

**ARTISANAL FISHING AND LIVELIHOODS IN KWAHU-NORTH DISTRICT,
GHANA.**

By

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DECLARATION

I hereby declare that, the study described in this thesis is my original work. No part of the study has been presented in any form for any degree or certificate in another institute of study. I also declare that, all references and assistance received from various people have been duly acknowledged.

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DEDICATION

I humbly dedicate this piece of work to my parents, Mr. and Mrs. Agbevem Robert for their immense contribution towards my success in life; and to my siblings: Georgina, Salomey and Thomas Aho. The study is also dedicated to my wife Beauty Agbemazi and my children Kafui, Edem and Etornam.

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ABSTRACT

Fishing forms a major economic activity and source of livelihood among communities dotted along the Volta Lake in Ghana. It is undertaken on a small scale, artisanal basis, leading to low returns and inability to break out of the poverty trap. The major players in the artisanal fishing, namely, fishermen, processors and mongers experience a wide range of challenges which make it difficult for them to make ends meet and provide for themselves and their dependants. The research examines the artisanal fishing and livelihoods along the Volta Lake in the Kwahu-North District. The study also examined livelihood activities of the key people involved in artisanal fishing and how their positions along the fish production value-chain affected their well being. Both qualitative and quantitative analytical procedures were used. The general characteristics of the fisher groups were examined. Various hazards, constraints and fishing methods were investigated. A combination of stratified random sampling and purposive sampling techniques were used to select a total of 194 respondents from four communities in the district. Methods of data collection included questionnaires, focused group discussions, and direct observation. Difficulty in acquiring hired labour accounted for the use of child labour. Smoking was the most common mode of processing fish. Poor saving habit was identified among the fishers. Both short and long term measures were put forward for improving the livelihood situation of the fishers. Institutions like VRA, MoF, FD, VBRP and the Government should also play a major role through financial and technical assistance in improving livelihood conditions of the fishers. Finally, the Fishery Law must be enforced with the full participation of the fishers. This will ensure sustainability of the fishing industry.

TABLE OF CONTENTS

DECLARATION.....	ii
DEDICATION.....	iii
ACKNOWLEDGEMENTS	iv
ABSTRACT.....	v
LIST OF TABLES	xii
LIST OF FIGURES	xiii
LIST OF PLATES	xiv
LIST OF ABBREVIATIONS	xv
CHAPTER ONE	1
GENERAL INTRODUCTION.....	1
1.1. Introduction.....	1
1.2. Statement of the Problem.....	3
1.3. Research Objectives.....	4
1.4. Research Propositions.....	5
1.5. Research Methodology	5
1.5.1. <i>Types and Sources of Data</i>	5
1.5.2. <i>Sampling and Sample Size</i>	6
1.5.3. <i>Data Collection Methods</i>	7
1.5.4. <i>Data Analysis and Presentation</i>	8
1.6. Justification and Relevance of the Research.....	8
1.7. Scope of the Study	9
1.9. Organisation of Chapters	10
1.10. Summary.....	11
CHAPTER TWO	12
LITERATURE REVIEW AND CONCEPTUAL ISSUES	12
2.1. Introduction.....	12

2.3. Artisanal Fishing Value-Chains	14
2.4. Technologies for Fish Capture, Processing and Marketing	17
2.5. Rural Livelihood Concepts and Artisanal Fishing.....	19
2.5.1. <i>Rural Livelihoods</i>	20
2.5.2. <i>Resilience and Vulnerability of Fishing Dependent Livelihoods</i>	21
2.5.3. <i>Livelihood Sustainability and Portfolios</i>	23
2.5.4. <i>Livelihood Diversification</i>	24
2.5.5. <i>The Nexus between Artisanal Fishing as a Rural Livelihood Activity and Well Being</i>	26
2.6. Socio-Economic Conditions of Fishers in Fishing Communities.....	27
2.6.1. <i>Artisanal inland Fisheries and Employment Generation</i>	28
2.6.2. <i>Artisanal Inland Fishing and Income Generation</i>	29
2.6.3. <i>Artisanal Inland Fishing and Revenue Generation</i>	30
2.7. Problems of Artisanal Fishing	31
2.7.1. <i>Mismanagement of Fishery Resources</i>	31
2.7.2. <i>Environmental Challenges of Fishing</i>	33
2.8. Fisheries Policies and Artisanal Fishing	35
2.9. Conceptual Framework.....	37
2.10. Summary	43
CHAPTER THREE.....	44
BACKGROUND TO THE STUDY AREA	44
3.1. Introduction.....	44
3.2. Physical and Natural	44
3.2.1. <i>Physical and Natural Environment</i>	44
3.2.2. <i>Location and Size</i>	44
3.2.3. <i>Climate and Rainfall</i>	46
3.2.4. <i>Vegetation and Forest Reserve</i>	46

3.2.5. Soils and Agricultural Land Use.....	46
3.2.6. Geology.....	47
3.2.7. Relief and Drainage.....	47
3.2.8. Temperature and effect on Fishing.....	48
3.2.9. Relative Humidity.....	48
3.3. Demographic Characteristics.....	49
3.3.1. Population and Density.....	49
3.3.2. Rural-Urban Split.....	50
3.3.3. Ethnicity and Religion.....	51
3.3.4. Occupational Distribution of Population.....	51
3.4. Overview of the District Economy.....	51
3.4.1. Employment Status.....	52
3.4.2. Occupational Structure.....	52
3.6. Health.....	53
3.6.1. Health Services.....	54
3.6.2. Causes of Admission to Health Facilities.....	55
3.7. Water, Sanitation and Waste Management.....	55
3.7.1. Type of Toilet Facility Used.....	57
3.8 Land Use Distribution.....	57
3.9. Settlement Patterns.....	58
3.10. Summary.....	58
CHAPTER FOUR.....	59
DATA ANALYSIS AND DISCUSSIONS.....	59
4.1. Introduction.....	59
4.2. General Demographic and Socio-Economic Characteristics of the Respondents.....	60
4.2.1. Gender Roles in Artisanal Fishing.....	60
4.2.2. Artisanal Fisher Groups and Net Monthly Income.....	61

4.2.3. Educational Level of Fishers and Net Monthly Income.....	62
4.2.4. Saving Habits of Fishers with Banks	63
4.2.5. Adequacy of Income in Meeting Domestic Needs.....	63
4.2.7. Acquisition of Inputs	65
4.3. Specific Demographic and Socio-Economic Characteristics of Fishermen	67
4.3.1. Educational Levels and the Age of Fishermen	67
4.3.2. Marital Status and Ages of Fishermen.....	68
4.3.3. Ethnic Composition of Fishermen in the Study Communities	69
4.4.1. Livelihoods Activities of Fishermen.....	70
4.4.2. Fish Capture	70
4.5. Challenges Faced by Respondents in the Artisanal Fishing Industry.....	73
4.5.1. Common Diseases among Fishers in the Kwahu-North District.....	73
4.5.2. Ability to Finance Healthcare.....	74
4.5.3. Means of Healthcare Financing	75
4.6. Hazards Faced by Fishermen When Undertaking Their Activities	76
4.7. Constraints Facing Fishermen.....	77
4.8. Appropriateness of Fishing Technology Adopted by Respondents in the Study Area.....	78
4.8.1. Gill net	78
4.8.2. Fish traps.....	79
4.8.3. Cast Net.....	80
4.8.4. Hook and Line.....	82
4.8.5. Bamboo Tubes and Traps	82
4.8.6. Gill net with fish traps.....	84
4.8.7. 'Atidza' Method of Fishing	85
4.8.8. Beach seines (Adranyi).....	86
4.8.9. Purse Seine.....	87
4.9. Type of Assistance Needed By Fishers	88

4.10. Specific Demographic and Socio-Economic Characteristics Fish Processors	89
4.10.1. Educational Levels and Age Group of Fish Processors	89
4.11. Livelihoods Activities of Fish Processors	92
4.11.1. Fish Processing Methods	92
4.11.2. Types of Labour Used in Fish Processing	94
4.12. Challenges Faced by Fish Processors	97
4.12.1. Hazards Faced by Fish Processors When Undertaking Their Activities.	97
4.12.2. Constraints Facing Fish Processors.....	98
4.13. Specific Demographic and Socio-Economic Characteristics Fish Mongers	99
4.13.1: Educational Levels and Age Group of Fish Mongers	100
4.13.2. Marital Status of Fish Mongers and Their Ages.....	101
4.13.3. Ethnic Composition of Fish Mongers in the Study Communities	101
4.14. Livelihoods Activities of Fish Mongers	102
4.14.1. Selling of Fish Products.....	102
4.15. Challenges Faced by Fish Mongers	103
4.15.1. Hazards Faced by Fish Mongers When Undertaking Their Activities.....	104
4.15.2. Constraints Facing Fish Mongers	105
4.16. Prospects of artisanal fishing industry	106
4.17. General Views of the Fisher Groups about Their Activities in the Fishing.....	107
4.18. General Views of other stakeholders on fishing activities in the communities.....	109
CHARTER FIVE.....	111
SUMMARY, CONCLUSION AND RECOMMENDATION.....	111
5.1. Introduction.....	111
5.2. Summary of Key Findings	111
5.3. Conclusions.....	115
5.4. Recommendations.....	115
5.4.1. Short-Term Measures of Improving Livelihoods of Fishers.....	115

5.4.2 Long-Term Measures of Improving Livelihoods of Fishers	117
REFERENCES.....	119
APPENDIX 1: Questionnaire to Fishermen.....	127
APPENDIX II: Questionnaire to Fish Processors	131
APPENDIX III: Questionnaire to FishMongers.....	134
APPENDIX IV: Questionnaire to Stakeholders (Head of Fishermen, Traditional Authorities and Assembly Members).....	137

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LIST OF TABLES

Table 1.1. Population of the Study Communities	7
Table 3.1 Spatial Distribution of Population for the first 20 settlements.	50
Table 3.2 Occupational Structure in the District	52
Table 3.3 Literacy levels.....	53
Table 3.4 Top 10 Causes of Hospital Admissions.....	55
Table 3.5 Major Source of Water Supply in the District.	56
Table 4. 1: Gender Roles in Artisanal Fishing.....	60
Table 4.2 Artisanal Fisher Groups and Monthly Income.	61
Table 4.3 Educational Levels of Fishers and Net Monthly Income.	62
Table 4.4 Saving Habit of Fishers with Banks.	63
Table 4.5 Adequacy of Income in Meeting Domestic Needs	64
Table 4.6 Adequacy of Income in Meeting Cost of Children’s Education.....	65
Table 4.7 Educational Levels of Fishermen to Their Age.....	68
Table 4.8 Marital Status of Fishermen to Their Ages.....	69
Table 4.9 Ethnic Composition of Fishermen in the Study Communities	70
Table 4.10 Ability to Finance Healthcare.	75
Table 4.11 Means of Healthcare Financing	76
Table 4.12 Hazards Faced by Fishermen.....	77
Table 4.13 Educational Levels and Age Group of Fish Processors.....	90
Table 4.14 Marital status of Fish Processors to Their Age.....	91
Table 4.15 Ethnic Composition of Fish Processors in the Study Communities	92
Table 4.17 Educational Levels and Age Group of Fish Mongers.....	100
Table 4.18 Marital status of Fish Mongers to Their Age.....	101
Table 4.19 Ethnic Composition of Fish Mongers in the Study Communities	102
Table 4.20 Hazards Faced by Fish Mongers.....	105

LIST OF FIGURES

Figure 2. 1. The DFID Sustainable Livelihoods Framework.....	38
Figure: 2.2. Framework for Assessing Core and Context of Livelihood System	41
Figure 3.1: Map of Ghana showing District with study Communities	45
Figure 4.1 Pie Chart Showing Acquisition of Initial Capital or Stocks.....	66
Figure 4.2 Bar Graph Showing Common Diseases in the Communities.....	74
Figure 4.3 Bar Graph Showing Constraints Facing Fishermen in the study Communities.....	78
Figure 4.4 Kind of Assistance Needed by Fishing Artisans.	89
Figure 4.5 Pie Chart Showing Fish Processing Methods in the study communities.	93
Figure 4.6 Bar Graph Showing Types of Labour Used in Fish Processing in the Fishing Communities.	95
Figure 4.7 Pie Chart Showing Modes of Selling Produce.	
Figure 4.8 Bar Graph Showing Constraints Facing Fish Processors.....	99
Figure 4.9 Bar Graph Showing Constraints Facing Fish Mongers.....	106
Figure 4.10 Prospects of Artisanal Activities.	107



LIST OF PLATES

Plate 1. Fisherman with an outboard motor.	71
Plate 2. School going children Preparing Gill net with Their Father.....	79
Plate 3. Fisherman returning from fishing with fish traps and gill net.	80
Plate 4. Cast Net being thrown by a Fisherman.....	81
Plate 5. The Cast Net is being carefully drawn out by the Fisherman.....	81
Source: Field Observation, July 2012.	81
Plate 6. Fisherman preparing Baited Fishing Lines.	82
Plate 7. Bamboo tubes or traps	83
Plate 8. Fisherman harvesting fish with bamboo traps.	83
Plate 9. Harvested fish from bamboo traps or tubes.	83
Plate 10. Gill net with fish traps.....	84
Plate 11. Showing ‘Atidza’ where branches of trees are heaped in the river.	85
Plate 12. Fishermen Harvesting ‘Atidza’.....	86
Plate 13. Fishermen Carefully Dragging Beach Seine to the Shore	87
Plate 14. Fishermen harvesting purse seine.	88
Plate 15. A woman smoking fish at Ekye-Amanfrom.	94
Plate 16. Fish processors frying fish at Ekye-Amanfrom.	94
Plate 17. Processors retailing their produce at Ekye-Amanfrom Market.	97
Plate 18: Traders buying from processors at Ekye-Amanfrom Market.....	103

LIST OF ABBREVIATIONS

CSR	Corporate Social Responsibility Movement
DANIDA	Danish International Development Agency
DDT	Dichlorodiphenyltrichloroethane
DFID	Department for International Development.
DoF	Directorate of Fisheries.
EEZs	Exclusive Economic Zones.
EVT	Economic Valuation Technique
FAO	Food and Agriculture Organisation.
FED	Fisheries Enhancement Programmes.
FD	Fishery Department.
FMD	Fisheries Management and Development.
GNACF	Ghana National Association of Canoe Fishermen.
GDP	Gross Domestic Product.
GNP	Gross National Product.
GoG	Government of Ghana.
GSS	Ghana Statistical Service.
IDA	International Development Association.
LA	Livelihood Analysis.
MoFA	Ministry of Food and Agriculture.
NHIS	National Health Insurance Scheme.
NDPC	National Development Planning Commission.
SIA	Sustainable Impact Assessment.
SPSS	Statistical Package for the Social Sciences
UNDP	United Nation Development Programme
WCED	World Commission on Environment and Resources.
WPPF	Working Party on Pollution and Fisheries.
WTO	World Trade Organisation.

CHAPTER ONE

GENERAL INTRODUCTION

1.1. Introduction

The world's fisheries occupy an important niche in the global eco-system, economy and human diets. According to the Food and Agriculture Organisation (FAO, 2009), total world fisheries production reached a new high of 143.6 million tonnes in 2006. About 110.4 million tonnes of this resource was used for human consumption, with the remaining going to other uses such as livestock feed and fishmeal for aquaculture (FAO, 2009).

Artisanal fisheries have long been a very important economic sector in West Africa. Small-scale fisheries are typically of traditional, artisanal and/or subsistence character. According to Mathew, S. (2001), fishing activities have been passed on from generation to generation and fishing is carried out for livelihood and food security purposes (Mathew, S. 2001 cited in International Journal of Development and Sustainability, 2012).

In some coastal communities, up to 60% of their animal protein intake comes from fish. Where distribution systems are efficient, inland communities can also obtain smoked dried fish that can be stored for up to three months. Since most of these rural communities do not have facilities for chilling or freezing foods, this makes smoked fish much more important than beef (Jallow, 2009).

The African industrial fishing sector has always been weak and this is reflected in the limited contribution of the sector to Gross Domestic Product (GDP) in most countries. In Namibia and Mauritania, fisheries contribute more than 6 percent of GDP, in Sierra Leone 11 percent and in Ghana 4.5 percent (Jallow, 2009).

The importance of fish in the Ghanaian diet cannot be overemphasized as it provides the Ghanaian consumer with 60% of animal protein needs. According to the 2007 Budget

Statement of Ghana, the country's total annual fish requirement was estimated at 720,000 metric tonnes, while annual production averages 400,000 metric tonnes. This leaves an annual deficit of 320, 000 metric tonnes which is made up through importation of US \$ 200 million worth of fish yearly (MoFEP, 2007).

The fisheries sector contributes significantly to national economic development objectives relating to food security, employment, poverty reduction and foreign exchange earnings. The sector is significant for its division of labour based on gender. Men are involved in fish harvesting, undertaking the main fishing activities in the artisanal, semi-industrial and industrial sectors, while women are the key players in on-shore post-harvest activities; fish processing, storage and trade activities. Many women are also engaged in the growing frozen fish distribution trade as well as marketing fish within and outside the country. As fish stock gets depleted and catches dwindle all operators at all levels of the fish value-chain are affected (Seini et al, 2002).

Following from the above, fish has always had far-reaching implications for food security in Ghana. Fish supplies naturally augment food availability; ensuring good nutritional outcomes particularly of the poor and rural populations; and, the vast number of people engaged in the fishing industry earn income that improve upon their access to food (Seini et al, 2002).

In the Kwahu-North district in Ghana, migrant settlers on the Obosum and Afram rivers depend on fishing as their main economic activity which provides them with employment, income and protein. An examination of artisanal fishing value-chains in the Kwahu North district with a focus on livelihood production, benefits and constraints is the subject matter of this research.

1.2. Statement of the Problem

The contributions of artisanal fishing to employment creation, food security and livelihoods in rural communities have been acknowledged in the literature (FAO, 1996, Jallow, 2009). However, global and local statistics and estimates point to the fact that, annual fish yields and catches in Ghana have been on a decline for some time now. But, how reduced fish harvests affect the livelihoods of fishers has received little research attention.

Artisanal fishing involves different players who perform different roles in fish capture, processing and marketing. These activities serve as a fulcrum around which the livelihoods of families are built. However, how individual players along the fish production value-chain cope with reduced catches and rising cost of inputs for processing as well as transportation difficulties in reaching marketing centres are little understood. To understand how these factors affect livelihood security and the range of coping mechanisms that fishers adopt, there is the need to investigate the dynamics of artisanal fishing through the application of Porter's (1985) Value-Chain Analysis.

In the Kwahu North District, social and economic infrastructure and services in fishing communities seem not to be of the standard and quality that can support higher levels of welfare for the fisher folks and more importantly, for the younger generation of children and the youth. This is because, the communities are scattered with most of them poorly linked with roads. Others are located on islands and can only be reached by boats. The scattered and remote nature of the settlements makes them difficult to be reached by government interventions. There is, therefore, the need to find out the stock and quality of educational and health facilities and services in order to determine what level of welfare they may need.

In the wake of low catches, fishermen may resort to ingenious ways of catching more fish, some of which may be detrimental to the long-term sustainability of the fishing industry. It is,

therefore, important to find out issues of over fishing, pressure on fish stocks and competition for territorial areas which may result in conflicts.

Besides unacceptable fishing methods and conflicts, fishers' ability to mobilize sufficient financial resources to support their businesses need to be closely examined as this information is largely unavailable on the situation in the Kwahu-North District.

Even though some information exists on the effects of tree stumps in the Volta Lake and how they affect navigation, the damage that these tree stumps cause to fishers' nets and how this affects their businesses have also received little research attention. It is important to know how much fishers spend on net repairs and how that affects their net earnings.

Finally, the fishing technology employed may have implications for the long-term sustainability and annual profitability and viability of the fishing enterprise. These issues need to be carefully studied as they affect livelihood outcomes.

It is against this background that, the study sets out to investigate artisanal fishing and livelihoods in the Kwahu North district, and to find answers to the following questions;

- i. What is the standard and quality of socio-economic characteristics of the fishers in Kwahu-North District?
- ii. How does fish harvests affect livelihoods of fishers in Kwahu-North District.
- iii. What are the challenges facing the fishermen and other players in the artisanal fishing industry?
- iv. Do the fishing methods and technology inure to the long-term viability and sustainability of fishing dependent livelihoods in the Kwahu-North District?

1.3. Research Objectives

The general objective of the research is to investigate socio-economic effects of artisanal fishing on rural livelihoods in Kwahu North District.

Specifically, the study seeks to:

- i. Examine the demographic and socio-economic characteristics of the people in the fishing industry in terms of their education, income, health status and ethnic groups.
- ii. Investigate the work and livelihood activities of the key actors involved in artisanal fishing and how their positions along the fish production value-chain affect their wellbeing.
- iii. Identify the challenges facing the fishermen and other actors in the artisanal fishing industry in the study area.
- iv. Describe the appropriateness of fishing technology employed by various fishers in the study area.

1.4. Research Propositions

The study is guided by a number of propositions. These are:

- i. Demographic and socio-economic characteristics of the fishers influence livelihood activities and well being of fishers in Kwahu North district.
- ii. Artisanal fishing is important for livelihood security and sustainability for various categories of fishers in the Kwahu North district.
- iii. The challenges faced by the fishermen and other players in the artisanal fishing industry negatively influence their well being.
- iv. The technologies employed by the fishers have implications for long term sustainability and viability of the fishing enterprise.

1.5. Research Methodology

1.5.1. Types and Sources of Data

Data for the study was obtained from both primary and secondary sources. The primary data was obtained first hand from the field principally from a sampled group of fishermen, fish

processors and fishmongers whilst the secondary data was obtained through review of relevant documents such as books, journals, district assembly profiles and internet sources on issues relating to artisanal fishing activities. The data consisted of both qualitative and quantitative types and were used to investigate the work and livelihood activities of the key people involved in the artisanal fishing and how their positions along the fish production value-chain affects their well being.

1.5.2. Sampling and Sample Size

Due to the scattered nature of the settlements, it was considered more feasible to locate a cluster of communities for closer analysis. For instance, the 2000 Population and Housing Census shows that, the population in Kwahu-North District is scattered in 544 towns, villages and hamlets spread over a total land area of 5040 sq km.

With regard to this, four communities were selected for the study, namely Ekye-Amanfrom, Brumben, Amankwa-Krom and New-Kyease. The total population of the four communities where the sample was drawn was 8, 784.

The sampling techniques used included stratified sampling and purposive sampling. The stratified method was used to select respondents from each community. A total sample of 200 was drawn out of 8, 784 with 50 respondents selected from each community. These included 25 fishermen, 15 fish processors and 10 fishmongers or traders. These ratios generally reflect the proportions in which the fisher groups occur in the study area.

The researcher selected the same number of respondents from the study communities due to the cosmopolitan nature of some of the communities, though the communities have differences in their population size. Purposive sampling was used to select 4 opinion leaders who were head of fishermen, 4 traditional authorities and 4 Assembly Members for further understanding of artisanal fishing and livelihoods activities in the study area. In each of the

communities, one opinion leader, traditional authority and assembly member was selected. The table below, shows the total population of the study communities.

Table1.1. Population of the Study Communities

Settlement	Location	Male	Female	Total	Total Sample Size
Ekye Amanfrom	Afram Arm	2,473	2,502	4,975	50
Amankwakrom	Volta (MainLake)	1,048	1,064	2,112	50
Brumben	Volta	724	772	1,496	50
New Kyeise	Obosum Arm	96	103	201	50

Source: G.S.S. 2000

1.5.3. Data Collection Methods

The main data collection instrument used was formal interview using a structured questionnaire. This is the method in which a set of questions was administered to respondents where the researcher fills in the responses. Respondents with formal education also filled in their responses where necessary. This was supplemented by in-depth interviews where the interviewer questions the respondents for detailed information. This method ensured consistency and validity of the responses in view of the low literacy levels in the study area.

The information that was sought from each of the groups, related to their various areas of operation as fishing, fish processing and fish mongering. These included specific activities and methods of operation like the type or types of gear used, main fishing hours and hours spent during fishing time, number of people in each canoe, time for preparing the nets, distance mostly covered from shore, sources of income, health status; living conditions, problems encountered and ways of improving the fishing industry.

Among the processors, information sought includes; specific activities, processing materials, methods used in processing, labour used in processing and ways of marketing processed fish.

The information sought from the mongers included marketing activities, modes of financing

fishermen and fish processors, types of labour, hazards and constraints facing the mongers. The formal interviews were supplemented by Focused Group Discussion and observation.

1.5.4. Data Analysis and Presentation

In this study, both qualitative and quantitative analytical procedures were used. The quantitative data was analysed and presented through descriptive techniques such as frequency distributions, cross-tabulations, pie-charts and bar-graphs. This was done after the field data was edited for consistency of responses, re-coded and fed into the computer and analysed with the aid of Statistical Package for the Social Sciences (SPSS) Version 16.0. The qualitative data was analysed through examination of main themes, trends, differences and similarities in the responses and presented through a written account to better explain the proportions that the quantitative analysis provided.

