regression. The Cox & Snell R Square and the Nagelkerke R Square values in Table 6 indicate the amount of variation in the dependent variable explained by the model (from a minimum value of 0 to a maximum of approximately 1). The two values are .103 and .146, which suggest that between 10.3 and 14.6 per cent of variability is explained by this set of variables.

Table 7: Hosmer and Lemeshow Test

Step	Chi-square	Df	Sig
1	2.974	7	.887

Table 7 reveals Hosmer and Lemeshow Test. For the Hosmer-Lemeshow Goodness of Fit Test poor fit is indicated by a significance value less than .05, so to support our model we want a value greater than .05. Table 7 shows that the chi- square value for the Hosmer-Lemeshow Test is 2.974 with a significance level of .887. This value is larger than .05, therefore indicating

support for the model.

Table 8: Classification Table

Observed		Predicted	
	Problem of provision		Percentage
	No	yes	Correct
Problem of provision	No	39	15.2
	Yes	106	98.1
	2	106	98.1
Overall Percentage			73.4

The cut value is 0.5

Table 8 shows the classification table. This provides us with an indication of how well the model can predict the correct category (problem with providing for the family) for each case. Table 8 shows that we can correctly classify 98.1 per cent of the fishing families who did have problems with providing for their family. On the other hand, we can correctly classify 15.2 per cent of fishing families who did not have a problem with providing for their family.

Table 9: Variables in the Equation

		B	S.E	Wald	Df	Sig.	Exp(B)	95% C.I for Exp (B)	
								Lower	Upper
	Age	-0.33	0.23	2.07	1	0.15	0.719	0.458	1.127
	Gender (1)	0.223	0.423	0.278	1	0.598	1.25	0.545	2.866
	Household Size (1)	0.109	0.446	0.059	1	0.807	1.115	0.465	2.67
	Marriage	0.21	0.452	2.310	1	0.60	0.571	0.442	1.23
Step 1a	Income Level	-3.162	1.118	7.997	1	**0.005**	0.042	0.005	0.379
	Educational Level	-0.576	0.431	1.79	1	0.181	0.562	0.242	1.307
	Constant	5.458	1.466	13.862	1	0.00	234.66		

a. Variable(s) entered on step 1: Age, Gender, Household Size, Marriage, Income Level, Educational Level

Table 9 shows variables in the equation. This gives us information about the

contribution or importance of each of our predictor variables. Table 9 shows that among all the socio-demographic variables, income level was significant (p= 0.005). Age, gender, household size, marriage and educational level did not contribute significantly to the model. Negative B values indicate that an increase in the independent variable score would result in a decreased probability of the case recording a score of 1 in the dependent variable (indicating a problem with providing for their family in this case). It is noted that the variables were scored as dichotomous of 0 and 1.

The variable measuring the income level showed a negative B value (-3.162). This indicates that the more fishing families' income level increases the less likely it is that they will have the problems of providing for their families. The odd ratio for income level is .042, a value less than 1. This indicates that the more income level of fishing families goes up, the less likely they are to have difficulty providing for their family. In other words, higher income levels are associated with a lower likelihood of facing difficulty in providing for their family. For all extra income fishing families earn, the odds of fishing families reporting difficulty in providing for their family decreases by a factor of .042, all other factors being equal.

This agrees with studies done by Ocheiwo (2004); Tzanatos et al. (2006); Belwal, Tamiru and Singh (2012) who revealed that one of the socio-demographic variables that affect fishing families was income level. Since these authors have revealed that they are affected by income, it can logically be said that a high-income level will make fishing families provide for their family whereas a low income may cause fishing families not to provide for their family.

Chapter Summary

Chapter 4 discusses the study findings concerning the Chapter 1 questions. Using statistically significant differences between variables, to compare and analyse data. While some of these variations are rather noticeable, others are scarcely noticeable. The conclusion of the discussion was the realisation that Moree's fishing family had diversified their sources of livelihood. Their main way to get by was to borrow money, but they also made clothes, sold food, and did other similar things.

