UNIVERSITY OF GHANA
COLLEGE OF HUMANITIES
DEPARTMENT OF ECONOMICS

ASSESSING THE LIVELIHOOD VULNERABILITIES AND COPING STRATEGIES OF WOMEN FISH PROCESSORS AND TRADERS: A CASE STUDY OF GOMOA WEST DISTRICT IN THE CENTRAL REGION OF GHANA

BY

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JULY, 2017
DECLARATION

I hereby declare that this thesis titled: “Assessing the Livelihood Vulnerabilities and Coping Strategies of Women fish Processors and Traders: A Case Study of Gomoa West District in the Central Region of Ghana” is my own work carried out in the Department of Economics, University of Ghana under the supervision of Dr. F. Agyire-Tettey and Mr T. O. Antwi-Asare. References to other works have been duly acknowledged. This work has never been presented in full or in part for any degree in this University or elsewhere.

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(Co – Supervisor) (Signature) (Date)
DEDICATION

I dedicate this thesis work to my parents Mr and Mrs Appiah and my lovely friends Peter, Prosper, Francis, Dorcas and Naa for their continuous love, support and encouragement.
ACKNOWLEDGEMENT

I am most grateful to God for His grace, protection, provision and guidance toward me throughout the study period. Indeed I would not have come this far without His grace. Glory be to God.

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ABSTRACT

Women’s immense contribution in the Ghanaian fisheries sector, particularly in post-harvest fisheries cannot be underestimated. However, a lot of factors inhibit the wellbeing of women activities in the sector which makes them more vulnerable to livelihood insecurity. This study assessed the characteristics of women fish processors and traders in the Gomoa West District of Ghana, and investigated into the major sources of their livelihood vulnerability and the coping strategies employed by them. The study surveys 333 women in the Gomoa West District who are engaged in fish processing and trading, soliciting both quantitative and qualitative data. The Alkire- Foster Multidimensional Poverty measure was used to quantify the livelihood vulnerability of individual processors and traders based on the capital assets of the Sustainable Livelihood Framework: social, financial physical, human and natural capitals. The overall multidimensional livelihood vulnerability index (MLVI) of 0.56 showed that on the average 56% of women processors and traders in the district were multidimensionally vulnerable based on the given aggregated deprivation cut off and were most deprived in in social capital indicators such as social network and extension service. Based on the MLVI scores, individuals were categorized into: Low Vulnerability, Moderate Vulnerability and High vulnerability groups. While a wide range of coping mechanisms were utilized in the midst of livelihood shocks, the most common strategies used by majority of the women surveyed were buying of fish on credit, relying on savings, receiving assistance from family/friends and temporal migration. The estimates of the probit regression model revealed that differences in multidimensional livelihood vulnerability among women fish processors and traders in the district was influenced by differences in certain socioeconomic characteristics such widowhood, gender of household head, access to remittances, post-harvest losses (major fish spoilage) and experience in business. To sustain and enhance the livelihoods of women in the fisheries sector in the district, policy interventions must be focused on improving their access to livelihood resources particularly social capital indicators ( such as, social networks and extension service), as well as building human and institutional capacity.
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<th>Full Form</th>
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<tbody>
<tr>
<td>DFID</td>
<td>Department of International Development</td>
</tr>
<tr>
<td>FANRPAN</td>
<td>Food, Agriculture and Natural Resources Policy Analysis Network</td>
</tr>
<tr>
<td>FAO</td>
<td>Food and Agriculture Organization</td>
</tr>
<tr>
<td>FGT</td>
<td>Foster- Greer and Thorbecke</td>
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<tr>
<td>GDP</td>
<td>Gross Domestic Product</td>
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<td>GLSS 6</td>
<td>Ghana Living Standards Survey Round Six</td>
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<td>GSS</td>
<td>Ghana Statistical Service</td>
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<td>HPI</td>
<td>Human Poverty Index</td>
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<td>HVI</td>
<td>Household Vulnerability Index</td>
</tr>
<tr>
<td>IPCC</td>
<td>Intergovernmental Panel on Climate Change</td>
</tr>
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<td>LEAP</td>
<td>Livelihood Empowerment against Poverty</td>
</tr>
<tr>
<td>LVI</td>
<td>Livelihood Vulnerability Index</td>
</tr>
<tr>
<td>MFIs</td>
<td>Microfinance Institutions</td>
</tr>
<tr>
<td>MLE</td>
<td>Maximum Likelihood Estimation</td>
</tr>
<tr>
<td>MLVI</td>
<td>Multidimensional Livelihood Vulnerability Index</td>
</tr>
<tr>
<td>MPI</td>
<td>Multidimensional Poverty Index</td>
</tr>
<tr>
<td>NAFPT</td>
<td>National Association of Fish Processors and Traders</td>
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<tr>
<td>NGOs</td>
<td>Non-Governmental Organizations</td>
</tr>
<tr>
<td>OPHI</td>
<td>Oxford Poverty and Human Development Index</td>
</tr>
<tr>
<td>PHC</td>
<td>Population and Housing Census</td>
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<tr>
<td>SDGs</td>
<td>Sustainable Development Goals</td>
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<tr>
<td>Abbreviation</td>
<td>Full Form</td>
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<tr>
<td>SFLP</td>
<td>Sustainable Fisheries Livelihood Programme</td>
</tr>
<tr>
<td>SLA</td>
<td>Sustainable Livelihood Approach</td>
</tr>
<tr>
<td>SLF</td>
<td>Sustainable Livelihood Framework</td>
</tr>
<tr>
<td>SNV</td>
<td>Stichting Nederlandse Vrijwilligers (Netherlands Development Organization)</td>
</tr>
<tr>
<td>USAID</td>
<td>United States Agency for International Development</td>
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<tr>
<td>WARFP</td>
<td>West Africa Regional Fisheries Program</td>
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CHAPTER ONE

1.0 Introduction

Globally, fisheries play an important role in national economies in terms of income, livelihood and food security as well as poverty reduction. The sector, according to the FAO supports the livelihoods of over half a billion people globally (FAO, 2010). Likewise, in Africa, it employs about 12.3 million people; accounting for 2% of Africa’s population between 15 and 64 years old; and of whom 27% are women (FAO, 2014). Fish contains important micronutrients and omega-3 fatty acids that are particularly important in Africa, where one in three children is stunted as a result of poor nutrition (Worldfish, 2015). Fishing is an important part of the traditional West African life, particularly that of Ghana. The dependence on fish and fishery products in Ghana for food, livelihood and poverty alleviation cannot be underestimated (Asiedu and Nunoo, 2013). Fish constitute about 65% of the animal protein consumed in Ghana. Research shows that Ghanaians eat around 20-25kg of fish annually per person, which is well above global average of 16kg (Mactaggart, 2011). The fisheries sector also contributes about 4.5% to the annual GDP and indirectly supports the livelihoods of 2.2 million people or 10% of the Ghanaian Population (FASDP, 2011).

Women play a vital role in the Ghanaian fisheries particularly in the post-harvest activities, such as fish processing and trading. The sector in Ghana is dominated by artisanal fisheries where men fish and women exchange, process and distribute the catch (Overa, 1993). It employs over 60% of women and links with other sectors in providing raw materials especially the food processing companies and the hospitality industry whiles employing the services and products of other sectors.
to operate (Amarfio, 2010). Women’s immense contribution to the fishing industry in Ghana, in particular their involvement in fish trade, is long established. For instance, the Cape Coast Fish Traders Association, a body representing women working in the fisheries sector, was established before 1900. Women in small groups act as wholesalers, supplying catch from boats they own or negotiate with boat captains to buy landed catches which they pass on to other women. They also serve as financiers to fishermen for fishing inputs (Overa, 1993) while they process the catch. In effect women, particularly from families with good fishing connections, have often developed prestige, status and wealth to improve their livelihood (Mactaggart, 2011).

Consequently, the sector if well managed will eventually enhance food and nutrition security and also serve as a major source of livelihood for many people, particularly the women in fishing communities. However, the population reliant on natural resources like fish for their food and livelihood security is particularly vulnerable to climate change, resource extraction, seasonal cycles, idiosyncratic shocks and other natural disaster and the most affected are women (Adusah-Karikari, 2015; Devereux, 2001; Allison et al., 2005; Inyang and Udong, 2013).

1.1. Problem Statement

Small scale fisheries contribute significantly to food security, poverty alleviation and the wellbeing of the poor especially coastal women (FASDP, 2011; Aheto et al., 2012). Despite the benefit that can be derived from the natural fish resource, the populace around coastal communities are poor relatively in economic terms and the most disadvantaged are women and children (Kamau and Ngigi, 2013). The Ghana Living Standard Survey Round Six (GSS, 2014b) reports that even though poverty headcount levels has been declining since 1992; from 51.7% in 1991/92 to 33.1%
in 2005/2006 to 24.2%, in 2012/2013 (GSS, 2014b), the level of decline is not even across the country as shown in Table 1.

Table 1: Poverty Trend by Ecological Zones

<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Urban Poverty</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Urban Coastal</td>
<td>6.4</td>
<td>9.9</td>
</tr>
<tr>
<td>Urban Forest</td>
<td>8.7</td>
<td>10.1</td>
</tr>
<tr>
<td>Urban Savannah</td>
<td>30.1</td>
<td>26.4</td>
</tr>
<tr>
<td><strong>Rural Poverty</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rural Coastal</td>
<td>27.2</td>
<td>30.3</td>
</tr>
<tr>
<td>Rural Forest</td>
<td>33.1</td>
<td>27.9</td>
</tr>
<tr>
<td>Rural Savannah</td>
<td>64.2</td>
<td>55</td>
</tr>
</tbody>
</table>

Source: GSS, 2013

This shows that poverty incidence increased in both urban and rural coastal areas. On the regional level, the Central Region according to the GLSS 6 is one of the poverty prone areas in Ghana aside the three northern regions. However, most of the populace in the Central Region, located at the coastal areas engage in fishing and fishery related activities as their major source of livelihood.

Women in the coastal zone of the Central Region for instance, engage predominantly in small scale fish processing and trading as their main economic activity, owing to their location and the low level of education among females in some of the districts in the region (GSS, 2014b). Besides the poverty incidence in the region, fisher folks livelihoods are further exacerbated by their exposure to natural disasters, climate change, resource extraction, socio-economic shocks and other idiosyncratic shocks (Adusah-Karikari, 2015; Berchie et al., 2013; Béné and Friend, 2011) and the most affected are women. Idiosyncratic livelihood shocks caused by socio-economic factors which are common among women in small scale fisheries worsen the poverty problem by adversely affecting their profitability and sustainability in the sector. For instance, the current decline in per
capita fish supply, worsened by post-harvest losses increases the livelihood vulnerability of women in the fisheries sector due to their inability to access certain basic livelihood resources to cope with their livelihood shocks. In sum, women activities in the fisheries are hindered by culture, gender and socio-economic factors that somehow constrain their livelihood sustainability in the fisheries sector (Ngigi, 2008 and Madanda, 2003).

The fisher folks in the Gomoa West District of the Central Region depend on the fisheries as their main source of livelihood. Most of the men are predominantly fishers whilst the women engage in fish processing and trading, to various regions across the nation. Women fish traders in the district sell their fish at Tuesday Market in Accra, Swedru, Mankessim, Kumasi, Koforidua, Techiman, Hohoe and as far as Tamale in the Northern region of Ghana. Whilst the fisheries activities in the district are largely artisanal, it is one of the major coastal areas that contribute significantly to the nation’s total fish output. In effect, fishers from the district (from Mumford) were accorded the National Best Fisherman Awards and second runner-up for 2003, 2012 and 2004 respectively, due to their high engagement and the economic impact of their fishing activities in the area. However, in spite of the economic benefits of their activities to the nation, the absence of landing sites and cold/dry storage facilities in the district, expose them to natural disasters (such as tidal surge and flood), deaths and socio-economic shocks which threatens their livelihood activities. For instance in 2004, the Ghana News Agency reported that, the 2003 National Best Fisherman who was from Mumford lost his fishing vessel which was estimated at over 350 million cedis (currently GH₵35,000) when it broke from its anchor off-shore at Mumford during a storm, and drifted hitting a rock at Apam, thereby destroying the vessel (GNA, 2004). The news report further explained that about three to four fishing vessels are destroyed every year at Mumford due to the rocky nature
of the shore. While, the award winners have seized the opportunity to inform governments about
the intensity of these problems faced by fishers in the district, the issues have not received
maximum attention by governments. As a result, most of the men migrate or go to offload their
catch in other fishing towns where there are landing sites, especially when there is high tidal surge.
This reduces the women’s access to fish, increases their production cost, increases fish spoilage
(due to delays at sea and lack of cold storage facilities) and exposes them to several other
socioeconomic shocks which inhibit the sustainability of their livelihood and wellbeing in the
sector. The problem also distorts family systems in the area and encourages polygamous marriages
since the men (husbands) who are mostly fishermen often have to reside in other fishing towns
where there are landing sites. Even though, the women follow the fishermen to buy the landed
catches, they often have to come back to their respective towns to process or market their fish, in
order to fulfil their traditional role as mothers and wives in their homes. These factors therefore
affect the socio-economic and the general wellbeing of women in the area.

The coping strategies adopted by women processors and traders to withstand these economic
shocks depend on the available options, in terms of capabilities, assets, both material and social
resources (Ellis, 1998).

Nevertheless, efficient interventions which connects fishing, processing and trading, needed for
the long term sustainability of the fisheries sector has not been well structured to curb all the
problems that relates to both males and females in the sector. The numerous interventions put in
place in the sector focus entirely on fishing activities such as regulatory catch, gear and access
rights (Monfort, 2015) rather than on improving processing methods, access to market and building
capacity of the processors and traders, who are mostly women. For instance, almost all the targets
of the current Fisheries and Aquaculture Development Plan 2011-2016 for Ghana (see appendix 3) focus primarily on capture fisheries and traditionally male roles in the sector. Even the target that aims to promote value addition in the fisheries sector and improve livelihood of fisher folks focuses on diversifying the species caught by fishermen than creating value chain improvement for women involved in processing and marketing of fish.

In effect, vulnerabilities among women in small scale fisheries is more multidimensional than a unidimensional measure which measures vulnerability with respect to a specific shock such as climate change, resource extraction and poverty income. The question of what constitutes the multidimensional nature of vulnerability among women in the fisheries and the coping strategies they employ, is crucial for understanding the root causes of the issue. This study therefore adopts the Alkire–Foster multidimensional measure Alkire and Foster (2011) and Sustainable Livelihood Framework (DFID, 1999) to explore the sources of livelihood vulnerability among women fish processors and traders, and the coping strategies adopted, to gain a better understanding of their capacity-building needs, necessary for building a sustainable livelihood for the women in the sector.

1.2 Objectives

The study assess the characteristics and vulnerability of women involved in fish processing and trading and further assess the coping strategies that these women adopt to overcome shocks that threaten their livelihood. Specifically, this study:

- Assesses the characteristics of the women fish processors and traders together with the major trading routes and markets for their products.
• Constructs and analyses a multidimensional livelihood vulnerability index for women fish processors and traders.

• Analyses the factors that contribute to the vulnerabilities of women in fish processing and trading.

• Identify strategies employed by women engaged in fish processing and trading to cope with shocks affecting their livelihood.

1.3. Justification of the Study

In spite of the numerous factors that inhibit the sustainability of women activities in the fisheries, most studies in the area focus mainly on the external factors of vulnerability than the internal factors which worsen the already existing situation. For instance, (Adusah-Karikari, 2015; Allison et al., 2005) found that the population reliant on natural resources like fish for their food and livelihood security are particularly vulnerable to environmental change, resource extraction (oil production and exploration), seasonal fluctuations, changes in access and other natural disaster. However, in designing appropriate and effective intervention for development relief, it is expedient to also assess the internal (idiosyncratic) factors since people differ in their exposure to risk as a result of differences in their socio economic characteristics. Additionally, an individual or household’s exposure to risk may not be solely external or internal but could be a mix of both due to several reasons. People’s level of vulnerability and the extent of their capacity to resist, cope with and recover from a hazard are determined by physical, economic, social and political factors (Thabane, 2015). Despite these factors, most studies have focused mainly on the external factors of vulnerability such as climate change, seasonality, resource extraction, natural disasters and little is known about the major internal (idiosyncratic) factors that contribute to the increasing
vulnerability of women in small scale fisheries. However, these issues are crucial in understanding the depth of vulnerabilities of women in the sector, for appropriate policy intervention. Hence, this study examines the sources of the multidimensional nature of livelihood vulnerability and the coping strategies employed, to gain better insights into the adaptive capacity of the women fish processors and traders to their livelihood shocks.

The findings from the study will inform stakeholders, such as the National and Local Government, the Fisheries and Aquaculture Ministry, the Ministry of Gender, Children and Social Protection, Worldfish and other NGOs with profile of women in small scale fisheries and the analytical basis for a business – based pilot intervention and policies to reduce specific vulnerability factors and safeguard the livelihood of women in the fisheries. These issues are crucial in stimulating capacity building of the women in the sector, and will intend improve food security, the livelihood of coastal women and long term sustainability of the fisheries sector. Moreover, findings of this study will inform policy in building a sustainable livelihood for coastal women who depend on small scale fish processing and trading as their main source of livelihood, in both domestic and regional trade in fish. In effect, these will contribute to achieving the goal one, two and five of the Sustainable Development Goals (SDGs) which aim at eradicating poverty, hunger and promoting gender equality and women empowerment respectively.

Finally, the study will contribute to literature on the livelihood vulnerabilities of women in small scale enterprises, in particular women fish traders and processors.
1.4. Organization of the study

This study is organized into five chapters. Chapter one provides introduction of the study. Chapter two gives a review of relevant literature on livelihood vulnerabilities and coping strategies. Chapter three provides the methodology for the study, it discusses the conceptual framework, description of the study area, methods of data collection, sampling techniques and empirical methods used in the analysis. Chapter four provides empirical results and discussions of the study. Finally, chapter five provides the summary of the study, conclusion, recommendations, limitations and suggestions for further research.
CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter reviews literature on the concept of livelihood vulnerability and its determinants as well as the coping strategies employed. This was done in the context of the sustainable livelihood framework, stressing on the livelihood vulnerability context, the capital assets that influence it and the livelihood strategies adopted.

2.2 Livelihood

Livelihood is a means of making a living. It "comprises the capabilities, assets (including both material and social resource) and activities required for a means of living; a livelihood is sustainable when it can cope with and recover from stress and shocks, maintain or enhance its capabilities and assets, while not undermining the natural resource base" (Chambers and Conway, 1992). The ability of a livelihood to manage or recover from shocks and stresses is key to both livelihood adaptation and coping (Davies, 1996). This implies that individuals who are unable to cope (temporal adjustment in the face of change) or adapt (long term shift in the individual’s livelihood strategies) are inevitably vulnerable and unlikely to achieve sustainable livelihood. Livelihoods can be made up of a range of on-farm and off-farm activities which together provide a variety of procurement strategies for food and cash. Frankenberger (1996), defined household livelihood security as adequate and sustainable access to income and resources to meet basic needs of a household (including adequate access to food, potable water, health facilities, educational
opportunities, housing, time for community participation and social integration). This implies that, livelihoods are secure when households have secured ownership of, or access to resources and income earning activities. These resources include reserves and assets to offset risks, ease shocks, meet contingencies and provide a sustainable livelihood opportunities for the next generation (Chambers & Conway, 1992). The risk of livelihood failure determines the level of vulnerability to income, food, health and nutritional insecurity.

2.3. The concept of Vulnerability

The concept of vulnerability has been used in the social science disciplines in both macro and micro level analysis with reference to issues as diverse as climate change, natural disaster, food security, poverty, HIV/AIDS, resource extraction (Antwi-Agyei, Dougill et al., 2012; Hahn et al., 2009; Thabane, 2015). While the term vulnerability is used in various contexts, there is no standard definition of vulnerability. Nonetheless, definitions of vulnerabilities tend to fall under two categories. The first category draws on the natural hazard literature and defines vulnerability as a function of the internal characteristics of a population or a system that mediates the extent to which the population or system experience harm as a result of exposure to external hazard (Wisner et al., 2003).

The second category follows from Chambers (1989) and Chambers and Convey (1992) where vulnerability refers to exposure to contingencies or stress and difficulty in coping with them. According to them, vulnerability has two dimensions or sides: an external side of risk (shocks and stress to which an individual is subject to) and an internal side which is a lack of means to cope with damaging loss. The second category differs from natural hazard approach, in that, it views
vulnerability as a function of both internal factors (sensitivity and adaptive capacity) and external factors. The Third and Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) also draws on this to define vulnerability as a function of exposure, sensitivity and adaptive capacity (IPCC, 2001). Thus according to the IPCC, “Vulnerability is the degree to which a system is susceptible or unable to cope with adverse effects of climate change including climate variability and extremes” (IPCC, 2007).

The British Department for Internal Development (DFID, 2008), defines vulnerability as susceptibility of individuals, households or communities to become poor or poorer as a result of events or processes that affect their livelihood systems. This implies that vulnerability measures an individual or a households’ proneness to livelihood insecurity or poverty as a result of their failed capacity to cope and recover from a shock. In addition, Thabane (2015) also defined vulnerability as the diminished capacity of individuals or group to anticipate, cope with, resist and recover from the impact of a natural or man-made hazard.

Vulnerability is now recognized as a central feature of rural livelihoods and poverty (Chambers, 1989; Devereux, 2001; Scoones, 1998a) and currently of focused policy attention. It has been investigated in relation to livelihood insecurity and poverty at national, regional, community levels household/individual levels (Allison et al, 2009; Prowse, 2003; Thabane, 2015 and Devereux, 2001). However, Wisner and Luce (1993) explains that, within the various levels, it is individuals’ susceptibility to hazards that differs. Consequently, a detailed understanding of vulnerability is much explained at the individual level (Prowse, 2003). At the micro level, vulnerability is the susceptibility of individuals or households or communities to suffer poverty situations as a result of hazardous occurrences that affect their main source of livelihood, (Thabane, 2015). Even though
poverty and vulnerability are not synonymous, it is widely known that the poor are largely exposed to livelihood threats because they are more likely to live in marginal areas (Wisner and Luce, 1993). Moser (1998) also argues that the poor are more susceptible to shocks because their asset holdings (such as productive assets, savings, human capital and social capital) are lower.