1.6. Justification and Relevance of the Research

Fishing is a very important economic activity in Ghana. Artisanal fishing forms a very important aspect of fishing in rural communities and, therefore, supports many rural livelihoods. It is practised in all the inland water bodies in Ghana including the Volta Lake. Most fishermen in the coastal communities also engage in artisanal fishing. As a result, it accounts for approximately 70-80 percent of the national fish production (Quatey, 1997; Amador et al., 2006).

The contributions of artisanal fishing to the national economy in terms of food security, employment generation and sustainability of livelihoods cannot be underestimated. This calls for the study to investigate the major actors such as fishermen, fish processors and fish mongers and their livelihoods. The study investigated the demographic and socio-economic characteristics of the fishers, their livelihood activities, challenges that face the main players and the technology employed by the fishermen along the fishing value-chain. This would

help determine the necessary interventions that they may need to improve their living conditions.

Further, the study would help fill the gap in literature by contributing to our understanding of the dynamic interrelationship among the fishers and undertaking value-chain analysis instead of individual groups. The study would be useful for policy makers, NGO's, and rural researchers because it would influence and fine-tune their policies holistically in solving problems for 'whole' groups instead of individual groups.

1.7. Scope of the Study

Artisanal fishing is important in the lives of various categories of people in the study area. These groups of people perform specific activities for the growth and sustenance of the artisanal fishing industry. They include; fishermen, fish processors, fish mongers, transporters, fishing gear sellers and consumers. Other related groups of people are, labourers, fuels wood suppliers, head porters, financiers and loaders.

The study, however, is focused on the fishermen, fish processors and fish mongers. This is because; they carry out the main fishing activities on the value-chain. The study also analysed artisanal fishing and how they impinge on their livelihood outcomes of fishers. The study, however, is restricted to inland fishing along the Volta Lake and the Kwahu North in particular.

1.8. Limitation of the Research

One challenge encountered in the course of the study was accessibility. Access to some of the communities was difficult as a result of their dispersed nature. Vehicles do not ply these communities regularly. The researcher had to travel only on specific days to overcome the problem of accessibility and transport.

Secondly, meeting the respondents to be interviewed and to fill the questionnaires was a problem. This was because the respondents were always engaged in their activities in the

morning and in the evenings. As a result, the researcher had to arrange to meet them mostly in the afternoon. In some situations, the researcher had to meet the fishermen at the shore when they were arranging or mending their nets.

Linked to the difficulty of meeting the respondents, was the unwillingness of some of the fishers to volunteer information. This was especially limited to the fishermen who engaged in unapproved fishing methods like the use of 'Atidza'. The researcher, however, explained to them that, the information was to be used for academic purposes.

Also, taking pictures of the fishers with their activities was a major challenge. The fishers were not willing for themselves and their activities to be captured on camera, especially, those engaged in 'Atidza' method of fishing. The researcher explained that, the pictures were meant to show real situations based on information received from them but would not be used for any other purpose.

1.9. Organisation of Chapters

The study has been organized into five chapters. Chapter One presents introduction to the study, problem statement, research questions, objectives and proposition. This is followed by the research methodology, justification and relevance of the research, the scope of the study and limitations of the research. Chapter Two presents literature review and conceptual issues. Issues discussed included livelihood situations of fishers, artisanal fishing value-chains, and problems of artisanal fishing and policy implications. Chapter Three presents geographical background of the study area in relation to the physical and natural environment, location and size. It also examines demographic characteristics and the overview of the district economy. Data analysis and the findings of the study are outlined in Chapter Four. Issues discussed include; demographic and socio-economic characteristics of the respondents, work and livelihood activities of the fishers, hazards and challenges of the fishers and the

appropriateness of fishing technologies employed by the fishermen. Chapter five presents summary of findings, conclusion and recommendations.

1.10. Summary

This chapter has outlined the problem of the study, research questions, objectives and propositions of the study. The chapter also showed the methodology employed and revealed the population of the study communities. It also showed the limitations of the study. The next chapter presents the literature review of the study and the conceptual framework employed.



CHAPTER TWO

LITERATURE REVIEW AND CONCEPTUAL ISSUES

2.1. Introduction

The previous chapter highlighted the problem to be investigated, the specific objectives and the proposition of the study. This chapter aims to situate the study in the scholarly context by reviewing literature on fishing, which is related to the objectives of the study. This is based on an exploration of published works, reports, documents, journals as well as Internet sources to gain insight into artisanal fishing activities and rural livelihoods in Kwahu-North District. This includes; artisanal fishing (2.2); artisanal fishing value-chains (2.3); technologies for fish capture (2.4); rural livelihoods and artisanal fishing (2.5). The study also examines the socio-economic conditions of the fishers in the fishing communities (2.6), fisheries policies and artisanal fishing (2.7) and conceptual issues that affect the livelihood activities of the fishers.

2.2. Artisanal Fishing

According to FAO (2000), fishery can be defined as the exploitation of living aquatic resources held in some form of common or open access property regime. Although, the current study is not concerned about all living aquatic resources but fish, this definition is useful because it focused on open access fisheries where restriction cannot be exercised. However, Arlinhaus et al (2002) defined inland fishery as “fishing activities in natural or “semi-natural”, limonitic ecosystems, such as rivers, lakes, gravel pits, other aquatic organisms therein”. Allan et al (2005) defined inland fisheries as the capture of wild stocks of primarily freshwater fish, including migratory species that move between freshwater and oceans. Inland fishery is a unit or an entity that is engaged in exploiting and harvesting of freshwater fish. Typically, inland fishery is the combination of fish and fishers in a region

and the conservation, management and development of fish and water resources (Allan et al, 2005).

The term, 'artisanal' in fisheries context is derived from the term "artisan" and according to Oxford Genie Advanced Dictionary (2003), it refers to "a person who does skilled work, making things with the hand". Subsistence fishers catch fish for bringing food on the table and also for trade. An extensive definition of 'artisanal fishing' is provided by Demuynck, (1994): ' Artisanal fishing is a dynamic activity that range from sedentary to migrant fishers or communities, from part time to full time fishing activity, from subsistence to non-differentiated or highly differentiated and specialized fishing', (Demuynck, 1994).

According to Mathew, S. (2001), 'artisanal fishing', particularly applies to coastal or island and inland ethnic groups using traditional techniques such as rod and tackle, arrows and harpoons, throw nets, drag nets and traditional boats. Artisanal fishing is often, but not always, less intensive and less stressful on fish populations than modern industrial fishing techniques (Mathew, S. 2001).

Further, socio-economic characteristics are important determinants of livelihood situations of fishers. This can be seen in the area of employment, income, revenue, health and education. Artisanal fishing is a source of livelihood in many developing countries, particularly for low income families in rural areas. Tetteh (2007) estimated that, artisanal sub-section of Ghana fisheries offer jobs to approximately 30,000 people. In as much as this may be true, it fails to clearly identify the subsectors involved.

Linked to employment is income generation through artisanal fishing. According to Lorenzen et al (2000), in Laos, about 30 per cent of rural household income is earned through artisanal fishing. In Sri Lanka, recent economic variations have put the value of fisheries at about 18 per cent in irrigated paddy production (Renwick 2001; cited in Coates, 2007).Also

artisanal fishing when managed properly can provide revenue to both management and local communities (Coates, 2007).

A study on Lake Chariba by Njaya (2007) supports the revenue generation attribute of artisanal fisheries as the collection of taxes from fishers provide revenue for the common good of all communities around the fishing area. Though this assertion may be true, as to how the revenue would be collected in most remote areas of the study area, its distribution remains unanswered.

Further, the issue of health affects the socio-economic lives of fishers. Positively, engaging in fishing enables the fishers to have access to more regular source of cash (through the selling of their daily catches) than other socio-economic groups in the same communities, for example, farmers. This is the 'bank in water' function as field data confirm that households engaged in fishing activities use fish income to cover their health expenses (Russell et al. 2007). Recent research suggests, however, that access to cash does not always reduce sensitivity of fisher folk to health risks. It can, in fact, in some cases increase it through a high expenditure to risks attached to a fisher 'life cycle' characterized by alcohol and, or drug consumption and reliance on casual sex or prostitution (Allison and Seeley, 2004; Kissling et al. 2006). Though the issue of alcohol, drug consumption and sex may be true, they cannot be described as causal factors to health situations in fishing communities at the study area. Rather, health issues can be linked more to the conditions under which the fishers work.

2.3. Artisanal Fishing Value-Chains

Fishing is an important economic activity in the lives of many people. Various categories of people are engaged in the organisation of fishing activities for their livelihoods. These activities bring to the fore the concept of value-chain which emerged in the 1960s as an analytical tool for agricultural research (Raikes et al. 2000). The growth in theory and application of value-chains suggests that, they are useful in understanding benefit flows from

production systems such as fisheries. Porter in (1985) introduced in his book ‘The Competitive Advantage’ the concept of value-Chain. He suggested that, activities within any organization should add value to the service and products that the organization produces, and all these activities should run at an optimum level if the organization is to gain any real competitive advantage.

Primary product-based (e.g. fish) value-chain analysis is often used to track changes in the price and cost that are incurred as the product passes between actors (fishermen, processors and traders) with production systems, from initial inflow of products through to the final consumer (Taylor, 2005). However, the view that activities within the organizational structure should add value to the service and product and that, the organizational activities should run at an optimum level, does not apply in all cases. This is because every activity has its challenges resulting in vulnerability context. According to Adger et al. (2004), in the case of fisheries, people may be exposed to physical risks (waves and high winds, accidents while hauling nets), climate induced risks (impacts of global warming on fish productivities), health risks, currency devaluations and increased fuel prices and political and security risks (theft and conflicts) are eminent factors hindering fishery activities. This study, however, seeks to show the livelihood situations of artisanal fishing including fishermen, fish processors and traders and relationships that exist between them in the Kwahu North District. Fishers (particularly men) may perceive such activities as ‘women’ business, as women are generally responsible for selling of processed fish (Weerafungue et al. 2010). The role of consumers is however, not included in this study.

Further, in mapping fishing value-chain networks, it may be possible to identify inefficiencies that run through the fishermen, fish processors and traders and the inequalities that emerge between these stakeholders as a result of trade relations. Value-chain analyses might also present an opportunity to enhance the resource management strategies and the type of fishing

methods to use to enhance sustainability. It would also present a clearer estimate of the overall economic contribution to the main actors (Gillett, 2009).

Also, traditionally, each fishing community in Ghana has a chief fisherman who governs the fishermen. He is assisted by a council of elders. The roles of the chief fisherman include; co-ordination of rescue operation in the event of accidents at sea, participation in religious rituals connected to the sea, and settlement of disputes (Bunnet et al., 2001). Furthermore, he is involved in mediation with migrant fishers, and represents their communities of the Ghana National Association of Canoe Fishermen (GNACF).

There is a head of the women mongers and processors. She also has a council of elders. She is involved in settlement of disputes in the fish trade, represents women in negotiations to set daily prices of fish, and oversee occasional cleaning of landing sites. The two councils co-exist and generally work together for the mutual benefits of their members. In communities where women processors have received external support in terms of credit, technology, and functional education, they often contribute to community development activities (Bennett et al., 2001).

In Africa including West Africa artisanal fisheries have long been a very important economic sector. The contribution by the artisanal (canoe) fishing is about 65 -70% of the total annual fish production. The artisanal (marine) fishing consist of about six sub-sectors, namely ali fishery, poli/watsa fishery, drifting gill – net fishery, set net fishery, hook and line fishery and the beach seine fishery (Bennett et al., 2001). Nevertheless, with the importance of artisanal fishing in the lives of the fishers, the study seeks to investigate the challenges that bedeviled the fishers and how these could be solved to improve the livelihood conditions and well being of the fishers in Kwahu North District.

2.4. Technologies for Fish Capture, Processing and Marketing

Fish and fishery play an important role in the lives of most Ghanaians. It provides employment to an important proportion of the work force either as full time employment or as a part time activity. There are numerous secondary benefits, such as the role it creates for women as artisanal processors and traders. Various fishing inputs, such as hooks, netting materials, ropes, floats and lead as well as outboard motors are used to harvest fish.

The main methods of preserving fish are, smoking, salting, drying, freezing and frying. These methods preserve and add value to suit consumer preference. In Ghana for example, 70 per cent of the total fish supply is consumed as smoked fish. Hot smoking and drying to a moisture content of 15-20 per cent is common with freshwater fish. Marine fish are normally smoked up to 30-60 per cent moisture content. Fish are not gutted, gilled or salted before smoking. Small pelagic species are cut up. Catfish are characteristically curled round and kept in position by forcing the pectoral spine into the caudal peduncle (Halliday, 1986; Anon, 1980). Freshwater fish are well smoked in Ghana and have high market value in the urban centres (Essuman and Diakite, 1990). Though the literature captures to some extent fish processing methods, the study, however seeks to investigate socio-economic backgrounds and constraints faced by the fish processors and how these constraints can be addressed to improve their livelihoods.

Salting and sun-drying are also used together to preserve fish in Ghana. The process is always accompanied by fermentation due to hydrolysis of proteins by fish enzymes and bacteria and impacts a characteristic 'stinky' odour to the products (Njai, 1986; Orraca-Tetteh and Nyanteng, 1987).

Salting is done by coating or sprinkling salt over the fish or by soaking in light or saturated brine for 1-5 days. In the remote inland fishing towns, salt is expensive, hence, light brining is more common. Fish is spread on the ground, on stones, straw or old discarded nets to dry

in the sun. In some areas raised platforms are used. Drying takes up to 6 days depending on ambient temperature, relative humidity and air flow (Azeza, 1986).

Fish are susceptible to infestation by insects which is a major cause of dried fish spoilage in Ghana. Blowflies infest wet fish with eggs during drying and the larvae eat the fish until moisture inhibits their development. Moisture content above 20 per cent does not completely halt the activity of maggots. The presence of maggots is thus a common feature of fermented fish products (Walker, et al. 1986).

A moisture content of 15-20 per cent in smoked or sun-dried fish is conducive for infestation by necrobia and nermestes species. Dried fish in storage may be heavily infested with these insects which can eat up the flesh. A sack full of 'banda' or anchovies may be reduced to bones after some time. This is a major problem of inland fishing where drying is the main form of preservation, and some processors store fish for up to six months to await better prices during the lean season. Where fuel wood is available, periodic re-smoking is practiced. In the Sahel Region this is usually impossible. Some processors prevent insect attack by applying insecticides (Walker, et al. 1986). In Ghana, camphor is used to prevent insect attack on smoked or sun-dried anchovies (Azeza, 1986). Again, though the literature mentioned to some extent insect infestation during salting, fermentation and drying, its causative factors and assistance needed by fishers remains a challenge. The study, therefore, seeks to bring to the fore the causal factors and the necessary assistance needed by the processors to improve their livelihood conditions in the Kwahu North District.

Post-harvest handling of fish is a major problem which affects the quality of fish products in many developing countries. Lack of suitable fish containers and poor transport systems contribute to post-harvest losses as well as loss in quality.

Processed fish products are often packed in heaps and covered until they are ready to be transported to the markets. Common containers used to pack processed fish are old jute bags

or locally made wooden boxes and baskets. While in storage the fish is re-dried periodically, smoked fish in particular is re-smoked, while salted and dried fish are sun-dried (Orraca-Tetteh and Nyanteng, 1987). The development of these artisanal containers has been influenced by local handling, storage practices and cultural factors as well as by the availability of raw materials and traditional technology (Essuman and West, 1990).

A considerable proportion of fresh and processed fish are packed in hard or rigid containers. They include crates, cartons, baskets, metal containers and sacks. These containers are widely used for handling fish products in bulk either for transport, distribution or storage (Essuman and West, 1990). However, a systematic analysis of the use of these artisanal fish containers by both processors and traders during distribution process remains unanswered. The study, therefore, seeks to identify the linkage between the processors and traders and how they can improve on their activities to reduce mismanagement during packaging and distribution processes.

2.5. Rural Livelihood Concepts and Artisanal Fishing

The definition of a livelihood as a means of securing a living summarises a reality which comes into focus as being complex as its parts are found and named, and its structure unraveled. Livelihood is a process that underpins the way people derive their incomes. According to Ellis (1999), livelihood comprises ‘the activities, the assets, and the access that jointly determine the living gained by individuals or household’. The livelihood concept is a realistic recognition of the range of activities that individuals and households engage in to ensure their survivals and improve their well being.

The definition of a livelihood can be at different hierarchical levels. The most commonly used level descriptively is the household, usually the human group which shares the same hearth for cooking. In adopting this level here, it is important to recognise an individual or intra-household level, in which the well being and access of some household members, and

especially women and children, may be inferior to that of others, especially men; and also the broader levels of the extended family, the social group, and the community (Swift, 1989).

In relation to artisanal fishing and rural livelihood, various strategies are adopted by rural households in artisanal fishing to support their livelihood. These strategies range from low human (labour) investment combined with low capital investment, to a highly intensive labour activity and/or highly capital-based activity. Between these two extremes, a continuum of combinations exist which provide opportunities to thousands of people to include fishing activity as part of the overall range of activities they undertake to sustain their livelihoods in rural areas.

2.5.1. Rural Livelihoods

Rural livelihoods depend more on natural assets and is much less likely in urban areas where people are more dependent on cash income and do not draw directly on natural capital. The urban economic activities such as manufacturing, transport and construction are mostly beyond the control of individuals or households. Rural-Urban livelihoods, however, should not be dealt with in isolation because the actors notably politicians, enterprises, households and individuals operate in both urban and rural areas. Tacoli (1998) suggests that there are two types of rural-urban linkages.

- i. Flows of people or goods.
- ii. Sectional interactions.

Flows of people are complex; they are multi-directional and differing in duration

And of variable composition. On the other hand, sectional interactions refer to 'rural' sectors in urban areas. Urban and rural areas usually enjoy mutually beneficial links and promote economic growth. Cities benefit when agricultural productivity increases. Growing rural economies provide market for urban services and manufactured goods. Rural areas also benefit from the growth of cities which provide markets for agricultural products and for rural

non-farm outputs, and from increased productivity resulting from technology transfers, services, education and training (Tacoli, 1998).

Nevertheless, rural-urban links may also have negative consequences. Increased agricultural production to satisfy urban demand may deplete environmental capital. Urban expansion may compete for rural resource such as land and water, and is likely to generate increased waste and pollution. In rural areas, access to land, capital and labour determines the extent to which fishers can benefit from urban markets (Tacoli, 1998).

However, the deprived nature of Kwahu North District hinders the full benefits that could be derived from the urban centers. The study therefore seeks to fill the gaps on how policy interventions by government and institutions improve the livelihood conditions of the fishers in the study area. This would enable the fishers to take advantage of livelihood opportunities to increase their assets. This is because increased interaction between urban and rural areas may increase inequality and vulnerability of those groups with least assets rather than benefit them.

2.5.2. Resilience and Vulnerability of Fishing Dependent Livelihoods

The assets which poor people possess or have access to, the livelihood they desire and the strategies they adopt are influenced by the context within which they live (Ellis, 1999). This is conceptualized as having two broad dimensions; factors that influence their vulnerability, and policies, institutions and processes. Vulnerability refers to the insecurity of the well-being of individuals, households or communities in the face of changing environment. Environmental changes threatening welfare can be ecological, economic, social and political. These changes often come with increased risk and uncertainty and declined self respect (Moser, 1998). The concept of vulnerability better captures processes of change than more static measures of poverty (Moser, 1996,p2;1998). Nevertheless as a result of low level of research on the vulnerability of fishers in the area, the study further seeks to fill the gap by

investigating vulnerable situations of the fishers in terms of hazards and constraints they face in undertaking their activities. This would help identify policy interventions needed by the fishers to improve their livelihood conditions.

Further, analyzing vulnerability also identifies not only the threats to individuals and households and their assets but also their resilience. Resilience is the ability to mobilise assets to exploit opportunities and resist or recover from the negative effects of the changing environment (Moser, 1998). The ability of households to avoid or reduce vulnerability and to increase economic productivity depends on their ability to transform those assets into income, food and other basic necessities by intensifying existing and developing new or diversifying their strategies (Moser, 1996; 1998, Conney, 1998).

Many rural and urban residents rely on a combination of both rural and urban based assets or income sources and access which is often essential for the survival strategies of poorer households as well as for accumulation of strategies of better-off groups (Moser, 1998). For example, urban demand (and markets) can be critical for rural producers, while at the same time many urban enterprises rely on rural consumers. Small and intermediate urban centers are often linked to the surrounding rural settlements by complex two-way interactions which include trade or employment and the provision of services such as hospitals and secondary education (Kamete, 1998). It is widely acknowledged that access to non-agricultural employment is increasingly important for rural populations and that in many cases diversification of income sources is an effective survival strategy for vulnerable groups with limited access to assets (Ellis, 1998). However, with little research work on diversification of economic activities of fishers in Kwahu North District, the study seeks to exploit fully, diversified economic activities available in the fishing communities for their full exploitation to improve the livelihood condition of the fishers.

For the rural populations, migration is an important way to ensure access to assets which are temporary or permanent. These two linkages may include sending remittances from urban to rural areas. In addition investing in property such as housing, land and cattle in the home area is often an important element of migrant-livelihood strategy, and relatives are those most likely to take care of those assets in the migrants absence (Kriiger,1998; Smith,1998). Strong rural-urban links at household level mean that, increased poverty in rural areas often impacts negatively on urban areas and vice versa. It is assumed that falling fish prices or lean harvest of fishery resources or declining rural production mean a sharp rise not only in rural poverty, but these also mean a falling demand for the goods and services provided by many urban enterprises to rural enterprises or households. An increase in urban poverty also implies that, there are fewer job opportunities in urban areas for rural dwellers; reduced remittance flows from urban to rural areas, less urban demand for rural products and possibly more urban to rural migration, which could increase dependency burdens in rural areas (Moser, 1996).

2.5.3. Livelihood Sustainability and Portfolios

Livelihood comprises the capabilities, assets (including both tangible and intangible resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base (DFID, 1999). Sustainable livelihoods are those that can avoid or resist stresses and shocks and /or that are resilient and able to bounce back. Household's portfolio of tangible (stores and resources) and intangible (claims and access) assets can be understood as partly chosen by design to reduce vulnerability and to enable the household to survive stress and shocks with minimum risk of threat to the future livelihood (Swift, 1989).

Planning for future livelihoods implies the placing of a value on the future. The Brundtland Report by World Commission on Environment and Resources (WCED, 1987:8) emphasized

this in its definition of ‘sustainable development’ as meeting the needs of the present without compromising the ability of future generations to meet their own needs, and thereby raise the issue of equity for future generations. Little research work has been done on livelihood sustainability among fishers in Kwahu North District and the study seeks to identify livelihood portfolios among fisher groups which would serve as security during vulnerable situations and will serve as a buffer for future generations in the study area. The sustainability criterion suggests that, at a minimum, future generations should be left no worse than current generations (Tietenberg, 1984).

Reducing vulnerability has two dimensions. The first is external through public action to reduce external stress and shocks through off-season public works to provide employment. The second is internal through private action in which a household adds to its portfolio of assets and repertoire of responses so that it can respond more effectively and with less loss. This is reflected in the following quotations (Cited from Pearce et al. 1989:173-185) ‘...Sustainability might be redefined in terms of requirement that the use of resources today should not reduce real incomes in the future....’ Sustainability ought to mean that a given stock of resources, trees, soil quality, and water resources should not decline (Markandya and Pearce 1988).

2.5.4. Livelihood Diversification

Livelihood portfolios, bring to the fore the issue of livelihood diversification. Livelihood diversification is a process by which a household increases the number of its income generating activities (Ellis, 2000a). The purpose of income diversification is thus to develop portfolios of income generating activities with low covariate risk among the components (Ellis, 2000a, 2000b, Hazelt and Norton 1986). Most studies recognize the benefit of diversification as a means to achieve increased income and livelihood security. In particular, Ellis (2000b), Carter and May (1998) and Reardon et al. (1992) emphasized the role of

flexible government schemes and policies in promoting diversification such as removal of financial, legal and fiscal boundaries like market access, transportation and commodity taxes to new activities, while taking into account regional/local specificities and households motives for diversifying their income sources.

The issue of local specification is lacking in most inland fishing communities, especially, those which practice artisanal fishing. As a result of the disadvantaged nature of the study area, policies of providing basic social facilities of electricity, good roads and portable drinking water which are needed to help the local fishers are lacking. The study will therefore draw attention of policy makers to focus their attention on deprived areas such as the Kwahu North District. Technical support could be provided for the fishers to diversify their income earning activities. The lack of attention or misplaced attention through maladapted policies that lack clear assignment, control, surveillance and enforcement; and the power of government to restrict the size of catch of the fishery sector and the communities have received so far can be traced to a number of misconceptions stemming from ‘the old paradigm on poverty in small scale fisheries’ (Béné, 2003, p.500).

Diversification is widespread and has been occasionally shown, when households can seize opportunities, to offer them a path way out of poverty. But this is not always the case. In rural (farming) household, those who begin poor in land and financial assets face more difficulties to overcome barriers of entry and investment to engage in non-farm activities, and remain caught in a ‘poverty trap’ (Barrett, 2005). This situation echoes that of fisher folks documented by IMM (2003) in the Bay Bengal: not all members from fishing households benefitted equally from diversification opportunities, in particular when a household engage in activities associated with catching fish, such as processing and marketing.