It was also found that determinants of alternative livelihood strategies of fishing families in Moree were high level of education, low income, large household size, awful experience, inability to save enough, inability to fend for the family, distance to the regular market, aspiration into another job, an increment in fuel prices, lack of capital and expensive fishing equipment.

It was also found that the most alternative livelihood outcome for fishing families in Moree was more income. Lastly, among all the socio-demographic variables, income level was significant.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Summary

The research explored alternative livelihood methods in Moree for fishing households. The study addressed these research questions:

1. What are the alternative livelihood strategies and activities of fishing families in Moree?
2. What are the determinants of alternative livelihood strategies of fishing families in Moree?
3. What are the alternative livelihood outcomes of fishing families in Moree?
4. What socio-demographic factors predict the likelihood that fishermen are not able to provide for their families?

Data collection from fishermen about their alternative livelihood and activities was guided by the study's descriptive design. The total accessible population of registered fishermen and fishmongers were 201. Out of the total population, 140 are men whereas 61 are women. Proportionate stratified and random sampling was used for sampling fishermen and fishmongers.

I answered three research topics; I used mean and standard deviation for the first two and a pie chart for the third. Binary logistic regression was used to evaluate research question 4. One hundred and fifty-four respondents were used for the study. The fishing families were asked to answer a questionnaire with 30 items based on the literature review.

Key Findings

Here are some important findings:

The research identified several important findings regarding alternative livelihood strategies and activities practiced by fishing families in Moree. These include the following: borrowing as a means to sustain their livelihood, the presence of dressmaking as an additional livelihood strategy within the community, and the involvement of other fishing families' wives in food selling to support their livelihoods. Additionally, wives in fishing families engage in storekeeping to contribute to the family's livelihood, some fishing families participate in small businesses in the community, and certain families sell agricultural products for sustenance. In view of this, the alternative livelihood strategies used by the fishing families include borrowing, tailoring, grocery selling and retailing.

The study revealed several determinants that influence the choice of alternative livelihood strategies among fishing families in Moree. These determinants include low income, large household size, negative experiences in the fishing industry, and the inability to save enough from fishing businesses. Other factors include the distance to regular markets, aspirations to pursue different job opportunities, the impact of increasing fuel prices, the lack of capital, and the expense of fishing equipment.

Regarding the outcomes of alternative livelihood strategies among fishing families in Moree, the study found positive effects. These outcomes include an increase in income, improved food security, and a rise in employment opportunities.

The study demonstrated that among all the socio-demographic variables examined, income level exhibited a significant correlation (p=0.005).

Conclusions

The study examined various alternative livelihood strategies of fishing families at Moree. The most alternative livelihood and activity revealed by the study was borrowing. This was not a good alternative livelihood strategy employed by fishing families in their community. The implication of this is that many fishing families at Moree may incur debt as a result of borrowing. If this borrowing does not stop, many fishing families may leave their occupation. As fishing families continue to borrow, the more interest rate on the money borrowed increases leading to more debt. Other livelihood strategies and activities revealed by the study were dressmaking, food selling, storekeeping, small businesses and selling agricultural products. This type of alternative livelihood is decent and if they continue in it, they will develop other expertise.

It was also revealed that the most determinant of alternative livelihood strategies of fishing families in Moree was low income. This finding implies that low income causes fishing families to be involved in another alternative livelihood. Low income in these communities may lead to substandard living, homelessness and inadequate child care. This may adversely impact the nation and the fishing communities. Other determinants were household size, awful experience. Large household size may lead to low income and this will make fishing families engage in other alternative livelihoods. On the other hand, fishing families may also take advantage of their large family size. Fishing families may use their family members in the fishing business and

instead of low income, they may generate a lot of income.