The concept of vulnerability is dynamic and broad. However, it is usually conceptualized based on the aspects the researcher wishes to investigate. In this study, vulnerability measured the likelihood that a shock will result in a decline in wellbeing due to the lack of means (or assets) to cope with the damaging loss from livelihood shocks. The study adopted the Sustainable Livelihood Framework, to investigate how vulnerability is closely linked to assets ownership. The more asset people have, the less vulnerable they are, and the greater the erosion of people’s assets, the greater their insecurity (Moser, 1998).

2.4. Sustainable Livelihood Framework

The Sustainable Livelihood Framework (SLF) developed by DFID (1999) was adopted for this study. The Sustainable Livelihood Approach (SLA) is a framework developed by the UK’s Department for International Development (DFID, 1999) for the analysis of livelihood strategies to aid poverty reduction in developing countries. The SLA is a multidimensional approach that looks beyond income generation activities that people are engaged in and takes an all-inclusive assessment of the assets of the poor and the strategies they employ in making a living. DFID identifies the SLA as a more realistic understanding of the livelihood of the poor and the factors that shape them. Thus the SLA has offered a way of identifying the wider issues affecting people’s livelihood. Several sustainable livelihood approaches have been developed by researchers and
organizations including OXFAM, FAO, CARE, Khanya framework and the Karim Husein’s Multidisciplinary approach, in addition to DFID.

The SLA framework from OXFAM (2009-2013) focuses on basic human rights and equitable distribution of resources to address poverty and deprivation. The FAO adopted the DFID (1999) framework towards achieving only food security. The CARE International’s framework though similar to the DFID framework, excluded livelihood strategies in its framework to address poverty. The Khanya framework which emanated from South Africa, focuses on good governance as core of its framework to address poverty and deprivation. The multidisciplinary approach developed by (Hussein and Nelson, 1998) drew inspiration from the other livelihood approaches to address poverty through creating business opportunities for the poor and vulnerable (Abukari, 2014).

The SLA by DFID (1999) has been chosen for this study because it distinguishes itself from other frameworks as it includes reduced vulnerability and increased wellbeing as two of its livelihood outcomes. The DFID framework is still useful in eliminating poverty and pursuing sustainable livelihood looking at the strategies of the vulnerable, through their assets and capabilities (Carney, 2008). This study aims to assess the livelihood vulnerabilities and coping strategies of women in small scale fish processing and trading and hence the SLA by DFID (1999) becomes the most appropriate. This is because the framework will help to investigate into the assets and capabilities of the women fish processors and traders, to give an in-depth understanding of their level of vulnerability.

The SLA builds on the Amartya Sen’s entitlement approach, which states that people experience food insecurity due to the problem with access to resources (Sen, 1981). Entitlements according
to Sen (1981) are the set of alternative commodity bundles that a person can command using the totality of the rights and opportunities that he or she faces. He further explains that an individual’s endowment (essential for entitlement) constituted the resources, which are transferred through production and trade into food and commodities or exchange for food. Resources included both tangible assets such as land, equipment, labour power, membership of a particular community and intangible such as skills and knowledge (education level) as well as endowment established by social norms and official legislation. According to Sen, an entitlement set that does not include adequate quantities of food implies food insecurity. Sen summarizes his entitlement approach in the following:

“A person will starve if his entitlement set does not include a commodity bundle with enough food. Also a person is reduced to starvation if some changes occur either in his endowment (for example, alienation of land, loss of labour, power, ill-health) or his exchange entitlement (for example, fall in wages, rise in food prices, loss of employment, drop in prices of food he promises).” (Sen, 1995:p.56).

Consequently, the sustainable livelihood framework takes a holistic view of the assets (resources or entitlements) of people and the strategies they employ in making a living taking into account the constraints faced. Thus, the framework shows how, sustainable livelihoods are achieved through access to a range of livelihood resources which are combined in the pursuit of different livelihood strategies (Scoones, 1998a). The SLA dwells on two main concepts; livelihoods, and sustainability, in addition to a range of sub concepts that helps in building a general framework that explains the processes leading to livelihood outcomes (Yaro, 2004). The SLA investigates how an individual in a particular socio-economic and environmental situation, using a range of
resources with given institutional policies, rules and social norms, devices livelihood strategies towards achieving sustainable livelihood. Hence, according to Scoones (1998), the key question to be asked in any analysis of sustainable livelihood is how can an individual within a given ecological and socio-politico economic context combine livelihood resources and strategies that will result in an outcome that enhances his/her wellbeing. Livelihood outcomes are not always sustainable or positive. In the real world, livelihood outcomes among the rural poor are almost perpetually negative with rising poverty and vulnerability. The SLA framework stresses on vulnerability contextual factors; inadequate capital, structures and processes and the portfolio, combination and dynamism of livelihood strategies (Yaro, 2004).

**Figure 1: Sustainable livelihoods framework**

The Sustainable Livelihood Framework shown in Figure 1 is based on the five thematic pillars linked to one another. These are the: Vulnerability Context, Livelihood assets in a form of pentagon, Structures and Processes which transform the asset base, Livelihood Strategies and the Livelihood Outcomes. Each of these are discussed in turn to provide the overall conceptual framework. Figure 1 summaries the components of the sustainable livelihood framework.
2.4.1. Vulnerability context of the SLA

In general perspective, the social, political, economic, cultural and environmental conditions faced by an individual, household and community define the opportunities and constraints existing at a particular time. The factors that make up the vulnerability context are essential because they have direct impact upon peoples’ assets and options available to them in pursuit of beneficial livelihood outcomes (DFID, 1999).

The sustainable livelihood framework assesses household livelihood vulnerability with reference to shocks, trends and seasonality (DFID, 1999). Shocks refer to the unpredicted events which destroy assets directly. It includes natural disasters (such as, Cyclone, floods, earthquakes), economic shocks (sudden change in the marketing system or conflicts). Trends are predictable occurrences in nature that brings about changes over a period of time. These include, declining fish stock, natural and international economic trends or technological trends. Seasonality also refers to the phenomenon such as price fluctuations, fish catching seasons or food availability (Kleih, Greenhalgh, & Oudwater, 2003). Additionally, the framework postulates the possibility of differences in vulnerability faced by people and industries due to other factors and recommends that in assessing livelihoods it is imperative that an inside out comprehension of the nature of vulnerability be considered (DFID, 1999).

2.4.2. Livelihood Capital Assets

Capital assets refer to resources that help an individual to survive. People combine the capital endowments that are available to them and which they have control over to create their livelihoods. These include personal capabilities, tangible assets (for example, stores and material resources)
and intangible assets (claims and access) (Chambers and Convey, 1992). That is to say, livelihood resources available to an individual forms the capital base from which productive ventures are derived and nurtured to ensure survival. According to the Sustainable Livelihood Framework (DFID, 1999), a livelihood is supported by five livelihood capital assets, namely; natural, social, financial, physical and human capital.

**Physical Capital**

The physical asset in the framework refers to basic infrastructure, productive equipment and technologies essential for supporting livelihoods strategy. These physical assets may include available market infrastructure, road network, health facilities, access to information (radio, mobile phones) and access to fishing equipment such as fishing nets, boats, drying racks, refrigerators (Antwi-Agyei et al., 2012; Kleih et al., 2003; Mkenda et al., 2003) using the SLF to analyze the nature of subsistence farmers’ household vulnerability in two districts in Ghana. They found ownership of mobile phones, television, radio and irrigation facilities as the major physical assets required by the farmers. Mkenda et al. (2003), in their study to analyze fisher folks livelihoods in East Africa revealed that fishing gear (nets and boats) which are mostly damaged by whales and ships, and accessible roads to transport fish to the market were the major physical assets needed to improve their livelihood activities.

**Human Capital**

The sustainable livelihood framework considers human capital as a generic livelihood asset that serves as a foundation for the achievement of a livelihood outcome (DFID, 1999). It includes the skills (fishing, fish processing skill), knowledge, ability to labour, good health and other physical
capability necessary for the successful pursuit of different livelihood strategies (Yaro, 2004). Studies have shown that high illiteracy rate, in particular affect small scale farmers and fisher folks and hinders them from adopting innovative ways to improving their livelihoods (Antwi-Adjei et al., 2012; Kambewa et al., 2009; Abukari, 2014; Thabane, 2015). Other researchers also argue that the health status, dependency ratio are essential characteristics that influence an individual’s livelihood (Antwi-Agyei et al., 2012; Thabane, 2015).

**Social Capital**

Social capital refers to the social resource which enable individuals to pursue different livelihood strategies requiring coordinated actions. These include social networks, social claims, affiliations, and associations that boost the efforts of individuals in pursuing their livelihoods (Scoones, 1998; Yaro, 2004). According to Winters, Corral, & Gordillo (2001), social capital can be categorized into three classes, namely, bonding, bridging and linking social capital. *Bonding social capital* is the type established along family kinship, ethnicity or nationality. This group is largely homogeneous sharing similar economic and social background. *Bridging social capital* refers to weaker social connections among individuals from different ethnic and occupational groups. *Linking social capital* also refers to ties among individuals of distinct social and economic classes. For instance, the ties between poorer household and richer household or those with influence in formal organization (Winters et al., 2001; Abukari, 2014). How valuable a social capital will be to improving livelihood will depend on the number (quantity) and types of relationship and the quality of these relationships where quality refers to how well established these relationships are (Vincent, 2007; Winters et al., 2001). Thus, the amount of social capital accessible to an individual may increase his/her accessibility to loans and other assets to improve their livelihood activities.
Social capital may not always be entirely positive since some members may place their personal obligations on other members (Abukari, 2014). However, (Narayan & Pritchett, 1999) suggests five useful ways through which social capital can potentially be beneficial to livelihood outcomes. These according to them include; enhancing more efficacious government, solving common pool problems, enhancing diffusion of innovation, lowering transaction costs and serving as informal insurance (especially among households with horizontal relationships). Abukari, (2014) argues that when social capital is vertical, citizens’ capacity for collective effort is limited and their potential influence on state markets become weaker. He however, asserts that horizontal social capital encourages high levels of participation in social organization and other networks.

More importantly, social capital helps to solve the “free rider problem” associated with public good in that, it craves the indulgence of individuals in a particular network to act responsibly for a collective well-being (Abukari, 2014). Moreover, social capital enhances the development and sharing of useful information, to solve problems and develop bargaining power with middlemen (Sanginga, Abenakyo, Njuki, Kaaria, & Delve, 2007; Scoones, 2009). In addition, social capital (social networks) serves as a source of empowerment for women to participate in decision making processes (Abukari, 2014). For instance, the National Association of Fish Processors and traders (NAFPT) was jointly initiated in 2015 by the Ministry of Fisheries and Aquaculture Development Fisheries Commission and the West Africa Regional Fisheries Program (WARFP) to specifically facilitate the effective inclusion of women fish traders and processors into the national policy discourse.
**Natural Capital**

Natural capital in the SLA constitutes the natural resource stock such as land, forest, water, aquatic resources (for instance, fish), biodiversity, air quality, waste assimilation and wild resources from which useful livelihoods are derived (Scoones, 2009). The interdependence of man and the environment shows how essential the natural capital base is, in determining the livelihood outcomes of individuals (Scoones, 2009), especially the people who depend on natural resources as their major source of livelihood (for instance, fishers and fish processors).

Within the sustainable livelihood framework, natural capital has the closest link with vulnerability, in the sense that most of the shocks that destroys livelihoods are caused by changes in natural capital (DFID, 1999). For instance empirical studies by Badjeck, Marie Caroline, Perry, Allison, Renn, Sylvia, Brown, David and Poulain (2013) to examine the vulnerability of fishery-dependent economies to disaster revealed that the fishing sectors of Africa and Southeast Asian countries are more vulnerable to disasters according to both frequency and mortality exposure indicators, fishing dependence and capacity to adapt. They found that Ghana was among the vulnerable countries whose nations are most dependent on fish. According to them, in addition to tragic loss of life, disasters can have both direct and indirect impact on fisheries and fishing based livelihoods. Disasters can have direct impact on livelihoods through the destruction of fishing gears, infrastructure and productive assets such as boats, landing sites and post-harvest activities. Indirect impacts also occur through disruption of markets, reduced harvesting capacity and access to market, food supply and employment, thereby affecting both local livelihoods and the overall economy (Badject et al., 2013).
Financial Capital

Financial capital consists of the financial resources essential in the pursuit of any livelihood strategy. These include bank deposit or liquid assets like livestock, jewelry and loans from financial institutions (Scoones, 2009). Remittances from relations, savings income from other off-farm labour and pensions also constitute financial capital base of individuals’ livelihoods (Antwi-Agyei et al., 2013)

Financial assets are classified as the most versatile of the livelihood capital assets under the sustainable livelihood framework, owing to the fact that it can increase the individual’s holdings in any of the other livelihood assets (DFID, 1999). Consequently, inadequate financial capital is a major problem in small scale livelihood activities, limiting their seasonal liquidity needs to invest in agriculture and other off-farm activities. In addition to the difficulty in access to credit, which is a major issue in subsistence livelihoods, one other important indicator of financial capital is ownership of livestock. For instance Abukari (2014) argues that, financial capital in Sub-Saharan Africa is dominated by livestock. Antwi – Agyei et al. (2012) also found that livestock is crucial to offer a readily available cash in times of crop failure among subsistence farmers in Ejura Sekyeredumase district and the Bongo district of the Ashanti and Upper East regions of Ghana, respectively. Contrary, to the issue of difficulty in access to credit (Udong, Niehof, & Tilburg, 2010), in assessing the livelihood strategies employed by female fish traders in Ibaka, Nigeria, found that access to credit is not the major problem but rather the period of loan repayment. According to them, several organizations were found to give out loans to the female fish traders in the study area, but the period of loan repayment was too short for the women to make any profit.
The situation puts pressure on the female loan beneficiaries to look for sources of quick money to pay back their loans, resulting in some engaging in transactional sexual relations.

2.4.3 Policies, Institutions and Processes

According to the sustainable livelihood Guidance sheet (DFID, 1999), institutions or structures refer to organizations both public and private that set and implement policies and legislations; deliver services; purchase and trade and perform all manner of functions that affect livelihood. The SLA puts institutions at the center of livelihood analysis and show how individuals and households are facilitated or constrained in their efforts to construct sustainable livelihood by institutional arrangements. Most often, the access of individuals, households and communities to the various types of capital are determined by institutional rules and social norms. Farrington et al. (2002), argues that institutions are the social cement which connects stakeholders to have access to capital of different kinds. They further explain that institutions create a channel through which power is exercised and also serves as the gateway through which positive or negative livelihood adaptation can be achieved.

One of the key principles of the SLA is attempt to link micro and macro levels: the household/community level with processes initiated by government, the private sector and NGOs. There is a two-way influence between assets, policies and institutions. The presence or absence of relevant policies can have important effect on livelihoods of the poor. Changes or transformation in these policies and institutions can be used to mitigate negative efforts of trends on overall asset status and cushion the impact of shocks and seasonality thereby reducing people’s vulnerability (Kleih
et al., 2003). Thus, structures uncover the rules governing social relations and reproductions and linkages of multi-level institutions (Yaro, 2004).

2.4.4. Livelihood Strategies

A livelihood strategy refers to how people combine and use their resources to make a living, given the constraints and opportunities available to them. The combination of the vulnerability context, the livelihood capital assets and the institutional context within which the individual lives to a large extent influences the portfolio of activities an individual can engage in to earn a living (DFID, 1999; Abukari, 2014). Other researchers (for instance, Kambewa et al, 2009; Yaro, 2004) have also opined that in addition to the contextual factors, the choices, objectives and cultural preference (such as gender stereotype of activities) of men and women also define the range of activities and individual will engage in to earn a living.

Livelihood strategy is most often used interchangeably with coping strategies. However, the sustainable livelihood guidance sheet of DFID gives clarification between the two. Coping strategies is a mechanism adopted by individuals in the midst of livelihood crisis while livelihood strategy represents the portfolio of activities that individuals engage in to make a living (DFID, 1999). The SLA of DFID postulates three broad clusters of livelihood strategies that the rural poor exposed to shocks and other livelihood stresses can diversify into. These are; agriculture intensification/extensification, livelihood diversification and migration.

People may adopt different livelihood strategies based on their resources and the level of risk associated with the alternative options (such as, disaster; oil spills, seasonality, and conflicts), with the aim to generate more income, reduce their vulnerability and improve their wellbeing (DFID,
However, diversifying into different portfolio of livelihood activities will not automatically lead to livelihood security (Yaro, 2004). Within the scope of this study, only livelihood diversification as livelihood strategy will be reviewed due to the study objectives.

**Diversification as a livelihood strategy**

Livelihood diversification is a strategy or mechanism to invest in other livelihood activities in order to cope with temporal or permanent shocks or stresses (Scoones, 1998). Ellis (1988), also defined livelihood diversification as “the process by which rural families construct a diverse portfolio of activities and social support capabilities in order to survive and improve their standard of living”. Abukari (2014), also relates livelihood diversification to a form of investment in various livelihood assets to safeguard livelihoods from extreme exposures.

Rural livelihoods are often heavily dependent on the natural resource base (for example, fisher folks depend on the fish natural resource mostly, as their main source of livelihood and food). However, the populace dependent on the fish natural resources is more likely to experience livelihood insecurity due to their exposure to certain covariate shocks such as natural disasters, oil spills from resource extraction, seasonality, and other idiosyncratic shocks. Even though, the lack of alternative livelihood opportunities has long been highlighted within the fisheries management literature, this has been disputed by the fisheries social science literature. For instance, Allison & Ellis (2001), have for some time now, identified the continual process of diversification among fisher folks, captured in the concept of ‘pluri-activity and occupational mobility’ (Brugère et al., 2008). According to Ellis (2000), livelihood diversification has a positive attribute for household
security that outweighs the negative effects it may bring, in most low income countries. However, Yaro (2004) contends that, livelihood diversification may not necessarily lead to livelihood security, the type of activity, intensity, duration and trickle down effects on the individual’s livelihood are essential in assessing the performance of additional activities engaged in. Notwithstanding, diversification most often serves as a household risk management strategy that enables individuals to secure income and consumption. It may also be adopted by individual households to serve as a buffer against future potential shocks and stresses (Brugère et al., 2008; Ellis, 2000).

In effect, diversification can be adopted as an ex-post coping strategy or an ex-ante adaptive strategy. However, due to the problem of uncertainty, diversification can be adopted as an ex-ante coping strategy by choice, to enable households cope with unforeseen shocks, trends and seasonality (Brugère et al., 2008; Ellis, 2000). In the context of fishing and fishing related activities like fish processing and trading, owing to the variations in catches and fish stock, fisher folks react with different coping and adaptive strategies. This is mostly dependent on the type of value chain actors they are. For instance, migrant fishers may adopt migration and mobility as a response strategy and migrate to richer fishing grounds on seasonal basis. This is reported to be common among Ghanaian fishermen who travel much along the West African Coast in search of fish. However, a fisherman may adopt this strategy depending on the financial resources available to him. Non migrant fishers, engages in non-fishing activities such as farming, petty trading, fish marketing, and other businesses (Brugère et al., 2008). The Sustainable Fisheries Livelihood Program (SFLP) in Ghana identified opportunities outside the fisheries that could be developed in the target communities. The livelihood activities identified included; snail farming, batik, craft (tie
and dye and screen printing, kente weaving, ornaments) pastries and baking and bee keeping (Brugère et al., 2008).

2.4.5. Livelihood Outcomes

Individuals / households embark on livelihood activities in order to achieve specific ends in life known as livelihood outcomes. Livelihood outcome in effect, refers to the possible outputs brought about by livelihood strategies adopted. According to the DFID Sustainable Livelihood framework people engage in livelihood activities such as agriculture/fisheries and other off–farm and nonfarm activities based on their perceived priorities and objectives to achieve a range of preferred outcomes. These outcomes may include, improved income, increased wellbeing, reduced vulnerability, improved food security and a more sustainable use of the natural resource base (DFID, 1999; Scoones, 1998a, 2009). However, Kleih et al. (2003) argue that the different livelihood outcomes cannot be achieved at the same time; there can be conflict among them. For instance, in recent times in the Ghanaian Marine Fisheries sector, some fishermen were reported to use chemicals and other unauthorized equipment for fishing in order to increase their catch at the expense of the natural resource base. This may lead to an increase in their income at the expense of the sustainability of the natural resource base. Notwithstanding, in this study, literature on livelihood outcome is centered on reduced vulnerability and improved wellbeing.

Reduced Vulnerability as a livelihood outcome

Reduced vulnerability as a livelihood outcome under the sustainable livelihood framework is concerned with the ability of individuals/households to cope with and recover from shocks and stresses in order to achieve sustainability in their livelihoods (Scoones, 1998a). Davies (1996) stated that resilience in the midst of livelihood shocks and stresses is essential to both livelihood adaptation and coping. Consequently, the ability to cope with or adapt to livelihood shocks (both external and internal shocks as explained by Chambers and Conway) make them inevitably vulnerable and are unlikely to achieve the preferred sustainability in their livelihoods (Scoones, 1998b). However, an individual or household’s ability to cope with and recover from livelihood shocks and stresses is mostly determined by the entitlements available and accessible to them (Antwi-Agyei et al., 2012; DFID, 1999; Moser, 1998; Sen, 1997). In particular, Antwi-Agyei et al., (2012), in assessing the nature of household vulnerability to climate variability in two regions of Ghana, found that the differences in degrees of climate vulnerability is explained by wealth, gender, access to capital, access to alternate livelihood options and social connection. Moser (1998) illustrates how the poor can utilize the asset resources available to them to reduce their vulnerability. Thus, according to him the ability of the poor to manage their productive assets, labour, social capital, household relations, and human capital will help to reduce their level of vulnerability and poverty.