One of the first reasons for skewed perceptions about the status and activities of fisher folk is that, fisheries have been traditionally- and incorrectly- associated with poverty and

marginality (Béné, 2003), with fishing as a last resort activity, and impending households from engaging in ‘positive’ diversification processes as a means to escape poverty. In addition, numerous sources report, in a general manner, the importance of fisheries as a major contributor to livelihoods. Although, this is in essence true, this generalization hides the fact that, fishers also engage in other jobs in parallel to fishing, and that these other jobs probably contribute on average equally, if not more, to the income and well being of fishing households. The ‘lack of opportunities for alternative livelihoods in fishing communities’ is often bluntly reported, yet sometimes next to evidence showing the contrary (MRAG, 2003).

2.5.5. The Nexus between Artisanal Fishing as a Rural Livelihood Activity and Well Being

Various strategies are adopted by rural households in artisanal fishing to support their livelihoods. These strategies range from low human (labour) involvement, to a highly intensive labour activity and from low capital investment to highly capital based activity. Between these two extremes, a continuum of combination exist which provide opportunities to thousands of people to include fishing activity as part of the overall range of activities they undertake to sustain their livelihoods.

The combination of low human involvement and low capital investment corresponds to the strategy of opportunistic fishing, especially for subsistence purposes. This involves cheap and simple fishing gear (baited fishing lines) and it is frequently carried out by ‘non leading’ members of the household (children or elders, or sometimes adult women) in addition to other domestic activities. In West African villages on the coast or in the vicinity of rivers, opportunistic fishing, with other activities such as farming, household or agricultural commitments occupying the rest of the day is very common (Horemas and Jallow 1997, Williams and Awoyomi, 1998).

Further, seasonal (or part-time) fishing is usually characterized by a slightly higher labour and financial involvement. It is also operated by different members of the household, part-

time fishers and young or mature males who get involved in fishing activities as part of a wider, multi-activity livelihood portfolio. These artisanal fishers use relatively cheap and simple gears (e.g. traps, gillnets, hook and lines) although some use sophisticated gear or techniques (Ahmad et al. 1998).

The third categories of fishermen are full-time fishers as a result of absence of other opportunities. They are wage based fishermen working all year round on artisanal vessels (Ahmad et al. 1998).

Nevertheless, the categories of fishers and the degree of human and financial investment does not necessarily 'explain' by itself the level of success or failure of the household and the extent to which involvement in fishing activities contribute to household well-being.

According to the Volta Lake Frame Survey completed in 1999 by the Directorate of Fishers (DoF), there were over 1,200 villages along the lake, over 24,000 planked canoes and over 70,000 fishermen engaged in the Lake Volta Fishery. It is also reported that 20,000 fish processors and traders also depend on the lake for their livelihood. The gears used are cast and gill nets, hook and line and traps. The species exploited are mainly Cichlids (38.1%), *Chrysichthys spp* (34.4%) and *Synodontis* (11.4%) (MoFA, 2004).

In summary, the contributions of fishing activities to the livelihoods of rural poor and non-poor households may take remarkably diverse forms and may involve a variety of different strategies.

2.6. Socio-Economic Conditions of Fishers in Fishing Communities

Socio-economic indices are important in determining livelihood conditions of fishers in fishing communities. This can be seen in the form of employment, health, income, revenue and education.

The issue of health in relation to fishing as indicated by Allison et al (2006) is that fisher folks are not necessarily the poorest of the poor in monetary terms, but may, instead, be

among the most vulnerable socio-economic groups in societies due to their particularly high exposure to certain natural, health-related or economic shocks and disasters. Though this may be true, it however, fails to show specific natural conditions that may be responsible for health conditions of fishers. Further, Allison et al. (2006) argue that fishing households may appear to be more vulnerable than some other socio-economic groups in the same community or other communities (Allison et al. 2006). Again, it fails to identify the socio-economic groups and the types of communities involved. Lemoalle (2007) indicated that large part of infections in fishing communities are water-borne disease.

Along the Volta Lake, the absence of hospitals means that, the sick people have to be sent to the nearest clinic or hospital in transport boats. Medicines are available only from itinerant drug vendors. In these conditions, fishers are especially vulnerable to this lack of provision to health services and medication as their access to these facilities is even more problematic than the rest of the local population. Possibly, one 'positive' effect of being engaged in fishing is that fishers may have access to more regular source of cash (through the selling of daily catch) than some other socio-economic groups in the same communities (e.g. farmers). This is the 'bank in the water' function and field data confirm that households engaged in fishing activities use income to cover their health expenses (Russell et al. 2007). Recent research suggests, however, that access to cash does not always reduce the sensitivity of fisher folk to health risks. It can, in fact, increase it through a high exposure to risk attached to a fisher 'life-style' characterized by alcohol and, or drug consumption and reliance on casual sex or prostitution (Allison and Seeley 2004, Kissling et al. 2006).

2.6.1. Artisanal inland Fisheries and Employment Generation

FAO (2009), estimated that 43.5 million people worldwide were directly involved in the capture of fisheries and aquaculture in 2006. Factoring in employment in fish processing, marketing and service industries, including the families of all people employed directly or

indirectly from fisheries and aquaculture, over half a billion people depend on the sector for their survival (FAO, 1996).

Allan et al. (2005) citing Kura et al (2004), acknowledge that fishing and its related activities- processing, transport, and retailing are important at every scale from the village level to the national economies. As a crucial source of livelihoods in developing nations, inland fisheries provide employment as last resort, particularly for low-income families in rural areas where job options are limited. Béné et al (2003) added that the fisheries of river basins of West and Central Africa provide employment for a greater number of households as much as 64,700 and 62,000 in the Niger-Benue system and in the Congo-Zaire respectively. Equally, Jul-Larsen et al (2003) in Béné (2007) described that, fishers' density on lakes and reservoirs in Ghana rank up to six fishers per kilometer of shoreline, which is a relatively high figure compared to what is observed in Southern Africa. FAO (2004) in Tetteh (2007) estimated that artisanal sub-sector of Ghana's fisheries offer jobs to approximately 30,000 people. The above literature is relevant for this study as it tries to establish the link between artisanal fisheries of Kwahu North District and employment creation. However, whereas the focus was on direct employment to various categories of fishers, it also looks at indirect or ancillary employment as aquaculture, farming, animal rearing and services sector, that could be generated along with the main fishing activities to improve livelihood situations of the fishers in the study area.

2.6.2. Artisanal Inland Fishing and Income Generation

Allison et al., (2007) argued that although the fisheries of Lake Chariba in Malawi, offer an economically unstable environment determined by the seasonal and long-fluctuations in lake level at high production periods, the fisheries contribute readily-earned cash to the wider rural economy. In supporting this view, Béné (2006) pointed out that well managed inland fisheries and fish-related activities play a crucial role in generating wealth and sustaining

economic growth. For example, research in the Zambezi River area reveals that artisanal fisheries generate more cash for households than cattle rearing in most cases and more than crop production in some cases. According to Lorenzen et al., (2000), in Laos, about 30 per cent of rural household income is earned through artisanal fishing. In Sri Lanka, recent economic valuations have put the value of fisheries at about 18 per cent of total economic returns to water in irrigated paddy production (Coates, 2007). This issue of income dimension of artisanal fisheries was supported by a study of World Fish Center (2008) in West and Central Africa river fisheries. The organization alluded that artisanal fisheries is not only labour intensive but also a strategy of risk spreading of the poor rural households. As a result of importance of income generation in artisanal fishing and little research work on artisanal fishing and income generation in the study area, the research also seeks to look at artisanal fishing and income generation and its importance in the lives of fishers in the study area.

2.6.3. Artisanal Inland Fishing and Revenue Generation

Fish provides more than 2.9 billion people with at least 15 percent of their average per capita animal protein intake in many small island developing states as well as in Bangladesh, Cambodia, Equatorial Guinea, French Guinea, the Gambia, Ghana, Indonesia and Sierra Leone (FAO, 2009). Both direct employment and jobs in related industries are likewise important for developing countries, whilst their revenue from fisheries export earnings have reached US\$ 24.6 billion annually (Brown et al. 1995). Across Africa, about three million fishers and fish farmers depend directly on fisheries and aquaculture for their livelihood. A further seven million men and women depend on the sector through their work as fish handlers, processors and traders (Jallow, 2009).

Further, scholars in the fisheries sector are of the view that well managed artisanal fisheries in inland waters can provide revenue to both management and local government. A study carried on Lake Chad and other water bodies by Béné et al. (2003) pointed out that artisanal

fishery sector contributes about ten percent to GNP. Although livelihood of fisher folks are known to be adaptive (mobile and diverse), long-term decline in fishing is a wider concern for rural development because fisheries provide one of the few sources of cash revenue and are therefore a local 'engine of growth' in areas otherwise remote from the cash economy (Allison et al. 2004). Also, a study on Lake Chariba in Malawi by Njana (2007) supports the revenue attribute of artisanal fisheries as the collection of taxes from fishers provided revenue for the common good of all communities around the fishing area.

2.7. Problems of Artisanal Fishing

Jallow (2009) has catalogued some of the problems of artisanal fishing at the global scale. He identified the high cost of fishing gear and vessels which results in challenges with investment in these equipment. It is therefore important to investigate how fishers acquire their inputs in the study area and the challenges they face in acquiring these inputs and how it affects their work and livelihood conditions.

Perhaps, the most disconcerting developments have been the incidence of illegal unreported and unregulated (IUU) fishing. This is a problem that threatens to deplete fish stocks worldwide. The level of illegal fishing in Africa particularly in West African waters is amazing. It has been estimated that illegal unreported and unregulated fishing cost sub-Saharan African at least US \$1 billion (£0.7 billion) each year (Jallow, 2009). The problem is that governments cannot afford to police their waters to prevent illegal vessels operating within their exclusive economic zones (EEZs) (Greenpeace, 2006; Jallow, 2009). These are discussed below;

2.7.1. Mismanagement of Fishery Resources

There is global concern about mismanagement of fishery resources. FAO's 1996 report on the state of the world's fisheries emphasized that, population pressures and shortages of alternative employment opportunities together with lack of effective conservation and

management policies in many developing countries have increased the attraction of fisheries as a last resort to employment.

The problem of fisheries mismanagement in deprived areas as the Kwahu North District has been a result of failures of national and international foresight in three policy areas; first, the over-capitalization of the fishing fleets and over-exploitation of fisheries (Bell 1978); second, environmental deterioration especially degradation and destruction of breeding and feeding areas for many fishes (Bell 1978, FAO 1996) and third, the use of fishing resources for recreation purposes (Bell, 1978).

In the report on FAO's (1995) conference on Fisheries Conservation, Saouma points out that nearly 10 percent of the catch in many developing countries does not reach the consumer because of deterioration and lack of immediate cold storage facilities, and difficulties in processing and marketing. Nevertheless, in the Kwahu North district, the issue of fisheries mismanagement is missing in the literature, though, inefficient processing methods, bad roads leading to market centers and challenges posed by storm resulting in mismanagement of fishery resources exist. The problem of fishery management identified by Sarnowski (2004) on Lake Albert in Uganda, revealed that there was a decline in the type of fish harvested. The same study added that, a decrease in the size of fish is a major indicator for biological overfishing. A study by Béné (2004) on the Volta Lake as in the study area revealed that the fishery resources are seriously over exploited for the past 30 years. Similarly, Kofie and Yiborku (2005) confirmed that, one of the key problems in the fisheries sector in Ghana is over fishing, which directly impact on fisheries livelihood through income and profit reduction, increasing competition and conflicts over fishing grounds and resources. The above literature is relevant for the current study because, the more fish is exploited, the more the catch Per Unit Effort (CPUE) decreases and as a result, a fall in fishermen's income. Though Béné (2007) linked the issue of overfishing to fishers' income, it failed to assess

same on artisanal inland fishery employment and revenue generation. This study seeks to identify the challenges of the fishermen and the necessarily technical assistance needed to improve their fishing methods as well as their livelihood situations.

2.7.2. Environmental Challenges of Fishing

The challenges that face the fishermen, fish processors and traders do not relate to mismanagement, illegal fishing and provision of fishing gear alone but also to the environment.

According to Katriku (1999), the Volta Basin is now in a crisis situation 'as a result of deforestation, overgrazing, increased cultivation, loss of biological diversity and various forms of pollution and contamination'. Like in the Kwahu North District, some of the worst practices that degrade the environment are found among fishermen in the Volta Lake. The use of bamboos in fishing has resulted in the degradation of the river beds. This is partly to blame for the decreasing fish catch.

These problems which apply to lake and riverine fisheries therefore need future management strategies that should not be concerned just with achieving or maintaining certain levels of production, but also with ensuring that the maximum number of fisher folks, traders and other support personnel make a reasonable living from the fish resources.

The fishers along the lake use wood from the forest around the lake for smoking of fish and for domestic purposes. This has led gradually to the destruction of the forest around the lake. This exposes the land to the weather especially rainfall and causes erosion and landslides during torrential rains. This situation was emphasized by (Ly, 1980; VRA, 1995). The destruction of the forest along the Lake led to landslides in many areas on the eastern banks of the lake. This act will also deprive the fishers of the available trees needed to smoke their fish catch (Gordon and Amatekpor, 1999).

Deforestation also means that the wood that has been used to build traditional canoes is becoming scarce and more expensive. Some fishermen have resorted to imported fiberglass canoes, which last longer, but the initial investment and maintenance costs are higher. All these factors are affecting the profitability of many family businesses. At a time of rising global food prices, they also threaten the food security of the entire community (Jallow, 2009).

Pollution is another major problem that affects fisheries. Despite emphasis on the monitoring of chemical contaminants in the environment, the ultimate consequences of pollutants are biological. The effects on fisheries may be direct, arising from the toxicity of pollutants or indirect as a result of ecosystems modification. Since urban pollution is mainly organic, it is dominated by the enrichment pollutants (Stirn, 1981) which excessively increase natural levels of nutrients for primary producers, resulting in eutrophication (the enrichment of bodies of fresh water by inorganic plant nutrients) and its attendant deoxygenation (a chemical reaction involving the removal of molecular oxygen from a solvent) of waters. These conditions can lead to fish kills, especially, in inland waters with subsequent changes in species diversity favourable to coarse fish. Kpekata (1978) analysed the nutrient pollution load in the Odaw River, Accra, which in addition to sewage, also receives the discharges of a brewery. He recommended at least partial treatment before discharge into Accra Lagoon. Also, massive fish mortality has been observed due to industrial effluences and the illegal use of pesticides, particularly paraquat, for catching fish. A case of mass poisoning of people eating contaminated fish which had been caught with pesticides is reported by Imeybore (1972). Oil spills, either directly in the rivers or in the temporary ponds formed in the flood plains has led to tainting of fish which consequently could not be marketed. An area where fisheries are certainly at risk is the Niger Delta, but no accurate data are available (Imeybore, 1972). However, research work on environmental challenges in the fishing communities in

the study area is clearly missing. The study therefore seeks to identify these environmental challenges on artisanal fishing and livelihood of the fishers.

2.8. Fisheries Policies and Artisanal Fishing

In order to solve challenges facing the fishery sector and to improve the conditions of the fishers, various policies have been put in place by various governments and districts assemblies. The Food and Agriculture Organization (FAO) has been concerned with the problem of pollution of the aquatic environment since its founding. FAO (1997) also established the Committee for Inland Fisheries of Africa (CIFA) and the Working Party on Pollution and Fisheries (WPPF) to develop an active technical co-operation programme of its work in its field. At its first meeting in 1986, the Working Party prepared document on 'Scientific basis for water pollution control in Africa' (Biney, 1982) which is a useful and practical reference material.

Moreover, the strategy for Fisheries Management and Development (FMD) adopted by the 1984 FAO World Fisheries Conference emphasized the potential contribution of inland waters to fish production. It called upon governments to take steps to prevent or abate pollution and any forms of environmental degradation which may result from various aspects of economic development that would affect the aquatic environment, thus helping to maintain fisheries resources. The Commission surveys the state of inland water pollution in several countries in East, Central and West Africa (Alabaster, 1981). The reviews have helped to promote public awareness and focused government attention on the dangers of aquatic pollution and the important benefits that could be derived from protection of the aquatic environment.

In Ghana, the problems of fishery management have been identified and documented in the Ghana Environmental Action Plan (1994). The government of Ghana has enacted the Fisheries Law, PNDC Law 256 (1991) which has detailed the management systems and also

made provisions for the establishment of a monitoring, control, surveillance and / enforcement unit, whose function is to enforce the fisheries law (Bennett et al, 2001).

The Fisheries Act is to consolidate with amendments the law on fisheries; Act 625 of 2002, to provide for the regulation and management of the fishing industry and the sustainable exploitation of fishery resources and to provide for connected matters. One laudable function of the Commission is to promote co-operation among local fishermen and advanced development of artisanal fishing. Section 51 mandates the Commission to take such action as it considers necessary to protect and promote artisanal and semi-industrial fishing. According to Bennett et al (2001), lack of clear assignment, control, surveillance and enforcement; and the power of government to restrict the size of catch, through the imposition of total allowable catch were some of the weaknesses of the law with others on minimum landing efforts. A revised draft law, the Fisheries Bill awaiting promulgation has redressed the weaknesses to strengthen the fishing industry. However, the establishment of a Monitoring, Control and Surveillance (MCS) division capacity strengthening project is providing administrative support for monitoring, control and surveillance activities (Bennett et al, 2001).

With assistance from the International Development Association (IDA) which operates within the broad guidelines of the National Planning Commission (NPC) the government formulated a Medium Term Agricultural Development Strategy in 1990, to accelerate agricultural growth. The objectives of the fisheries sub-sector is to increase production for local consumption and export, develop management plans for the sector as a means to alleviate poverty in fishing communities, and strengthen Directorate of Fisheries (DoF) to effectively carry out its mandate. To achieve the objectives for the sub-sector, among others, a capacity building project was instituted.

To conclude, Khalid (2001) observed that the formation and implementation of policies are different issues in both theoretical and practical terms. Implementation is more complicated, being concerned with political, financial, administrative and socio-economic issues, and requires motivation, proper lobbying, technical, professional and administrative support to succeed.

2.9. Conceptual Framework

This study adopts the Sustainable Livelihood Approach (SLA) as its conceptual framework. This is because of the failure of other approaches like Economic Valuation Technique (EVT) to identify factors which influence or affect people's access to these resources. According to Sen's (1981) conclusion, which was initially framed in the context of famine (Sen, 1981), the wider domain of empirical studies have clearly demonstrated that poor people in rural areas are usually those who lack access to the natural resources like fishing. Further, Fisheries Enhancement Programmes (FEP) initiated in the 1990's in Bangladesh, though successful, failed because the poorest who could not invest in adequate fishing gears and fishing licenses were totally excluded or only benefited from a very limited portion of the increased fish production (Capistrano, Ahmed and Hossain, 1994).

However, the Sustainable Livelihood Approach (SLA) offers a useful framework to answer different questions. It provides a methodology that looks at positive and negative impacts of a particular form of fishing development upon the livelihood of the poor (Jamieson et al. 2004). Sustainable Livelihood Approach is a way to improve understanding of the livelihoods of poor people. It draws on the main factors that affect poor people's livelihoods and the relationship between these factors. It can be used in planning new development activities and in assessing the contribution that existing activities have made to sustainable livelihoods.

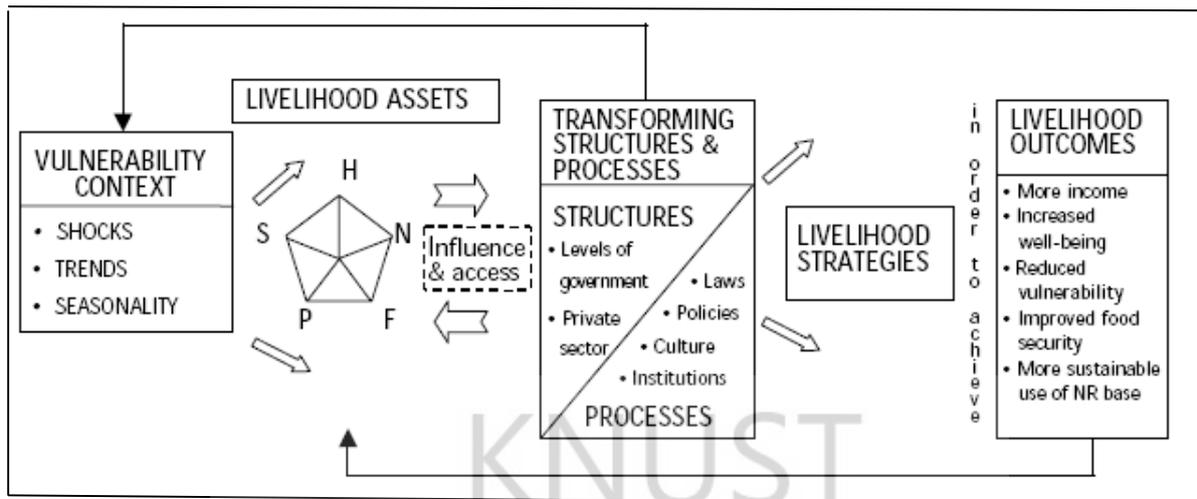
SLA is a holistic and people-centred approach that attempts to capture and provide a means of understanding people's livelihoods and in particular the factors and processes which affect these livelihoods (DFID, 2000). The framework as presented consists of five components;

- i. The vulnerability context of the environment in which the communities under consideration operate:
- ii. The livelihood assets of these communities;
- iii. The policies, institutions and processes which affect their access to livelihood assets;
- iv. The livelihood strategies which the communities adopt and
- v. The outcomes they achieve or which they aspire.

An important aspect of the SLA is its use in helping to understand the role of institutions (e.g. rules and norms) which appear to be so important in shaping the mechanisms which affect people's access to the resources.

The UK Department for International Development (DFID), United Nations Development Programme (UNDP), Oxfam and CARE, adopting their own related understandings of SL and employing SL approaches to facilitate and help rural development in practice (Carney et al., 1999; DFID, 1999). Comparing various agencies' livelihoods work, the approaches employed appear to have much in common although there may be some different operational emphases. Among these approaches, the pentagram-based module (Figure 2.1) developed by DFID (1999) is most prominent, and this framework is believed by some to have captured well, the essential concept of 'livelihood' (Baumgartner & Högger, 2004).

Figure 2. 1. The DFID Sustainable Livelihoods Framework (Source: DFID, 1999: 11).



Source: DFID, 1999.

The DFID based framework (fig. 2.1) reinforces a people-centred approach, based around five features;

key features:

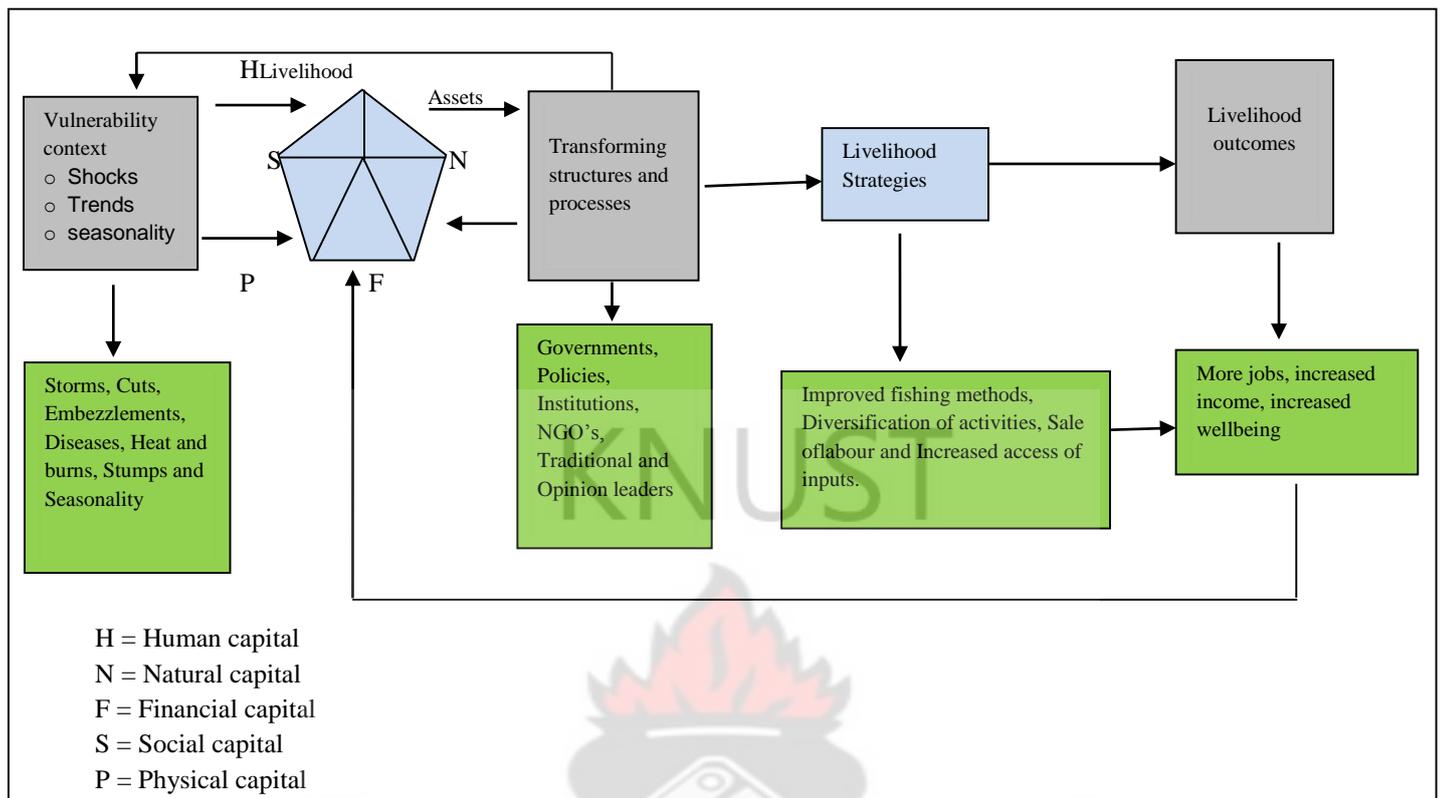
- i. (Asset): Livelihood assets consist of Natural, Physical, Human, and Financial forms of capital (DFID, 1999). Assets are fundamental to the poor.
- ii. Transforming structures and processes: In the framework, structures are hardware which involves public and private sectors. Process is made up of policy, laws, culture and institutions, and is more like software (DFID,1999). Transforming structures and processes play important roles in shaping livelihood assets and outcomes in SL system.
- iii. Vulnerability context: Vulnerability is a key concept related to livelihood sustainability. It includes shocks, trends and seasonality (DFID, 1999). It can adversely affect the poor's assets and choice of livelihoods although not all vulnerabilities are negatives.