It was also revealed that alternative livelihood outcomes were an increase in income of fishing families, improved food security and increased employment. An increase in the income of fishing families as a result of alternative livelihood is logical because doing two or more jobs will at least add extra money to their income. With improved food security, fishing families and their communities may eat healthy food and anaemia may be reduced. With increased employment, fishing families' GDP may increase.

Lastly, it was revealed that income level was the only sociodemographic variable that affected fishing families' likelihood of providing for their families. Income level predicted that an increase in income will lead to less problem of providing for the family. So, it implies that fishing families may venture into other alternative livelihood strategies.

Recommendations

Given that borrowing emerged from the study as the most common alternative livelihood strategy, it is crucial to address this issue to prevent fishing families from accumulating debt. Implementing financial literacy programmes and providing access to microfinance initiatives can help fishing families better manage their finances and explore alternative income-generating opportunities.

Recognize the significance of low income as a key determinant of alternative livelihood strategies among fishing families. Implement targeted interventions that aim to improve income levels, such as facilitating access to market opportunities, promoting value addition to fish products, and supporting entrepreneurship initiatives. Enhancing income can alleviate

poverty, enhance living standards, and reduce the need for families to seek alternative livelihoods.

Acknowledge the influence of household size on alternative livelihood strategies. The government of Ghana should help recognise that large household sizes can pose challenges in generating sufficient income from fishing alone. Encourage fishing families to leverage their family members' involvement in the fishing business to increase productivity and income. Support initiatives that promote effective utilization of family labour, while also ensuring adequate support for child care and family well-being.

The government of Ghana should establish social safety nets and support mechanisms to assist fishing families in times of economic hardships. This can include programs that provide temporary financial assistance, access to healthcare, and educational opportunities for their children. Strengthening community networks and fostering collaboration among fishing families can also create a supportive environment for sharing resources, knowledge, and experiences.

The government of Ghana should facilitate partnerships between fishing families and other stakeholders, such as local businesses, markets, and cooperatives. This can enhance market access for their products, improve pricing and bargaining power, and promote sustainable value chains. Support initiatives that promote collective marketing, branding, and quality assurance to enhance the competitiveness of fishing families' products.

Suggestions for Further Research

Based on the findings from the study:

It is suggested that further study should be conducted on a larger-scale, encompassing multiple fishing communities across Ghana. This would provide a broader perspective on the various alternative livelihood strategies employed by fishing families in different regions of the country. Comparing and contrasting findings from diverse communities can highlight regional variations and identify unique factors influencing alternative livelihood choices.

Alternatively, longitudinal study should be conducted to examine the long-term impact of alternative livelihood strategies on fishing families and their communities. This would involve tracking changes in income levels, food security, employment, and overall well-being over an extended period. Longitudinal research can provide valuable insights into the sustainability and resilience of alternative livelihood approaches, as well as their long-term effects on individuals, families, and communities.

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APPENDICES

APPENDIX A

QUESTIONNAIRE TO FISHING FAMILIES

The purpose of this questionnaire is to obtain information about the alternative livelihood strategies adopted by fishing families at Moree fishing community, Cape Coast. This is a Post Graduate thesis. All the information supplied will be kept confidential and will be used for academic purposes only. Thank you for your co- operation.

SECTION A

Socio-Demographic Background

Write your age in the dots and tick in the parenthesis the appropriate characteristics that apply to you.

1. Age in years……
2. Gender Male ( ) Female ( )
3. Household size

1. Large (6 above) ( )
2. Small (1-5) ( )

4. Income level

1. Low ( )
2. Medium ( )
3. High ( )

5. Educational Level

1. No School ( )
2. Primary/JHS ( )
3. Senior High School ( )
4. Tertiary ( )

6. Marital Status

1. Single ( )
2. Married ( )
3. Divorced ( )

SECTION B

Instruction: Check the box next to the statement that best describes your opinion on each of the following statements numbered 7 through 29. The letters SD denote "strongly," D "disagree," A "agree," and SA "strongly disagree."