The livelihood outcome of the SLF shows the ends of individuals owing to the livelihood strategies pursued and the resources available to deal with livelihood shocks. In effect it gives indications to the state of wellbeing of individuals. The next section review existing literature on
vulnerability measurement highlighting the advantages and disadvantages of the various common approaches being used.

2.5. Approaches to Measuring Vulnerability

The concept of vulnerability has had no standard definition and the complexity of it gives rise to a wide range of measures mostly based on the context and the objective of the study. However, in recent times researchers and development practitioners have laid greater emphasis on the multidimensionality of vulnerability (Thabane, 2015). Barsley et al. (2013) in reviewing literature on vulnerability assessment methodologies posited that the various approaches can be grouped into three distinct frameworks. These are indicator – based methodologies, model and geographic information systems (GIS) methods (the use of statistical measures and mapping technologies to display vulnerability) and stakeholder based methodologies (the use of wide range of tools such as cognitive mapping, interviews, surveys, participatory process and experts to achieve effective and context specific vulnerability assessments). Deressa et al. (2009) also postulate that two main approaches are employed in measuring vulnerability, namely the indicator approach and the econometric approach. However, assessments often use a combination of the approaches when measuring vulnerability (Barsley et al., 2013).

This study, reviews literature on the indicator–based approach and the econometric approach based on the objectives of the study.
2.5.1. The Indicator based approach

The indicator based approach is a method of selecting variables that the researcher considers relevant to the context specific vulnerability. The approach irrespective of its relevance has its limitations. The main limitation of this approach as highlighted by Hahn et al. (2009) is the issue of subjectivity in selecting the various variables believed to be contributing to vulnerability. Ahmed and Gassmann (2010) also emphasise on some limitations of the approach such as loss of heterogeneity, data availability limitation and the scale at which they are used, stressing that the complexity of vulnerabilities cannot be represented by the use of indicators. However, the indicator based approach owing to its ability to capture various factors of vulnerability, is the most common way of measuring vulnerability (Barsley et al., 2013 and Deressa et al., 2009). Examples of the indicator based approaches include the Livelihood vulnerability index (LVI) developed by Hahn et al. (2009) for district level vulnerability assessment of climate change in Mozambique and the Multidimensional vulnerability index developed by Ahmed and Gassmann (2010) to measure post conflict vulnerability in Afghanistan. Again it also includes the Household Vulnerability Index(HVI) developed by FANRPAN (2011) to measure household vulnerability to food insecurity in South Africa and the Alkire- Foster approach of multidimensional index construction (AF method: Alkire and Foster (2011) ), originally developed to measure the multidimensional aspect of poverty.

2.5.2. The Econometric approach

The econometric approach is the application of economic, mathematical and statistical methods such as regression to measure vulnerability. The limitations of this approach is that it can lead to
perverse policy recommendation or may not be predictive when necessary assumptions are not made, especially in terms of establishing the actual relationship among variables. Moret (2014) argues that, even though panel data is recommended for econometric analysis in order to generate the most accurate results, it is often difficult to access such data in developing countries.

Hoddinott and Quisumbing (2003) using the econometric method has provided a toolkit to undertake quantitative risk and vulnerability assessment using household data. They conceptualized vulnerability in three different approaches namely; vulnerability as expected poverty (VEP), vulnerability as expected utility (VEU) and vulnerability as uninsured exposure to risk (VER). While these measures are relevant in themselves by providing measures to assess vulnerability to poverty, they fail at the micro level because they do not take into consideration the fact that individuals differ in their exposure to risk resulting from differences in their socio demographic and economic characteristics (Thabane, 2015). Also Ahmed and Gassmann (2010) argue that reliance on simplistic measures such as consumption and vague measures such as utility only captures the incidence of poverty and makes it difficult to quantify the multidimensionality of vulnerability. Furthermore, Moret (2014) adds that, the quantitative measures posited by Hoddinott and Quisumbing (2003) relied on predefined definitions of vulnerability, which may or may not line up with community level perceptions of vulnerability.

This study however adopted a combination of both the indicator and econometric approaches to develop a multidimensional livelihood vulnerability index and examine the determinants of vulnerability respectively to gain a holistic understanding of the subject. In particular, the Alkire Foster multidimensional measure and the Probit model regression were used. These methods were discussed in detail in chapter three.
2.6. Empirical Literature on Determinants of Vulnerability

Allison et al. (2009) used the indicator based approach by developing a vulnerability index to compare the relative vulnerabilities of 132 national economies to potential climate change impact on fisheries at a global scale. Their assessment was done using indicators of the exposure, sensitivity and adaptive capacity components of vulnerability. Findings of their study revealed that countries in Central and Western Africa (such as Malawi, Senegal, Guinea and Uganda), Peru and Colombia and four tropical Asian countries (Bangladesh, Cambodia, Pakistan and Yemen) were the most vulnerable. The basis of their vulnerability was attributed to the combined effect of predicted warming, the relative importance of fisheries to national economies and limited societal capacity to adapt to potential impacts and opportunities.

Again, on a global perspective, Badject et al. (2013) investigated into the vulnerabilities of fishing dependent economies to disaster using the indicator based approach. They conceptualized vulnerability based on the IPCC definition comprising of exposure, sensitivity to hazards and capacity to adapt indicators to develop a vulnerability index as described by Allison et al., (2009). The empirical results revealed that Africa and Southern Asian countries are most vulnerable to disaster in terms of frequency and mortality indicators, fishery dependence and capacity to adapt. They found Ghana and Senegal amongst the vulnerable countries whose nationals are most dependent on fisheries. This was based on the sensitivity of the fisheries sector to fish production, employment, export income and dietary protein demands in these countries.

Antwi- Agyei et al. (2012) used the Livelihood Vulnerability Index to investigate into the factors affecting the nature of household vulnerability to drought in 270 households across six (6)
communities in the Ejura Sekyerdumasi district of Ashanti region and the Bongo district of the Upper west region of Ghana. They utilized indicators under the five capital assets (natural, human, physical, financial and social capitals) of the sustainable livelihood framework and livelihood diversification to assess the nature of vulnerabilities of small scale farmers in the two regions. They found that within the same agro ecological zones, households and communities experience different degree of climate vulnerability due to differences in their socioeconomic characteristics explained by wealth, gender, access to capital, access to alternate livelihood options and social connections.

Thabane (2015) also investigated into the major determinants of household vulnerabilities to food insecurity in the context of a rural community in Lesotho. He adopted the concept of vulnerability as captured by Chambers and Conway (1992) to assess the external and internal defenselessness of vulnerability. The study adopted the household vulnerability index (HVI) developed by FANRPAN (2011) to quantify the household vulnerability of 2581 households based on capital assets of the sustainable livelihood framework. The Ordinal Probit regression was used to estimate the categories of vulnerability based on the HVI score: low, moderate and high vulnerabilities. The results revealed that, highly vulnerable households were those that have female heads who are of elderly age, have two meals which are mainly wild fruits and those who have limited land for cropping of stable fruits.

Kambewa et al. (2009) also investigated into the factors contributing to the vulnerability of female fish traders to HIV/AIDS in Malawi using frequencies and means of variables. He found that high illiteracy rates, immigration, deep rooted cultural practices, transactional and recreational sex increases the vulnerabilities of the female trades to HIV/AIDS.
Gerlitz et al. (2016) also adopted the AF method to develop a multidimensional livelihood vulnerability index for 16 districts of the Hindu Kush Himalayas (HKH). The index was used to explore and describe the livelihood vulnerability to climatic, environmental and socio-economic change in the HKH region. They also adopted the IPCC definition of vulnerability to define the dimensions of vulnerability. Their empirical findings showed that among the 16 districts surveyed, the Khotang district of the Koshie sub basin suffered the highest multidimensional livelihood vulnerability. The decomposition of the MLVI by the specific indicators in a form of censored vulnerability headcount for Khotang revealed that 96% of the population of Khotang were multidimensionally vulnerable. They were vulnerable with regards to lack of improved cooking fuels, 93% in water insufficiency and slope of agricultural land, 90% in environmental shocks and 93% in socio economic shocks, during the past twelve (12) months prior to their study.

Ahmed and Gassmann (2010) also adopted the multidimensional poverty measure by Charkravaty and Bourguignon (2003). They examined the multidimensional nature of post conflict vulnerability in Afghanistan based on (Chambers, 1989; Chambers and Convey, 1992) concept of vulnerability. The empirical result showed that, at the intra domain level, majority of Afghan households experience a two dimensional vulnerability in social capital and access and more severity in exchange of freedom.

The incidence of vulnerability was found to be higher for Kuchi and rural households than urban households and they were more vulnerable in the lack of entitlement component than the exposure component. They further found that households with educated household heads have lower levels of vulnerability. Likewise, households that engage in regular income activities such as formal
employment and small businesses were found to be less vulnerable compared to other income generating activities.

Muleta and Deressa (2014) also used the econometric approach to assess the determinants of vulnerability to poverty in female headed households in Rural Ethiopia. Defining vulnerability as expected poverty, they employed a poverty threshold of 0.5 of the estimated vulnerability level to determine whether or not a household is vulnerable. Empirical results from the logistic regression model showed that large family size, illiterate head, small land holdings and less livestock ownership are the major determinants of vulnerability that increases the possibility of female headed households to be poor.

Taylor (2014) used the LVI to assess small holder maize farming household’s vulnerability to climate change in two municipalities in the Brong Ahafo region of Ghana. He employed the Generalized Least Squares (GLS) estimation and the Kendall’s ranking technique to assess the factors affecting household vulnerability and ranked household’s constraint to climate adaptation strategies respectively. The overall vulnerability index showed that the Wenchi Municipality was more vulnerable than the Techiman municipality with LVI scores of 0.346 and 0.312 respectively to climate change.

In addition, estimates from the regression model showed that, gender of household, age of household head, household size, farm size, hired labour, family labour, physical assets, rainfall perception and economically active female members of households influenced household vulnerability. The Kendall’s ranking technique also revealed that, the three topmost constraints to
climate adaptation strategies were lack of access to credit, lack of ready market for produce and poor extension services.

Asiedu et al. (2013) also used the Foster-Greer and Thorbecke (FGT) technique and the Sumaila Relative Poverty Indices to assess and measure multidimensional poverty in small scale fisheries in Ghana. Using a case study on four small scale fishing communities in Ghana, namely; Small London, Kpong, Ahwiam and Elmina, an analysis of poverty, vulnerability and marginalization were carried out using both monetary and non-monetary indices. The empirical findings in terms of vulnerability and marginalization revealed that lack of access to capital, fish stock related issues, lack/poor fishing equipment, poor markets and low fish prices were the most important sources of vulnerability.

This study will adopt the Alkire–Foster approach to multidimensional index construction to develop a multidimensional livelihood vulnerability index (MLVI) for women fish traders and processors in the Gomoa West District of Ghana. The AF Method was originally developed in 2010 by the Oxford Poverty and Human Development Initiative (OPHI) and the United Nations Development Program to create the Multidimensional Poverty Index (MPI), a globally recognized human development measure that replaced the Human Poverty Index (HPI) (Alkire and Santos, 2010). While, other measures of vulnerability (for example, the LVI and the HVI) also captures the multidimensionality of vulnerability by incorporating several indicators, the decomposition feature of the AF method gives it an additional advantage. Thus the MLVI, in addition to answering the question of how vulnerable a given population is in aggregation also describes the ways in which individuals are vulnerable. In effect, the decomposition gives a more elaborative understanding of vulnerability and suggest specific components to focus attention (Gerlitz et al.,
International aid flows, which were a major contributor to development projects in Ghana have declined since 2008. Consequently, it is expedient for policy makers and social protection agencies to understand the dimensions and location-specifics of vulnerabilities and also identify the highly vulnerable groups to ensure efficient allocation of resources. The AF method helps in this way by decomposing complex indices into groups and location-specific components of livelihood vulnerability to address location specific needs (Gerlitz et al., 2016). Thus the AF aids in subgroup decomposability and dimensional breakdown to address specific needs of the target population.

The AF method, like most indicator based approaches suffers the limitation with regards to the issue of subjectivity of choosing indicators. However, Diener and Suh (1997) argues that subjective indicators are relevant and valid measures in assessing the quality of life. They explained that these measures shed more light on the different aspects of wellbeing and serve as significant complement to the objective wellbeing measures. The Gross National Happiness Index of Bhutan developed by Ura et al. (2012) for instance, shows a typical combination of objective and subjective indicators used in measuring the quality of life.

The AF method was used to quantify the multidimensional livelihood vulnerability of individual fish processors and traders based on the capital assets (social, financial, physical, natural and human capitals) of the Sustainable Livelihood Framework. The indicators used to proxy for the capital assets were discussed in detail in chapter three. Additionally, the Probit model regression was used to assess the influence of certain socioeconomic variables on multidimensional livelihood vulnerability. These variables are based on literature discussed and included, age, gender of household head, marital status, household size, level of income, access to remittances,
experience in business, number of dependents, residential location and post-harvest losses such as major fish spoilage. These are discussed in chapter three.

2.7 Livelihood Vulnerabilities and Coping strategies in small scale fisheries

In vulnerability analysis, the coping strategies employed by individual or households in the face of their livelihood shocks are as important as the vulnerability itself. The identification of these strategies are essential to aid policy makers develop effective social protection measures to assist the different vulnerable groups in society. However, the coping aspect of vulnerability is mostly neglected in vulnerability analysis (Prowse, 2003).

Small scale marine and inland capture fisheries are by nature prone to high level of vulnerability (Béné et al., 2007). The unpredictable nature of fishing activities due to the recent decline in fish catches attributed to overfishing, illegal fishing, resource extraction in coastal communities and mismanagement of coastal resources, natural disasters, climate change, high occupational risk and fish price fluctuations accounts for this (Adusah-Karikari, 2015; Béné et al., 2007; FAO, 2004). These uncertainties associated with the sector are also transferred to other fisheries related activities such as processing and trading, dominated by coastal women who are members of the same community and mostly married to fishermen (Béné et al., 2007).

In effect fisher folks particularly, women processors and traders resort to a variety of coping strategies to deal with their livelihood vulnerabilities. However, Béné et al. (2007) posit that the strategies adopted by fisher folks may vary by region, community, social group, household, gender, age and season. Hulme et al., (2001) highlights the distinction between ex ante risk management strategies and ex post coping strategies in dealing with livelihood vulnerabilities. Ex
ante risk management strategies are proactive measures put in place afore time to deal with shocks and losses (Ellis, 2000). Ex post coping strategies also refer to reactive survival measures adopted by individuals or households when they are exposed to unanticipated livelihood failure either in a sudden or gradual sense (Ibid). Béné et al. (2007) highlights some ex-ante and ex post mechanisms used in fishing dependent communities/households to deal with vulnerability and this is summarized in Table 2.

In terms of coping strategies, Devereux (2001) in his study highlights typology of strategies with ‘insurance mechanism’ preceding the ‘disposal of productive asset’ and subsequently ‘destitution of behavior’ with those strategies depending not only on its effectiveness but on its cost and reversibility. Other researchers, for example (Devereux, 2001; Doss et al., 2015; Moser, 1998) also highlights the importance of community support, or informal safety nets, social network and assets in reducing vulnerability. While the selling or pawning of assets was found to be an important coping strategy in the face of a shock, Doss et al. (2015) found that women in Ghana were less likely than their partners to sell assets or draw on savings since women are less likely to be asset owners or own savings account. Devereux also postulate that in Sub-Saharan Africa, vertical redistribution from, say, a superior to a subordinate is gradually fading out and that horizontal redistribution among people of the same level are widespread but are very weak to covariant shocks.

Doss et al. (2011), in studying into the gender asset gap and shocks analysis in Ghana, Ecuador and Karnataka (India), categorized coping strategies into three, namely; formal social protection, informal social protection and other coping strategies. Formal social protection mechanisms they used included, assistance from government/district assembly and formal insurance policy.
Informal social protection measures also were, assistance from NGO’s / church groups, assistance from family and friends. The other coping measures they highlighted include, selling/pawning of assets, relying on savings, borrowing and salary advance, reduced consumption, migration, changed employment and did nothing. Notwithstanding, findings from their study revealed that irrespective of the numerous coping strategies identified, only a few and same coping strategies are used by a large proportion of the population and these were, receiving assistance from family and friends, borrowing and drawing on savings.

Table 2: Coping mechanisms used in fishing-related households to deal with vulnerability

<table>
<thead>
<tr>
<th>Type of coping mechanism</th>
<th>Within the fisheries sector</th>
<th>Outside of the fisheries sector</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Ex-ante risk management</strong></td>
<td>Storage of fish</td>
<td>Investment in livestock</td>
</tr>
<tr>
<td></td>
<td>Diversification of fisheries assets</td>
<td>Storage of non-fish food items</td>
</tr>
<tr>
<td></td>
<td>Early warning systems and advice on how to prepare vessels and gear for minimum losses, e.g. For hurricanes (see Box 14)</td>
<td>Additional cultivation</td>
</tr>
<tr>
<td></td>
<td>Development of patron-client relationships to minimize transaction costs in the absence of insurance</td>
<td>Use of different cropping patterns</td>
</tr>
<tr>
<td></td>
<td>Credit and improved market information</td>
<td>Diversification of assets</td>
</tr>
<tr>
<td><strong>Ex-post coping mechanism</strong></td>
<td>Debt/credit/loans</td>
<td>Remittances by family members working away from the household</td>
</tr>
<tr>
<td></td>
<td>Expansion of fishing effort in terms of hours and/or areas fished</td>
<td>Expenditure of surpluses on assets that appear to be non-productive, e.g. Housing, education, health, since such assets may be beneficial from a preventative point of view in reducing vulnerability</td>
</tr>
<tr>
<td></td>
<td>Mortgaging and selling of fisheries related assets</td>
<td>Debt/credit/loans</td>
</tr>
<tr>
<td></td>
<td>Illegal fishing activity and non-compliance with gear, area and effort regulations</td>
<td>Additional cultivation</td>
</tr>
<tr>
<td></td>
<td>Migration and resettlement to other fishing areas (see Box 12)</td>
<td>Employment off-water</td>
</tr>
<tr>
<td></td>
<td>Reduced consumption of fish</td>
<td>Exploiting other common property resources, e.g. Wild foods</td>
</tr>
<tr>
<td></td>
<td>Sale of products into different markets</td>
<td>Mortgaging and selling of non-fishery assets</td>
</tr>
<tr>
<td></td>
<td>Participation of other household members (typically women and children) in the labour force</td>
<td>Migration and resettlement to non-fishing areas</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced consumption of non-fish items</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Deferring of medical treatment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mutual support through community and kinship ties</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Participation of other household members in the labour force</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Extended family support</td>
</tr>
</tbody>
</table>

Source: Bene et al. (2007)
The review of literature on coping strategies highlights the fact that bonding social capital World Bank (2000), borrowing and savings plays an important role in helping individuals and households in the midst of shocks. However, since individuals differ in their response to their livelihood shocks based on their socio-economic, cultural and environmental characteristics, this study explored the various coping strategies in small scale fisheries mentioned in literature. This study followed Doss et al. (2015) categorization of coping strategies to group the strategies into formal, informal and other coping strategies. Coping mechanisms in small scale fisheries highlighted by Béné et al. (2007) were used to explore the coping strategies employed by women fish processors and traders in dealing with their livelihood shock.
CHAPTER THREE
METHODOLOGY

3.1 Introduction

The chapter describes the study area highlighting some key district level characteristics. It also explains the research design and methodology; describing how both quantitative and qualitative data were collected and the statistical tools used in analyzing it. In particular the AF method is discussed.

3.2 Definitions and Conceptual Framework

In this study livelihood refers to economic activities of women in fish processing and trading. Vulnerability refers to their exposure to livelihood shocks and their sensitivity to its adverse effects on their livelihoods. Livelihood vulnerability in this study refers to a state of being where the sustainability of women activities in fish processing and trading as their major source of livelihood is undermined due to their inability to cope and recover from livelihood shocks. Coping strategies refers to the measures employed by the women to cope with the livelihood shocks. Women fish processors and traders refer to women who buy, process and sell fish in markets.

This study adopted the sustainable livelihood framework which builds on Sen’s capability approach (Sen, 1981). In effect, this study is conceptualized on the notion that an individual fish processor and trader’s level of vulnerability to livelihood insecurity is dependent on her asset entitlement and the alternative livelihood options available, which influences her coping capability (DFID, 1999). Individuals in the low level vulnerability are those who are vulnerable but can still cope with their livelihood shocks. Those in the moderate level are those that need urgent but
temporal assistance to cope while those in the high level category are individuals that are in a tragic state and need special focus attention to sustain their livelihoods. The diagram below shows the conceptual framework of this study:

**Figure 2: Conceptual framework**

![Conceptual framework diagram]

Source: Adapted from FANRPAN (2011) and Moser (1998)

### 3.3. Study Area

The study was conducted at the Gomoa West District of the Central Region of Ghana. The district was carved out of the Gomoa District in 2008 based on the Legislative Instrument (LI) 1896. It covers a total area of 458.5 square kilometers and a population of 135,189 representing 6.1 percent of the total population in the region. The district falls within the semi-wet equatorial region and has a mean rainfall between 1500mm to about 2999mm with an average temperature of 29°C (GSS, 2014a). Consequently, it experiences two main seasons, the major season in March to July and the minor season from August to October (GSS, 2014a). However, it occasionally experiences minor deviations. The district is made up of 60,417 males constituting 44.7% and 74,772 females constituting 55.3% of its population, (GSS, 2014a). It has two main vegetation zones, the coastal
savannah (where this study is being undertaken) and the moist – semi deciduous forest. As result, the main occupation of the populace is fishing and farming in the coastal and forest belt respectively. The populace in the coastal communities in the district are mainly engaged in fishing and fishery related activities (such as fish processing and trading) employing about 5000 fishermen and 2500 women (GSS, 2014a).