- iv. Outcomes: Livelihood outcomes are successes and objectives that livelihood strategies achieve. Outcomes are always the pathway to assessing livelihood sustainability, and the scale of analysis of paramount importance (Scoones, 1998).
- v. Strategies: Livelihood strategies are the activities employed to generate the means of household survival.

According to Ashley and Carney (1999), Livelihood approaches should be people centred, responsive and participatory, multi-level, conducted in partnership and be sustainable (Ashley and Carney, 1999). The SL framework therefore places people at the centre of a web of inter-related influences that affect how these people create a livelihood for themselves and their households. Closest to the people at the centre of the framework are resources and livelihood assets that they have access to and use. These can include natural resources, technologies, their skills, knowledge and capacity, their health, access to education, sources of credit, or their networks of social support.

In applying livelihood approaches to fishing industry, fishers are seen as the main actors who use human capital, social capital, financial capital, natural capital, physical capital and political situations to explore opportunities. The Sustainable Livelihood Approach (SLA) which embraces the different dimensions of conditions in fishing communities, such as low levels of educations, inadequate public services, low living conditions, lack of assets and skills, including vulnerability, social networks, institutions which are management systems and more importantly interactions that exist between the fisher groups.

Figure: 2.2. Framework for Assessing Core and Context of Livelihood System



Source: Adapted from DFID (1999).

The natural resource is the lake and the rivers which are exploited by the fishermen from which they derive their Livelihood. The fishers can exploit the natural resource by using their social capital which involves networks, membership of groups, trust and access to wider institutions upon which they derive their income. The social resource depends on the network among the fishermen, fish processors and fishmongers.

Further, human capital is needed to fully exploit the natural resource. This represents the skills, knowledge and ability to work, physical capability and good health that together enable people to pursue different livelihood strategies and their livelihood objectives. At the household level, human capital is a factor of the amount and quality of labour available; this varies according to household sizes, skill levels, leadership potential, health status and ability to leverage labour of other household members particularly women (DFID, 1999).

Also, the fishers depend on physical capital in the form of basic infrastructure which involves transport, energy and communication to achieve their goals. The fish processors and the fishmongers depend on the transport system to carry out their activities.

The fishers also depend on the financial capital in the form of credit, loans, savings and remittances to undertake their work. The fishers, however, are vulnerable and are at risk to shocks, trends and seasonality. The vulnerability context affects livelihood assets which involves human capital, social capital, natural capital, physical capital and financial capital. Linked to the vulnerability context below in the framework are storms, cuts, embezzlements, diseases, heats and burns, stumps and seasonality.

Further, closely linked to the livelihood assets in the framework are the structures and processes which can be transformed. Below the structures and processes which can enhance effective work and livelihood of the fishers are governments, institutions, NGO'S, traditional and opinion leaders. They need to implement policies to regulate and enhance activities of the fishers.

In addition, connected to the structures and processes are livelihood strategies that the fishers adopt. These strategies results in improved fishing methods, diversification of activities, and sale of labour and increased access of inputs.

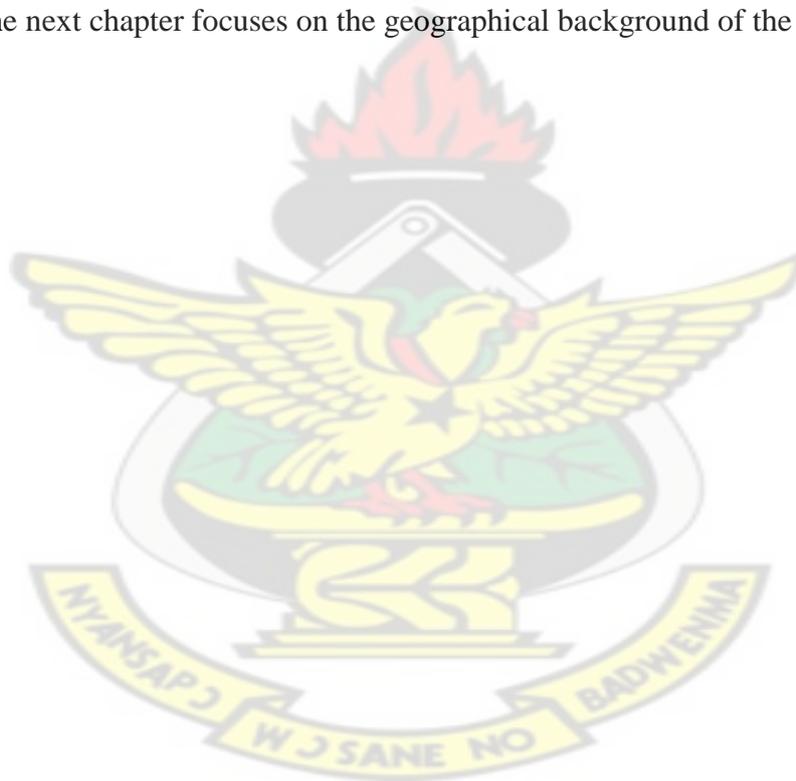
The livelihood strategies which the communities adopt and the outcomes they achieve or which they aspire, results in more jobs, increased income and increased wellbeing of fishers and are closely linked to the livelihood assets in the framework.

In summary, the value of such a frame-work is to encourage analysts to take a broader and systematic view of the factors that affect people's livelihoods. Whether these are shocks and adverse trends, poorly functioning institutions and policies or a lack of assets, and to investigate the relationship between them it does not take a sectorial view, but tries to recognise the contributions made by all the sectors to building up the stocks of assets upon

which people draw to sustain their livelihoods. It is important, however, to keep in mind that, this SLA is and remains a conceptual framework and not an assessment technique.

2.10. Summary

This chapter presented an overview of the fishing industry, especially, artisanal fishing and revealed that, fishers' density on lakes and reservoirs in Ghana rank up to six fishers per kilometer of shoreline, which is a relatively high figure compared to what is observed in Southern Africa. The chapter also examined livelihood activities within the context of value-chain analysis and fisheries policies to improve artisanal fishing industry. Having examined the literature, the next chapter focuses on the geographical background of the study area.



CHAPTER THREE

BACKGROUND TO THE STUDY AREA

3.1. Introduction

The previous chapter looked at the literature and the conceptual issues of the study. This chapter presents the geographical background of the study area (3.2.1); including location and size (3.2.2); demographic characteristics of the study area (3.3.); overview of the district's economy (3.4); literacy levels (3.5) and waste management (3.7).

3.2. Physical and Natural

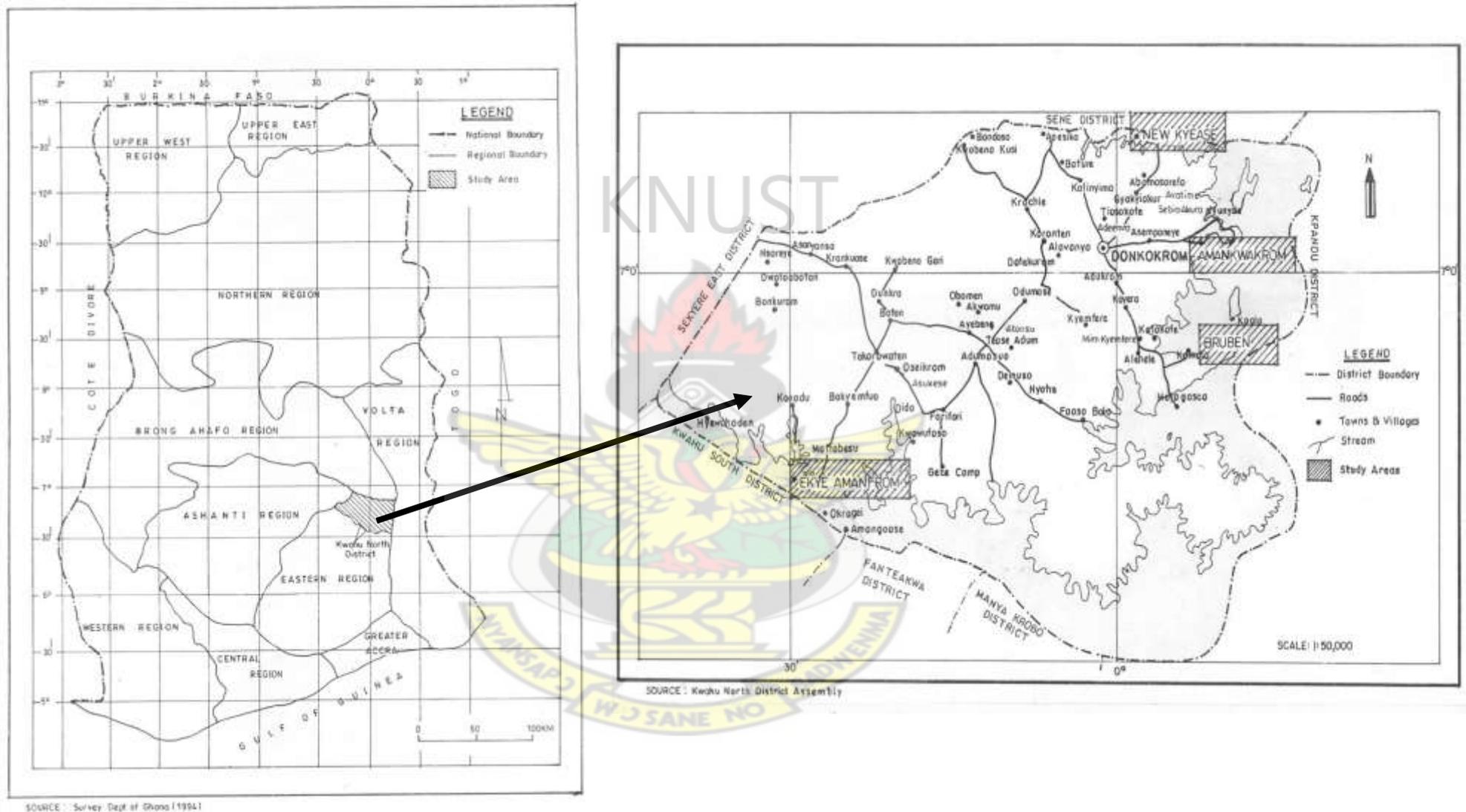
3.2.1. *Physical and Natural Environment*

This section presents the 'gifts of nature' or natural resource base of the Kwahu North District. It begins with explanation of the positioning of the district in the global, national and regional contexts as well as the size of the land mass. The natural situation and factors that influence and govern human activities and behaviours are also presented in detail.

3.2.2. *Location and Size*

Kwahu North District measures about 5040sq.km representing 26.8% of the total land area of the Eastern Region and is located between latitudes $6^{\circ} 40^1N$ and $7^{\circ} 10^1N$; longitudes $0^{\circ}40^1E$ and $0^{\circ} 10^1E$; at the north-western corner of the Eastern Region. The district is located in the northern-most part of the Eastern Region. It is the largest district in the Eastern Region in terms of landmass. The Kwahu North District shares boundaries to the south with Kwahu South District, to the east with the Volta River, to the west with two districts in the Ashanti Region, precisely, the Sekyere-East and Asante-Akim Districts and to the north with two districts in the Brong Ahafo Region namely Sene and Atebubu.

Figure 3.1: Map of Ghana showing District with study Communities



3.2.3. Climate and Rainfall

There are two rainy seasons in the Kwahu North District. The first is the main wet season, starting in April and usually ending in the second week of July. Within this period, over three-quarters of the total annual rainfall are recorded. The minor rainy season occurs in September and October, and is followed by a long dry season from November to the end of April or early March. During the dry season there is drought accentuated by the harmattan weather so that most plants shed at least part of their leaves, and many tributaries of Afram and Obosom Rivers dry up as well as some boreholes.

3.2.4. Vegetation and Forest Reserve

The District falls within the savannah vegetation zone comprising the savannah transitional zone and savannah woodland. This is characterised by short deciduous fire resistant trees often widely spaced and a ground flora composed of grass of varying heights. Riverine forests occur along the major rivers and streams of the savannah zone and the largest stretches are cultivated by villagers who settle near the rivers and streams. The district can also boast of Digya Game Reserve in the Digya and its environs.

3.2.5. Soils and Agricultural Land Use

A recent study conducted in the Kwahu North District revealed that 16% of the district's land area in relation to soil types had not yet been surveyed. Meanwhile, 15 soil types have been identified in the area. Types classified as Haplicuvisols by the Food and Agricultural Organisation (FAO) constitute over 40% of the land area and belong to the Ejura Series. They have been enveloped over 'Voltaian clay', shale, and are of both forest and savannah vegetation types. In the absence of bush fires, they accumulate considerable reserves of organic matter in their top layers.

With minor exceptions, the soils of the district are fertile and suited to a wide variety of crops. The quality of soils is unlikely to be a constraint to the agricultural development of the district. Indeed, the reverse is more likely to be the case, since one of the main attractions of the district is the abundance of readily-available land of good quality. These soils possess the good chemical properties of clay and appreciable amounts of humus making them generally fertile and a great potential for cash and food crop production.

3.2.6. Geology

The Kwahu North District lies in the southern-most part of the Voltaian Sedimentary Basin, which covers about 45% of the total area of Ghana and extends eastwards into the Republic of Togo. The underlying geology of the Voltaian Basin consists almost entirely of sedimentary rocks; main coarse-grained sand stones, clays, shale and mudstones of the Devonian or early Carboniferous Age (Junner and Bates, 1946). The district, therefore, has geology described principally as Upper Voltaian sandstones consisting of coarse and fine-grained massive sandstones that are thin bedded, flaggy, impure, ferruginous or Field spathic and locally inter-bedded with shale and mudstone. The sandstones are found along the boundary margins while shale and mudstones outcrop within the central part of the district from below the sandstone bed. Within these rocks are patches of minerals that are yet to be discovered and fully exploited which would contribute immensely to employment creation.

3.2.7. Relief and Drainage

Topographically, the Kwahu North District has generally low lying lands that rise from 60 metres to 120 metres above sea level. The only high ground is the Donkorkrom Plateau. The district is drained by the Afram River in the west, Volta Lake in the east and the Obosom River in the north which flow continually throughout the year and can be used for both domestic and agricultural purposes.

Due to the nature of the topography, the district is prone to flooding mostly during the rainy season thus, affecting the road networks. Also, the presence of the rivers serves as sources of livelihood for most of the people in the district. But these sources are not exploited into good irrigational schemes to support farming all year round. The rivers provide an alternative transportation routes into the district and the northern part of Ghana and also serve as a source of water for communities who have no potable sources of water and animals as well.

3.2.8. Temperature and effect on Fishing

Generally, the hottest months are February and March (36.8°C and 36.6° respectively) while the coldest are December and January (19.9°C and 20.1°C). The highest average mean monthly temperature occurs in February and March, indicating that the highest temperatures are recorded just before the onset of the main rainy season in April. During the wet months from April through to October, temperatures fall gradually and are relatively low.

3.2.9. Relative Humidity

Relative humidity values in the Kwahu North District are generally highest in the mornings (0600 hours) and lowest around early afternoon (1500 hours). Relative humidity figures for both 0600 and 1500 are highest between April and October and lowest between November and May, which coincide with the rainy and dry periods of the Kwahu North District. During the highest relative humidity periods and rainy season months of April to November, mean monthly relative humidity's range between 81.6% and 71.6%. During the harmattan months when relative humidity is low, mean monthly relative humidity figures of only 68.2% to 71.6% are recorded.

3.3. Demographic Characteristics

3.3.1. Population and Density

The 2000 National Population and Housing Census put the district's population at 135,928 with an intercensal growth rate of about 3.6%. The projected population for the year 2010 is therefore 193,600. The projected population is considered rather low considering the inflow of people into the district capital on daily basis. Again according to 2000 Population and Housing Census, the population is male dominant with males representing 53.5% and females 46.5%.

Most of the people in the district are migrants from the Kwahu South District, the Volta Region, the Ashanti Region and Northern Ghana who have been attracted to the area basically for employment in the agricultural sector and it is usually the men who migrate.

The population is scattered in 544 towns, villages and hamlets spread over the 5040 sq.km land area. Hundreds of these villages are on islands and can only be reached by boats or canoes. The district has a low population density of 19 persons per square kilometre.

The Kwahu North District has four urban settlements namely, Donkorkrom, Tease, Ekye-Amanfrom and Maame Krobo. Apart from Donkorkrom the district capital whose population is 6,938, the other three towns have population less than six thousand. More than 75% of the district population resides in rural areas. There are two main religious groups, namely: Christianity and Islamic. The major ethnic groups are the Akans (Twi) in the west, Ewe in the east and along the banks of the Volta Lake while people of northern extraction are found in most of the farming communities.

The 2000 population figure yields a density of 27 persons per sq. km much lower than the national density of 79.3 and lower than the regional density of 895.5 persons per sq. km. With a projected population of 193,600 in 2010, the estimated population density is 38 persons per sq. km.

3.3.2. Rural-Urban Split

According to the 1984 National Population Census, only 4.9 percent of the population lives in urban areas and the rest (95.1%) live in rural areas. Currently, 20.4 percent of the population lives in an urban area (Donkorkrom) whilst 79.6% lives in rural areas. Table 3.1 indicates the largest 20 settlements in the District.

Table 3.1 Spatial Distribution of Population for the first 20 settlements.

No	Community Name	Projected Population (2010)	Urban / Rural
1	Donkorkrom	9,882	Urban
2	Ekye Amanfrom	7,086	Urban
3	Maame Krobo	5,307	Urban
4	Tease	4,865	Rural
5	Amankwakrom	3,008	Rural
6	Kwaekese	2,765	Rural
7	Adiembra	2,280	Rural
8	Forifori	2,269	Rural
9	Brumben	2,131	Rural
10	Dedeso	2,089	Rural
11	Asanyanso	1,998	Rural
12	Dodi	1,826	Rural
13	Ntonaboma	1,806	Rural
14	Nsogyaso	1,597	Rural
15	Kwasi Fante	1,515	Rural
16	Samanhyia	1,443	Rural
17	Mem Kyemfere	1,302	Rural
18	Agya Atta	1,269	Rural
19	Odomasua	1,268	Rural
20	Abomsarefo	1,251	Rural

Source: compiled from DPCU Records, 2006.

3.3.3. Ethnicity and Religion

Majority (66 percent) of the district's population are Ewes. The other significant tribes are Krobos (11 percent), Northern tribes (13 percent) and Ashanti (10 percent). These figures depict the district as heterogeneous in terms of ethnicity. Again, the district is predominantly Christian as they constitute 89.5 percent whilst the Muslims constitute 6.9 percent and the rest, which is 3.6 percent, consists of pagans and traditionalists.

3.3.4. Occupational Distribution of Population

A total of 97 percent (124,218) of the total labour force are employed in the district. Within the employed labour force, the predominant occupation in the District is agriculture (employing 80 percent of the total labour force), Commerce (employs 5 percent), Agro industry (12 percent) and service (3 percent).

It was detected that most of the females were engaged in trading / commerce and small-scale industries i.e. agro-processing (cassava processing and palm oil extraction). The bulk of the tradesmen are in carpentry and automobile repairs.

3.4. Overview of the District Economy

Basically, the economy of Kwahu North District is an agrarian one with agriculture and fishing constituting 80 percent of the labour force employed. This can be attributed to the fact that large rivers such as Afram, Obosom and Volta Lake are fertile areas for fishing. The climatic condition and soil organisation in the district favour the cultivation of crops such as maize, cassava, plantain, cocoyam, yam, cashew and oil palm. The livestock and animal rearing sub-sector serves as a supplement of income to the people with animals such as cattle, sheep, goats, poultry and pigs being reared. The industrial sector is the second highest sector employing 12 percent of the labour force. The service and commerce sector is the least sector in terms of employment, thus, employing only 8 percent of the labour force. The main activities under the sector is buying and selling of agriculture and manufactured goods and

provision of services such as teaching, nursing and others. Most industries in Kwahu North District can be classified under small and medium scale industries since they have a total workforce ranging from 5 to 30 persons each. The industrial activities in this district are diversified, ranging from household industries, handicrafts / traditional crafts, modern crafts and small / medium scale manufacturing.

3.4.1. Employment Status

Statistics in the district showed that, out of the district's total population of 193,600, a total of 128,060 (66.1 percent) represents the potential labour force. However, a total of 3,842 (3 percent) are unemployed. Hence, 97 percent (124,218) of the labour force are employed.

3.4.2. Occupational Structure

Within the employed labour force, the predominant occupation in the district is agriculture and fishing employing 80 percent of the total labour force; service employs 3 percent of the labour force; commerce employs 5 percent and industry employing 12 percent.

Table 3.2 Occupational Structure in the District

Sector	Number				Total	Percentage
	Male	Percentage	Female	Percentage		
Agriculture and fishing	53,166	75	46,209	25	99,375	80
Service	1,994	65	1,733	35	3,727	3
Commerce	3,322	40	2,888	60	6,210	5
Industry	7,975	70	6,932	30	14,906	12
Total	66,457	54	57,761	46	124,218	100

Source: Kwahu North District Field Survey, May 2010.

3.5. Literacy Levels

'Literacy' plays an important role in the socio-economic development of every society.

'Literacy' here refers to the total population of a given area who can read and write. Hence,

high literate population gives an indication of a high public understanding and contribution in the formulation and implementation of policies, programmes and projects in the society.

From Table 3.3, the literacy rate in the Kwahu North District is 48.8 percent of the total population. This is lower than the national estimated figure of 57.9 percent. Again 36.4 percent of the male population and 63.6 of the female population are literates. These figures are equally lower than the national literacy rates of 66.4 percent and 49.8 percent for males and females respectively.

Table 3.3. Literacy levels

Literacy level	Male		Female		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Literate	23813	36.4	37713	62.8	61526	48.8
Illiterate	41622	63.6	22931	37.8	64553	51.2
Total	65435	100	60644	100	126079	100

Source: Ghana Education Service (Kwahu North District), May 2010.

3.6. Health

For the human resource to contribute effectively towards the development of any geographical entity, the health status of its human resource base should be assessed. When the health of a population improves the community can produce more with any given combination of skills, physical capital and technological knowledge in certain growth sectors. The infrastructure of health delivery system of the district consists of one (1) hospital at Donkorkrom, three (3) health centres located at Ekye, Tease and Kwasi Fante and thirteen (13) CHPS Compounds at Ntonaboma, Dome, Bonkrom, Bruben, Dim, Samanhyia, Krokrobuta, Koranteng Krachi, Amankwaa, Forifori, Abomesarefo, Maame Krobo and Mem - Chemfre.

The district's hospital, located at Donkorkrom, has only three (3) doctors, although a number of doctors visit the hospital regularly. The district has an unfavorable Doctor-Population ratio of 1:21,529 as against national average of 1:25,000 and WHO standard of 1:10,000. The Nurse Population ratio is also relatively unfavorable (1:1,435) as against the national figure of 1:900. The major problems facing the health system in the district are; sanitation, inadequate supply of potable water, poor road network, inadequate skilled and professional staff, inadequate staff accommodation and infrastructure.

3.6.1. Health Services

The health sector in the district performs many functions apart from the routine medical care given to patients. The services range generally from the usual health care to sensitization of people on current health issues and organisation of counseling session for people on various issues such as reproductive health care and on general hygiene.

The inadequacy of health facilities within the various settlements in the district have resulted in most of the people in the district patronizing health service outside their places of residence.

The type of health facility highly patronized within the Kwahu North District is the Clinic constituting about 67.6 percent. Other health facilities like hospital, health Post, traditional healing, maternity homes and drug store constitute 27.95 percent, 1.0 percent, 0.7 percent, 0.5 percent, and 2.3 percent respectively. The average cost per visit is about GH¢ 9,00. Looking at the high cost per visit, (NHIS) is a vital intervention to improve the health status of the people, thus, the need to intensify education to increase awareness and patronage. The average distance travelled by the inhabitants of the district to the health facilities is about 3.7 km whilst the average travel time is about 42 .8 minutes.