	Statement about Livelihood Strategies and Activities of Fishing families in Moree Community	**SD**	**D**	**A**	**SA**
7.	Some fishing families do add poultry to their occupation				
8.	Some fishing families do engage in livestock farming				
9.	Some of the fishing families are also into small businesses in this community				
10.	Some of the fishing families sell agricultural products for sustenance				
11.	Wives of fishermen do storekeeping to support the family livelihood				
12.	Some of the fishermen are into furniture making				
13.	Other fishermen's wives are into food selling to support the livelihood				
14.	Dressmaking is an added livelihood strategy in this community				
15.	Some fishermen do borrow to sustain their livelihood				
16.	Some of the fishermen here do engage in masonry work				
	SECTION C				
	Statement about Determinants of Alternative Livelihood in Moree Community	**SD**	**D**	**A**	**SA**
17.	The large household size in this community influence fishing families to adopt alternative livelihood				
18.	Distance to regular market propels fishing families to engage in alternative livelihood.				
19.	Awful experience in the fishing industry causes people to do other jobs				
20.	A high level of education has made people in the fishing industry consider other occupation				
21.	Food shortages in this community make people				

	consider another livelihood.				
22.	Low income has made some fishermen leave the fishing industry to other occupation				
23.	People in the finishing industry aspire to be in other jobs and this influence members of fishing families to consider another job				
24.	An increment in fuel prices is one of the reasons some fishermen consider another livelihood				
25.	Inability to fend for the family is one of the reasons fishing families consider another livelihood				
26.	Not getting support from the government influences fishing families to migrate onto other occupation				
27.	Lack of capital compels one to find another occupation				
28.	Expensive fishing equipment demotivates fishermen to continue in their fishing business				
29.	Inability to save enough with the fishing business make fish farmers consider another source of livelihood				

SECTION D

30. What are the alternative livelihood outcomes in your area?

……

……

……

APPENDIX B

INTRODUCTORY LETTER

Department of Vocational and Technical Education.

University of Cape Coast

Cape Coast

13th September 2020

The Chairman

The Institutional Review Board

University of Cape Coast

Dear Sir,

COVERING LETTER

Based on the information provided in this letter, Rebecca Arhin is a student in the Master of Philosophy programme at the Department of Vocational and Technical Education. The title of Ms. Arhin's thesis is "Exploring Alternative Livelihood Strategies of Fishing Families in Moree."

At the moment she has completed her research proposal along with the instrumentation and will start the pilot study, which will be followed by the data collection phase. I am writing to suggest that Mrs Arhin's request for essential assistance that she is requesting be considered. I need your help in this matter.

Yours faithfully

Prof. Christina Offei-Ansah

(+233244512560)

APPENDIX C

ETHICAL CLEARANCE LETTER

UNIVERSITY OF CAPE COAST

COLLEGE OF EDUCATION STUDIES

FACULTY OF SCIENCE AND TECHNOLOGY EDUCATION

DEPARTMENT OF VOCATIONAL AND TECHNICAL EDUCATION

Director: 03320-91047

University of Cape Coast

Telegrams & Cables: University, Cape Coast

Our Ref: VTE/IAP/V.3/29

16th September, 2020

The Head,

Institutional Review Board

UCC Dear Sir,

REQUEST FOR ETHICAL CLEARANCE

We have the pleasure of introducing to you **Rebecca Arhin** who is an M.Phil student of this Department and working on the thesis topic **"Exploring Alternative Livelihood Strategies of Fishing Families at Moree."**

Currently, she is at the data collection stage of her thesis and we would be most grateful if you could grant her an Ethical Clearance to enable her to proceed with the collection of data.

Thank you

Yours Faithfully

Dr. (Mrs.) Augusta Adjei-Frempong

Snr. Lecturer

For: Head of Department