According to the 2010 Population and Housing census, there are five main fishing communities in the district, namely Apam, Mumford, Dago, Mankoadze and Ablekum (GSS, 2014a). These communities are located at the coastal belt of the district with fishing and fisheries related activities being the main occupation of the population (GSS, 2014a). Apam, the district capital, in particular, due to its high dominance of fish processors and traders is one of two coastal towns which benefitted from the cold storage facilities under the Ministry of Trade and Industry’s Private Sector Development Programme launched in 2010 to support women who process fish in the area. However, the facility is currently not in good shape as stated in the Gomoa West District Analytical Report (GSS, 2014a). Mumford, is also one of the five fishing towns proposed by the government in the 2017 Budget Statement and Economy Policy, to benefit from the construction of modern landing site and storage facilities (Ofori-Atta, 2017). The proposed project is to reduce the livelihood vulnerability and facilitate the activities of the populace who are mainly dependent on fishery and fishery related activities as their major source of livelihood.
The fisheries serve as the major source of livelihood for the populace in the coastal belt of the district. Fishers from the district (from Mumford) were accorded the National Best Fisherman Awards and second runner-up for 2003, 2012 and 2004 respectively, due to their high engagement
and the economic impact of their fishing activities. However, in spite of the economic benefits of their activities to the nation, the absence of landing sites and cold and dry storage facilities in the district, expose them to natural disasters (such as tidal surge and flood), deaths and socio-economic shocks which threatens their livelihood activities. While, the award winners have seized the opportunity to inform governments about the intensity of these problems faced by fishers in the district, the issues have not received maximum attention by governments. As a result, most of the men migrate or go to offload their catch in other fishing towns where there are landing sites, especially, when there is high tidal surge. This reduces the women’s access to fish, increases their production cost, increases fish spoilage (due to delays at sea and lack of cold storage facilities) and exposes them to several other socioeconomic shocks which inhibits the sustainability of their livelihood and wellbeing in the sector. The problem also distorts family systems in the area and encourages polygamous marriages since the men (husbands) who are mostly fishermen often have to reside in other fishing towns where there are landing sites. Even though, the women follow the fishermen to buy the landed catches they often have to come back to their respective towns to process or market their fish, in order to fulfil their traditional role as mothers and wives in their homes. These factors therefore affect the socio-economic and the general wellbeing of women in the area.
3.4. Research Design

3.4.1 Sampling Technique and Sample size

The population of interest was purposively selected with regard to the research objectives. The five main fishing communities within the coastal belt of the district, namely Apam, Mumford, Dago, Ablekum and Mankoadze were considered. However, upon consultation with the officials at the Gomoa West District Assembly, the district’s fishery extension officer at the area and other stakeholders, Apam and Mumford were selected for the study. These communities were selected based on their dominance with fish processors and traders in terms of population, reliance on the fisheries as the principal economic activity and preservation methods engaged in. Apam, the district capital, for instance has a big site for fish processing with various sections for salting, drying and smoking where other women processors and traders from the neighboring towns also come to process their fish. In addition, Mumford, is also noted to be dominated with relatively higher number of women mainly engaged in fish smoking.

According to the 2010 Population and Housing census conducted by the Ghana Statistical Service, the Gomoa West District has about 2500 women who are engaged in fishery activities (GSS, 2014a). Owing to time constraint and limited financial resources, it was practically impossible for the research survey to cover every individual woman fish processor within the area of study. Notwithstanding, it was important to determine the number of people that the survey should cover within the target population, in order to have a representative sample. This was to help generalize the findings to the women fish processors and traders in the district with certain degree of
assurance. This study used the sample size calculator by Raosoft (2004)\(^2\), to acquire a sample size (n) of 334 based on the population size (N) of 2500 using the formula:

\[
 n = \frac{N \cdot x}{((N - 1)E^2 + x)} \\
 x = Z\left(\frac{c}{100}\right)^2 r(100 - r)
\]

Where \( n \) is the sample size, \( N \) is the population size, \( E \) is the margin of error, at a confidence interval of 95%, \( r \) is the fraction of responses that you are interested in and \( Z(\frac{c}{100}) \) is the critical value for the confidence level.

### 3.4.3. Data Collection

The study employed both the quantitative and qualitative methodologies. A structured questionnaire instrument was developed and pre-tested with some of the women processors fish traders at Akyemfo, a fishing community closer to Mumford. The ambiguities in the questionnaire were corrected and the actual data collection was done in the two towns in a period of three weeks. Field assistants were given two days intensive training on the questionnaire after which they pretested it to test their understanding of the questionnaire, and also to ensure that the data were collected in similar way. In all, five field assistants were recruited to assist the researcher in the data collection process.

The questionnaire was used to collect both qualitative and quantitative data from 333 respondents in the two towns. The instrument was divided into three sections. Section one assessed the socio-

\(^2\) Retrieved from , [www.raosoft.com/samplesize.html](http://www.raosoft.com/samplesize.html)
economic characteristics of the respondents and the trading routes for their products. Section two examined the capital assets (financial, social, natural, human and physical capitals) available to each individual processor and trader. This information was used in developing a multidimensional livelihood vulnerability index. Section three also explored their livelihood shocks and the coping strategies they adopt to cope with them.

A convenience sampling approach was used to collect data from individual processors and traders in the study communities. Respondents were purposively selected in these two communities based on their availability, willingness and ability to participate in the survey. On a whole 158 respondents were interviewed from Apam and 175 from Mumford. Also, qualitative data was collected through focus group discussion through key informant and expert interviews. In accomplishing this, at least one focus group discussion was conducted in each community to make further enquires and explore major themes that emerged from the questionnaire survey. In addition, the district fishery extension officer and some executives of the local fish mongers group at the area were interviewed.

3.5. Data Analysis

For quantitative data analysis, univariate and multivariate analysis were conducted. Univariate analysis was done using frequency tables, bar chats and pie charts to describe the demographic and socioeconomic characteristics of the women fish traders and processors in Apam and Mumford. A multidimensional livelihood vulnerability index (MLVI) was developed based on each individual’s access to the capital assets within the sustainable livelihood framework and whether or not they diversify their livelihood. In developing the multidimensional livelihood
vulnerability index, the Alkire–Foster approach to multidimensional analysis of poverty was used. The MLVI scores were used to assess the level of vulnerability of each individual following the classification of (FANRPAN, 2011). Indicators used to assess the various capital assets were summarized in Table 3.

Based on each individual’s livelihood vulnerability index score, she is either classified multidimensionally vulnerable or not, with reference to the given aggregated vulnerability cut off. Consequently, vulnerability was binary dependent variable. As a result, multivariate analysis was performed using the Probit modelling techniques, results obtained and discussed, and recommendations provided for policy making. Data coding, entry and analysis were facilitated by the Scientific Package for Social sciences (SPSS) Version 2007 and STATA 14 software packages.

3.5.0 Measures

3.5.1 Dependent Variable

3.5.1 Calculating the Multidimensional Livelihood Vulnerability Index

The study adopted the multidimensional index construction measure by Alkire and Foster (2011), popularly known as the AF method, to develop a Multidimensional Livelihood Vulnerability Index (MLVI) for women fish processors and traders in the study area. Hence the unit of analysis is the individual. This study further adopted the classification by FANRPAN (2011) and Thabane (2015) to categorize individuals into three levels of vulnerability based on the MLVI scores. Although there are other measures of vulnerability, for example, the LVI (Hahn et al., 2009) and the HVI (FANRPAN, 2011) that captures the multidimensionality of vulnerability by incorporating several indicators, the decomposition feature of the AF method gives it a
comparative advantage. The decomposition gives a more elaborative manifestations of vulnerability and suggest components to focus attention (Gerlitz et al., 2016). The AF method, like most indicator based approaches suffers the limitation with regards to the issue of subjectivity of choosing indicators. However, Diener and Suh (1997) argues that subjective indicators are relevant and valid measures in assessing the quality of life. They explained that these measures shed more light on the different angle of wellbeing and serve as significant complement to the objective wellbeing measures. The Gross National Happiness Index of Bhutan developed by Ura et al. (2012) for instance, shows a typical combination of objective and subjective indicators used in measuring the quality of life.

The AF method has been adopted by Gerlitz et al. (2016) to develop multidimensional livelihood vulnerability index for the Hindu Kush Himalayas. This was used to explore livelihood vulnerability to climatic, environmental and socio-economic changes based on the IPCC definition of vulnerability. Ahmed and Gassmann (2010) and Asiedu et al. (2013) also adopted the multidimensional poverty measures by Charkravaty and Bourguignon (2003) and Foster, Greer and Thorbeck (FGT) respectively, to examine the multidimensional nature of livelihood vulnerabilities based on Chambers (1989) and Chambers and Conway (1992) concept of vulnerability.

This study similarly views vulnerability as the combination of two components as mentioned by (Chambers and Conway, 1992). Thus, exposure to risk or a defined shock resulting from external defenselessness and internal vulnerability or inability of a household/ individual to withstand shocks in general. In effect, the study utilizes the capital assets of the Sustainable Livelihood Framework to capture the exposure to risk (external) and the lack of entitlement (internal) aspect
of vulnerability. According to Carney (1998), the SLA can be used to examine how people combine different capital endowments comprising of tangible and intangible assets to achieve their livelihood objectives within a larger socio-politico economic environment.

Livelihood is sustainable when it can cope with and recover from stresses and shocks maintain or enhance its capabilities and assets, while not undermining the natural resource base (Carney, 1998). The more assets an individual has the lesser vulnerable he/she becomes in times of shocks. According to the sustainable livelihood framework, a household or an individual’s livelihood comprises of five assets, namely; human, physical, financial, social and natural capitals. The ability of an individual or household to cope with the impacts from a shock depends on her asset ownership (Moser, 1998). This study is therefore, conceptualized on the notion that an individual fish processor and trader’s sensitivity to livelihood vulnerability is dependent on her access to livelihood capital assets and alternative livelihood options available to her as shown in Figure 2.

### 3.5.2. Model Specification: MLVI computation

In operationalizing the measurement of multidimensional livelihood vulnerability based on the AF method, the following steps need to be considered; identification of dimensions, indicators and weights, dimension deprivation cut off and aggregation stage.

**Identification of Dimensions, Indicators and Weights**

The first step is the identification of dimensions and indicators to the measure of vulnerability. Based on the conceptual framework of the study, six (6) dimensions, comprising of the five capital assets of the SLA, namely; social, financial, physical, natural and human capitals as well as livelihood diversification were used. Eleven (11) indicators under the six dimensions were
identified based on literature (for instance, Antwi-Agyei et al., 2012) to measure the exposure to risk and the lack of entitlement aspect of vulnerability. Indicators for the various dimensions are described in Table 3.

In this study, weighting of indicators follows the weighting approach of the MPI (Alkire and Santos, 2010). Each dimension and indicators were considered equally important and hence equal weights were given to each dimension to ensure easy interpretation of results. Likewise, each of the indicators within the dimensions are also weighted equally with the sum of the weights (for all indicators) equal to 1.

Thus, \( \sum_{i=1}^{d} w_i = 1 \)

Where \( w_i \) is the weight of indicator \( i \)

**Dimension Specific cut off / Indicator Deprivation cut off**

The next step is to identify the indicator specific cut off within each dimension and the across dimension cut off. Indicator specific cut off is the threshold below which an individual is considered deprived in that indicator. Assume the deprivation cut off of a particular indicator is \( z_i \), an individual is considered deprived in that indicator if her achievements \( x_i \), in that indicator is below the cutoff, that is, if \( x_i < z_i \). Thus, an individual fish processor and trader is deemed vulnerable in an indicator if she falls below the deprivation cutoff of that indicator. Across dimension cutoff (aggregated deprivation cutoff) determines who is multidimensional vulnerable comparing individual deprivation scores to the given aggregated vulnerability threshold. Let this be denoted by \( k \)
**Aggregation stage**

The final step is the aggregation stage which involves establishing the levels of vulnerability. It defines the overall level of vulnerability for the whole society by summarizing the deprivations and profiles of different vulnerable members. In this study, the aggregated vulnerability cutoff used was 66% (0.67). While the aggregated cut off used in literature are 30% to 50% (for instance, Alkire & Foster, 2011; Béné, 2009) used 33% and 50% respectively), most of these studies were done at the household level. However, women as a whole are found to have a limited access to livelihood capital assets compared to their male counterparts. Women in fishing communities in particular are characterized by weak access to capital assets (Kebe et al., 2009; Muleta and Deressa, 2014; Oumer, 2004). In effect, this study used a new cutoff of 0.67. Thus an individual fish processor and trader is multidimensional vulnerable to livelihood insecurity if she is vulnerable in two – thirds (2/3) or more of the weighted indicators. Figure 4 provides a summary of how the AF multidimensional approach applied to the measurement of livelihood vulnerability.

When the various steps are established, thus, once the dimensions and indicators are selected, with the dimension cut offs defined for the identification of the vulnerable woman fish processor or trader, the deprivation score $C_i$ for each woman $I$ is specified as:

$$C_i = W_1I_1 + W_2I_2 + \cdots + W_dI_d$$

Where,

$C_i =$ the deprivation score of each individual

$I_i = 1$ if the individual fish processor and trader is deprived in the indicator $i$ and $I_i = 0$ if she is not deprived in $i$.  

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$W_i$ is the weight attached to each indicator $i$. Each dimension is considered equally important and hence the dimensions are implicitly weighted equally.

In this study, an individual processor and trader is deemed multidimensionally vulnerable if her deprivation score is greater than or equal to the given aggregated deprivation cut off, that is ($C_i \geq 0.67$). This implies that an individual is considered multidimensionally vulnerable if she is deprived in two thirds or more of the weighted indicators. In effect, vulnerability becomes a binary dependent variable and hence will be used to examine the role of certain socioeconomic factors on the likelihood that an individual fish processor and trader will be multidimensionally vulnerable.

Mathematically, MLVI is made up of two components. These are defined as follows:

H, the vulnerability headcount ratio, representing the percentage of the sampled population who experience multiple deprivations.

$$H = \frac{q}{n}$$

Where, $q$ is the number of multi-dimensionally vulnerable women fish processors and traders, while $n$ is the number of fish processors and traders sampled by the survey.

A, the intensity of vulnerability, denotes the average proportion of weighted indicators that the individual is deprived in, and is calculated as:

$$A = \frac{\sum_{i=1}^{n} C_i(k)}{q}$$

Where,
\( C_i \) (k) is the deprivation score and \( q \) is the number of individuals who are multi-dimensionally vulnerable.

Finally, the MLVI value is calculated as a product of the vulnerability headcount (H) and the intensity of vulnerability (A).

Thus, the MVLVI was constructed using AF measure and specified as:

\[
MLVI = H \times A
\]

Where,

\( H \) is the incidence of vulnerability or the percentage of people who are vulnerable in the sample population.

\( A \) is the intensity of vulnerability or the average of dimensions in which individuals are deprived.

The MLVI score ranges from zero (0) to one (1) where “0” means, no individual is vulnerable in any indicator and “1” means every individual is vulnerable in all indicators.

Now, based on the MLVI scores of the individuals, the study adapted HVI categorization of vulnerability (FANRPAN, 2011; Thabane, 2015) and grouped vulnerability into three classes, namely; low, moderate and high. Individuals in the low level vulnerability are those who are vulnerable but can still cope with their livelihood shocks. Those in the moderate level are those that need urgent but temporal assistance to cope while those in the high level category are individuals that in a tragic state and needs special focus attention to sustain their livelihoods.
Figure 4: Steps to operationalise measurement of MLVI using AF approach:

- Step 1: Identify dimensions
- Step 2: Identify indicators
- Step 3: Identify dimension thresholds
- Step 4: Identify across dimension cut-offs
- Step 5: Identify levels of vulnerability

Indicators for calculating the Multidimensional Livelihood Vulnerability Index

Below are the indicators for the capital assets used in calculating the MLVI:

Social Capital

Social capital was assessed using an individual respondent’s access to social resources such as membership of a social network and access to training and extension service. Access to social network was expected to boost individual’s effort in pursuing their livelihood (Scoones, 1998a; Yaro, 2004). Membership of a social group may increase the individual’s access to credit and other assets, sharing of useful information (Scoones, 2009) and even serve as a source of empowerment for women. However, Abukari (2014) argues that social capital may not always be positive since other members may place their personal responsibilities on others. Access to extension service increases individual’s awareness adoption to innovative ideas (Thabane, 2015) and hence reduce individual vulnerability to shocks. For instance, individuals who had access to fish extension service were more likely to be introduced to new and effective processing methods and storage to reduce post-harvest losses. Additionally, they are more likely to acquire basic business
management skills and related information that will help to reduce their vulnerability to livelihood shock.

**Physical Capital**

Indicators used in assessing physical capitals are access to storage facilities and ownership of communication gadgets such as mobile phones and ownership of real assets such as outboard motors, canoes, fishing nets and land. Ownership of mobile phones will help the individual processor and trader to gain access to market information and hence expected to reduce livelihood vulnerability (Antwi-Agyei et al., 2012). Likewise, access to storage facilities and ownership of fishing equipment are important assets to fisher folks, in that these help in proper fish storage to prevent post-harvest losses, boost their activities and returns respectively, and are expected to reduce their livelihood vulnerability.

**Human capital**

The level of education attained and the health status of each individual processor and trader were used as indicators for human capital asset. High illiteracy rate hinders the efforts of small scale farmers and fisher folks from adopting innovative ways to doing things (Antwi-Agyei et al., 2012; Kambewa et al., 2009; Abukari, 2014; Thabane, 2015). Good health is expected to boost a person’s availability for productive activities and hence reduce his/her vulnerability. According to Allison et al. (2009), households with significant health problems may have to allocate most of their scarce resources to treating ill health, thereby reducing their capacity to cope with the impact of climate variability (in the case of this paper, livelihood vulnerability).
Financial capital

Ownership of savings account and access to credit facility were the indicators used in assessing financial capital. Households or individuals who have access to these (savings account and credit facility) are expected to have reduced vulnerability compared to households or individuals who do not have access to these assets. For instance, Fosu-Mensah et al. (2012) found that access to credit facilities by individuals or households gives them the opportunity to adopt to climate change adaptive strategies. More importantly access to credit helps the individual to acquire other productive assets essential to improving her livelihood activities. In effect, individual fish processors and traders who have access to credit facilities any time they have need of them are expected to have lower vulnerability to their livelihood shock.

Table 3: Summary of the dimensions and indicators of multidimensional livelihood vulnerability

<table>
<thead>
<tr>
<th>Components/Dimensions</th>
<th>Indicators</th>
<th>Weights</th>
<th>Dimension Deprivation cut off</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Capital</td>
<td>Access to credit facilities</td>
<td>0.08</td>
<td>Have no or limited access to credit</td>
</tr>
<tr>
<td></td>
<td>Ownership of savings account</td>
<td>0.08</td>
<td>Have no savings account</td>
</tr>
<tr>
<td>Physical Capital</td>
<td>Ownership of mobile phone</td>
<td>0.06</td>
<td>Does not own a mobile phone</td>
</tr>
<tr>
<td></td>
<td>Access to storage facilities</td>
<td>0.06</td>
<td>Have no dry or cold storage facility or have only &quot;kuku&quot;</td>
</tr>
<tr>
<td></td>
<td>Ownership of real assets, such as canoes, outboard motors, land, etc</td>
<td>0.06</td>
<td>Owns no real assets</td>
</tr>
<tr>
<td>Social Capital</td>
<td>Belongingness to social network</td>
<td>0.08</td>
<td>Does not belong to any social group</td>
</tr>
<tr>
<td></td>
<td>Access to extension service</td>
<td>0.08</td>
<td>Does not have access to extension service</td>
</tr>
<tr>
<td>Human Capital</td>
<td>Health Status</td>
<td>0.08</td>
<td>Either she or any household member has suffered major illness</td>
</tr>
<tr>
<td></td>
<td>Level of Education</td>
<td>0.08</td>
<td>within the past 12 months.</td>
</tr>
<tr>
<td>Natural Capital</td>
<td>Access to fish</td>
<td>0.17</td>
<td>Have no formal education</td>
</tr>
<tr>
<td>Livelihood diversification</td>
<td>Diversified livelihood portfolios</td>
<td>0.17</td>
<td>Have no alternative livelihood</td>
</tr>
</tbody>
</table>

Author’s Compilation from field work, 2017
Natural capital

Access to the fish natural resources was used to proxy for natural capital. Fish processing and trading is mostly the main livelihood activity of most coastal women. Women who have access to more fish often are more likely to be less vulnerable than others who do not. Even though, access to fish is sometimes dependent on the amount of financial capital an individual trader has to buy the fish especially during the lean season, this study does not do an in-depth investigation in this issue.

Livelihood diversification

Household or individuals who have diversified portfolio of livelihood activities are more likely to be less vulnerable compared to those who have only one livelihood activity (Abukari, 2014). Literature in sustainable livelihoods has posited that livelihood diversification is one of the main strategies for reducing household vulnerability to the impacts of climate change (Ellis, 1998; Barrett et al., 2001). This study therefore assesses whether or not women fish processors and traders in the district engage in alternative livelihood portfolios, particularly due to the seasonal nature and uncertainties of their businesses.

Table 3 gives the summary of the various components of capital assets, their indicators and deprivation cut offs used in this study.

3.8. Evaluating the Determinants of Livelihood Vulnerability

Now since the outcome variable is binary, it is inappropriate to use the ordinary least squares regression because of the non-interval nature of the dependent variable. Consequently, the Probit
or Logit model is deemed fit to be used to analyze the data. These models are used when the dependent variable takes a discrete value. In effect, these models estimate the probabilities of being multidimensionally vulnerable using the maximum likelihood estimation (MLE) while accounting for the discrete nature of the dependent variable (Greene, 2002). Although, both yield similar results, the Probit assumes a normal distribution of the error term whereas the logit assumes a logistic distribution of the error term. The Probit regression estimation technique was however employed to explore the impact of each of the explanatory variables on the women fish processors and traders’ multidimensional vulnerability. Additionally, marginal effects of the Probit regression was estimated to show the amount of change in the dependent variable produced by a percentage change in an explanatory variable, holding all other variables at means.