3.6.2. Causes of Admission to Health Facilities

On the incidence of diseases in the district, malaria is the highest reported case with 1561 cases constituting 25.5 percent of all reported cases and Septicemia being the least cause of admission with 113 cases which also constitutes 1.8 percent of all reported cases.

Table 3.4 Top 10 Causes of Hospital Admissions

No	Disease	Total	Percentage
1	Malaria	24,685	58.4
2	Acute Respiratory infection	5,578	13.2
3	Rheumatism & Joint Condition	2,742	6.5
4	Intestinal worms	1,672	4.0
5	Eye infection	1,410	3.3
6	Home / Occupational Injuries	1,311	3.1
7	Diarrhoea	1,773	4.2
8	Urinary Tract Infections	815	1.9
9	Skin Disease	1,774	4.2
10	Anaemia	516	1.2

Source: Kwahu North District Health Service, May 2009

3.7. Water, Sanitation and Waste Management

Over the past decade, the rural water and sanitation sector in Ghana has been transformed from a centralized supply-driven model to a system in which local government and communities plan together, communities operate and maintain their own water services, and the private sector is active in providing goods and services. This reform started with an extended dialogue with the major stakeholder in the sector, which led to a new rural water, sanitation, and hygiene education policy.

Table 3.5. Major Source of Water Supply in the District.

FACILITY	NUMBER OF PEOPLE	PERCENTAGE
Small Town Water supply system	87,120	45
Boreholes	77,440	40
Streams	29,040	15
Total	193,600	100

Source: Kwahu North District Field Survey, May 2010

Water supply is generally inadequate, considering the difficulty women and children have to go through to meet their water requirements. This situation is, however, more pronounced in the rural areas. The implications are that the communities face serious water problems when the rivers and streams dry up. The situation forces households to depend on other sources such as rivers and ponds which are contaminated, and are susceptible to water borne diseases. In response to the above, each settlement has a form of water supply system with the predominant being Small Town Supply System (45 percent) and borehole (40 percent). In most remote villages irrespective of size, boreholes have been provided. The achievement is due to the collaborative effort between the District Assembly, Ghana Water Company and other development partners such as Danish International Development Agency (DANIDA) District Based Water and Sanitation Program and Oboaba Rural Action Program (ORAP). In the district, it appears that a number of people have access to some type of sanitation facilities either public or private. Others also resort to indiscriminate defecation in gutters, school compound and public refuse dumps. Total sanitation coverage is estimated at 40 percent for domestic and 20 percent for institutions. The types of facilities in use include WC toilets, KVIPs, and Cartage. Pit latrine even though not approved by the Assembly is being used by some households even in the urban community (Donkorkrom). The District Assembly is currently participating in the District Based Water and Sanitation Component of

the Community Water and Sanitation Programme to improve the provision of such facilities in the various institutions in the district.

3.7.1. Type of Toilet Facility Used.

Although cartage (0.4 percent) is phasing out, there are few houses still relying on pan latrines. As a result of the unhygienic nature of this type of toilet and the scarcity of conservancy labourers, by the Ministry of Local Government and Rural Development directive, users are being compelled to adopt acceptable technologies. Water Closets (WC's) are being encouraged to replace the cartage type. Presently, about 7.6 percent of households in the district have some toilet facilities of this type. However, this figure is far inadequate for a district with over 10,000 houses in the 20 major towns in the urban and area council settlements.

Public pit latrines are mostly used in the rural communities in the district. About 35.5 percent of inhabitants are using this facility. The unhygienic nature of these toilet facilities prompts the shift to the use of household water closets. About 41 percent of this facility used in the district is in very bad conditions. The KVIP (54.5 percent) has the widest usage within the district with about 32.5 percent also in bad condition. Apart from these toilet facilities, over 2.2 percent of the populations attend to nature's call in the bush. The indiscriminate defecation along streets, open spaces and roadsides raises a matter of environmental concern in the District.

3.8 Land Use Distribution

The major land uses which can be identified within the district are,

- Agricultural and economic land use.
- Settlements and development
- Difficult /Terrain and steep slopes; and
- Roads and high-tension lines

3.9. Settlement Patterns

In the Kwahu North District, with the exception of Donkorkrom, Maame Krobo and Tease which are urban areas, the rest of the settlements are peri-urban, towns and small communities. However, there is a very strong economic, social and political interaction between the smaller settlements and the urban centres. These settlements are separated from each other by a distance of about 1-9 km and mostly spread along the main trunk roads within the district and from the district capital by an average distance of about 20km. the remaining smaller settlements are scattered all over the district.

3.10. Summary

This chapter has presented geographical background of the study area in relation to the physical and natural environment, location and size. This also examined demographic characteristics, and an overview of the districts economy and waste management. The next chapter presents data analysis of the study. It examined demographic and socio-economic characteristics of the respondents, work and livelihood activities of the fishers, hazards and constraints of the fishers, fishing methods and views of the stakeholders in the fishing communities.

CHAPTER FOUR

DATA ANALYSIS AND DISCUSSIONS

4.1. Introduction

The previous chapter examined the background of the study in terms of physical and natural environment of the study area, location and size, demographic characteristics and overview of the district's economy. The demographic characteristics of the study area revealed that, most of the people in the district are migrants. These migrants hail from Kwahu South District, the Volta Region and Northern Ghana who have been attracted to the area basically for employment in the agricultural sector. This chapter deals with the analysis of data and the results and presentation of findings of the study. The analyses are done in line with the objectives of the study. The first objective was to examine the demographic and socio-economic characteristics of the people in the fishing industry on education, income, health status and ethnic groups. The second objective was to investigate the work and livelihood activities of the key people involved in artisanal fishing and how their positions along the fish production value-chain affect their well being. The third objective was to identify the challenges facing the fishermen and other actors in the artisanal fishing industry in the study area. Further, the fourth objective describe the appropriateness of the fishing technology employed by the fishermen in the study area and to make recommendations to enhance fishing to improve the living conditions of the people involved. The key areas includes; gender roles in artisanal fishing, educational levels and age group of fishers, acquisition of fishing inputs, fish capture, fish processing and selling of fish products. Others are hazards and constraints of fishers and appropriateness fishing technology employed by fishermen in the study area.

4.2. General Demographic and Socio-Economic Characteristics of the Respondents

The first objective of the study was to find out the demographic and socio-economic characteristics of the respondents on education, income, health status and ethnic groups. This is made up of the fishermen, fish processors and sellers. These characteristics are made up of age, artisanal groups, monthly net income, educational levels, health, savings, acquisition of inputs and gender roles. These demographic and socio-economic characteristics of the respondents are both general and specific to the respondents.

4.2.1. Gender Roles in Artisanal Fishing

The fishing activities in the study area follow clearly defined gender roles. This is shown in Table 4.1 where 100 per cent of the fishermen were males who undertake the main fishing activities in all the communities. This is as a result of the labour intensive nature of the key fishing activities which involve preparation and setting up the fishing equipments and fish harvesting. The fish processors and the fishmongers in all the fishing communities studied were all females representing 100 per cent for each group. The fish processors undertake the processing, which includes; smoking, frying, salting and drying. The fishmongers were mainly involved in the marketing of the fish products.

Table 4.1. Gender Roles in Artisanal Fishing.

Gender Characteristics	Fishermen		Fish Processors		Fish Mongers		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Male	98	100	0	0	0	0	98	50.5
Female	0	0	57	100	39	100	96	49.5
Total	98	100	57	100	39	100	194	100

Source: Author's field survey, May 2011.

4.2.2. Artisanal Fisher Groups and Net Monthly Income

Financial status of any family is very important for sustaining livelihood condition of fishers. The study carried out in the communities revealed that, 57.9 per cent of fish processors and 43.7 per cent of the fishermen earned less than GHC100.00 per month from their fishing activities while none of the fish mongers earned less than GHC100.00 per month. The study also showed that, among the fishers, 4.6 per cent of the fishermen earned more than GHC500.00; 1.7 per cent for fish processors and 16.2 per cent for the fishmongers. This trend showed that, though fish mongers form the least group of the fishers, they formed the highest earning fisher groups, followed by fishermen and fish processors, respectively. This has made majority of the fish mongers to finance both fish processors and the fishermen and tend to dictate their activities and the prices of the fish to their benefit. Also while 32.2 per cent of the fishermen earned between GHC100.00 and GHC 200.00 per month, 24.6 per cent of fish processors and 13.9 per cent fish mongers earned the same amount monthly.

Table 4.2. Artisanal Fisher Groups and Monthly Income.

Index		Monthly income						Total
		< GHC100	GHC 100-199	GHC 200- 299	GHC 300-399	GHC 400- 499	> GHC500	
Fishermen	Frequency	38	28	3	8	6	4	87
	%	43.7	32.2	3.4	9.2	6.9	4.6	100
Fish processors	Frequency	33	14	2	5	2	1	57
	%	57.9	24.6	3.5	8.8	3.5	1.7	100
Fishmongers	Frequency	0	7	9	10	5	6	37
	%	0.0	13.9	24.3	27.0	13.5	16.2	100

Source: Author's field survey, May 2011.

4.2.3. Educational Level of Fishers and Net Monthly Income

The study sought to establish whether educational level of fishers has any bearing on their income. It was revealed that, 33.3 percent of respondents, who had no formal education, earned less than GHC100.00 per month. Among respondents who had no formal education, 7.4 per cent earned more than GHC500.00 monthly and among Senior High school graduates 9.5 per cent earned more than GHC500.00 per month. Further, among respondents with primary education, 48.9 per cent earned less than GHC100.00 per month with 6.4 per cent earning more than GHC500.00 per month. The study also indicated that, while 39.0 per cent of the Junior High School graduates earned less than GHC100.00 per month, only 3.4 per cent earned more than GHC500.00 monthly. Even though education is a strategic livelihood asset which is critical in the use of livelihood access, the study on educational levels and net monthly income showed that, educational levels do not determine net monthly income of fishers. The fishers felt that, their net income levels per month were rather influenced by access to sufficient financial resources. This is shown in Table 4.3 below;

Table 4.3. Educational Levels of Fishers and Net Monthly Income.

Index		Monthly net income						Total
Educational level		< GHC100	GHC 100-199	GHC 200-299	GHC 300-399	GHC 400-499	> GHC500	
No schooling	frequency	18	20	2	6	4	4	54
	%	33.3	37.0	3.7	11.1	7.4	7.4	100
Primary	frequency	23	7	6	6	2	3	47
	%	48.9	14.9	12.8	12.8	4.3	6.4	100
Junior sec./ Middle school	frequency	23	13	6	8	7	2	59
	%	39.0	22.0	10.2	13.6	11.9	3.4	100
Senior high	Frequency	7	8	2	2	0	2	21
	%	33.3	38.1	9.5	9.5	0.0	9.5	100

Source: Field survey by author, May 2011.

4.2.4. Saving Habits of Fishers with Banks

More than two-thirds (75.3%) of the respondents had no bank savings accounts. The remaining 24.7 per cent of the respondents had savings account with the fish processors the least representing 14 per cent. Among the fishermen, while 22.4 per cent have savings accounts, 77.6 per cent do not. The study indicated that while 14.0 per cent of the fish processors and 46.2 per cent of fish mongers have savings accounts, 86.0 per cent of fish processors and 53.8 per cent and of fish mongers do not have savings accounts. Though the savings accounts of respondents had not been verified, the fishermen form the highest respondents without savings accounts representing 77.6 per cent. The 75.3 per cent of the fishers who do not keep money at the bank gave three reasons;

- i. That they do not have enough money to keep at the banks.
- ii. That they frequently need money to run their various activities and
- iii. That they prefer investing in other sources to diversify their economic activities than saving at the banks.

Table 4.4. Saving Habit of Fishers with Banks.

Index	Fisher folks							
	Fishermen		Fish processors		Fishmongers		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Fishers with savings account	22	22.4	08	14.0	18	64.2	48	24.7
Fishers without savings account	76	77.6	49	86.0	21	53.8	146	75.3
Total	98	100	57	100	39	100	194	100

Source: Field survey by Author, May 2011.

4.2.5. Adequacy of Income in Meeting Domestic Needs

The seasonality of fishing activities made it difficult for the fishers to raise sufficient income to satisfy their domestic needs such as food, clothing and shelter. The study revealed that, while 59.2 per cent the fishermen cannot afford their domestic needs, 40.2 can afford it. The study further indicated that, while 45.6 per cent of fish processors and 64.1 per cent of fish

mongers can afford their domestic needs, 54.4 per cent of fish processors and 35.9 per cent of fish mongers respectively cannot afford it. Among the fisher groups, 40.8 per cent of fishermen and 64.1 per cent of fish mongers respectively can meet their domestic needs. This goes to confirm that, among the fishers, fish mongers are the better-off fisher group than the fishermen and the fish processors. This is because, while 16.2 per cent of the fish mongers earned more than GH¢500.00 per month, only 4.6 per cent of the fishermen and 1.7 per cent of the fish processors earned more than GH¢500.00 monthly.

Table 4.5. Adequacy of Income in Meeting Domestic Needs

Index	Fisher folks							
	Fishermen		Fish processors		Fishmongers		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Yes	40	40.8	26	45.6	25	64.1	91	46.9
No	58	59.2	31	54.4	14	39.9	103	53.1
Total	98	100	57	100	39	100	194	100

Source: Field survey by Author, May 2011.

4.2.6. Adequacy of Income in Meeting Cost of Children's Education

In terms of education, 42.8 per cent of the fishers cannot meet the cost of their children's educational needs such as paying of school fees, buying school uniforms and other learning materials including exercise books and pens. However, 57.2 per cent of the respondents can meet the needs of their wards' education. This implies that, some of the fishers seek other sources of income to satisfy the educational needs of their children. These sources include; borrowing and support from family members. These conditions accounted for absenteeism and lateness of pupils because they normally engage in fishing to meet their school needs. Further discussions with the fisher groups revealed that those who could afford their children's education rely on hired labour to undertake their various activities. About 53.1 per cent of the fishermen can afford the cost of their children's education while 46.9 per cent cannot afford. Further, while 54.4 per cent of fish processors and 71.8 per cent of fish

mongers can afford the cost of the children's education, 45.6 per cent and 28.2 per cent respectively cannot afford it. A greater proportion of the fish mongers constituting 71.8 per cent can afford their children's education as compared to 53.1 per cent of fishermen and 54.4 per cent of fish processors.

Table 4.6. Adequacy of Income in Meeting Cost of Children's Education.

Index	Fisherfolks							
	Fishermen		Fish processors		Fishmongers		Total	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Can meet cost of Children's education	52	53.1	31	54.4	28	71.8	111	57.2
Cannot meet cost of Children's education	46	46.9	26	45.6	11	28.2	83	42.8
Total	98	100	57	100	39	100	194	100

Source: Field Survey by Author, May 2011.

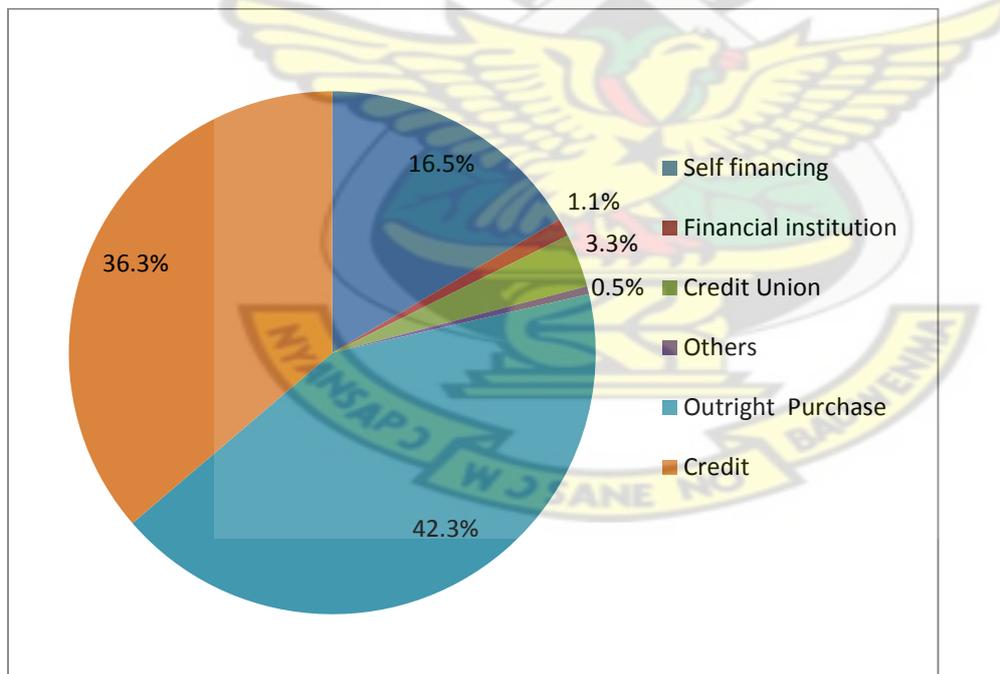
4.2.7. Acquisition of Inputs

Most of the artisans started by outright purchase of their inputs which constitutes 42.5 per cent and 36.3 per cent relied on credit. Further, 16.5 per cent of the respondents started business with their own capital and less than 5 per cent of the respondents had some form of assistance from other sources such as financial institutions 1.1 per cent, credit unions 3.3 per cent, friends and relatives 0.5 per cent respectively.

Financing of fishing inputs is a major challenge to fishers. The 42.5 per cent of the artisans who normally purchase their inputs outright were the well established fishermen who attracted funding from the fish mummies to buy their inputs. Those who financed their own fishing inputs were also better-off and relied on other sources of funds like animal rearing and crop farming. These groups of fishermen, who are the sole financiers of their fishing activities, sell their produce to their spouses who doubled as processors and traders.

The fishermen who bought on credit from the inputs sellers sell their produce to the traders who usually dictate the prices to them. These conditions created hardship for fishermen. The conditions mostly used by the financiers and the difficulties involved in obtaining loans from financial institutions, credit union and high cost involved in making the inputs available, forced the fishermen to adopt ‘Atidza’ method of fishing. This fishing method is one of the main causes of deforestation along the lake because the fishermen use tree branches to set it. This situation was emphasized by (Ly, 1980; VRA, 1995). The destruction of the forest along the Lake led to landslides in many areas on the eastern banks of the lake. The main sources of funding by the fish processors were credit unions’ (3.3 per cent) and for the fishmongers, it was financial institutions (36.2 per cent). Fish processors sometimes depend on the traders for financing.

Figure 4.1. Pie Chart Showing Acquisition of Initial Capital or Stocks



Source: Author’s field survey, May 2011.

4.3. Specific Demographic and Socio-Economic Characteristics of Fishermen

Socio-economic indices are important in determining livelihood conditions of fishers in fishing communities. Specific demographic and socio-economic characteristics of fishermen include; educational levels, marital status and ethnic composition.

4.3.1. Educational Levels and the Age of Fishermen

Generally, education plays an important role in the success of any economic activity. However, fishers in the study area did not possess higher educational qualifications but were skillful in undertaking their activities. About 61.2 per cent of the fishermen had some form of education. Education is a strategic livelihood asset which is critical in the use of other livelihood assets. Among the fishermen with some level of education, 27.6 per cent were primary school leavers, and 10.2 per cent were Senior High school leavers. The study further revealed that, among 20-29, 30-39 and 40-49 age groups, primary school leavers form the highest representing 32.4 per cent, 25.8 per cent and 24.0 per cent respectively. None of the fishermen among the 50 and above age groups had formal education at the Senior High School level. Fishermen with no formal education were high among 40-49 age groups and least among 50 and above age group. This implies that, fishermen with some form of formal education decrease in number with increasing age. This is shown in Table 4.7 below

Table 4.7. Educational Levels of Fishermen and their Age.

Index	Age Group Of Fishermen								Total	
	20 - 29		30 – 39		40 - 49		50+		Frequency	%
Educational Levels	Frequency	%	Frequency	%	Frequency	%	Frequency	%		
No Schooling	8	23.5	12	38.7	14	56.0	4	50	38	38.8
Primary	11	32.4	8	25.8	6	24.0	2	25	27	27.6
Junior High/Middle School	9	26.5	7	22.6	5	20.0	2	25	23	23.5
Senior High	6	17.6	4	12.9	0	0.0	0	0	10	10.2
Total	34	100	31	100	25	100	8	100	98	100

Source: Field survey by Author, 2011.

4.3.2. Marital Status and Ages of Fishermen

Marriage is an important institution which forms part of any social life of an individual. As shown in Table 4.8 below, majority (79.8 per cent) of the fishermen were married while 4.0 per cent were widows. Further, among 20-29 age groups, fishermen with marital status form the highest representing 80 per cent. However, none of the fishermen lost their spouses in the 20-29 year group with 5 per cent divorced. Again among the various age groups, only 40-49 and above 50 year groups had respondents who were not single. The study further indicated that, among the fishermen who were married, 30-39 age group formed the highest (86.1 percent) and 50 and above age group the least constituting 70.6 per cent respectively.

Table 4.8. Marital Status and Ages of Fishermen.

Index	Age Group Of Fishermen								Total	
	20 - 29		30 - 39		40 - 49		50+			
Marital Status	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Single	3	15.0	2	5.6	0	0.0	0	0.0	5	5.1
Married	16	80.0	31	86.1	20	76.9	12	70.6	79	79.8
Divorced	1	5.0	2	5.6	4	15.4	4	23.5	11	11.1
Widowed	0	0.0	1	2.8	2	7.7	1	5.9	4	4.0
Total	20	100	36	100	26	100	17	100	99	100

Source: Field survey by Author, May 2011

4.3.3. Ethnic Composition of Fishermen in the Study Communities

Ethnic composition of the fishermen forms a major demographic and socio-economic characteristics in the study area. The study in the fishing communities revealed that, among the fishermen as shown in Table 4.9 below, 58.9 per cent of the fishermen were Ewes forming the largest ethnic group and 23.2 per cent were Ga-Adangbe. Among the communities, the Ewe ethnic group was more predominant at Brumben, representing 70.8 per cent and the least was New-kyease (45.8 per cent). At Ekye-Amanfrom, the Ewes form 60 per cent followed by Ga-Adangbe 24 per cent and other ethnic groups forming the least with 8 per cent. Further, at Brumben and Amankwakrom while the Ewes form the highest fisher group of 70.8 and 59.1 per cent respectively, fishermen with other ethnic origin represent, zero (0%) per cent each. Within the Akan ethnic group in the communities, New-kyease form the highest (25 per cent) and Brumben the least with 8.3 per cent.

Table 4.9. Ethnic Composition of Fishermen in the Study Communities.

Ethnicity	Communities								Total	
	Ekye-Amanfrom		Brumben		AmankwaKrom		New Kyease			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Ewe	15	60.0	17	70.8	13	59.1	11	45.8	56	58.9
Akan	4	16.0	2	8.3	5	22.7	6	25.0	17	17.9
Ga- Adangbe	6	24.0	5	20.8	4	18.2	7	29.2	22	23.2
Others	2	8.0	0	0.0	0	0.0	1	4.2	0	
Total	25	100	24	100	22	100	24	100	95	100

Source: Field survey by Author, May 2011.

4.4. Work and Livelihood Activities of the Fishers

The second objective of the study was to investigate the work and livelihood activities of the key people involved in artisanal fishing and how their position along the fish production value-chain affects their well being. These livelihood activities involved; fish capture, fish processing and selling of fish products.

4.4.1. Livelihoods Activities of Fishermen

Livelihood is a process that underpins the way people derive their incomes. According to Ellis (1999), livelihood comprises..... ‘the activities, the assets, and the access that jointly determine the living gained by individuals or household’. The main livelihood activities of fishermen include fish capture. This involves the use of various types of nets, traps, canoes and outboard motors to harvest fish.

4.4.2. Fish Capture

As stated, the types of equipment used to harvest fish include; various types of nets, traps, canoes and boats. Observation from the field showed that, some boats were attached with outboard engines shown in Plate 1 below. This enables them to travel further off the shore.

They are mostly found along the section of the Volta Lake where the waves were stronger as a result of frictional wind speed on the lake.

Plate 1. Fisherman with an outboard motor.



Source: Field Observation, January 2012.

The various type of nets used include; nylon gill-nets with meshed size ranging between ½ inch to a bigger inch nets of 8 inches. Fishing traps of various kinds were also employed. They include, basket traps, bamboo traps or tubes and traps made from wire mesh. Hooks and lines are also important fishing equipments. Other methods are cast nets, combination of gillnet and fish traps-“nifa” as well as active gear such as beach seines-“Adranyi” and purse seines. Bamboo tubes and ‘Atidza’ are fast catching up with the fishermen. The study indicated that, the fishermen employ combination of various fishing methods. Fish trap constitute 5.2 per cent. Gill net and fish trap ‘nifa’ represent 11.3 percent whilst gill net and cast net 6.2 per cent. Gill, cast, ‘nifa’, purse seines constitute 13.4 per cent with hook and line, fish traps and ‘Atidza’ 5.2 per cent. Others include ‘Atidza’ and gill net 6.2 per cent. Gill net, fish traps and cast net represent 5.2 per cent. 14.4 percent of the methods include gill net,

cast nets and 'Atidza' methods of fishing. The study also revealed that 32.9 per cent of the fishermen use more than four fishing methods.