The dependent variable is whether or not an individual processor and trader is multi-dimensionally vulnerable. Hence it is measured in a dichotomous form and takes a value of 1 if the individual is multi-dimensionally vulnerable based on the aggregated deprivation cutoff and 0 if she is not multi-dimensionally vulnerable. The Probit model assumes that when we observe the values of 0 and 1 for the variable \( Y \), there is a latent, unobserved continuous variable \( Y^* \) that determines the value of \( Y \).

\[
Y^* = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k + u_i
\]

\[
Y_i = 1, \text{if } Y^*_i > 0
\]

\[
Y_i = 0, \text{if otherwise}
\]

Where \( X_1, X_2, \ldots, X_k \) = vectors of random variables and \( u \) is the random disturbance term.
From equation 1

\[
\Pr(Y_i = 1) = \Pr(\beta_0 + \beta_iX_{1i} + \beta_2X_{2i} + \ldots + \beta_kX_{ki} + u_i > 0)
\]

\[
\Pr(Y_i = 1) = \Pr(u_i > -(\beta_0 + \beta_iX_{1i} + \beta_2X_{2i} + \ldots + \beta_kX_{ki}))
\]

\[
= 1 - \Pr(u_i < -(\beta_0 + \beta_iX_{1i} + \beta_2X_{2i} + \ldots + \beta_kX_{ki}))
\]

\[
= 1 - F[-(\beta_0 + \beta_iX_{1i} + \beta_2X_{2i} + \ldots + \beta_kX_{ki})]
\]

Where \( F \) = cumulative density function of the variable \( u \).

\[
\Pr(Y_i = 1) = 1 - \Phi(-X_i\beta)
\]

\[
= \Phi(X_i\beta)
\]

\( \Phi \) = cumulative normal distribution function

Suppose;

\[
Y = X'\beta + \varepsilon \tag{2}
\]

Where, \( Y \) is the dependent variable.

\( X \) is the vector of independent variables that determine the individual’s level of vulnerability

\( \beta \) is the vector of regression coefficient which will be estimated.

\( \varepsilon \) is assumed to be a certain symmetric distribution with zero mean such as normal or logistic distribution. It captures the measurement errors and all unobserved factors.

Now using the probit regression technique, equation 2 is specified as:

\[
\Pr (Y = 1|X_i) = \Pr (J = 1|X_1, X_2, \ldots, X_k)
\]
3.8.2. Estimation Procedure

Assuming that the model is linear:

\[ \Pr(Y = 1 / x) = B_0 + \sum_{j=1}^{k} B_j X_{ik} + \varepsilon_i \]

\[ Y = B_0 + \sum_{j=1}^{k} B_j X_{ik} + \varepsilon_i \]

Where,

\[ Y_i = \text{multidimensional livelihood vulnerability of the explanatory variables (measures the extent to which a change in the explanatory variables affect the dependent variable)} \]

\[ \varepsilon_i = \text{the error term} \]

\[ X_i = \text{explanatory variables} \]

Now, the empirical model employed in this study was:

\[ \Pr(Y=1) = \theta (\beta_0 + \beta_1 \text{Age} + \beta_2 \text{Gen of hshold} + \beta_3 \text{Hshold size} + \beta_4 \text{Mstatus} + \beta_5 \text{Experience} + \beta_6 \text{Remittance} + \beta_7 \text{Income} + \beta_8 \text{Fish spoilage} + \beta_9 \text{ResApam} \]

\[ Y = \beta_0 + \beta_1 \text{Age} + \beta_2 \text{Gen of hshold} + \beta_3 \text{Hshold size} + \beta_4 \text{Mstatus} + \beta_5 \text{Experience} + \beta_6 \text{Remittances} + \beta_7 \text{Income} + \beta_8 \text{Fish spoilage} + \beta_9 \text{ResApam} \]

Where,

\[ \Phi \text{ is the commutative distribution function for the standard normal.} \]
Age is the age group of individual participants.

Gen of hshold represents the gender of household head of respondents

Hshold size represents the household size of the respondents

Mstatus represents the marital status of the respondents

Experience represents the number of years each individual has been in business

Remittances represent the individual respondents’ access to remittances

Income represents the level of sales income the individual respondent makes in a week from her fish processing and trading activities.

Fish spoilage represents the individual response to post harvest losses such as major fish spoilage

ResApam is a residential dummy which represents Residence in Apam.

3.8.2.1. Description of explanatory variables

The independent variables that were used in this study were derived from literature particularly, on internal factors that determine vulnerabilities (Abukari, 2014; Antwi-Agyei et al., 2012; Muleta and Deressa, 2014; Thabane, 2015) and other variables specific to the chosen target group. Table 4 represents the summary of the explanatory variables, their description and the expected signs.
### Table 4: Description of variables:

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description</th>
<th>Expected Sign</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age group</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1= 15- 24 years</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>2= 25-34 years</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>3= 35-44 years</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>4= 45-54 years</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>5= 55-64 years</td>
<td>+/-</td>
<td></td>
</tr>
<tr>
<td>6= 64+ years</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td><strong>Gender of household head</strong></td>
<td>1 =Female , 0 = Male</td>
<td>+</td>
</tr>
<tr>
<td><strong>Household size</strong></td>
<td>Continuous (Numbers)</td>
<td>-/+</td>
</tr>
<tr>
<td><strong>Marital Status</strong></td>
<td>1= Never married(singl)</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>2= Widowed</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>3= married</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>4= separated/ divorced</td>
<td>+</td>
</tr>
<tr>
<td><strong>Experience</strong></td>
<td>Continuous (years)</td>
<td>-</td>
</tr>
<tr>
<td><strong>Remittances received</strong></td>
<td>1=Yes , No = 0</td>
<td>-</td>
</tr>
<tr>
<td><strong>Level of income</strong></td>
<td>1 = 0 – 200</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>2 = 201 - 500</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>3 = 501 - 1000</td>
<td>+/-</td>
</tr>
<tr>
<td></td>
<td>4 = 1001 - 1500</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>5 = 1501 - 2000</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>6 = 2000 and above</td>
<td>-</td>
</tr>
<tr>
<td><strong>Residence in Apam</strong></td>
<td>1= Yes, 0 = No</td>
<td>-</td>
</tr>
<tr>
<td><strong>Major fish spoilage</strong></td>
<td>1= Yes, 0 = No</td>
<td>+</td>
</tr>
</tbody>
</table>

Source: Author’s compilation, 2017

#### 3.8.2.2. Justification of Explanatory Variables

**Age of Respondent**

The age group of respondents was introduced as a categorical variable into the model. The younger women especially those within the range 15-24 years and the aged 55+ are expected to be more vulnerable due to lack of experience and lack of energy respectively (Boohene & Peprah, 2012). Those in the more active years (24-54 years) are expected to be more productive and hence have a reduced vulnerability.
Gender of household head

Empirical research has shown that female headed households are more vulnerable to poverty and livelihood insecurity compared to male headed households, in terms of access to resources, resource management and cultural beliefs (Muleta and Deressa, 2014; Oumer, 2004; Thabane, 2015). For instance, Taylor (2015) in assessing household vulnerability of small scale maize farmers to climate change, in the Brong Ahafo Region of Ghana found that female headed households, due to the absence of a male adult are more likely to be vulnerable to external shocks. Thus, due to the effect of the loss or absence of the male adult, the coping strategies of such households in terms of livelihood security are more likely to be limited. Female headed households are therefore expected to have an increased level of vulnerability in this study.

Household Size

Literature on the impact of household size on the household or individual vulnerability is inconclusive. Some researchers argue that an increased in household size increases their vulnerability while others also postulate that an increase in household size reduces the vulnerability of the household. The proponents of the later, argue that in subsistence Agrarian economy (in the case of this study, small scale fisheries), children play major role (serve as a source of labour) in the economic activities of their households. As a result, they help in generating more income for their households thereby reducing their household vulnerability. For instance, (Thabane, 2015) explains that in Maphutseng (Lesotho), crop production is highly labour intensive and as a result households with larger household size have more advantage. Regassa (2011) found a positive relationship between household size and the level of coping strategy used in a family.
However, other researchers also argue that larger household size will increase vulnerability since it will tend to increase household expenditure on food and other household resources, especially when the dependents are children or unemployed (Taylor, 2015).

**Experience**

Experience of a fish processor and trader measured by the number of years she has been in business is expected to have a negative relationship with livelihood vulnerability. An individual processor and trader, who has been in business for a longer time is expected to have a better knowledge on the livelihood shocks associated with the business and a means to cope with them. A more experienced trader is more likely to be abreast with seasonal changes, fluctuations in price, fish quality and booming fish markets. It is on this premise that Boohene and Peprah (2012) found that revenue generation among women fish processors in coastal Ghana is likely to be influenced by experience. They explain that fish processing is like apprenticeship and hence more experienced women are likely to attain higher levels of revenue, which can help to reduce their vulnerability to livelihood shocks.

**Access to Remittances**

Remittances play important role in the affairs of the populace in natural resource dependent communities, particularly fisher folks. Owning to the seasonal nature of their livelihood activities, fisher folks, just like rural agricultural dependent communities mostly rely on remittances from family and friends to cope with the livelihood impacts emanating from climate variability (Antwi-Agyei et al., 2012). Consequently, remittances are expected to reduce the level of livelihood vulnerability.
Marital Status

The effect of marital status was introduced into the model in a form of four categorical variables (married, widowed, single and divorced). The study expected either a positive or negative relationship between marital status and livelihood vulnerability based on the category of each individual respondent. Women who are married are expected to be less vulnerable to livelihood shocks than their counterparts who are single, divorced / separated or widowed. Thus married women are more likely to gain assistance from their husbands (who are noted to have access to more resources and livelihood options than women) to cope with their livelihood shocks than their other counterparts who are not married. Consequently, women who are not married are expected to have higher vulnerability compared to their livelihood insecurity.

Residence in Apam

In the same ecological zone, individuals and communities are more likely to experience differences in their level of vulnerability to livelihood insecurity, due to differences in socioeconomic- politico characteristics (Antwi-Agyei et al., 2012). Individuals, residing in Apam, the district capital, are expected to be less vulnerable to livelihood vulnerability due to their higher access to social amenities, access to fish (supplied by industrial trawlers) and availability of alternative livelihood options than those residing in Mumford. Those who reside in Apam gain access to more fish due to their natural low lying landing site which enables the operations of industrial trawlers popularly known as “Seiko” to also sell their fish to the local fish mongers. Mumford on the other hand has no landing site to facilitate such activities.
**Level of Income**

The weekly sales revenue of the respondents was used to proxy for their level of income due to difficulties in assessing the profit an individual fish trader makes. According to Boohene and Peprah (2012) income is a very crucial determinant of wellbeing. Individuals who make higher weekly sales revenue are expected to be better off in terms of profit compared to those who make lesser sales. Level of income is therefore expected to have a positive or negative relationship with multidimensional vulnerability depending on the level of sales revenue an individual processor and trader makes.

**3.9. Identifying Coping Strategies**

A range of shocks and coping strategies were enlisted based on literature (particularly, Doss et al., 2015, 2011; Béné et al., 2007) in the questionnaire survey. Respondents were asked whether or not they have experienced a given set of shocks within the past five years preceding the survey and how they coped with it. An individual respondent was identified as experiencing a particular type of shock if she has experienced the shock at least once prior to the survey. Coping strategies were categorized into three namely; formal social protection, informal social protection and other coping strategies (Doss et al., 2011, 2015). Formal social protection mechanisms used included, assistance from government/ district assembly and formal insurance policy. Informal social protection measures also were, assistance from NGO’s / church groups, assistance from family and friends. The other coping measures include, selling/pawning of assets, relying on savings, borrowing from banks/MFIs, borrowing from private money lenders, buying fish on credit from fish mummies, did nothing, migration, buying fish from industrial trawler (Seiko) and cold store operators from Tema, do other business (diversification) and praying for God’s intervention.
Univariate analysis such as frequency tables and bar chart were used to describe the coping strategies employed by the women fish processors and traders to cope with their livelihood shocks.
CHAPTER FOUR
RESULTS AND DISCUSSIONS

4.0 Introduction

The chapter presents the findings of the study. It provides the description of the socioeconomic characteristics of the respondents. It also discusses the multidimensional livelihood vulnerability index computed for women engaged in fish processing and trading sampled in the study area. Furthermore, it presents and discusses the empirical results on the influence of certain socio-eco variables on multidimensional livelihood vulnerability. Finally, the section discusses strategies these women adopt to cope with shocks that expose them to livelihood vulnerabilities.

4.1. Socio demographic characteristics of the respondents

Age

Table 4.1 below indicates that 1.8% of the respondents were within the age category 15-24 years, 14.71% within 25-34 years, 34.23% within 35-44 years, 30.33% within 45-54 years, 13.5% within 55-64 years and 5.41% within 64 years and above. Most of the women (79.3%) actively engaged in fish processing and trading in the study area are between the ages 25-54 years, implying that majority of them are in their productive age. However, younger women below the age of 24 and older women above the age of 55 were not economically active in the sector. This may imply that as women grow older beyond 54 years their activeness in the fisheries reduces due to natural reduction in their level of energy resulting from old age.
**Marital Status**

Majority of the women interviewed (70.87%) were married while 11.41% were widowed, 10.27% were divorced and 6.91% were single. This is consistent with the Gomoa West District analytical report out of the 2010 Population and Housing Census (PHC), which reports that by the age 25-29 more than 63.5% females compared to 46.2% of males in the district are married (GSS, 2014a).

**Table 5: Summary statistics of socio demographic characteristics of respondents**

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Age</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>6</td>
<td>1.8</td>
</tr>
<tr>
<td>25-34</td>
<td>49</td>
<td>14.71</td>
</tr>
<tr>
<td>35-44</td>
<td>114</td>
<td>34.23</td>
</tr>
<tr>
<td>45-54</td>
<td>101</td>
<td>30.33</td>
</tr>
<tr>
<td>55-64</td>
<td>45</td>
<td>13.51</td>
</tr>
<tr>
<td>64 and above</td>
<td>18</td>
<td>5.41</td>
</tr>
<tr>
<td><strong>Marital status</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>23</td>
<td>6.91</td>
</tr>
<tr>
<td>Widowed</td>
<td>38</td>
<td>11.41</td>
</tr>
<tr>
<td>Married</td>
<td>236</td>
<td>70.87</td>
</tr>
<tr>
<td>Divorced</td>
<td>36</td>
<td>10.27</td>
</tr>
<tr>
<td>Total</td>
<td>333</td>
<td>100</td>
</tr>
<tr>
<td><strong>Married to a fisherman</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>101</td>
<td>33.89</td>
</tr>
<tr>
<td>Yes</td>
<td>197</td>
<td>66.11</td>
</tr>
<tr>
<td>Total</td>
<td>298</td>
<td>100</td>
</tr>
<tr>
<td><strong>Household head</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No</td>
<td>203</td>
<td>60.96</td>
</tr>
<tr>
<td>Yes</td>
<td>130</td>
<td>39.04</td>
</tr>
<tr>
<td>Total</td>
<td>333</td>
<td>1000</td>
</tr>
<tr>
<td><strong>Level of Education</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>No Education</td>
<td>219</td>
<td>65.77</td>
</tr>
<tr>
<td>Basic Education</td>
<td>114</td>
<td>34.23</td>
</tr>
<tr>
<td>Total</td>
<td>333</td>
<td>100</td>
</tr>
<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fanti</td>
<td>322</td>
<td>96.7</td>
</tr>
<tr>
<td>Ga</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td>Ewe</td>
<td>1</td>
<td>0.3</td>
</tr>
<tr>
<td>Total</td>
<td>333</td>
<td>100</td>
</tr>
<tr>
<td><strong>Religion</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Christianity</td>
<td>321</td>
<td>96.4</td>
</tr>
<tr>
<td>Muslim</td>
<td>2</td>
<td>0.6</td>
</tr>
<tr>
<td>Traditionalist</td>
<td>10</td>
<td>3</td>
</tr>
<tr>
<td><strong>Communities</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apam</td>
<td>158</td>
<td>47.45</td>
</tr>
<tr>
<td>Mumford</td>
<td>175</td>
<td>52.55</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>333</td>
<td>100</td>
</tr>
</tbody>
</table>

Source: Author’s compilation from field survey (2017)
**Married to a Fisherman (Occupation of Spouse)**

Out of the women who are married, 197 representing 83.48% are married to fishermen whilst the remaining 16.52% have husbands engaged in carpentry, masonry, driving, salt making and fitting. This is consistent with what Lwenya et al. (2009) found in Kenya around Lake Victoria, that most women engaged in fisheries were married to fishermen. The outcome is explained by the fact that the main economic activity of the population in the coastal belt of the district where the survey was undertaken is fishing, employing over 5000 fishermen (GSS, 2014a).

**Level of Education**

The study found that most women (65.77%) engaged in fish processing and trading have no formal education while 34.23% of them have at most basic education. This is consistent with the District report out of the 2010 PHC, which reports that out of the population aged 3 years and above (123,102) in the district, 28.6% have never attended school (GSS, 2014a). The lower level of education coupled with their location limits their means of livelihood to the informal sector, particularly the fishing sector.

**Religion**

Majority of the respondents representing 96.4% are Christians with 0.6% and 3% being Muslims and Traditionalist respectively. These findings are also in agreement with the District report out of the 2010 PHC which reports that the district is dominated by Christians, 82.6% and 6.1% Muslims.

**Community**

Out of the 333 respondents sampled for the study, 47.45% and 52.55% were from Apam and Mumford respectively.
**Ethnicity**

In this study most of the respondents (96.7%) are Fantes with 3% and 0.3% being Gas and Ewes. The study is consistent with the findings of Tetteh (2007), who found that most women engaged in fish processing and trading in Ghana are Fantes, Gas and Ewes.

**4.2 Economic Characteristics of the Respondents**

*Fisheries as the main economic activity*

All the respondents (100%) engage in fish processing and trading as their major economic activity. This is possibly due to their location at the coastal belt of the district where fishing and fisheries related activities are the major occupation of the populace. Enquires through field interviews and focus group discussion reveal that most women engaged in the sector have had no education or only basic education, which limits their occupation to the informal sector, particularly the fishery sector. Others also attributed it to the fact that there are no alternative livelihood options, for instance per their location, they have no farming lands.

**Livelihood diversification**

While livelihood diversification is essential coping strategy among agriculture and fisheries dependent population due to the seasonal nature of their activities, only 23.72% of the respondents had other livelihood options. Majority of those who diversified their livelihood engage in petty trading, dressmaking, food selling and drinking spot.

**Processing Methods**

Women in coastal Ghana engage in various forms of fish processing, including smoking, frying, salting and drying. Table 6 shows that majority of the women 89.79% engage in fish smoking
while 22.53% are engaged in salting and drying. Only a few women are engaged in frying 2.4%. This is consistent with the findings of Boohene and Peprah (2012) who found fish smoking as the major processing method engaged in, by women in coastal Ghana. Some women, 12.31% were engaged in both smoking and salting/drying while 1.5% were also engaged in smoking and frying. Field interactions with the women revealed that fish smoking is the predominant processing method because it requires less investment and technology compared to salting/drying and frying. The most commonly used technology by women in fish smoking is the ‘Chorkor smoker’. They further indicated that smoked fish has the largest market share because it can be used to serve variety of food, anytime and anywhere, hence having the highest market demand. Salting, drying and frying has lesser engagement due to the higher investment they require.

**Number of years in business (Experience)**

Business experience varies considerably among women fish processors and traders in the study area within a range of one to fifty years. 10.81% of the respondents indicated that they have been in business for at most 5 years, 26.43% for at most 10 years, 36.34% for at most 20 years, 18.92% for at most 30 years and 7.51% have also been in business 30 years and beyond.

**Primary source of fish**

Majority of the women fish processors and traders (57.66%) source their fish from ‘fish mummies’, 23.42% from fishermen, 19.52% from ‘fisher husbands’ and 0.3% from industrial trawlers. This shows that, despite the fact that 66.11% of the women were married to fishermen, they do not source their fish through their husbands possibly because most husbands and wives do
not necessarily have joint ventures. Only 29.9% of the women who are married to fishermen purchase or access their fish from their husbands. This result is consistent to the findings of (Lwenya and Yongo, 2012; Lwenya et al., 2009) who found that most Kenyan women engaged in fish processing do not get access to their fish through their fisher husbands. Field interviews and the focus group discussion revealed that most husbands belong to boat crews which they may not own or are pre-financed by fish mummies who buy the fish catch upon their return. This explains why the fish mummies have a more direct access to the fish than the wives of the fishermen. Figure 5 show the fish value chain in the area.

**Figure 5: Fish market chain**

![Fish market chain diagram](image)

Source: Fieldwork, 2017
**Major trading routes**

From Figure 6 and 7, the major markets for fish traders for the study area are Swedru, Mankessim, Kumasi, Accra, Techiman, Akim Oda, Kasoa and Koforidua. However, Swedru and Mankessim are the most dominant markets for both small scale fish traders and large scale fish traders in the district, during the off season.

Figures 6 shows the trading routes and major fish markets used by women in Gomoa West District, while Figure 7 provides information on trading across the entire country.

**Figure 6: Trading routes and major fish markets in study area**

Source: GIS unit, Department of Geography and Resource Development, University of Ghana
Field interviews and the focus group discussion revealed that during the main season, most of the traders go to major markets across the country, more importantly to Kumasi, Accra, Techiman and Akim Oda to sell their fish. Some few women also indicated that they go as far as Tamale (Northern Ghana) and Hohoe to sell their fish. However, others also explained that even though they seldom go to such far places, they have partner wholesale fish traders from Tamale, Bolgatanga and Burkina Faso who meet them at the Kumasi Central Market and the Techiman
Market to buy fish and transport them to their home regions. They further explained that women traders from Cote d’Ivoire bring beans and other items to sell at the Techiman Market and buy fish in return. Additionally, the fish traders in the district are noted to sell their fish at one of the major fish market in Accra popularly known as the Tuesday Market. The Tuesday Market is a regional fish market, for both traders in Ghana and other traders from neighbouring countries such as Togo, Benin and Cote d’Ivoire. Women from Cote d’Ivoire mostly bring shrimps to sell and buy the ‘amanemma’ (small herrings) in return.

Cross border trade

Even though most women from the district are not engaged in cross border trade, 6 of the respondents, 1.8% of the respondents indicated that they engage in cross border trade to Togo, Cote d’Ivoire, Benin and Nigeria, seasonally.

Membership of social network

While belongingness to a social network or group serve as a form of social capital that ensure livelihood security, most of the women fish processors and traders in the district do not belong to any social group. Only 1.5% of the women interviewed belong to a social group while 98.5 % of the respondents indicated that they do not belong to any social group. Further enquires through personal interviews revealed that most women do not belong to any social group in the area, even though a few groups exist, because of political infiltration into the sector which makes their leaders bias in terms of distributing aids from government or NGOs, and lack of interest of some women in group or community affairs. The few social groups in the area include the Akokudurufo and the Bakaano groups. Moreover, some of the women indicated that even though most women do not belong to any recognized association or group, there is always an informal network of trust that
enables some women to buy fish on credit from the fish mummies. However, fish sold on credit through this medium are sold higher than their original price, since there is no security. For instance, a basket of fresh fish that should have been sold at Gh₵ 70 at cash can be sold on credit at Gh₵100.

**Access to training and extension service**

Lack of and in certain case inadequate extension service has been one of the major challenges in agriculture and small scale fisheries in Ghana, and the district of study is of no exception. Out of the total sample for the study, only 5.41% of the respondents indicated that they have had access to training and extension service while 94.59% have not. The organizations who were reported to have provided these services, mostly during the main fishing season were USAID, SNV and the district extension officer. The focus group discussion revealed that, due to the lack of vibrant associations or groups in the area, most women processors and traders do get to know about these trainings when they are being organized.

**Access to credit**

Businesses thrive on the availability of credit facilities. Access to credit is therefore critical to the sustainability of small scale fisheries, particularly women in small scale fish processing and trading due to usually their low levels of capital. However, access to capital by small scale farmers and fisher folks remains a major challenge (Asiedu et al., 2013; Mills et al., 2011). This is possibly due to lack of collateral security and also lack of interest by some small scale traders for group loans. The study found that majority of the respondents (90.09%) do not have access to credit facilities and only 9.91% have access to loans.
Out of the few women who have access to credit, 75.76% indicated that they acquire their loans from banks and micro finance institutions (MFI), 18.18% from private lenders and 6.06% from relatives and neighbors. Majority of these women, about 72.72% indicated that they take the loans for a period of 4 to 6 months at an interest rate of 16%-20% respectively. Even though these women may be counted as fortunate to have access to some form of loans, they explained that the period of loan repayment is a major challenge, making them more vulnerable. Most of them 54.84% and 22.18% who have had access to loans, indicated that loan repayment (which is mostly weekly based) started exactly two weeks and one week respectively, after acquiring the loan, while 6.13% also indicated three weeks. Additionally, 77.42% specified that loan repayment scheme was a ‘pay interest and principal weekly’ system and these loans were mostly attained from July to August when the main season is about starting. Further interactions with these women revealed that due to the weekly loan repayment requirement they have no option than to sell their fish, even when there is excess supply at the market, making fish prices excessively low. In effect, some women falter in the loan repayment whilst others become worse off after the loan repayment.

Access to remittances

Remittances, at the macro, are a key ingredient to the growth prospects of developing countries of which Ghana is of no exception. Likewise, at the micro level, it plays a major role in the sustainability of agriculture and fishery dependent livelihood, particularly among women. The study found that 16.52% of the respondents receive remittances while 83.48% do not receive any remittance.
### Table 6. Summary of Economic characteristics

<table>
<thead>
<tr>
<th>Item</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Livelihood diversification</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>79</td>
<td>23.72</td>
</tr>
<tr>
<td>No</td>
<td>254</td>
<td>76.28</td>
</tr>
<tr>
<td>Processing Methods</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Smoking</td>
<td>299</td>
<td>89.79</td>
</tr>
<tr>
<td>Frying</td>
<td>8</td>
<td>2.40</td>
</tr>
<tr>
<td>Salting /drying</td>
<td>75</td>
<td>22.52</td>
</tr>
<tr>
<td>Experience</td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 5 years</td>
<td>36</td>
<td>10.8</td>
</tr>
<tr>
<td>6-10 years</td>
<td>88</td>
<td>26.42</td>
</tr>
<tr>
<td>11-20 years</td>
<td>121</td>
<td>36.33</td>
</tr>
<tr>
<td>21-30 years</td>
<td>58</td>
<td>17.41</td>
</tr>
<tr>
<td>30+</td>
<td>30</td>
<td>9</td>
</tr>
<tr>
<td>Primary source of fish</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Fishermen</td>
<td>78</td>
<td>23.42</td>
</tr>
<tr>
<td>Fish mummies</td>
<td>192</td>
<td>57.66</td>
</tr>
<tr>
<td>Fisher husbands</td>
<td>63</td>
<td>18.92</td>
</tr>
<tr>
<td>Cross Border trade</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>6</td>
<td>98.2</td>
</tr>
<tr>
<td>No</td>
<td>327</td>
<td>1.8</td>
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<tr>
<td>Membership of Association</td>
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<td></td>
</tr>
<tr>
<td>Yes</td>
<td>5</td>
<td>98.5</td>
</tr>
<tr>
<td>No</td>
<td>328</td>
<td>1.5</td>
</tr>
<tr>
<td>Access to extension service and training</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>18</td>
<td>5.41</td>
</tr>
<tr>
<td>No</td>
<td>315</td>
<td>94.59</td>
</tr>
<tr>
<td>Total</td>
<td>333</td>
<td>100</td>
</tr>
<tr>
<td>Access to credit</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>300</td>
<td>90.9</td>
</tr>
<tr>
<td>No</td>
<td>33</td>
<td>9.91</td>
</tr>
<tr>
<td>Remittances</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>55</td>
<td>15.52</td>
</tr>
<tr>
<td>No</td>
<td>278</td>
<td>83.48</td>
</tr>
<tr>
<td>Ownership of savings</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>110</td>
<td>33.03</td>
</tr>
<tr>
<td>No</td>
<td>223</td>
<td>66.97</td>
</tr>
<tr>
<td>Level of income (GH Cedis)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0-100</td>
<td>14</td>
<td>4.2</td>
</tr>
<tr>
<td>201-500</td>
<td>56</td>
<td>17.02</td>
</tr>
<tr>
<td>501-1000</td>
<td>67</td>
<td>20.12</td>
</tr>
<tr>
<td>1001-1500</td>
<td>93</td>
<td>27.93</td>
</tr>
<tr>
<td>1501-2000</td>
<td>50</td>
<td>15.02</td>
</tr>
<tr>
<td>2000+</td>
<td>51</td>
<td>15.32</td>
</tr>
<tr>
<td>Major fish spoilage</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>97</td>
<td>70.82</td>
</tr>
<tr>
<td>No</td>
<td>236</td>
<td>29.13</td>
</tr>
</tbody>
</table>

*Source: Author’s compilation from fieldwork, 2017*
Ownership of savings

Savings serves as a form of financial security and a coping strategy in times of livelihood shocks and hence crucial to the wellbeing of individuals, particularly individuals whose livelihoods depend on the vagaries of the weather. Ownership and amount of savings are therefore very important. However, the result of the study indicate that only 30.03% of the respondents own savings account, while majority of the respondents (66.97%) do not own savings account. 58.67% of the respondents who do not save indicated that they do not save because they have no trust in the financial institutions whilst 41.33% attributed it to not having enough money. 26.1 % of the respondents indicated that they have ever lost their savings to MFIs and susu operators.

Level of Income

The amount of weekly sales revenue attained was used to access the income level of the respondents. Majority of the respondents, about 28% indicated a weekly sales revenue range of 1001-1500 Ghana cedis while the minority 4% indicated a range of 0-200 Ghana cedis. About 17% and 15% also indicated a range of 201-500 and 1501+ Ghana cedis respectively. This shows that majority of women fish processors and traders in the area have a weekly sales revenue less than 1501 Ghana cedis.

Major Fish Spoilage

Post-harvest losses are one of the major problem in the agriculture and fishing sectors in Ghana (Boohene and Peprah, 2012). This situation has been a major threat to food and nutritional security needs of this nation as well as the wellbeing of fisher folks. The problem persist due to lack of access to credit by small scale fisher folks to purchase proper storage facilities and other fishing equipment. In this study about 29% of the respondent were reported to have suffered a major fish
spoilage. Majority of the respondents (79%), who suffered this situation attributed the cause of fish spoilage to heavy rainfall which destroy their “kuku” (traditional storage facility). Other causes highlighted by 2% to 7% of them were, fish burning during processing (due to too much oil in fish which ignites excessive fire), delays at sea, inadequate processing due to insufficient firewood, chemicals used in fishing and rancidity (too much oil in some fish).

4.2. Empirical results

This section presents the findings of the multidimensional livelihood vulnerability of fish processors and traders in Apam and Mumford of the Gomoa West District. Firstly, the section shows and discusses the MLVI index value as well as the vulnerability headcount (H) and the intensity of vulnerability (A) for the district. Based on the MLVI score for each individual surveyed, the study categorizes individuals under three levels of vulnerability following the works of (FANRPAN, 2011; Thabane, 2015). It further shows and discusses the patterns of deprivation (decomposition) of the various components and indicators and the depth of their contributions to livelihood vulnerability. The decomposition gives an illustration of which components and indicators are the major contributing factors of livelihood vulnerability and helps to identify the specific areas that need an immediate focus attention. Additionally, the decomposition property is applied to age and community to show the contribution of each age group and community to the overall vulnerability index of women fish processors and traders in the district. Finally, a Probit model is used to estimate the determinants of vulnerability following the binary nature of multidimensional vulnerability.
4.2.1. Findings of the Multidimensional Livelihood Vulnerability Index (MLVI)

The results of the index calculation showed that at an aggregated deprivation cut off of 0.33 and 0.5, greater percentage of the women fish processors (99% and 94% respectively) surveyed in the district were found to be multi-dimensionally vulnerable in about 73% and 75% of the weighted indicators (intensity of vulnerability). However, at an aggregated deprivation cut off of 0.67 (chosen for this study) the vulnerability headcount reduced to 70%, whilst the intensity of their vulnerability was 80%. Consequently, the adjusted vulnerability headcount representing the percentage of women fish processors and traders in the district who were multi-dimensionally vulnerable to livelihood insecurity with respect to the given deprivation cut offs of 0.33, 0.5 and 0.67 were 73%, 70% and 56% respectively.

These results affirm the fact that women have limited access to resources and hence at a lower cut off, almost all the women sampled were found to be multi-dimensionally vulnerable. Besides the intensity of vulnerability did not show much difference across the various cutoffs. This indicates that irrespective of the deprivation cut off, majority of the population sampled were deprived in greater percentage of the indicators and hence policy interventions should focus on improving women access to livelihood resources.

In effect, with reference to the aggregated deprivation cut off of 0.67 chosen by this study, 70% of women fish processors and traders in the Gomoa West District of Ghana experienced multiple deprivations. They were found to be deprived in about 80% of the weighted indicators resulting in an overall district multidimensional livelihood vulnerability index (MLVI) of 0.56. The deprivation in 80% of the weighted indicators shows the intensity of livelihood vulnerability faced
by fish processors and traders in the district. The MLVI value indicates that on the average, 56% of women fish processors and traders in the district are multi-dimensionally vulnerable in more than two-thirds (0.67) of the weighted indicators.

Table 7. Estimates of Multidimensional Livelihood Vulnerability Index at different cut offs in %

<table>
<thead>
<tr>
<th>Estimates</th>
<th>0.33</th>
<th>0.50</th>
<th>0.67</th>
</tr>
</thead>
<tbody>
<tr>
<td>Multidimensional Vulnerability Headcount</td>
<td>99.4</td>
<td>93.6</td>
<td>70.3</td>
</tr>
<tr>
<td>Intensity of Vulnerability</td>
<td>72.9</td>
<td>74.5</td>
<td>80.03</td>
</tr>
<tr>
<td><strong>Adjusted Headcount (MLVI)</strong></td>
<td>72.5 (0.725)</td>
<td>70.01 (0.701)</td>
<td><strong>56.23 (0.562)</strong></td>
</tr>
</tbody>
</table>

*Source: Fieldwork, 2017*

### 4.2.1.1. Categorization of Vulnerability levels of individuals surveyed

The Multidimensional Livelihood Vulnerability Index was used to establish the vulnerability status of the individuals studied base on their entitlements. The study adapted the classification of Thabane (2015) and FANRPAN (2011) to categorize individuals into three levels of vulnerability (Low, medium and high). The categorization was done based on the MLVI score which ranges from 0 to 1, where “0” is the least vulnerable individual and “1” is the most vulnerable individual.

Table 8 below gives a summary of the descriptions of the levels of vulnerability. The results showed that majority of the women fish processors and traders in the district (61.6%) were moderately vulnerable whilst about 33.6% were highly vulnerable and only 4.8% were lowly vulnerable to livelihood insecurity. This implies that most women engaged in the fisheries sector in the district are insecure in their livelihoods and faces transitory vulnerability which makes them slide in and out of poverty whenever they are exposed to livelihood shocks and stresses. This outcome is consistent with the findings of Kebe et al. (2009); Taylor (2014) and Thabane (2015). Particularly, Kebe et al. (2009) conducted a livelihood analysis on coastal fishing communities using the Sustainable Livelihood Framework (SLF) and found that most fisher folks are
characterized with temporal vulnerability while some also faces chronic poverty. In this study, over 33% of the respondents were found in the highly vulnerable category and may be living in chronic poverty. Therefore, an immediate social protection interventions aimed at improving the wellbeing of women and their activities in the fisheries must be put in place to ensure the long term sustainability of women livelihoods in the sector.

**Table 8: Description of the levels of vulnerability based on the MLVI scores**

<table>
<thead>
<tr>
<th>MLVI score</th>
<th>Vulnerability Category</th>
<th>Description</th>
<th>Frequency</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.20 – 0.42</td>
<td>Low vulnerability</td>
<td>Coping individual- individuals who are vulnerable but have the ability to cope</td>
<td>16</td>
<td>4.8</td>
</tr>
<tr>
<td>0.43 - 0.75</td>
<td>Moderate Vulnerability</td>
<td>Acute level individual- can cope after receiving some temporal assistance</td>
<td>205</td>
<td>61.6</td>
</tr>
<tr>
<td>0.76- 0.96</td>
<td>High Vulnerability</td>
<td>Emergency level individuals – requires a special focus intervention</td>
<td>112</td>
<td>33.6</td>
</tr>
</tbody>
</table>

Source: Author’s compilation from field survey (2017), FANRPAN, 2011 and Thabane (2015)

**Decomposition by age, community, dimension and indicators**

Now, the decomposition property was applied to some demographic variables such as age and community to determine the community and age group specific vulnerability. The decomposition by community shows that women fish processors and traders residing in Apam are more multi-dimensionally vulnerable compared to those residing in Mumford. However, the difference in the MLVI values between the two communities was negligible. The incidence of vulnerability in Apam was 72% compared to 69% in Mumford. Thus about 72% of women processors and traders in Apam were vulnerable and had a MLVI value of 0.563 whilst 69% of those in Mumford are multi-dimensionally vulnerable with MLVL value of 0.562.
Also decomposition by age group showed that individual women in the age category 55 years and above (that is 55-64 and 64 and beyond) and those within 15-24 years are more vulnerable compared to those in the other age groups. The incidence of vulnerability in the former groups ranges from 78% to 84% compared to the latter which ranges from 65% to 68%. This shows that the very young women (15-24) and the aged (55 and above) are more multidimensionally vulnerable than those in the very active age group (25-54). This can be attributed to the fact that fishing and fishery related activities require much energy (which does not favour the aged) and experience (which the younger women lacks). This result was consistent with the findings of Boohene and Peprah (2012) who found that older women who have been in fish processing business for a longer time are able to generate high revenues as compared to the younger women. However, they also found that, as one’s age advances beyond certain level, where she losses strength naturally, she becomes less productive and revenue decreases.
The index was further decomposed into the domains (dimensions) and indicators to show which dimensions and indicators contribute the highest to multidimensional livelihood vulnerability.

Figure 9 shows the spatial deprivation headcount on each of the indicators used. The spatial deprivation headcount is the percentage of the population surveyed who are vulnerable in an indicator with respect to the given threshold. The findings reveal that belongingness to a social network showed the highest rate of deprivation, constituting 98%. This implies that 98% of women fish processors and traders in the Gomoa West District were vulnerable and vulnerable with regards to lack of belongingness to a social network. Field interviews and the focus group discussion revealed that most women were reluctant in joining any association. This was attributed to political reasons, lack of interest of some women in group affairs and the dishonesty on the part of some association leaders in the past, who were bias in the distribution of aid, loans and other support systems. The lack of access to extension service and training, and lack of access to credit
equally showed a high rate of deprivation of 95% and 91% respectively. This was consistent with the findings of Asiedu et al. (2013) who found lack of access to capital and fish stock handling issues as important sources of vulnerability among small scale fishing communities in Ghana. Also, lack of access to storage facilities, livelihood diversification, ownership of real assets and ill health contributed immensely to livelihood vulnerability with percentage range from 76% to 89%. Most processors and traders in the area do not have access to both cold and dry storage facilities. They mostly resort to the traditional means of storage; the use of “kuku”. Kuku is a claylike structure like the “Chorkor smoker” used in storing smoked fish. In terms of livelihood diversification, over 76% of the women surveyed did not have any other means of livelihood apart from their activities in the fisheries. This was consistent with the findings of Asiedu and Nunoo (2013) who found that most fishing communities have limited alternative livelihood options. About 76% also indicated that either a member of their household or themselves have ever suffered from a major illness where they could not engage in their livelihood activities for some time, within the past twelve months. The results show that interventions to ensure the wellbeing and long term sustainability of women activities in the fisheries, in the Gomoa West District must first tackle access to social network (groups or association), credit facilities and increased access to fishery extension service and training. The second class of intervention should also focus on improved storage facilities, livelihood diversification and improved health. More so, no education, no savings, and inadequate access to fish also showed deprivation rate ranging from 53% to 66%. Ownership of mobile phones as a communication gadget showed the lowest rate of deprivation of 5%. This implies that most of the vulnerable individuals had access to mobile phones to boost communication in their fish trading business.
These results showed that women fish processors and traders in the Gomoa West District were highly vulnerable in almost all the indicators apart from ownership of mobile phones. This indicates that women engaged in fishery activities in the district have a low access to livelihood capital assets to sustain their livelihoods against shocks and stresses. This was consistent with the findings of Kebe et al. (2009) who found that fisher folks, particularly women in the fishing communities of Liberia have a lower access to capital assets.

**Figure 9: Spatial Deprivation headcount on indicators (percent)**

![Bar Chart](image)

*Source: Author’s computation from field work, 2017*

Additionally, the index was decomposed in terms of each domain’s (dimension) contribution to the overall district MLVI. Lack of social capital showed the highest contribution to MLVI with about 21%. This was followed by lack of livelihood diversification and inadequate financial capital contributing about 19% and 18% respectively. Human capital also contributed about 16% whilst the rest of the dimensions contributed 13% each, as shown in Figure 10.

Social capital consisting of membership of a social network and access to fishery extension service and training were found to be very essential to improving the wellbeing of women activities in the
fisheries and the long term sustainability of the fisheries as a whole. Hence, its deprivation requires an immediate focus attention. The formation of social networks for instance, can serve a better platform for women to be integrated into the fishery sector, in terms of giving them a unified voice, gaining access to extension service and training, corporate loans, government and NGO supports. Also it can necessitate the formation of micro credit unions which will intend give out soft loans to its members at a better loan repayment schemes. This will help solve the problem with lack of financial capital and likewise deepen financial inclusion among women fish processors and traders in the district. The field interview and the focus group discussion revealed that, while access to credit is a major challenge for women in the area, it is worsened by the loan repayment schemes of the microfinance institutions/banks in the area. The few women who gain access to credit from these institutions mostly become worse off due to the type of loan (group loan) and the loan repayment scheme offered them (explained under access to credit on page 6). Moreover, irrespective of the seasonal nature of fishing and fishery related activities such as fish processing and trading, majority of the women (76%) in the sector do not have alternative livelihood options.

Hence policy interventions should also focus on promoting diversification of livelihood among women in the district. For instance, women in the district can be trained and introduced to aquaculture and other livelihood options such as salt making, dress making and bead making, to give them other means of livelihood. More so, human capital consisting of health status and level of education also require attention in the district. Particularly measures must be put in place to improve access to education among females in the district. The survey showed that basic education was the highest level of education attained by the respondents surveyed. Greater proportion of the
women fish processors and traders (66%) interviewed had no formal education whilst (34%) had only basic education.