Braimah pointed out that, the use of active gear is illegal but does produce 65-70 per cent of fish landing in the Volta Lake (Braimah, 1992). However, observation showed that all fishing methods could be dangerous depending on the type of nets used. For instance, cast net which is considered to be one of the safest fishing methods can be bad if the mesh size used is small in such a way that immature fishes are caught. Also, with the exception of bamboo tubes meant for chrysichthyes (cat fish), the other types of fish caught are not solely limited to the various fishing methods.

The various fishing equipments were prepared solely by the fishermen, some of which are attached with corks and lead. The lead sinks the nets whilst the corks float it. The nets are, however weighed down when it is suspected that the fishes are not moving close to the surface of the water

Fishing activities also take place in shallow areas and bays where set gill nets are stretched between tree stumps in the water and the water floating plants. Most nets like gill nets are set perpendicular to the shore and on lake bed to catch fish as they feed in shallow waters especially in the night.

Fishing is carried out in both day and night and the number of fishermen expected per canoe ranges from two to four. The nets are set late in the afternoon and inspected the next morning between the hours of 6.00 a.m and 9.00 a.m. This depends on fishing methods used and the quantity of the nets.

Discussions with fishermen show that, bumper fishing months start from June to November which corresponds with the rainy months. During this period, the water level of the lake continues to rise, indicating inflow of water from its tributaries and watershed. The water

becomes turbid since suspended materials from upstream of the various tributaries attract fish nearer to the banks.

From December to May, fishing is usually poor as the level of the lake steadily decreases. The water becomes clearer during these months and the fishermen shift their attention mostly to crop farming in the draw-down zone as the water level recedes (Gordon, 1988).

4.5. Challenges Faced by Respondents in the Artisanal Fishing Industry

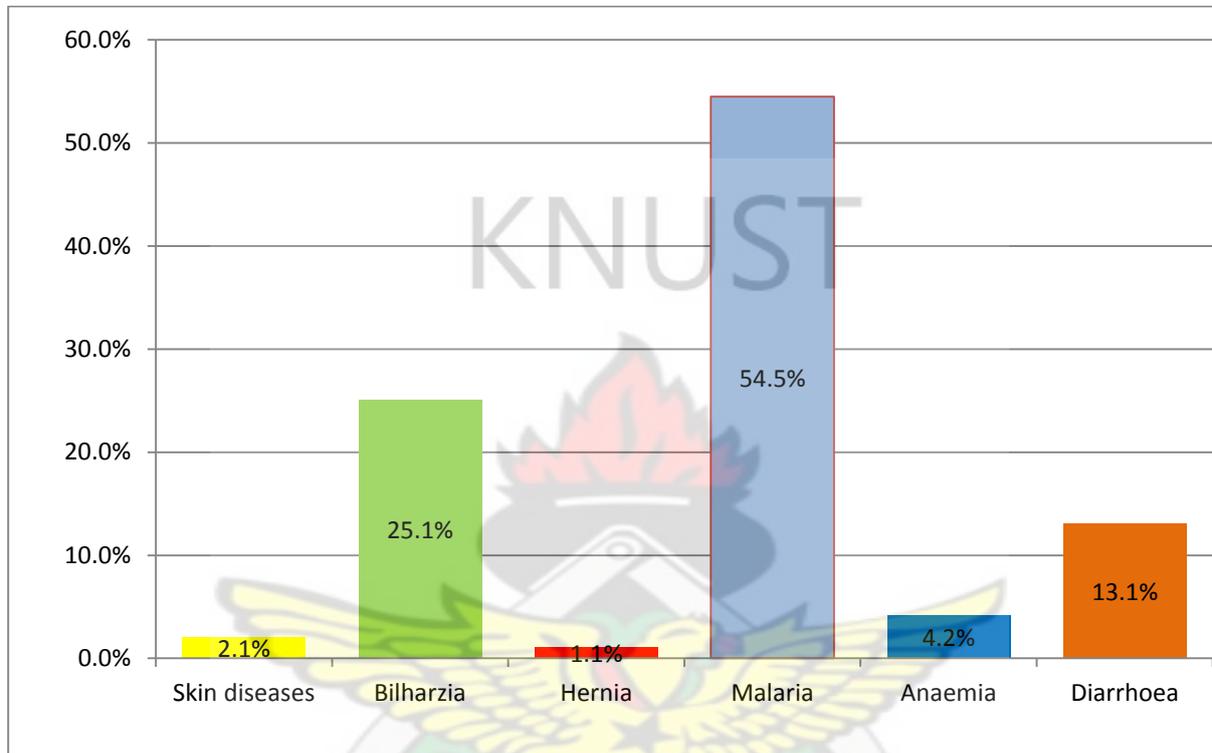
The third objective of this study seeks to find out the challenges facing the fishermen and other players in the artisanal fishing industry in the study area. The hazards and constraints faced by the fishers in the form of storm, snake bite, armed robbery, diseases and financial difficulty, hinder the smooth running of their activities.

4.5.1. Common Diseases among Fishers in the Kwahu-North District

The study tried to establish the common diseases that are mostly prevalent in the fishing communities. The study showed that malaria is the commonest disease among the artisans which constitutes 54.5%. According to Kwahu North District Health Service (2009), malaria is the highest reported case constituting 25.5 per cent and is the sixth cause of death in the district. Malaria is more prevalent in the fishing communities because of their closeness to the water sources which serve as breeding grounds for the mosquito larvae. Malaria is closely followed by bilharzia (25.1%). A study carried out by Chambers (1970) and VRA (1980) showed that, the two major hazards on the Volta Basin were Onchocerciasis (river blindness) and Schistosomiasis (bilharzias). This showed that, while Onchocerciasis is no longer health concern in the Volta Basin unlike malaria, bilharzias is still a major concern in the fishing communities. The research further pointed out that, the presence of weeds on the lake provided an ideal habitat for the vector (snails). This is common among the fishermen who dive into the river when performing their fishing activities. The study indicated that though bilharzia was still prevalent, the reported common disease was malaria.

Diarrhoea was also reported as a common disease constituting 13.1 per cent. This was as a result of sanitation problems in the communities and, also, sharing the same source of water with animals like cattle.

Figure 4.2. Bar Graph Showing Common Diseases in the Communities



Source: Field survey by Author, May 2011

4.5.2. Ability to Finance Healthcare

Generally, ability to finance health needs in the fishing communities was encouraging. Among the 194 respondents, 79.9 percent could finance their health needs as against 20.1 percent who found it difficult to finance it. Among respondents who were not able to finance their health needs in the communities, fish mongers form the least with 3.6 per cent and fishermen the highest with 9.8 per cent. Also, ability to finance health need was high among fishermen with 30.7 per cent as against 16.5per cent for fish mongers. This shows that, the fishermen who were the most vulnerable group in terms of hazards were able to finance their health needs. The issue of health is related to fishing as indicated by Allison et al (2001), that

fisher folks are not necessarily the poorest of the poor in monetary terms, but among the most vulnerable socio-economic groups in societies due to their high exposure to certain natural, health-related or economic shocks and disasters. Field data further confirmed that, households who engaged in fishing activities used fish income to cover their health expenses (Russell et al. 2007).

Table 4.10. Ability to Finance Healthcare.

Index	Fisher folks							
	Fishermen		Fish Processors		Fishmongers		Total	
	frequency	%	Frequency	%	frequency	%	frequency	%
No	19	9.8	13	6.7	07	3.6	39	20.1
Yes	79	30.7	44	22.7	32	16.5	155	79.9
Total	98	40.5	57	29.4	39	20.1	194	100

Source: Field survey by Author, May 2011.

4.5.3. Means of Healthcare Financing

As shown in Table 4.11 among the 194 respondents, 49.5 percent were able to finance their health needs through NHIS and 45.4 percent through income from artisanal activity. The use of NHIS, was high among fishermen constituting 21.1 percent and the fishmongers the least with 10.3 percent. The fish mongers felt that, they are the better-off fisher group in the fishing communities and can easily pay for their health needs even in emergency situations. Further, direct income from fisher groups in financing their health needs was high among fishermen representing 29.4 percent and least among fish processors constituting 6.2 percent. This is because; fishermen do have easy access to cash from proceeds of fish than fish processors. The study further revealed that, fish processors who relied on other income sources to finance their healthcare constituted 5.1 percent. This made the fish processors the most vulnerable group in terms of healthcare financing.

Table 4.11. Means of Healthcare Financing

Index	Fisherfolks							
	Fishermen		Fish processors		Fishmongers		Total	
Means of health-care financing	frequency	%	frequency	%	frequency	%	frequency	%
NHIS	41	21.1	35	18.0	20	10.3	96	49.5
Income from fishing.	57	29.4	12	6.2	19	9.8	88	45.4
Others	00	0	10	5.1	00	0	10	5.1
Total	98	50.5	57	29.3	39	20.1	194	100

Source: Author's field survey, May 2011.

4.6. Hazards Faced by Fishermen When Undertaking Their Activities

The hazards the fishermen face outlined in Table 4.12 makes them vulnerable as they were exposed to these risks when undertaking their activities. According to Moser (1996; 1998), vulnerability is seen as the insecurity of the well-being of individuals, households or communities in the face of a changing environment. These changes often come with increasing risk and uncertainty.

The study indicated that, among the hazards faced by fishermen in the study communities, storms form the highest with 61 respondents, followed by stumps representing 14 respondents, and snake bites the least with 4 respondents. Further, among the communities, risks faced by the fishermen in terms of storms were high at Amankwakrom and Brumben constituting 32.8 per cent and 29.5 per cent respectively. The high percentage recorded in terms of storms for Amankwakrom and Brumben were as a result of their location along the Volta Lake where wind storms were stronger than Ekye-Amanfrom and New Kyease which are located along River Afram and River Obusum the two tributaries of Lake Volta in the study area. Further, while diseases constitutes 22.2 per cent each at Ekye-Amanfrom, Brubem and Amankwakrom, it represent 33.4 per cent at New-Kyease. The hazards were found to negatively impact on the profit of the fishermen through destruction of nets, low level of

output, inability to undertake fishing activities on stormy days, loss of artisanal inputs and reduced profit.

Table 4.12. Hazards Faced by Fishermen

Hazards faced by fishermen		Ekye- Amanfrom	Brumben	Amankwa- krom	New-Kyease	Total
Storms	Frequency	14	18	20	09	61
	%	23.0	29.5	32.8	14.7	100
Diseases e.g Malaria, Bilharzia	Frequency	2	2	2	3	09
	%	22.2	22.2	22.2	33.4	100
Cuts	Frequency	1	1	1	2	5
	%	20	20	20	40	100
Stumps in river torn net	Frequency	4	3	3	4	14
	%	28.6	21.4	21.4	28.6	100
Snake bites	Frequency	2	-	-	2	4
	%	50	-	-	50	100
'Atidza' stick can hurt	Frequency	2	01	01	1	05
	%	40	20	20	20	100
Total	Frequency	26	24	26	22	98

Source: Field survey by author, May 2011.

4.7. Constraints Facing Fishermen

The highest constraint to fishermen was “financial difficulty” (39.2%), followed by “difficulty in acquiring hired labour” (21.7%). This was because only 17 per cent of the fishermen acquired their inputs through self financing. The difficulty in acquiring hired labour, which accounts for 21.7% actually form the basis of using family labour which were mostly school pupils, resulting in lateness to school, school dropout and absenteeism.

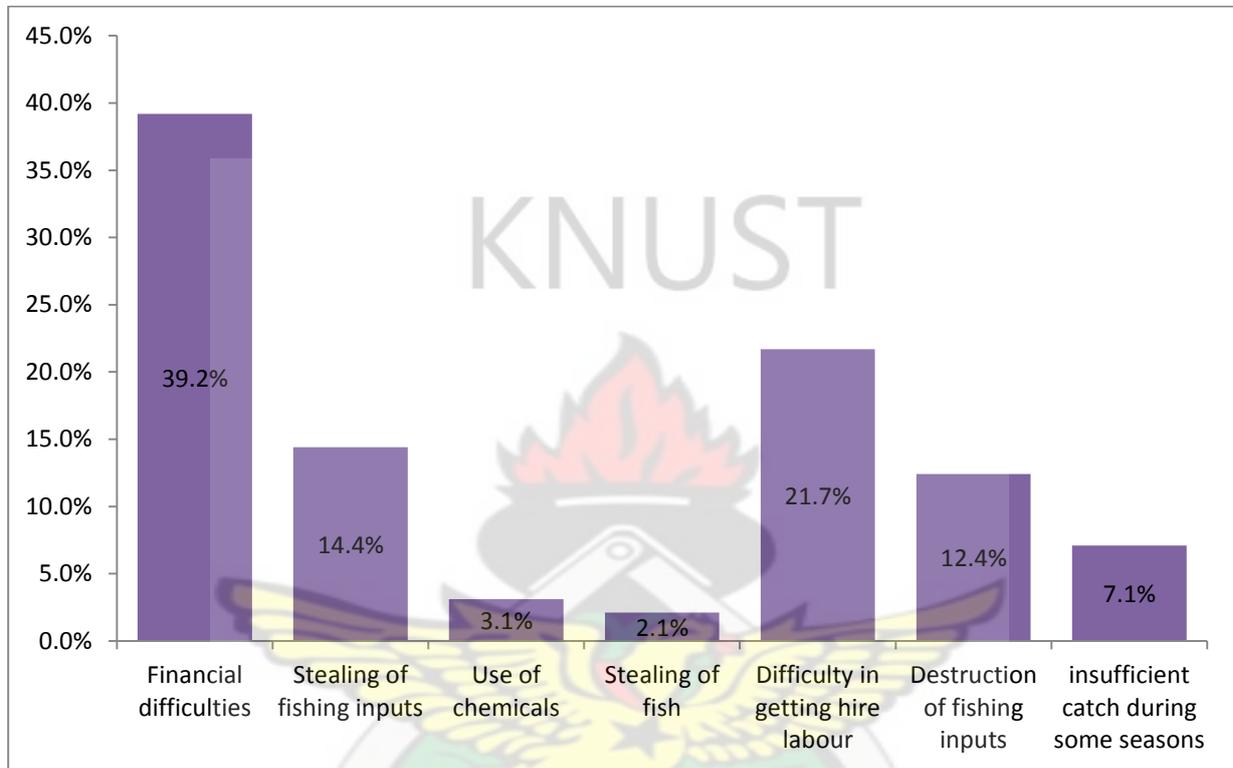
The constraint faced by the fishermen has negative impacts on initial investment, profit base and inability to re-invest. Others include ‘fish death’ due to chemical use, quarrels, police cases, extra cost incurred and reduced fish catch per head.

The effects of the constraints are indicative of the fact that, apart from self financing of fishing inputs, which forms approximately 17 per cent, the fishermen relied on financial institutions, credit unions, family members and friends. Credit and outright purchase financed

mainly by fishmongers for their fishing inputs led to the fishmongers controlling the prices of the fish during the bargaining process with the fishermen.

Figure 4.3. Bar Graph Showing Constraints Facing Fishermen in the study

Communities.



Source: Field survey by Author, May 2011.

4.8. Appropriateness of Fishing Technology Adopted by Respondents in the Study Area

The fourth objective seeks to describe the fishing technology employed by the fishermen in the study area. These technologies are the skills and methods used in hunting for fish. The commonly used technologies by the fishermen are discussed below:

4.8.1. Gill net

Gill nets are nets which are set perpendicular to the shore and Lake Bed. They can be set in both shallow and deep areas and across bays where they are stretched between tree stumps in the water and the floating plants. Observation in the study area showed that gill net is the most commonly used fishing technology. This is because it is applicable during major fishing

or raining season (when the lake is increasing in volume) and the lean season (when the volume of the water decreases). Gill nets are prepared with corks and lead. The lead sinks the nets whilst the corks float it. The fish get entangled as they come across the net and try to pass through it. It is a very safe fishing technology employed by the fishermen except when the mesh size is too small and the immature fish are caught. This normally takes place during the breeding periods of the fish and marks the beginning of the lean season. The fishermen therefore resort to the use of gill net with small mesh sizes to make a living. This affects the long term viability and sustainability of the fishing industry and reduces fish catch per head. Shown in plate 2 below are school-going children arranging gill net on canoe with their father.

Plate 2. School going children Preparing Gill net with Their Father



Source: Field Observation, January 2012.

4.8.2. Fish traps

Fish traps are prepared in various forms and shapes depending on the targeted species. They are usually funnel-like or conical tunnel structures with narrow tail piece with mechanism for

opening and closing. The fish get trapped when they enter the trap through the opening. Observation in the study area showed that, fish traps are usually made of palm fronds or wire mesh. They are placed at the bottom of the water with or without bait or food pieces. When fish traps are used alone, without combining it with any other fishing methods as 'nifa', it is very safe technology and enhances long-term sustainability of the artisanal fishing industry. Fish traps are mostly used alone in shallow waters closer to the shore for tilapia at the beginning of the major season when the water level begins to increase in volume. Fish traps are shown in Plate 3 below on a canoe of a fisherman returning from fishing.

Plate 3. Fisherman returning from fishing with fish traps and gill net.



Source: Field Observation, January 2012.

4.8.3. Cast Net

Cast net is a specially prepared net, thrown to envelope and trap fish. It is then slowly and carefully drawn out. It is one of the safest fishing methods used if bigger mesh size nets are used. However, when smaller mesh size nets are used, immature fishes are trapped and discarded which negatively affect long-term output of the fishermen leading to reduced income. Cast nets are however labour intensive and mostly used by the very poor fishermen

who lack the necessary financial assistance to invest in the other fishing inputs. These are shown in Plate 4 and 5 below.

Plate 4. Cast Net being thrown by a Fisherman.



Source: Field Observation, July 2012.

Plate 5. The Cast Net is being carefully drawn out by the Fisherman



Source: Field Observation, July 2012.

4.8.4. Hook and Line

Hook and line is another important fishing technology used by the fishermen in the study area. It basically consists of a line with hooks to which baits are attached. The bait lures the fish to swallow it together with the hook and the fish gets hooked until it's been harvested. Observation in the study area showed that, it can be individual lines with hooks or long lines on which the hooks are tied with specific intervals. Mostly, the size of the hook usually determines the size of the fish targeted. It is therefore a very safe technology used by the fishermen and helps sustain the artisanal fishing industry. This is shown in Plate 6 below.

Plate 6. Fisherman preparing Baited Fishing Lines.



Source: Field Observation, July 2012.

4.8.5. Bamboo Tubes and Traps

These are bamboo sticks cut into pieces of about a metre long. Smaller holes are created on the sides which serve as a passage and hiding places for the fish. The fish get trapped after entering through the passage. They are used for a particular species of *chrysichthys* (Cat fish). The fishermen said that, bamboo tubes are used because gill nets cannot be used to catch this particular species of *chrysichthys*. Observation from the field showed that, discarded bamboo

tubes litter the environment especially along the shore and the river bed. The fish, however, spawn in the tubes and when harvested into canoes the immature ones die and the unhatched eggs also go waste and this affect the viability and sustainability of the fish stock. This might reduce catch per head and affect income levels of the fishermen. This fishing technology is shown in Plate 7 and 8 below.

Plate 7. Bamboo tubes or traps



Plate 8. Fisherman harvesting fish with bamboo



Source: Field Observation, January 2012.

Source: Field Observation, January 2012.

Plate 9. Harvested fish from bamboo traps or tubes.

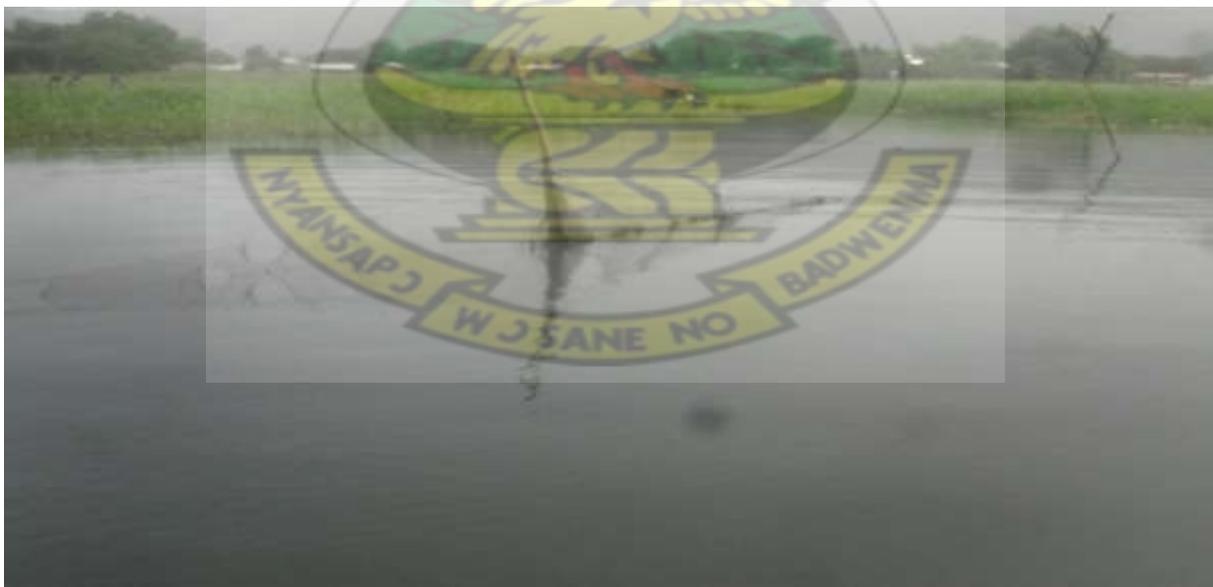


Source: Field Observation, January 2012.

4.8.6. Gill net with fish traps

Gill net and fish traps ‘nifa’ are also known as surrounding nets and pot traps. It is a surrounding net because, they are set in a semi-circle form with both ends attached to the mainland. It therefore serves as a barrier to the fish from escaping to the deeper waters during the day after feeding in shallow waters `at night. This is because the nets are tied to specially prepared sticks which raise the net above the water level. Fish traps are set along these specially prepared sticks and it serves as an opening to the fish. This surrounding net or ‘nifa’ mostly attract the usage of chemicals with the intention of forcing the fish to the deeper waters. Discussion with the fishermen showed that this sometimes lead to fish death and it takes a longer time before such areas becomes fully replenished to attract fish to where they were used. This fishing method is a source of conflict between communities since fishers try to prevent others from using such nets around their territorial areas. This fishing technology is shown in Plate 10 below.

Plate 10. Gill net with fish traps.



Source: Field Observation, January 2012.

4.8.7. 'Atidza' Method of Fishing

'Atidza' is a fish aggregating device made of tree branches and bushes. These branches are heaped in the water for about two weeks to a month before harvesting with a specially prepared type of net. The heaped branches serve as a hiding and breeding ground for the fish. Though it is very economical and does not need any huge capital investment, it is labour intensive. Discussion with the fishermen showed that, it contributes to environmental degradation since it leads to the destruction of the vegetation in areas where they are highly practised. It also destroys other fishing gears like gill net when they are cast on them reducing the lifespan of the fishing inputs which serve as additional cost to fishermen. Like surrounding nets with fish traps, the 'Atidza' technology also generates conflicts between communities since the fishermen try to prevent others from using such fishing methods closer to their communities. This is shown in Plate 11 and 12 below.

Plate 11. Showing 'Atidza' where branches of trees are heaped in the river.



Source: Field Observation, July 2012.

Plate 12. Fishermen Harvesting ‘Atidza’.



Source: Field Observation, July 2012.

4.8.8. Beach seines (Adranyi)

This is an active gear undertaken by five or more fishermen depending on its size. This type of net is cast from one end of the shore to the other in a semi-circle form. The enclosed fish are therefore dragged to the shore. This fishing method is one of the bad fishing methods because the immature fish end up being harvested and discarded. Beach seines breeds conflicts among fishermen because, it is very destructive to other fishing technologies such as gill nets. It also destroys the breeding and feeding grounds of the fish and affects long-term viability and sustainability of the inland fishing industry. It is against this that, it cannot be used continuously in a particular area. This is shown in Plate 13 below.

Plate 13. Fishermen Carefully Dragging Beach Seine to the Shore



Source: Field Observation, July 2012.

4.8.9. Purse Seine

It is a specially prepared type of gill net with the length of about forty-fifty metres. This type of purse seine is literally called ‘canoe-top net’ and it is hauled by two people. When set, it has both ends tied to stumps and it looks like the shape of a canoe. One side of the net is weighed down with stones tied on ropes to the river bed whilst the other side is floated with corks. It is then raised by the two fishermen who stand at both ends of the canoe at every twenty-thirty minutes with the trapped fish. It is a very safe fishing method because the fish is carefully sorted during the process of harvesting. This technology therefore promotes viability and sustainability of the artisanal fishing industry and enhances the well-being of the fishers. This is shown in Plate 14 below.

Plate 14. Fishermen harvesting purse seine.