Figure 10: Contribution of each domain to MLVI

Source: Author’s computation from field work, 2017

4.2.2. Probit Estimation of the Determinants of Multidimensional Livelihood Vulnerability

Table 10 shows the descriptive statistics of the explanatory variables in the model. Majority of the respondents 34% and 30% were within the age category 35-44 and 45-45years respectively. 39% of the women were household heads and the average household size was 8. The respondents have been in business for about 17years on the average. In terms of remittance, about 17% had access to remittances whilst majority of the respondents had weekly sales revenue of GH₵ 1001- 1500. About 29% of the respondents reported that they have suffered a major fish spoilage. In terms of location 47% of the respondents were from Apam.
Table 10. Description of explanatory variables

<table>
<thead>
<tr>
<th>Variable</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hshold_size</td>
<td>8.10811</td>
<td>4.11144</td>
<td>2</td>
<td>17</td>
</tr>
<tr>
<td>Experience</td>
<td>17.65766</td>
<td>11.261</td>
<td>1</td>
<td>50</td>
</tr>
</tbody>
</table>

*Source: Author’s computation from fieldwork*

<table>
<thead>
<tr>
<th>Variable</th>
<th>Frequency</th>
<th>Variable</th>
<th>Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td>Income</td>
<td></td>
</tr>
<tr>
<td>15-24</td>
<td>1.8</td>
<td>0-100</td>
<td>4.2</td>
</tr>
<tr>
<td>25-34</td>
<td>14.71</td>
<td>201-500</td>
<td>17.02</td>
</tr>
<tr>
<td>35-44</td>
<td>34.23</td>
<td>501-1000</td>
<td>20.12</td>
</tr>
<tr>
<td>45-54</td>
<td>30.33</td>
<td>1001-1500</td>
<td>27.93</td>
</tr>
<tr>
<td>55-64</td>
<td>13.51</td>
<td>15001-2000</td>
<td>15.02</td>
</tr>
<tr>
<td>65 +</td>
<td>5.4</td>
<td>2000+</td>
<td>15.32</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td>Community</td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>6.91</td>
<td>Apam</td>
<td>47.45</td>
</tr>
<tr>
<td>Widow</td>
<td>11.41</td>
<td>Remittances</td>
<td></td>
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<tr>
<td>Married</td>
<td>70.87</td>
<td>Yes</td>
<td>15.52</td>
</tr>
<tr>
<td>Divorced</td>
<td>10.27</td>
<td>Fish Spoilage</td>
<td></td>
</tr>
<tr>
<td>Household head</td>
<td></td>
<td>Yes</td>
<td>29.13</td>
</tr>
<tr>
<td>Yes</td>
<td>39.04</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Source: Author’s computation from field work*

The results of the marginal effects of estimated Probit model showing the determinants of multidimensional livelihood vulnerability among women fish processors and traders in the district were showed in Table 12. The Probit estimation showed that female headed households, access to remittance, experience in business, widowhood and post-harvest losses such as major fish spoilage were statistically significant. However, household size, age, level of sales income and the residential dummy were found not to be statistically significant. The Pseudo R² of 0.1074 implies that about 11% of the variations in multidimensional vulnerability among the women fish processors and traders in the Gomoa West District were jointly explained by the explanatory variables.
The empirical results show that female headed household have a significant negative relationship with multidimensional vulnerability at 5%. This implies that females who are household heads are 16.2% more likely to experience a lesser multidimensional vulnerability than those who are not. This results is contrary to the findings of Muleta and Deressa (2014); Oumer (2004); Taylor (2014) and Thabane (2015) who found female headed households to be more vulnerable to poverty and livelihood insecurity than male headed households. Their results were attributed to the fact that women have limited access to livelihood assets. However, this finding is consistent with the findings of the demographic report of GLSS 6 which found that on a whole male headed households are poorer than female headed households in Ghana (GSS, 2014b). Field survey also revealed most of the women surveyed who were household heads fall in the very active and experienced age group (35-54 years) and hence they are may have acquired higher income from their business to cope with livelihood shocks.

A significant positive effect of widow implies that fish processors and traders who are widows are 22.2% more likely to be multi-dimensionally vulnerable compared to those who are single. This outcome may be explained by the fact that widows have to spread their fewer assets to cater for their dependents and themselves, compared to the married who may receive some form of assistance from their husbands. Additionally, the deprivation of widows is explained by the fact that the demise of their husbands (male adult) limits their coping strategies in times of livelihood shocks (Thabane, 2015).

Again this paper finds a negative significant effect of remittances on the probability of being multi-dimensionally vulnerable to livelihood insecurity. Individuals who received remittances are more likely to reduce their multidimensional vulnerability by 26.5% compared to those who do not have
access to remittances. This outcome was consistent with the finding of Antwi-Agyei et al. (2012) and Abukari (2014) who found that rural natural resource dependent communities mostly rely on remittances from family and friends to cope with the livelihood shocks emanating from climate variability. This findings suggest that while remittances, are a key factor to the growth prospects of this nation at the macro level, it equally plays an important role in the sustainability of agriculture and fishery dependent livelihoods, particularly among women at the micro level.

The results further indicate that experience in business is negatively related to multidimensional vulnerability. Women fish processors and traders who have been in business for a longer time are more likely to have a lesser vulnerability compared to those who are new in the business. Thus an additional year in business reduces an individual processor and trader’s multidimensional vulnerability by 0.6%. This outcome is consistent with the findings of Boohene and Peprah (2012) who found that revenue generation among women fish processors in coastal Ghana is influenced by experience in business. Interviews from the field work revealed that women who have been in business for long are able to understand the vagaries in the fish trade business, build network of trust and become abreast with seasonal changes, fish quality and type, price fluctuations and identify various markets. They described the fish trade business as a lottery which you win or lose depending on the conditions at the market and experience of the dynamics in the trade as explained in this quotation:

*Fish trade business is like a lottery that is played. We sometimes lose and sometimes gain. Mostly, it depends on the amount of fish that comes to the market, how you understand the business, networks you have and the general condition of sales at the market.* (Efua Mena, 52, Apam)
Finally, the result gives evidence to suggest that post-harvest losses such as major fish spoilage showed a significant positive relationship with multidimensional vulnerability. Women fish processors and traders who have suffered a major fish spoilage were more likely to be more multidimensionally vulnerable than their counterparts who have not. The marginal effect of major fish spoilage indicates that a 1% increase in fish spoilage occurrence increases the probability of being highly multidimensional vulnerable to livelihood insecurity by 12.6%. This was consistent with the findings of Akande and Diei-Ouadi (2010); Asiedu et al. (2013) and Kumolu-Johnson and Ndimele, 2011) who found fish quality loss and fish spoilage as a major constraint in post-harvest fisheries. Results from the fieldwork revealed that about 79% of women who suffered major fish spoilage attributed it to heavy rainfall which destroy their “kuku” (traditional storage facility). Other causes highlighted were, fish burning during processing (due to too much oil in fish which ignites excessive fire), delays at sea, inadequate processing due to insufficient firewood, chemicals used in fishing and rancidity (too much oil in some fish). This outcome indicates that policy intervention in the fisheries sector of the district must target access to improved storage facilities, to reduce post-harvest losses and the livelihood vulnerabilities of women.
### Table 11. Probit Model Estimation

| Variable                              | Coef.   | Robust Std. Err. | P>|z|  |
|---------------------------------------|---------|------------------|-----|
| **Age**                               |         |                  |     |
| 25-34 (2)                             | -0.5616763 | 0.6380558         | 0.379 |
| 35-44 (3)                             | -0.31203 | 0.6292331         | 0.620 |
| 45-54 (4)                             | -0.3669482 | 0.636656         | 0.564 |
| 55-64 (5)                             | 0.2134695 | 0.6778985         | 0.753 |
| 64 and above (6)                      | 0.1011489 | 0.7531043         | 0.893 |
| **Household_Head (yes)**              | -0.4814401*** | 0.2324929      | 0.038 |
| **Household Size**                    | 0.0178587 | 0.0187846         | 0.342 |
| **Marital Status**                    |         |                  |     |
| Widowed (2)                           | 0.8209362** | 0.4110673      | 0.046 |
| Married (3)                           | -0.3077664 | 0.3415685         | 0.368 |
| Divorced (4)                          | 0.1520954 | 0.3795094         | 0.689 |
| Experience                            | -0.01656* | 0.0095258         | 0.082 |
| Remittances_received (yes)            | -0.7311082*** | 0.2044011      | 0.000 |
| **Level of Income (GHC)**             |         |                  |     |
| 201-500 (2)                           | 0.0637354 | 0.3910399         | 0.871 |
| 501-1000 (3)                          | -0.2804244 | 0.3854802        | 0.467 |
| 1001-1500 (4)                         | 0.0583171 | 0.3766525         | 0.877 |
| 1501-2000 (5)                         | 0.176999  | 0.3992357         | 0.658 |
| 2000 and beyond (6)                   | -0.0843012 | 0.4088349       | 0.837 |
| Fish Spoilage (yes)                   | 0.3713153** | 0.16497          | 0.024 |
| **Residential Dummy**                 |         |                  |     |
| Apam (1)                              | 0.1048356 | 0.164396         | 0.524 |
| Constant                              | 0.9428117 | 0.7797082         | 0.227 |

**Test Statistics**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of obs</td>
<td>333</td>
</tr>
<tr>
<td>Wald chi2(19)</td>
<td>41.84</td>
</tr>
<tr>
<td>Prob &gt; chi2</td>
<td>0.0019</td>
</tr>
<tr>
<td>Log pseudolikelihood</td>
<td>-199.60734</td>
</tr>
<tr>
<td>Pseudo R2</td>
<td>0.1074</td>
</tr>
</tbody>
</table>

*** p<0.01, ** p<0.05, * p<0.1

Source: Fieldwork, 2017

Note: Base outcomes of categorical explanatory variables (Age: 15-24, Marital Status: Single, Level of Income: 0 - 200).
### Table 12. Marginal Effects of the Probit Model Estimates

<table>
<thead>
<tr>
<th>Variable</th>
<th>dy/dx</th>
<th>Delta-method Std. Err.</th>
<th>P&gt;z</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>25-34 (2)</td>
<td>-.1935277</td>
<td>.2033885</td>
<td>0.341</td>
</tr>
<tr>
<td>35-44 (3)</td>
<td>-.1044227</td>
<td>.1991604</td>
<td>0.600</td>
</tr>
<tr>
<td>45-54 (4)</td>
<td>-.1237735</td>
<td>.2019315</td>
<td>0.540</td>
</tr>
<tr>
<td>55-64 (5)</td>
<td>.0636661</td>
<td>.2102171</td>
<td>0.762</td>
</tr>
<tr>
<td>64 and above (6)</td>
<td>.031097</td>
<td>.2339565</td>
<td>0.894</td>
</tr>
<tr>
<td>Household Head (yes)</td>
<td>-.1616933**</td>
<td>.0743345</td>
<td>0.030</td>
</tr>
<tr>
<td>Household Size</td>
<td>.0061077</td>
<td>.0063986</td>
<td>0.340</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Widowed (1)</td>
<td>.2216396**</td>
<td>.1141345</td>
<td>0.052</td>
</tr>
<tr>
<td>Married (2)</td>
<td>-.1072556</td>
<td>.11455</td>
<td>0.349</td>
</tr>
<tr>
<td>Divorced (3)</td>
<td>.0495143</td>
<td>.1240655</td>
<td>0.690</td>
</tr>
<tr>
<td>Experience</td>
<td>-.0056636*</td>
<td>.0032119</td>
<td>0.078</td>
</tr>
<tr>
<td>Remittances (yes)</td>
<td>-.2645566***</td>
<td>.0724112</td>
<td>0.000</td>
</tr>
<tr>
<td>Level of Income (GHC)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>201-500 (1)</td>
<td>.0217413</td>
<td>.1340456</td>
<td>0.871</td>
</tr>
<tr>
<td>501-1000 (2)</td>
<td>-.0988088</td>
<td>.1335924</td>
<td>0.460</td>
</tr>
<tr>
<td>1001-1500 (3)</td>
<td>.019908</td>
<td>.1292455</td>
<td>0.878</td>
</tr>
<tr>
<td>1501-2000 (4)</td>
<td>.0593324</td>
<td>.1355053</td>
<td>0.661</td>
</tr>
<tr>
<td>2000 and beyond (5)</td>
<td>-.0292733</td>
<td>.1413871</td>
<td>0.836</td>
</tr>
<tr>
<td>Fish Spoilage (yes)</td>
<td>.1258071**</td>
<td>.0543101</td>
<td>0.021</td>
</tr>
<tr>
<td>Residential Dummy</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Apam (1)</td>
<td>.0359037</td>
<td>.0562515</td>
<td>0.523</td>
</tr>
</tbody>
</table>

No. of Observations 333

*** p<0.01, ** p<0.05, * p<0.1
Source: Field work, 2017

**Note:** Base outcomes of categorical explanatory variables (Age: 15-24 years, Marital Status: Single, Level of Income: 0 - 200).

### 4.3. Identifying livelihood shocks and coping strategies

**Livelihood Shocks experienced**

Table 13 below shows the frequencies and percentages of livelihood shocks experienced by women fish processors and traders in the district. The most experienced shock was decline in fish
prices suffered by about 84% of the respondents. This was followed by decline in local fish catch and loss of capital/finance due to credit sales at 79% and 71% respectively. These outcomes were consistent with the findings of Asiedu et al. (2013), who found that fish price fluctuations and decline in fish stocks were amongst the major problems faced by fisher folks in Ghana.

**Table 13: Summary of shocks experienced**

<table>
<thead>
<tr>
<th>Shocks</th>
<th>Frequency</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of finance due to credit sales</td>
<td>237</td>
<td>71.17</td>
</tr>
<tr>
<td>Major decline in fish prices</td>
<td>281</td>
<td>84.38</td>
</tr>
<tr>
<td>Loss of fish/fishing equipment to tidal surge</td>
<td>16</td>
<td>4.80</td>
</tr>
<tr>
<td>Major fish spoilage</td>
<td>97</td>
<td>29.13</td>
</tr>
<tr>
<td>Decline in local fish catch</td>
<td>264</td>
<td>79.28</td>
</tr>
<tr>
<td>Destruction of property by flood and fire</td>
<td>27</td>
<td>8.11</td>
</tr>
<tr>
<td>Loss of financial investment to MFIs and Susu operators</td>
<td>63</td>
<td>18.92</td>
</tr>
<tr>
<td>Loss of fish through theft</td>
<td>125</td>
<td>37.54</td>
</tr>
<tr>
<td>Destruction of fish during processing</td>
<td>130</td>
<td>39.04</td>
</tr>
<tr>
<td>Major illness/death of spouse</td>
<td>29</td>
<td>8.71</td>
</tr>
</tbody>
</table>

Additionally, post-harvest losses such as major fish spoilage brought about by lack of storage facilities, destruction of fish during processing and loss of fish through theft, were suffered by for 29%, 39% and 38% respectively. This affirms the findings of Akande and Diei-Quaudi (2010), explained earlier on page 97. About 19% of the respondents were reported to have suffered loss of financial investment to MFI’s and Susu operators. Further enquiries from the field work showed that most of the populace in the district have lost their savings income to fraudulent micro finance
institutions and susu operators. Moreover, only 8% and 5% of the respondents indicated that they have lost properties and fishing equipment to tidal surge respectively. Field investigations revealed that fewer women in fishing communities owned fishing equipment compared to their male counterparts and hence women were not directly affected by these particular shocks. In addition, only 9% of the respondents indicated to have suffered from a major illness/death of spouse. This was contrary to the findings of Doss et al. (2015) who found illness and death as the most frequent shocks experienced in Ghana and Karnataka.

Coping Strategies

In the midst of livelihood shocks, women fish processors and traders in the district employ several coping mechanisms to manage the situation. Table 15 shows the percentages of individuals who employed each type of coping strategies across the various shocks. Table 14 also shows the incidence of coping strategies employed by individuals, should they experience a shock. Thus it shows the total number of individuals in the entire sample who utilized a particular coping strategy, conditional on experiencing a shock.

Firstly, the results indicate that majority of the women resorted to buying fish on credit from fish mummies as the dominant coping strategy to almost all the livelihood shocks except for the covariate shock (such as decline in fish catch, where most of the respondents 48% and 20% resorted to ‘doing nothing’ and ‘migration’ respectively). However, key informant interview and focus group discussion revealed that the cost price of fish bought on credit were relatively higher than fish bought at cash, as explained under ‘membership of association’ on page 78. This was attributed to risk associated with such informal credit sales system. The outcome affirms that
formation of social networks are very crucial to the profitability and sustainability of women in small scale post-harvest fisheries. Thus, these networks can serve as a social insurance system to facilitate the buying of fish on credit, for a common good and likewise attract assistance from formal social protection agencies.

Additionally, the results shows that, even though several coping strategies are employed, the same few strategies are used by greater percentage of the respondents. The most dominant strategies employed, conditional on having experienced a shock were, buying fish on credit (93.7%), relying on savings (20.4%), temporal migration(19.8) and receiving assistance from family and friends (18.3%). However, about 53.5% of the population sampled were reported to “doing nothing” when they are faced with livelihood shocks. The result is consistent with the findings of Doss et al. (2015) who found that majority of households in Ghana, Ecuador and Karnataka resorted to borrowing, receiving assistance from relatives and friends and drawing on savings as the most common coping strategies used in the midst of shocks. While livelihood diversification had been found to be essential livelihood strategy for fisher folks in small scale fisheries Asiedu and Nunoo, (2013) only 1.5% of the respondent resorted to engaging in alternative livelihood options as a coping strategy. Finally, the results also show that none of the respondents resorted to formal social protection strategies such as assistance from government/district assembly and insurance policy, to cope with livelihood shocks. This outcome suggests that formal social protection agencies need to be strengthened to cater for and improve the livelihood of the highly vulnerable women in the fisheries. Particularly, the third objective of the Livelihood Empowerment against Poverty (LEAP) which seeks to promote livelihoods and improve productive capacity must be strengthened to target highly vulnerable women in small scale fisheries.
Table 14: Incidence of Coping Mechanisms employed by Individuals, Conditional on Having Experienced a Shock

<table>
<thead>
<tr>
<th>Coping Strategies</th>
<th>Frequency</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Formal Coping Mechanisms:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Received assistance from Government/district</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>Insurance Policy</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>Informal Coping Mechanisms:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assistance from family / friends</td>
<td>61</td>
<td>18.32***</td>
</tr>
<tr>
<td>NGO support</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td><strong>Other Coping Mechanisms:</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relied on savings</td>
<td>68</td>
<td>20.42***</td>
</tr>
<tr>
<td>Sold asset to acquire capital</td>
<td>3</td>
<td>0.90</td>
</tr>
<tr>
<td>Bought fish on credit from fish mummies</td>
<td>312</td>
<td>93.69***</td>
</tr>
<tr>
<td>Temporal Migration</td>
<td>66</td>
<td>19.82***</td>
</tr>
<tr>
<td>Did Nothing</td>
<td>178</td>
<td>53.45***</td>
</tr>
<tr>
<td>Diversification</td>
<td>5</td>
<td>1.5</td>
</tr>
<tr>
<td>Loans from Banks/MFIs</td>
<td>10</td>
<td>3.0</td>
</tr>
<tr>
<td>Loans from private money lenders</td>
<td>16</td>
<td>4.80</td>
</tr>
<tr>
<td>Bought fish from industrial trawlers</td>
<td>25</td>
<td>7.51</td>
</tr>
<tr>
<td>Bought fish from cold store fish operators</td>
<td>1</td>
<td>0.30</td>
</tr>
<tr>
<td>Prayer</td>
<td>3</td>
<td>0.90</td>
</tr>
</tbody>
</table>

*** Dominant coping strategies
Table 15: Summary of shocks and coping strategies employed (%)

<table>
<thead>
<tr>
<th></th>
<th>Loss of finance</th>
<th>Decline in fish prices</th>
<th>Loss of fish/fishing equipment</th>
<th>Fish Spoilage</th>
<th>Decline in fish catch</th>
<th>Destruction of property by flood/fire</th>
<th>Loss of financial investment to MFI/susu operators</th>
<th>Loss of fish through theft</th>
<th>Destruction of fish during processing</th>
<th>Major illness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Relied on savings</td>
<td>11.71</td>
<td>2.10</td>
<td>1.80</td>
<td>1.50</td>
<td>0.30</td>
<td>0.9</td>
<td>1.80</td>
<td>4.80</td>
<td>3.00</td>
<td>0.9</td>
</tr>
<tr>
<td>Obtain loan from banks/MFI</td>
<td>1.20</td>
<td>0.60</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td></td>
<td></td>
<td></td>
<td>0.30</td>
<td>0.3</td>
</tr>
<tr>
<td>Obtain loan from private money lenders</td>
<td>2.70</td>
<td>0.90</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>1.20</td>
<td></td>
<td></td>
<td>0.30</td>
<td></td>
</tr>
<tr>
<td>Buy fish on credit</td>
<td>49.85</td>
<td>72.07</td>
<td>2.10</td>
<td>23.12</td>
<td>2.40</td>
<td>3.90</td>
<td>11.41</td>
<td>23.42</td>
<td>27.63</td>
<td>3.60</td>
</tr>
<tr>
<td>Receive assistance from family/friends</td>
<td>4.20</td>
<td>3.00</td>
<td>0.30</td>
<td>1.80</td>
<td>0.30</td>
<td>1.20</td>
<td>2.40</td>
<td>5.71</td>
<td>5.71</td>
<td>1.20</td>
</tr>
<tr>
<td>Sold assets to acquire capital</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Did nothing</td>
<td>0.90</td>
<td>3.90</td>
<td>0.30</td>
<td>1.50</td>
<td>48.05</td>
<td>1.20</td>
<td>3.00</td>
<td>2.10</td>
<td>1.50</td>
<td>1.20</td>
</tr>
<tr>
<td>Migration</td>
<td>19.82</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Buy fish from Industrial trawlers</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>7.51</td>
</tr>
<tr>
<td>Buy fish from cold store operators</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Diversification</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prayer</td>
<td>0.30</td>
<td>0.60</td>
<td>0.30</td>
<td>0.30</td>
<td>0.30</td>
<td>0.9</td>
<td>1.80</td>
<td>4.80</td>
<td>3.00</td>
<td>0.9</td>
</tr>
</tbody>
</table>

Source: Author’s compilation from field work
CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.0 Introduction

This chapter provides the summary and conclusions to the findings of the study. It further suggests policy recommendations based on the findings. Again it highlights the limitations of the study and provides suggestion for future research on the topic.

5.1. Summary of findings, Conclusion and Recommendation

Women’s immense contribution in the Ghanaian fisheries sector, particularly in post-harvest fisheries cannot be underestimated. However, a lot of factors inhibit the wellbeing of women activities in the sector which makes them more vulnerable to livelihood insecurity. This study has shown the multidimensional nature of livelihood vulnerabilities suffered by the women fish processors and traders in the Gomoa West District of Ghana. Firstly, the study examined the socioeconomic characteristics of the women sampled. Majority of the women were within the active age group (25-54 years), married to fishermen and engage in the fisheries as their main source of livelihood. However, most of them had only basic education to no education, no access to credit facilities, do not belong to any social network and, have no access to extension service as well as no alternative livelihood.

Secondly, the study utilized the Sustainable Livelihood Framework to explore the asset entitlements (social, financial, human physical and natural capitals) as well as the livelihood
options of each individual fish processor and trader surveyed. The Alkire–Foster multidimensional poverty measure (Alkire and Foster, 2011) was used to develop a multidimensional livelihood vulnerability index (MLVI) for the district using primary data collected on 333 fish processors and traders in Apam and Mumford.

The results of the index calculation, showed that 70% of women fish processors and traders in the district were multidimensionally vulnerable and were deprived in 80% of the weighted indicators. The overall district MLVI value was 0.56. This suggested that on average, the 56% of fish processors and traders in the district were multi-dimensionally vulnerable to livelihood insecurity with reference to the given aggregated deprivation cutoff of 0.67 (two-thirds or more of the weighted indicators). Based on the MLVI scores, the study categorized individuals surveyed into three levels of vulnerability (low, moderate and high vulnerability). Majority of the respondents, 61.6% and 33.6% were found in the medium and high level of vulnerability respectively. This outcome indicates that most fish processors and traders in the district are faced with transitory and chronic vulnerability and hence require immediate focus attention.

Applying the decomposition property to age showed that the very young women (15-24 years) and the aged (55 years and above) were more multidimensionally vulnerable relative to the active and energetic age group (25-54 years). This was attributed to lack of experience in business on the part of the younger women and loss of strength by the aged. Also decomposition by community showed that, women in Apam were more multidimensional vulnerable than those in Mumford. However, the difference in community specific vulnerability was negligible and consistent with the overall MLVI value of the district, showing that on the average 56% of women from each community experience multiple deprivations in their livelihoods. The MLVI values were 0.562 and 0.563 for
Apam and Mumford respectively. The MLVI was further decomposed into dimensions and indicators to show the dimension and indicator specific contributions to the overall index. The results showed that deprivation in social capital had the highest contribution (21%) to the overall district MLVI. This was followed by deprivation in livelihood diversification, financial capital and human capital at a rate of 19%, 18% and 16% respectively. The rest of the dimensions (physical capital and natural capital) showed a deprivation rate of 13% each. In addition, results of the spatial vulnerability headcount which gave the percentage of deprivation in each indicator, showed that belongingness to social network had the highest deprivation rate of 98%. This was followed by indicators such as lack of access to extension service and training, credit facilities, improved storage facilities, livelihood diversification and ill health in order of importance, with deprivation rates of 76% to 94%. These results indicates that fish processors and traders in the district were most deprived in social capital indicators such as membership of social networks and access to extension and require immediate interventions in these areas.

Moreover, the estimates of the Probit regression model revealed that differences in multidimensional livelihood vulnerability among women fish processors and traders in the district was influenced by differences in certain socioeconomic characteristics such widowhood, gender of household head, access to remittances, post-harvest losses (major fish spoilage) and experience in business. Widowhood and post-harvest losses showed a positive significant relationship with multidimensional vulnerability. Remittances, gender of household head and experience in business also showed a significant negative relationship with multidimensional vulnerability.

Finally, in terms of identifying the coping strategies used in the midst of livelihood shocks, within fisheries sector coping strategy such as buying fish on credit from fish mummies was the most
dominant strategy employed. While a wide range of coping mechanisms were utilized, the most common strategies used by majority of the women surveyed were buying fish on credit, relying on savings, receiving assistance from family/friends and temporal migration.

These outcomes have given evidence to the multidimensional nature of vulnerabilities faced by fish processors and traders in the Gomoa West District. They have also indicated their lack or limited ability to cope with their livelihood shocks as the study sought to investigate.

The empirical results suggest that interventions to ensure the wellbeing and long term sustainability of women activities in the fisheries, in the Gomoa West District must first tackle access to social network (groups or association), credit facilities and increased access to fishery extension service and training. The second class of intervention should also focus on improving access to storage facilities, livelihood diversification and improved health. This outcome suggests that the formation of associations among women fish processors and traders should be encouraged and strengthened.

Specifically, the National Association of Fish Processors and Traders launched in 2015 should be strengthened to spearhead the formation and empowerment of women groups in the fisheries to foster their involvement in equitable fisheries governance and their sustainability in the sector. This must be done in conjunction with the District Fishery extension officers and local fisheries management, taking into consideration the location specific challenges in previous fisher groups, whilst avoiding political infiltrations into the groups.

Additionally, access to fishery extension service and training must be increased. Extension service providers must liaise with the women groups to educate the women on improved fish processing methods, fish handling and basic business management skills. More importantly, extension service
providers should educate, guide and encourage the formation of micro credit unions among women fish processors and traders. This is to increase their access to credit in a form of soft loans with better loan repayment schemes. It will also foster financial inclusion among women in the sector. However, until the formation of such unions, informal credit systems such as the “Mary-go-round” should be encouraged to increase women access to credit. The “Mary–go-round is a system where women in small informal groups contribute some amount of money weekly or daily in a form of collective savings, for the amount to given to each member, in turns either weekly or monthly. The formal financial system should also be strengthened to develop products that are beneficial to women in the informal sector.

Moreover, the Gomoa West District assembly must liaise with other stakeholders at the national regional and local levels to regulate the activities of Micro finance institutions and susu operators in the district. This will help eradicate the menace of fraudulent financial institutions that runs away with the savings income of these women. Furthermore, the government and NGOs who aim at empowering women in the sector must also assist in providing cold and dry storage facilities for women in the district to reduce post-harvest losses. This study therefore suggests that the proposed government project in the 2017 Budget Statement and Economic Policy, to establish landing site and storage facilities at Mumford must receive immediate focus attention to reduce the livelihood vulnerabilities of fisher folks in the area, particularly, women. Additionally, formal social protection agencies such as the Livelihood Empowerment against Poverty (LEAP) must be strengthened to target highly vulnerable women in small scale fisheries in the Gomoa West District.
As studies have shown that the willingness of women in small scale fisheries and farming to adopt new technologies is tied to their level of education (Antwi-Agyei et al, 2012 and Abukari, 2014), the study showed that the district is characterized by high level of illiteracy among females, even though education was not found among the indicators with the higher rates of deprivation. The highest level of education attained by the respondents was basic education. Policy interventions in the district must therefore increase access to education, especially among females.

In conclusion, owing to the seasonal nature of fishing and fishery related activities such as fish processing and trading, policy interventions should also focus on promoting diversification of livelihood among women in the district. For instance, women in the district can be trained and introduced to aquaculture due to the wide area of water resource and other livelihood options such as salt making, dress making, bead making, to give them other means of livelihood.

5.3. Limitation and Suggestions for Future Research

While the study has provided essential insights into the multidimensional nature of vulnerabilities faced by women fish processors and traders in the district, it did not investigate into the trends in the level of vulnerability overtime. This was due to lack of data on women livelihood activities in the fisheries sector. However, since vulnerability is a dynamic concept, it is important for future research to assess the time dimensions of vulnerability to give an indication as to whether or not the women in the sector remain chronically vulnerable or faces transitory vulnerability overtime. Additionally, the study did not investigate into the drives of coping strategies employed by the women to cope with their livelihood shocks. Hence future research must investigate into what
influences the choice of coping strategies among women in post-harvest fisheries, in the midst of livelihood shocks.
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increased-nutrition-and-income on 20th September, 2016 at 2:01pm

Dear Sir/ Madam,

This is a data collection instrument for an academic thesis work. The study is aimed at assessing the livelihood vulnerabilities and coping strategies of women in fish processing and trading to gain in-depth understanding of their adaptive capacities to shocks. The data I collect will be only used for research purposes and will help come up with policy recommendations to improve benefits from fish trade in this country, region and Africa as a whole. Please feel free to ask any questions or raise any issues you might have. Thank you for your participation.

Code: ........................................

Name of Enumerator: ........................................ Date of interview: ..........................

Checked by: ........................................

Questionnaire number: ........................................

House location / number: ........................................

Community: ........................................

INSTRUCTION: Please tick [✓] the appropriate response to each of the questions below.

PART ONE: SOCIO-DEMOGRAPHIC DATA
1. Gender:
   1. [ ] Female
   2. [ ] Male

2. Age group:
   1. [ ] 15 – 24 years
   2. [ ] 25- 34 years
   3. [ ] 35 – 44 years
   4. [ ] 45- 54 years
   5. [ ] 55- 64 years
   6. [ ] 65 and beyond

3. Marital status:
   1. [ ] Single
   2. [ ] Widowed
   3. [ ] Married
   4. [ ] Divorced
   5. [ ] Separated

4. a. Is your husband a fisherman?  
   1. [ ] Yes
   0. [ ] No

   b. If no, what is the occupation of your husband?
   1. [ ] Carpentry
   2. [ ] Petty Trading
   3. [ ] Masonry
   4. [ ] Other, specify, ____________

5. Does your husband support your business financially?  
   1. [ ] Yes
   0. [ ] No

6. Are you a household head?  
   1. [ ] Yes
   0. [ ] No

7. Does your husband support the household financially?  
   1. [ ] Yes
   0. [ ] No

8. What is your household size?  
   [ ]

9. Number of Children/ dependents in the family  
   [ ]

10. What is your highest level of education?

    1. [ ] No education
    2. [ ] Primary/Middle/JHS
    3. [ ] Secondary/Vocational
    4. [ ] HND/Diploma
    5. [ ] University
    6. [ ] Postgraduate

    7. [ ] Professional qualification

11. What is your religious affiliation?

    1. [ ] Christian
    2. [ ] Muslim
3. [ ] Traditional  4. [ ] Other (specify)_______________________

12. Ethnicity affiliation: 1. [ ] Fanti  2. [ ] Ga  3. [ ] Ewe
   4. [ ] Ga-Adangbe  5. [ ] Other, Please Specify_______________________

13. Are you from this town?

   1. [ ] Indigenous  2. [ ] migrant

**Business Enterprise Characteristics**

14. Value Chain actor:  1. [ ] Trader  2. [ ] Processor  3. [ ] Trader and processor

15. What fish preservation method(s) are you involved in? (Multiple answer)

   1. [ ] Smoking  2. [ ] Frying  3. [ ] Salting/drying

   4. [ ] Other, Please specify_______________________

16. Is fish processing and trading your main economic activity?  1. [ ] Yes  0. [ ] No

17. a. Do you engage in any other economic activities aside the fish trade?  1. [ ] Yes  0. [ ] No

   b. If yes, could you rank them in terms of their contribution to your household income?

   Where, 1- Most engaged; 2- Moderate; 3- Least engaged

<table>
<thead>
<tr>
<th>Economic Activity</th>
<th>Rank</th>
<th>Revenue received per week</th>
<th>No. of months when the activity is most active</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petty trading</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Farming</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Dressmaking</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Salt making</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

18. How did you enter into fish trading? ____________________________
19. How many years have you been in this business? [ ] years
20. How many times in a week do you engage in your fish trading and processing business? [ ] times
21. What is your motivation for involving in the fish trading business?
   1. [ ] Main source of income  2. [ ] Requires no formal education  3. [ ] No alternative livelihood  4. [ ] Other, specify,________________________
22. a. What species or kinds of fish do you mostly trade in? (Multiple answer possible)
   1. [ ] Salmon  2. [ ] Herrings  3. [ ] Red fish  4. [ ] Tuna  5. [ ] other, specify __________________
   b. There specific reasons for trading in such species in your area?
   1. [ ] High market demand  2. [ ] Availability of species  3. [ ] Seasonality  4. [ ] Profitability  5. [ ] Other, Specify __________________________
23. In which months are you in operation?
   Please tick on the months in which you operate

<table>
<thead>
<tr>
<th>Jan</th>
<th>Feb</th>
<th>March</th>
<th>April</th>
<th>May</th>
<th>June</th>
<th>July</th>
<th>Aug</th>
<th>Sept</th>
<th>Oct</th>
<th>Nov</th>
<th>Dec</th>
</tr>
</thead>
</table>

   TRADING ROUTES AND MARKETS

   Domestic Trade
24. a. Where do you usually source/buy your fish? (Multiple answers possible in ranks, i.e. 1, 2)
   [ ] Fishermen  [ ] fish mummies  [ ] fisher- husbands
   [ ] Industrial Trawlers  [ ] Other (specify) __________________________
   b. Where do you usually sell your fish? (Name of towns/ major markets)
**Cross Border Trade**

25. Do engage in cross border trade?  
   1. [ ] Yes  
   0. [ ] No

26. Which countries do you normally send/buy your fish?
   
i._____________________________________________________
   
   ii._____________________________________________________
   
   iii._____________________________________________________

27. How often do you engage in this trade in a month? _________________________

28. In which months do you engage in this trade?

   Please tick on the months that are applicable.

   | Jan | Feb | March | April | May | June | July | Aug | Sept | Oct | Nov | Dec |

29. What are your reasons for the frequency in this trade?

   1. [ ] size of capital  
   2. [ ] Seasonality

   3. [ ] Cost of transportation  
   4. [ ] Other(Specify)
30. What are some of the problems you encounter in cross border trade?
   1. [ ] High cost of transportation
   2. [ ] Custom harassment
   3. [ ] Market entry barriers
   4. [ ] Other
   (specify) _______________________

31. a. Do you belong to any social network or association of traders in your area?
   1. [ ] Yes
   0. [ ] No

   b. If yes, what is/are the name(s) of the association(s)?

   i. ___________________________________________________________

   ii. ___________________________________________________________

   iii. ___________________________________________________________

   iv. ___________________________________________________________

32. What are the main activities of the association?

   i. ___________________________________________________________

   ii. ___________________________________________________________

   iii. ___________________________________________________________

   iv. ___________________________________________________________

33. What roles do the associations play in improving trading activities and income of members?

   i. ___________________________________________________________

   ii. ___________________________________________________________

   iii. ___________________________________________________________

   iv. ___________________________________________________________
34. Are women involved in the decision making process regarding the local fisheries management in your area?  
1.[ ] Yes  
0.[ ] No

35. a. Do you have access to training and fishery extension service?  
1.[ ] Yes  
0.[ ] No

   b. If yes, please list the organizations that provide these services.  
   i
   ii
   iii

36. How often do they provide you with these services in a year?  
1. [ ] Once  
2. [ ] weekly  
3. [ ] Bi-weekly  
4. [ ] Monthly  
5. [ ] Quarterly  
5. [ ] other ____________________

37. A. Do you have a storage facility for your processed or unsold fish?  
1.[ ] Yes  
0.[ ] No

   B. If yes, what type of facility? Please tick all those that are applicable.  
   1.[ ] warehouse  
   2.[ ] room  
   3.[ ] refrigerated room or cod store  
   4.[ ] shed  
   5. [ ] other (specify) ____________________

   C. What species do you store for longer period? What storage facility do you use? 

<table>
<thead>
<tr>
<th>Fish species</th>
<th>Type of storage facility</th>
<th>Quantity of fish stored</th>
<th>Month when the fish is stored</th>
<th>Month when the fish is sold</th>
<th>Quantity lost in storage</th>
</tr>
</thead>
</table>
38. a. Do you have any communication gadget which helps you in your trading activities?
   1.[ ] Yes 0.[ ] No
   b. If yes, which of them?
      1.[ ] mobile phone 2.[ ] radio 3.[ ] TV set 4.[ ] other, specify________

39. a. How long (distance) does it take you to access the nearest market for your fish?(In km/minutes)
      [ ]km or [ ]minutes
   b. What is the name of the nearest fish market? __________________________

40. a. Have you received remittances from any relative or friends in the past one year?
   1.[ ] Yes 0.[ ] No.
   b. If yes, state the amount [ ]
   c. What was the purpose of remittance? _________________________________

41. a. Do you have access to credit (loans) as a trader (When you are in need of funds)?
   1.[ ] Yes 2.[ ] sometimes 0.[ ] No
   b. If yes, from whom do you take the loan?
      1.[ ]MFI or Bank 2.[ ] Private lender 3.[ ] Relative/ Neighbour
   c. Duration of loan. [ ] months
   d. How much do you pay as Interest on loan [ ]Percent
   e. What is the loan repayment scheme?
      1. [ ] Pay interest and deductive principal daily 2.[ ] Pay interest and principal
monthly

3. [ ] Pay interest and principal at the end of the period

4. [ ] Other (specify) 

f. When do you start loan repayment? [ ] weeks after receiving loans

g. When do you normally borrow (month) [ ] name of month

42. a. Do you own a savings account? 1. [ ] Yes 0. [ ] No

b. If yes how much have you saved in the past twelve (12) months? [ ] GHC

43. a. Do you invest in real (physical) assets? 1. [ ] Yes 0. [ ] No

b. If yes, which type of assets?

<table>
<thead>
<tr>
<th>Assets</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Land</td>
<td></td>
</tr>
<tr>
<td>b. Building materials</td>
<td></td>
</tr>
<tr>
<td>c. Outboard motors</td>
<td></td>
</tr>
<tr>
<td>d. Fishing nets</td>
<td></td>
</tr>
<tr>
<td>e. Canoes</td>
<td></td>
</tr>
</tbody>
</table>

44. Why do you invest in these?

1. [ ] Returns 2. [ ] Buffer for the future 3. [ ] Cope with shocks
4. [ ] No trust for the financial institutions 5. [ ] other (specify) 

45. How much revenue (in Ghana Cedi) do you acquire from fish sales in a week?

1. [ ] 0 – 200 2. [ ] 201-500 3. [ ] 501- 1000
46. Have you or any of your household members suffered from any major illness that prevented from engaging in your livelihood activities in the past one year?  
1. [ ] Yes  
0. [ ] No

47. What are some of the major health problems you suffer in your fish processing and trading activities?

1. [ ] Eye problems  
2. [ ] Skin diseases  
3. [ ] Respiratory diseases  
4. [ ] Burns  
5. [ ] Sleep disorders  
6. [ ] Waist pains/back ache

7. [ ] Other (specify) ____________________

48. Does your area most often have access to sufficient fish catch?  
1. [ ] Yes  
0. [ ] No
49. Have you experienced any of the following shocks over the past five years? What are some of the livelihood strategies you have adopted to cope with some of these constraints?

*NB: If no for all, please move to question 50*

<table>
<thead>
<tr>
<th>Shocks</th>
<th>Yes / No</th>
<th>Causes</th>
<th>Impact (0- No impact, 1- Mild, 2- moderate, 3- severe)</th>
<th>Coping Strategy</th>
</tr>
</thead>
<tbody>
<tr>
<td>49. a. Loss of finance due to credit sales</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49. b. Major decline in fish prices at the market</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>49. c. Loss of fish and fishing equipment due to tidal surge</td>
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<td></td>
<td></td>
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<tr>
<td>49. d. Major fish spoilage</td>
<td></td>
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<td></td>
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<tr>
<td>49. e. Decline in local fish catch</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>49. f. Destruction of property by flood and fire</td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>49. g. Loss of financial investment to micro finance or susu operators</td>
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<td></td>
<td></td>
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<tr>
<td>49. h. Loss of fish through theft</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49. i. Destruction of fish during processing(e.g. burning of fish)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>49. j. Major illness/ death of spouse</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Coping Strategies**

1. Relied on savings
2. Obtain loan from Bank/ MFI
3. Obtain loan from private money lenders
4. Buy fish on credit from fish mummies
5. Received assistance from family and friends
6. Received assistance from government/ district assembly
7. Received assistance from NGO/ church groups
8. Sold assets to acquire capital
9. Did nothing
10. Insurance Policy
11. Other, specify

50. a. Are there any gender sensitive challenge(s) encountered by women in the fish trade?

   (Gender roles or certain societal norms that hinder women in fish trade)
   1.[ ] Yes    0.[ ] No.

   b. If yes, what are these challenges?
      i
      ii
      iii

51. What are the major challenges you encounter in your processing and trading activities?

   Can you rank these in the order of importance (ascending order)? Example: (1, 2, 3,..,10), 1- most, 10 -less severe

<table>
<thead>
<tr>
<th>Constraints</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>Inadequate capital</td>
<td></td>
</tr>
<tr>
<td>Lack of storage facilities</td>
<td></td>
</tr>
<tr>
<td>Lack of training and fishing extension service</td>
<td></td>
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<tr>
<td>Loss of finance due to credit sales</td>
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<td>Loss of financial investment to MFI and susu operators</td>
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<td>Fish spoilage</td>
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<td>Decline in fish prices at the market</td>
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<td>Decline in local fish catch</td>
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<td>Limited market outlets and poor market information</td>
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<td>Power crisis</td>
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<td>Other, specify</td>
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52. In your own view, what should be done to help women in this area to expand their fish trading business?
Appendix 2: Interview Guide: Focus Group Discussion

1. Can you give me a brief history about this community?
2. What occupation do most women in this community engage in?
3. What fisheries activities are women most engaged in this community?
4. What are the main fishing seasons in this community?
5. Where do women in this community normally source their fish?
6. Where do women in this community normally sell their fish?
7. Are women in this community engaged in cross border fish trade?
8. Do women in the fisheries engage in other economic activities alongside the activities in the fisheries?
9. Do most women belong to fishery associations in this community?
10. What are the names of the associations in this community?
11. Do women in this community have access to fishery extension service?
12. How often are do they have access to these services?
13. What are the major problems faced by women in the fisheries in this community?
14. Can you describe how the fisheries sector is managed in this community?
15. Are women engaged in local fisheries management in this community?
16. Are there gender sensitive challenges faced by women in this community?
17. What are some of the major livelihood shocks faced by women in this community?
18. What do you think are the major causes of these livelihood shocks?
19. What coping strategies are normally employed by women in this community to cope with their livelihood shocks?
20. What accounts for post-harvest losses in the fisheries in this community?
21. What do you think can be done to improve women livelihoods in the fisheries in this community?
Appendix 3: Fisheries and Aquaculture Development Plan 2011-2016 (Targets)

- Maintain current capture fisheries production.
- Increase revenue and profitability of in capture fisheries by at least US$ 50 million per year after five years.
- Increase aquaculture production from 9000 to 100,000 tonnes per annum within five years
- Retain Ghana as the landing and processing hub for the West Africa tuna Industry.
- Develop fisheries management to allow effective control of all commercial fishing eff in Ghana waters
- Ensuring fisheries’ management cost are suitable and the fisheries sector overall makes a fiscal contribution to government revenue