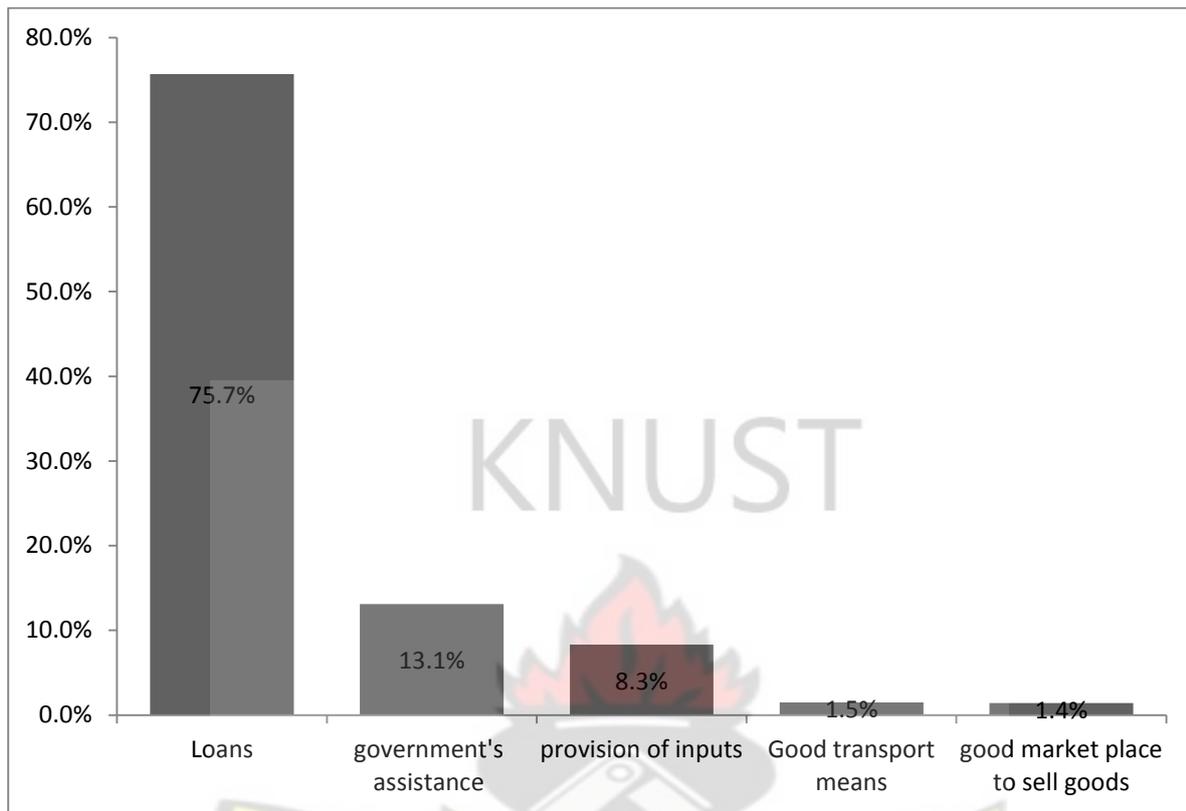


Source: Field Observation, January 2012.

4.9. Type of Assistance Needed By Fishers

Over 75% of the people request for loans as the kind of assistance they needed. Government assistance was mentioned by the fishers as subsidy and provision of inputs constituting 13.1 per cent and 8.3 per cent respectively. Good means of transport and good market place represents 1.5 per cent and 1.4 per cent respectively. The fishers emphasized that, with the necessary assistance, there would be improvement in their lives. This is because they will be able to diversify their economic activities. The respondents engage in other economic activities to complement fishing, processing and mongering of fish. The activities they undertake involve farming, animal rearing, selling of fishing inputs and other non-farm activities as petty trading.

Figure 4.4. Kind of Assistance Needed by Fishing Artisans.



Source: Field survey by Author, May 2011

4.10. Specific Demographic and Socio-Economic Characteristics Fish Processors

Educational levels, age groups, marital status and ethnic composition are the demographic and socio-economic characteristics of fish processors discussed in the study communities under this section.

4.10.1. Educational Levels and Age Group of Fish Processors

Generally, formal education among fish processors constitutes 57.9 per cent as against 42.1 per cent of the fish processors without formal education. The study indicated that, among fish processors with some form of formal education, Primary school leavers form the highest constituting, 31.6 per cent with Senior High School leavers forming 7.0 per cent. Among the fish processors within 20-29 age groups, Primary School leavers form the highest representing 40.0 per cent and Senior High School graduates the least representing 15.0 per

cent. None of the fish processors within 40-49 year group and above 50 years had Senior High school education. This implies that, fish processors with some form of education decrease in number with increasing age. The studies also showed that, fish processors without formal education, were high within 40-49 year group and above 50 year group constituting 75 per cent each.

Table 4.13. Educational Levels and Age Group of Fish Processors

Indexes	Age Group Of Fish Processors								Total	
	20 - 29		30 – 39		40 – 49		50+			
Educational Levels	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
No Schooling	3	15.0	6	35.3	12	75.0	3	75.0	24	42.1
Primary	8	40.0	6	35.3	3	18.8	1	25.0	18	31.6
Junior High/Middle School	6	30.0	4	23.5	1	6.3	0	0.0	11	19.3
Senior High	3	15.0	1	5.9	0	0.0	0	0.0	4	7.0
Total	20	100	17	100	16	100	4	100	57	100

Source: Field survey by Author, May 2011.

4.10.2. Marital Status and the Age of Fish Processors

The studies revealed that, majority of the fish processors were married constituting 75.4 per cent while 8.8 per cent were widows. Further, among 20-29 age groups, fish processors with marital status form the highest representing 75 per cent. However, none of the fish processors were widows between 20-29 year groups with 8.3 per cent divorced. Again among the various age groups, all the fish processors among 30-39, 40-49 and above 50 year groups were not single. Among the married age groups, 30-39 age group forms the highest, representing 80 percent and the above 50 year group of 66.7 per cent being the least.

Table 4.14. Marital status and Age group of Fish Processors

Index	Age Group Of Fish Processors								Total	
	20 - 29		30 – 39		40 - 49		50+		Frequency	%
Marital Status	Frequency	%	Frequency	%	Frequency	%	Frequency	%		
Single	2	16.7	0	0.0	0	0.0	0	0.0	2	3.5
Married	9	75.0	16	80.0	12	75.0	6	66.7	43	75.4
Divorced	1	8.3	3	15.0	2	12.5	1	11.1	7	12.3
Widowed	0	0.0	1	5.0	2	12.5	2	22.2	5	8.8

Source: Field survey by Author, May 2011.

4.10.3. Ethnic Composition of Fish Processors in the Study Communities

Ethnic composition of the fish processors forms a major demographic and socio- economic characteristics in the study area. The study in the fishing communities indicated that, among the fish processors, the Ewes form the largest ethnic group constituting 52.6 per cent, followed by Ga-Adangbe with 26.3 per cent. Among the communities, the Ewe ethnic group was more predominant at Brumben, representing 61.5 per cent and the least was New-kyease constituting, 43.8 per cent. At Ekye-Amanfrom, the Ewes form the largest fish processors representing 60 per cent followed by Ga-Adangbe 24 per cent and other ethnic group with no fish processors. Further, at Brumben and Amankwakrom while the Ewes form the largest fish processing group with 70.8 and 59.1 per cent respectively, fish processors with other ethnic origin represent, zero (0%). per cent each. Within the Akan ethnic group in the communities, New-kyease form the highest (25 per cent) and Brumben the least with 15.4 per cent.

Table4.15: Ethnic Composition of Fish Processors in the Study Communities

Ethnicity	Communities								Total	
	Ekye-Amanfrom		Brumben		AmankwaKrom		New Kyease			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Ewe	7	50.0	8	61.5	8	57.1	7	43.8	30	52.6
Akan	3	21.4	2	15.4	3	21.4	4	25.0	12	21.1
Ga-Adangbe	4	28.6	3	23.1	3	21.4	5	31.3	15	26.3
Others	0	0.0	0	0.0	0	0.0	0	0.0	0	
Total	14	100	13	100	14	100	16	100	57	100

Source: Field survey by Author, May 2011.

4.11. Livelihoods Activities of Fish Processors

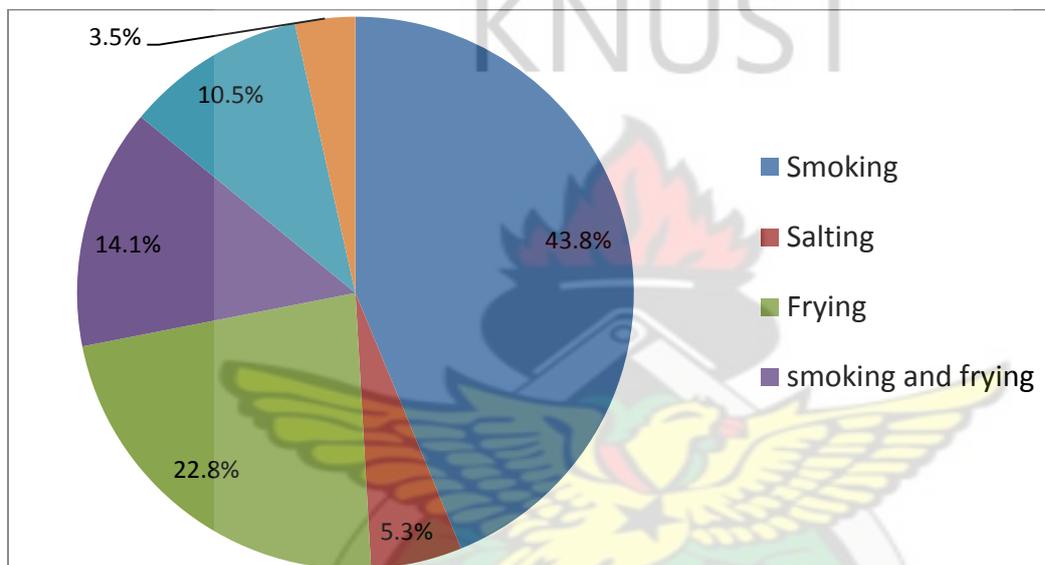
Livelihood comprises the capabilities, assets (including both tangible and intangible resources) and activities required for a means of living. The main livelihood activities of fish processors include; fish processing methods, types of labour used in fish processing and modes of selling fish produced.

4.11.1. Fish Processing Methods

Smoking is the commonest method of fish processing (43.9%) followed by frying (22.8%). Salting is a less popular single method of fish processing (5.3%). Processing methods used in the research communities included smoking and frying (14.1%), smoking, salting and drying (10.5%), and smoking and salting (3.5%). Bigger fishes caught by mesh sized nets of 2½ inches and above, are smoked. Traditionally, smoking is done in ovens built with clay. However, in recent years, ‘Chorkor’ ovens are in use. Most preferred method of smoking was by the rather inefficient round oven, which uses far more fuel wood than the ‘Chorkor’ oven which was introduced with great success along the coast. The fish processors believed that, fish smoked with the round ovens smoked better and the probability of the fish been burnt was less.

Freezing is a less popular method of fish processing in the study area. This is as a result of the distant nature of the fishing communities from urban centers. Locals prefer fresh fish to frozen ones. Reasonable quantity of salt is applied to the fish, kept for one to five days and dried for storage. Frying is another method of processing fish for the market. These activities are undertaken by either the wives of the fishermen or the processors who buy directly from the fishers as shown in Plate 4 and 5.

Figure 4.5. Pie Chart Showing Fish Processing Methods in the study communities.



Source: Field survey by Author, May 2011.

Plate 15. A woman smoking fish at Ekye-Amanfrom.



Source: Field Observation, January 2012.

Plate 16. Fish processors frying fish at Ekye-Amanfrom.



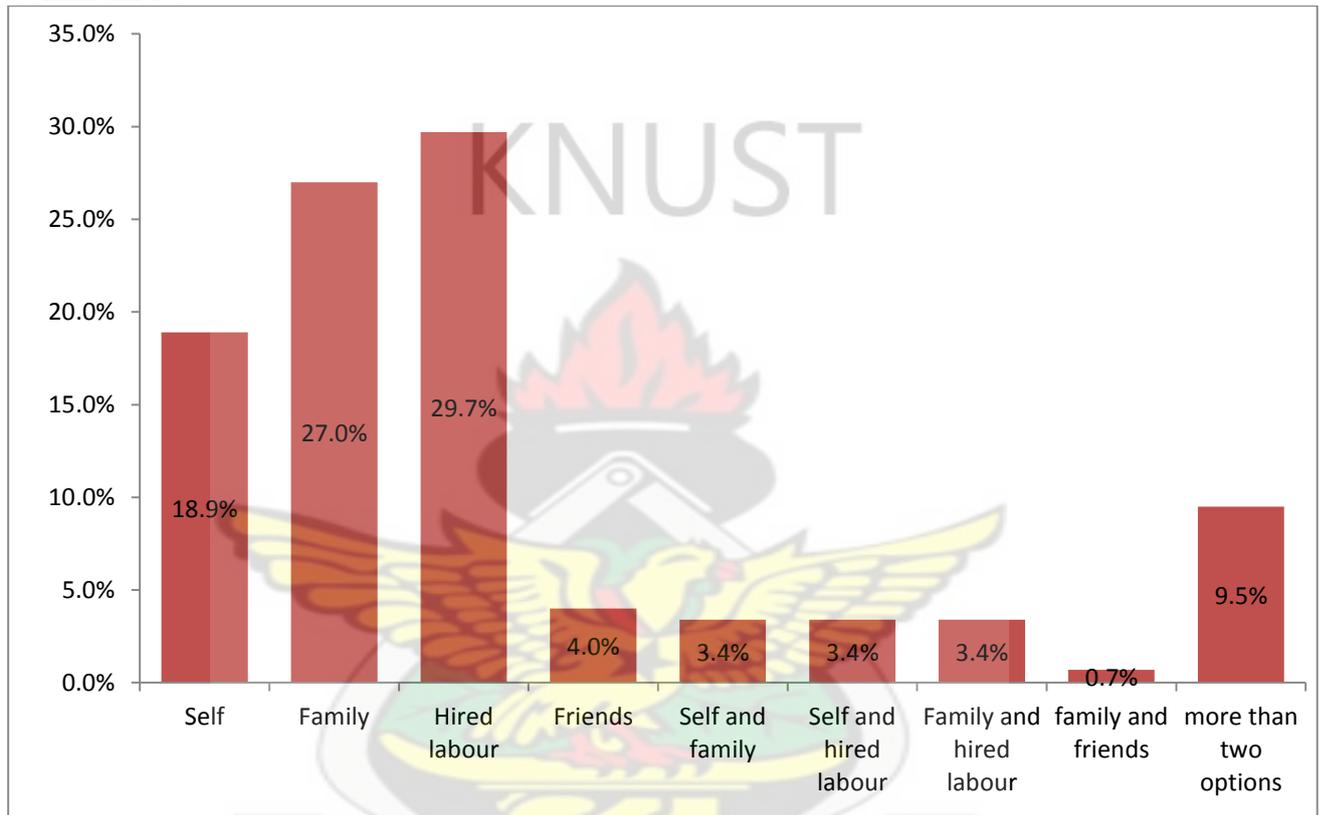
Source: Field Observation, January 2012.

4.11.2. Types of Labour Used in Fish Processing

Hired labour was used in fish processing (29.7%). Family, self and friends were also other sources of labour constituting 27%, 18.9% and 4% respectively. The study among fish processors reveal that more than two options of labour are used in processing. Hired and

family labour which accounted for 29.7% and 27% respectively were used because of their reliability. This is because processing of fish need to be done on time to avoid deterioration of the fish. The study also revealed that processors do have easy access to other forms of labour as compared to fishermen.

Figure 4.6. Bar Graph Showing Types of Labour Used in Fish Processing in the Fishing Communities



Source: Field survey by Author, May 2011.

4.11.3. Mode of Selling Fish Produced

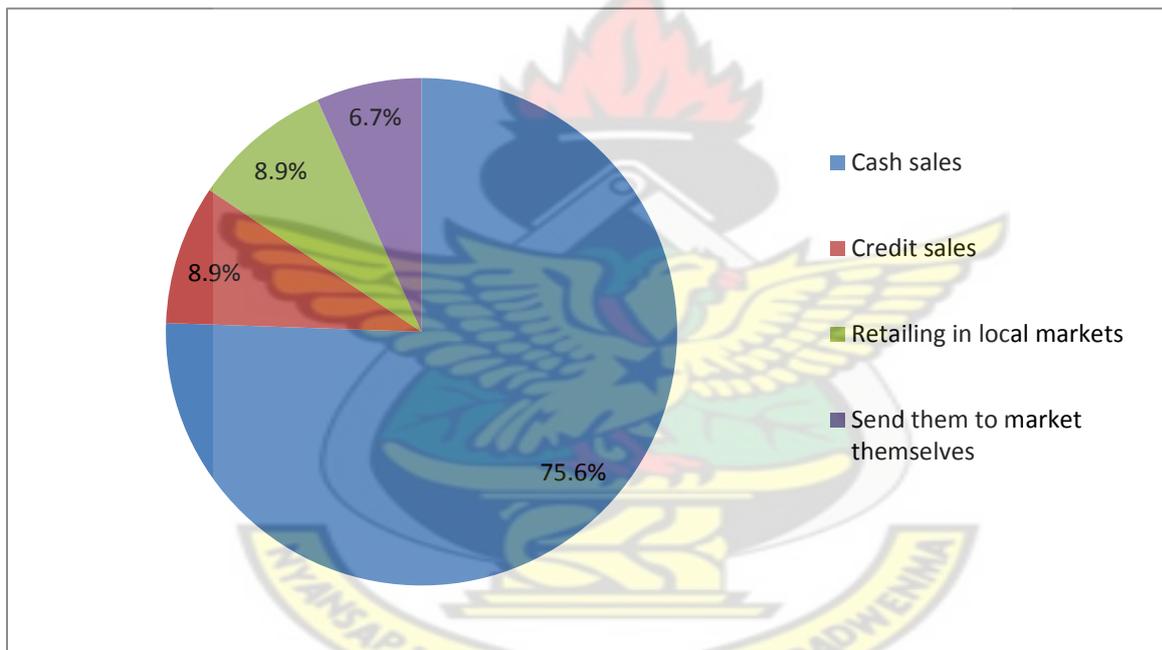
Approximately, 76% of the processed produce is sold to traders/ mongers for direct cash. Retailing and credit sales form less than 10% each as other modes of sales among fish processors. In order to play effective role to link both the traders and fishermen the processors use various modes as direct cash to sell the produce:

- i. Those that are paid promptly with 75.6% as indicated in Fig.4.7. These categories of processors are pre-financed by the traders who are their loyal customers.

ii. Those that allow some traders to buy on credit. These traders who are unable to pay for all the produce bought are seen as loyal to both fishermen and processors but mostly impose their wish during the bargaining process on them.

iii. The third groups are processors who retail their produce and are not financed by traders and can choose to sell in market centers at prevailing market prices and come directly under the category of the processors who sell their produce in the market centers both within and outside the district. These groups of processors double as traders as well and happened to be wives of well established fishermen.

Figure 4.7. Pie Chart Showing Modes of Selling Produce.



Source: Field survey by author, May 2011.

Plate 17. Processors retailing their produce at Ekye-Amanfrom Market.



Source: Field Observation, January 2012.

4.12. Challenges Faced by Fish Processors

The challenges faced by fish processors include; hazards when undertaking their activities and constraints. These hazards make them vulnerable as they undertake their activities and the constraints limit their economic potentials.

4.12.1. Hazards Faced by Fish Processors When Undertaking Their Activities.

The hazards the fish processors face outlined in Table 4.16 makes them vulnerable as they were exposed to these risks when undertaking their activities. According to Ellis (1999), the assets which poor people possess or have access to, the livelihood they desire and the strategies they adopt are influenced by the context which they live. This is conceptualized as having two broad dimensions; factors that influence their vulnerability, and policies, institutions and processes.

The study indicated that, among the hazards faced by fish processors in the study communities, heat and burn ranked high with 36 respondents and snake bites the least with 6 respondents. Heat and burn in the study communities do not revealed much variations as

Brumben and Amankwakrom represent 27.8 per cent each and Ekye Amanfrom and New Kyease constitutes 22.2 per cent. Cuts were also evenly distributed in all the communities constituting 25 per cent each. The study further showed that, while snake bites constitute 16.7 per cent at Ekye-Amanfrom and Amankwarom, it represents 33.3 per cent at Brumben and New-Kyease. Diseases also represent 28.6 per cent each at Ekye-Amanfrom, Amankwakrom and New-Kyease and form 14.2 per cent at Brubem. The hazards faced by the fish processors hinder the full realization of their economic activity, depriving them of income which affect their well being.

Table 4.16. Hazards Faced by Fish Processors

Hazards faced by fish process		Ekye-Amanfrom	Brumben	Amankwakrom	New-Kyease	Total
Heat and Burn	Frequency	8	10	10	8	36
	%	22.2	27.9	27.9	22.2	100.
Cuts	Frequency	2	2	2	2	08
	%	25	25	25	25	100.
Snake bites	Frequency	1	2	1	2	06
	%	16.7	33.3	16.7	33.3	100.
Diseases eg Malaria Bilharzia	Frequency	2	1	2	2	07
	%	28.6	14.2	28.6	28.6	100.
Total	Frequency	13	15	15	14	57

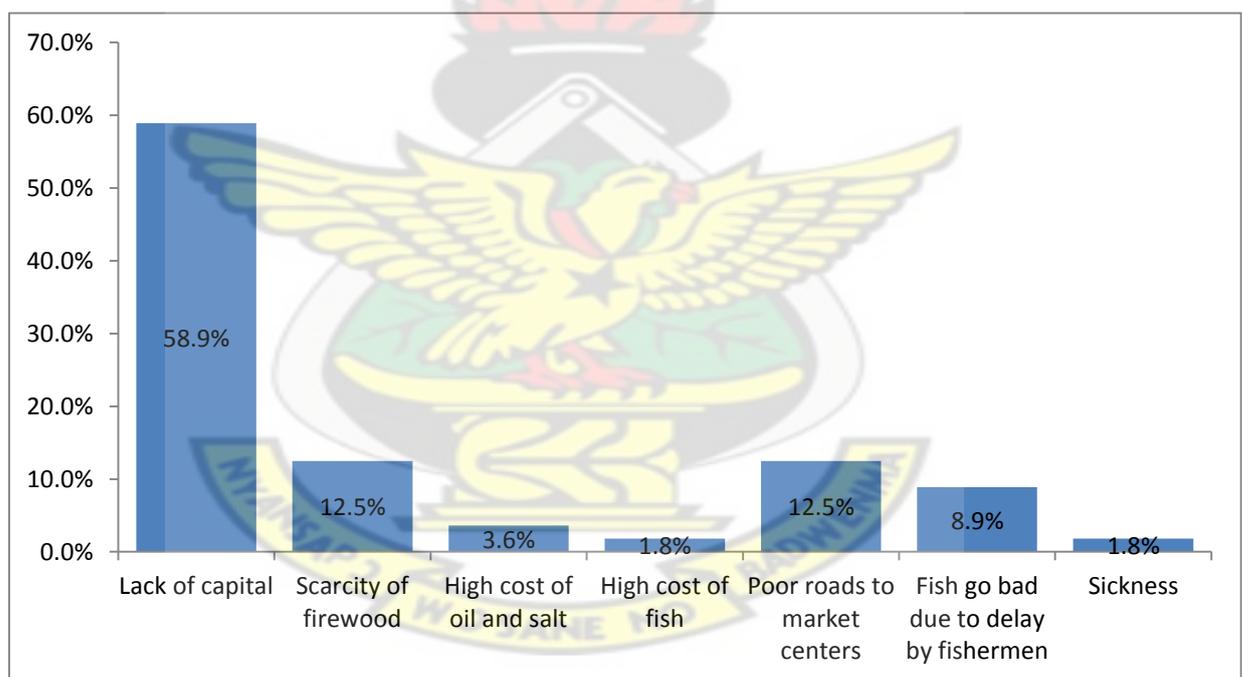
Source: Field survey by author, May 2011.

4.12.2. Constraints Facing Fish Processors

The greatest constraint was lack of capital (59%) followed by scarcity of firewood and poor roads constituting (12.5%) respectively. This also holds for the traders and the fishermen. Discussions with processors revealed that, traders were their main financiers. Scarcity of firewood was as a result of depleting the forest vegetation around the lake. This exposes the land to the weather especially rainfall and causes erosion and landslides during torrential rains. Ly (1980) and VRA (1995) indicated that destruction of forest vegetation around the lake led to landslide in many areas on the eastern bank of the lake. Poor road network is a

constraint because it hampers effective distribution of processed fish. This goes to confirm the bad roads and lack of effective transport system by the traders. This leads to mismanagement and high cost of transport fares. Discussion with the processors showed that, the price of the fish is determined by the season of the fishing activities. Gordon (1988) pointed out that from December to May fishing is usually poor on the Volta Lake as the water level steadily decreases and becomes clearer. During these months, the fisher folks shift their attention mostly to farming in the draw-down zone as the water level recedes. In addition to this farming activity, the processors also engage in petty trading to enhance their living conditions.

Figure 4.8. Bar Graph Showing Constraints Facing Fish Processors.



Source: Author's field survey, May 2011

4.13. Specific Demographic and Socio-Economic Characteristics Fish Mongers

The specific demographic and socio-economic characteristics of fish mongers include; educational levels and their age groups, marital status and ethnic composition in the study communities.

4.13.1: Educational Levels and Age Group of Fish Mongers

The role of education in the development of an individual cannot be underestimated. It is important for the development of any economic activity. The study indicated that, 59 per cent of fish mongers had formal education. Among 20-29 age group, Primary and Junior High school leavers form 33.3 per cent each while fish mongers with no formal education and Senior High school leavers constitutes 16.7 each. Among the fish mongers with formal education, Primary school leavers form the highest constituting 30.8 per cent and Senior High school leavers, the least forming 7.7 per cent. Among 30-39 age groups, Primary school leavers form the highest representing 42.9 per cent and Senior High school leavers forming 7.1 per cent. Further, fish mongers without formal education, ranked high within 40-49 age group, constituting 70.0 per cent and 20-29 years group, the least with 16.7 per cent.

Table 4.17. Educational Levels and Age Group of Fish Mongers

Index	Age Group Of Fish Mongers								Total	
	20 - 29		30 – 39		40 - 49		50+			
Educational Levels	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
No Schooling	2	16.7	4	28.6	7	70.0	3	100	16	41.0
Primary	4	33.3	6	42.9	2	20.0	0	0.0	12	30.8
Junior High/Middle School	4	33.3	3	21.4	1	10.0	0	0.0	8	20.5
Senior High	2	16.7	1	7.1	0	0.0	0	0.0	3	7.7
Total	12	100	14	100	10	100	3	100	39	100

Source: Field survey by Author, May 2011.

4.13.2. Marital Status of Fish Mongers and Their Ages

The study indicated that, majority of the fish mongers were married constituting 71.8 per cent while 10.3 per cent were widows. Further, among 20-29 age groups, fish mongers with marital status form the highest representing 85.7 per cent. However, none of the fish mongers were widows between 20-29 year groups with none divorced. This is contrary to the fish processors where 8.3 per cent were divorced within 20-29 age groups. Again among the various age groups, all the fish mongers among 30-39, 40-49 and above 50 year groups were singles. The study further indicated that, within the 30-39 age groups, the married fish mongers form the highest representing 75 percent with the widows constituting 8.3 per cent respectively.

Table 4.18. Marital status of Fish Mongers and Their Ages.
Source: Field survey by Author, May 2011.

Index	Age Group Of Fish Mongers								Total	
	20 - 29		30 – 39		40 - 49		50+		Frequency	%
Marital Status	Frequency	%	Frequency	%	Frequency	%	Frequency	%		
Single	1	14.3	0	0.0	0	0.0	0	0.0	1	2.6
Married	6	85.7	9	75.0	8	66.7	5	62.5	28	71.8
Divorced	0	0.0	2	16.7	3	25.0	1	12.5	6	15.4
Widowed	0	0.0	1	8.3	1	8.3	2	25.0	4	10.3
Total	7	100	12	100	12	100	8	100	39	100

4.13.3. Ethnic Composition of Fish Mongers in the Study Communities

The study in the fishing communities indicated that, among the fish mongers, the Ewes form the largest ethnic group constituting 60.5 per cent, followed by Ga-Adangbe with 21.1 per cent. Among the communities, the Ewe ethnic group was more predominant at Brumben, representing 70 per cent and the least was at New-kyease constituting, 50.0 per cent. At Ekye-Amanfrom, the Ewes form the largest fish mongers; representing 50.0 per cent followed by Ga-Adangbe 30.0 per cent with others forming 10.0 per cent. Further, at Brumben and Amankwakrom while the Ewes form the largest fish mongering group

constituting 70.0 and 62.5 per cent respectively, fish processors with other ethnic origin represent zero (00.0) per cent each. The study also revealed that, fish mongers with the Akan origin were highest at Amankwakrom forming 25 per cent and least at Ekye-Amanfrom and New-kyease representing 20 per cent each.

Table 4.19. Ethnic Composition of Fish Mongers in the Study Communities

Ethnicity	Communities								Total	
	Ekye-Amanfrom		Brumben		AmankwaKrom		New Kyease			
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Ewe	5	50.0	7	70.0	5	62.5	6	60.0	23	60.5
Akan	2	20.0	1	10.0	2	25.0	2	20.0	7	18.4
Ga-Adangbe	3	30.0	2	20.0	1	12.5	2	20.0	8	21.1
Others	1	10.0	0	0.0	0	0.0	0	0.0	0	
Total	10	100	10	100	8	100	10	100	38	100

Source: Field survey by Author, May 2011.

4.14. Livelihoods Activities of Fish Mongers

The assets which poor people possess or have access to, the livelihood they desire and the strategies they adopt are influenced by the context within which they live (Ellis, 1999). The main livelihood activities of fish mongers include; selling and distribution of fish products within and outside the district.

4.14.1. Selling of Fish Products

Slightly above fifty per cent (54%) of all the fish handled by fish mongers are sold outside the Kwahu North District. Fish landed by the fishermen are either distributed or marketed fresh or in processed form at prevailing market prices or through bargaining. Maembe (1991) estimated that, 10 percent of fish caught in the Volta Lake are eaten fresh. The study shows that 46.2 per cent of landed catch is sold in the district whilst 53.8 per cent is sold outside the district. The study further revealed that, the percentage of the landed fish which is sold within the district are re-sold to other traders who reside within and outside the district but are not

living in the fishing communities. The major market centres within the district are found in Donkorkrom, Maame Krobo, Ekye-Amanfrom, Bruben, New-Kyease and other smaller centres where barter system takes place between fishing and farming communities. The major markets are weekly markets. Donkorkrom market takes place on Thursdays, Ekye-Amanfrom and New-kyease on Tuesdays and Bruben on Wednesdays.

The price of fish depends on the type and size. The fish is either counted in hundreds, measured with baskets and pans or sold in singles. Usually, the smaller types of fish are measured or counted. This is shown in Plate 18 below.

Plate 18: Traders buying from processors at Ekye-Amanfrom Market.



Source: Field Observation, January 2012.

4.15. Challenges Faced by Fish Mongers

The challenges faced by fish mongers include; hazards when undertaking their activities and constraints. These hazards make them vulnerable as they were exposed to these risks and the constraints limit their economic potentials.

4.15.1. Hazards Faced by Fish Mongers When Undertaking Their Activities

The hazards the fish mongers face shown in Table 4, 20 makes them vulnerable as they were exposed to these risks when undertaking their activities. According to Moser (1996, 1998), vulnerability is seen as the insecurity of the well being of individuals, households or communities in the face of a changing environment. These changes come with increasing risk and uncertainty. The study revealed that, among the study communities, armed robbery ranked high at Ekye-Amanfrom representing 33.3 per cent with Amankwakrom and New Kyease the least, constituting 20 per cent each. Further, among the study communities, storm was highest at Ekye-Amanfrom representing 42.8 per cent and the least at Amankwakrom and New-Kyease representing 14.3 per cent each. The study also indicated that among the hazards faced by fish mongers in the communities, stumps in the river and heat and burn were not of much concern to them recording 2 and 4 respondents each. Further analysis of hazards faced by fish mongers at Ekye-Amanfrom revealed that, armed robbery constitutes 33.3 per cent and storm 42.8 per cent with heat and burns the least, representing 25 per cent. The study further revealed that, while armed robbery constitutes 26.7 per cent of hazards faced by fish mongers at Bruben, storms represent 28.6 per cent. Stumps in the river are not much of a concern to fish mongers at Bruben and Amankwakrom constituting zero (0%) each. This is because; stumps do not directly affect the activities of fish mongers. These risks deprive the fish mongers of income which affect their well being.

Table 4.20. Hazards Faced by Fish Mongers

Hazards faced by fish process		Ekye-Amanfrom	Brumben	Amankwa-krom	New-Kyease	Total
Armed robbery	Frequency	5	4	3	3	15
	%	33.3	26.7	20	20	100
Storms	Frequency	3	2	1	1	07
	%	42.8	28.6	14.3	14.3	100
Road accident	Frequency	4	2	2	3	11
	%	36.4	18.2	18.2	27.2	100
Stumps in the river	Frequency	1	-	-	1	02
	%	50			50	100
Heat and burn	Frequency	1	1	1	1	04
	%	25	25	25	25	100
Total	Frequency	12	9	8	10	39

Source: Field survey by author, May 2011.

4.15.2. Constraints Facing Fish Mongers

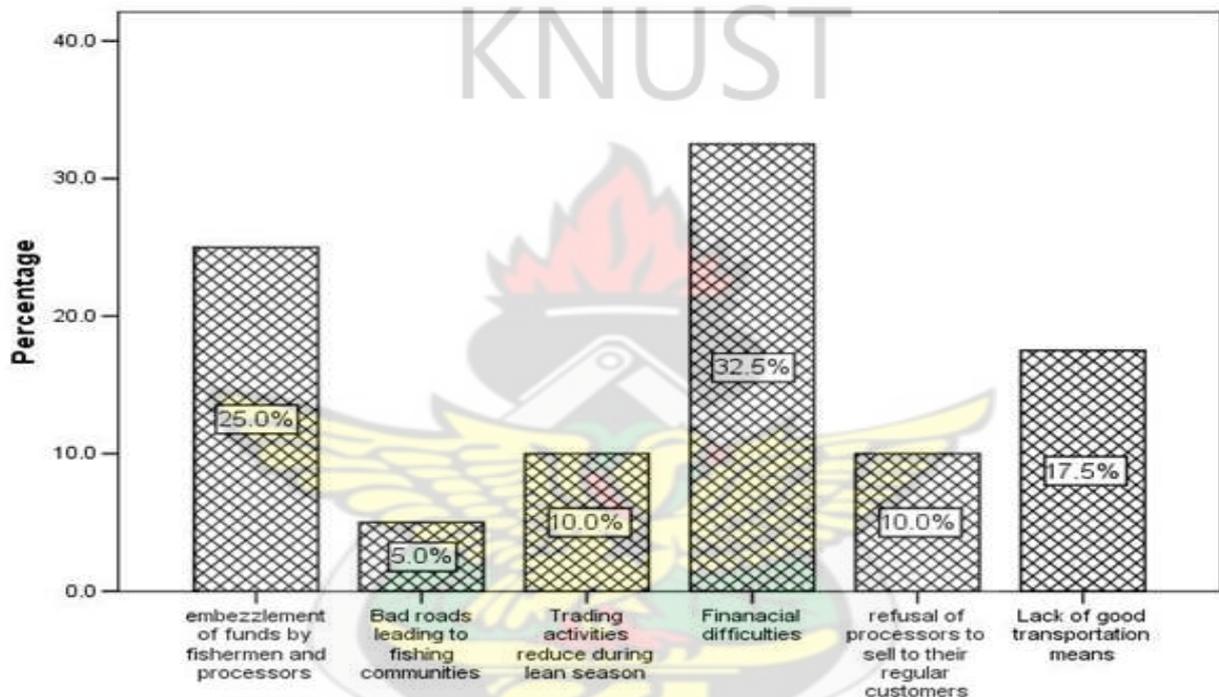
Financial difficulty was the highest constraint facing fish mongers constituting 33 per cent in the Kwahu North District. Embezzlement of funds by both fishermen and fish processors was also a major constraint constituting 25 per cent. Bad roads and lack of good means of transportation collectively contributed about 23 per cent of the constraints faced by fish mongers. Reduction in trading activity during lean season and refusal of fish processors to sell to mongers contributed 10 per cent each to the constraints of fish mongers in the district.

The mongering activity is structured in such a way that the traders need finance to both the fishermen and fish processors in order to survive in the trade because they buy mostly from those they sponsor. Further, bad roads and lack of effective means of transportation collectively contribute about 23 per cent of the constraint and leads to mismanagement of fishery resources on transit to the market centers within and outside the district. FAO's (1995) Report of conference on Fisheries Conservation, Saouma, points out that, nearly 10

per cent of the catch in many developing countries does not reach the consumer because of deterioration through lack of immediate cold storage facilities, processing and marketing.

Also, trading activities during lean season and refusal of fish processors to sell to mongers form 10 per cent each of the constraints, which further put the traders in a disadvantaged position. These led to reduced investment and reduced purchasing of fish by the traders resulting in bankruptcy.

Figure 4.9. Bar Graph Showing Constraints Facing Fish Mongers



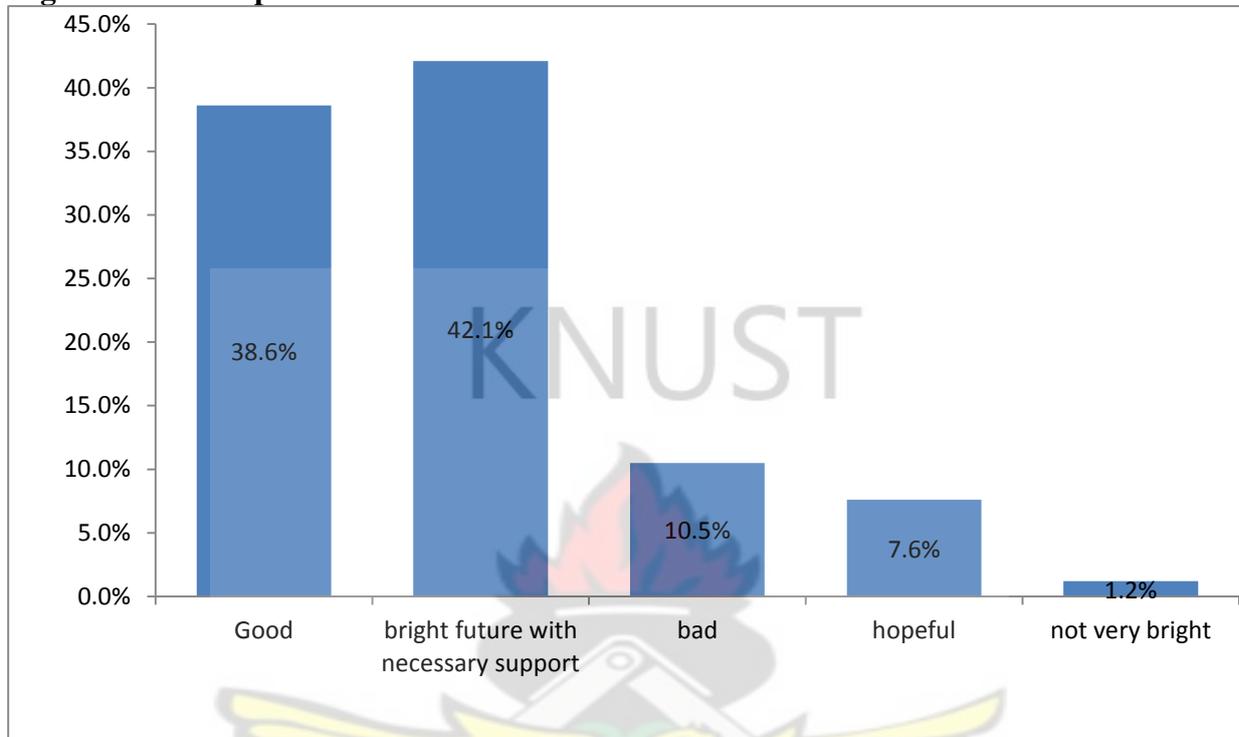
Source: Field survey by Author, May 2011.

4.16. Prospects of artisanal fishing industry

Fishing is an important economic activity in the lives of the rural populace and helps sustain livelihood situation in the study area. It is against this backdrop that, the study tried to find out from the fishers, the prospects of the artisanal fishing industry. The study showed that, about 38.6%, 42.1% and 7.6% of the artisans, respectively, believe that their activities have encouraging prospects. This group of fishers believes that, with the necessary assistance like

financial, technical, supply of inputs on subsidized basis and attitudinal change by the fishers themselves, can enhance their activities and improve their livelihood.

Figure 4.10. Prospects of Artisanal Activities.



Source: Field survey by Author, 2011.

4.17. General Views of the Fisher Groups about Their Activities in the Fishing

Communities

Generally, the fisher groups interact in various ways to keep the fishing industry running. Along the value-chain, the fishermen form the pivot on which the processors and traders depend. This is because increased output of fishermen’s activities will trickle down to other fisher groups.

Fishermen interviewed about the industry held divergent views about the artisanal fishing industry. They generally believed that, though the industry has good prospects, there is a decline in catch per head in recent years. One fisherman at Bruben on 6th May 2011 has this to say during Focused Group Discussion with the fishermen *‘now we do not catch fish as we used to do in the past. The main problem is that while more money is needed these days to*

invest in inputs unlike the past, our catch is reducing, leaving us in debt'. Others believe that, pressure on fishery resources as a result of increase in population account for their low catch. A middle aged fisherman at between 6th May 2011 and Bruben said, *'we the fishermen are now many and are fishing in the same area almost every day which used not to be the case. We do not have resting days, which do not allow the resources to replenish'*. Asked whether, they would do other jobs in addition to fishing, the fishermen acknowledged in the affirmative but have their reservation on the basis that, it can only be effective if they have additional hands. Another fisherman on 6th May 2011 at Bruben has this to say *'fishing is a difficult activity which always need helping hand and without anybody to assist, one cannot undertake it effectively'*.

Respondents were also asked why they mostly employ children, rather than adults. They said *'the children are obedient and can stay for a longer duration (years) and are trustworthy'*. As to why they mostly indulge in unapproved fishing methods, a fisherman has this to say, *"We do not need large capital to undertake some of these methods and they are effective"*. *If I want to set 'Atidza' I only have to go to the bush to cut branches of trees and my family will survive. We do not borrow and therefore do not owe anybody'*. The fishermen believe that, though it has been easy caring for their families or households, one can do better through hard work and support from government.

The processors are the most handicapped group in terms of access to capital among the fisher groups. This is because, they either process for their husbands or are financed by the traders. A processor at Amankwa-Krom had this to say *'I can only assist my husband to take care of the children, when I process his catch in addition to what I buy from other fishermen. Though sometimes I do not have much to process, helping hand is needed to perform my duty'*.

Discussions with the fisher groups showed that, the traders are the most beneficiaries along the fishery value-chain. This is because they mostly control the market activities of fishermen

and fish processors by altering the prices of fish when the market trends are not in their favour. A trader at New-Kyease acknowledged that, *'at first I process my husband's catch for the market. But now I buy from other fishermen which had helped expand my trading activities'*. The study also shows that, those who double as processors and traders and depend on hired labour are the better-off among the traders as well.

4.18. General Views of other stakeholders on fishing activities in the communities

Stakeholders involving traditional authorities, assembly members and opinion leaders recognize the need to collaborate to enhance livelihoods in their communities. There is a general view held by these groups that, collaboration in various ways with members of their communities is important.

Community participation is an integral part of ecosystems management, which according to Noss et al (1994), integrate scientific knowledge of ecological relationship with local knowledge and values framework with the view to protecting native ecosystems integrity over the long term. Several authors have emphasized the importance of local participation in ecosystems management, which is also fundamental to fisheries (Diegues, 1992; Bernard and Young, 1997; Snow, 2001).

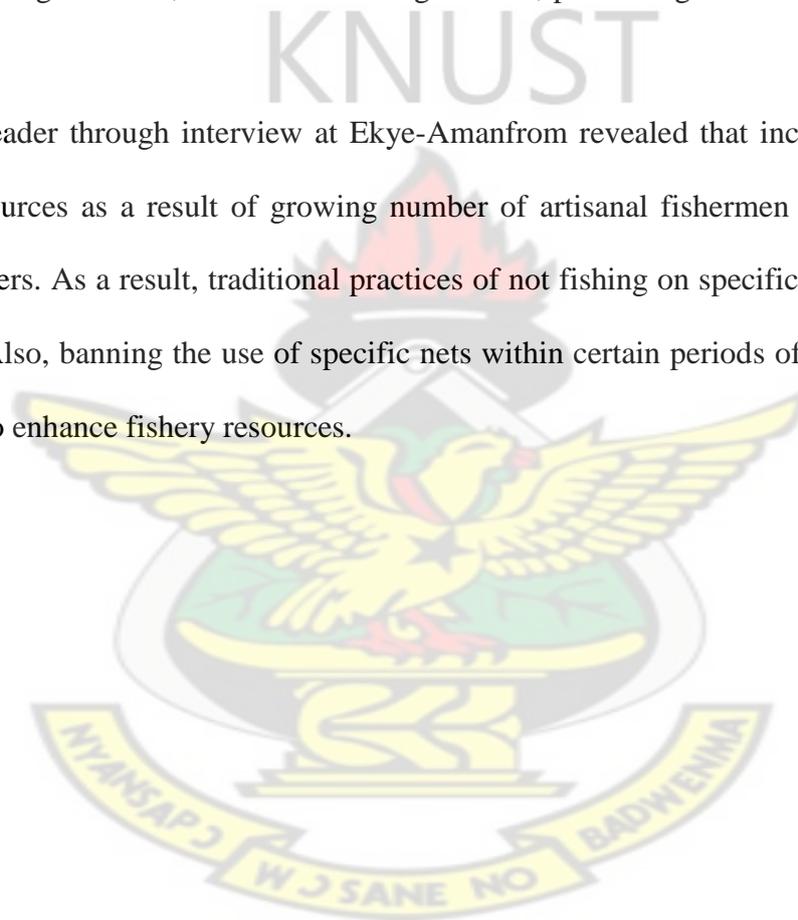
The study showed that, though stakeholders involving opinion leaders, traditional authorities and assembly members at the community level believed in collaboration to enhance livelihoods situations among fishers, implementing decisions relating to fishing activities are problematic and mostly generate conflict. This is due to the fact that, the stakeholders who are to regulate unapproved fishing activities of the fishers through education also end up participating in those activities which in the long term affect their source of revenue.

On the issue of unapproved fishing methods like 'Atidza' and beach seines, the study revealed that, whilst some community leaders try to frown on these methods, others approve

of it. Communities which do not approve these methods of fishing try to protect their territorial areas.

Discussions with the fisher groups through Focused Group Discussion also showed that, collaboration between the communities and other stakeholders as Ministry of Fisheries, the Ministry of Local Government and Rural Development and the District Assemblies is lacking. Leaders in the communities reveal that education by governments; departments and agencies on fishing methods, environmental degradation, processing of fish and preservation are absent.

A traditional leader through interview at Ekye-Amanfrom revealed that increasing pressure on fishery resources as a result of growing number of artisanal fishermen affect source of revenue of fishers. As a result, traditional practices of not fishing on specific days need to be reintroduced. Also, banning the use of specific nets within certain periods of the year should be reinforced to enhance fishery resources.



CHARTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1. Introduction

The previous chapter dealt with the result of data analysis and findings. This chapter summarises the key findings of the study (5.2), conclusion (5.3) and some recommendations of the study which includes short-term and long-term measures (5.4) and aimed at enhancing the livelihood outcomes of fishermen, fish processors and fishmongers in the Kwahu North District of Ghana.

5.2. Summary of Key Findings

As mentioned earlier, the Fishing Industry has substantial social and economic importance. It plays a major role in the global ecosystem, economy and human diets. It provides employment where millions of people fish full time for their livelihood (FAO, 2009).

The study focused on artisanal fishing and livelihoods in the Kwahu-North District, Ghana. The research was necessitated by the heightening concern of rural livelihood situation and ways of improving them. Fishing was chosen because it formed one of the main economic activities undertaken by people along the Volta Lake. Kwahu North was chosen with the reason that it epitomizes the issue concerned. Apart from it being a rural area in Ghana, it is deprived in terms of social facilities and amenities. It also forms one of the main fishing grounds in Ghana being surrounded by two important arms of the Volta Lake which are River Afram in south-west of the district and River Obosum in the north-east with the Volta lake itself located in south-east of the area.

A wide array of literature was reviewed on organization and stakeholders involved in artisanal fishing, methods of fish processing, socio-economic conditions of fishers, problems

of artisanal fishing such as mismanagement of fishery resources. Others include; environmental challenges, and policy implications.

Data for the study was drawn mainly from a sample survey of targeted population. The fieldwork involved interview with various categories of fishers, including fishermen, fish processors and traders. Analysis of data was both quantitative and qualitative.

The thesis provides detailed background of the general characteristics of the fisher groups involving gender, age, artisanal group, educational background, ethnicity and monthly income. Analysis from the field revealed that majority of the people engaged in the fishing activities in the area have some form of formal education from primary to senior high school levels. There is a clear indication that, most fishers in their area are enlightened and know the implications of their activities. About a third of the respondents do not have formal education. More than two-thirds of the respondents constitute the youth and the middle-aged bracket group. In terms of marriage, over 70% per cent of the various categories of fishers were married. Ewes constitute the largest ethnic group.

The study also revealed acquisition of initial inputs of artisans with outright purchase being the highest. However, this group of fishermen had their funding from the fish mongers who impose the prices of the fish to them. This resulted in reduced income levels of fishers. Credit and self financing are also important sources. Inability of the fishermen to sufficiently finance their inputs results in the use of unapproved fishing methods like 'Atidza'.

Wind storms in the fishing waters were identified as the most common hazards faced by both traders and fishermen. This hinders smooth undertaking of their activities and sometimes results in accidents. The study described fishing methods used by fishermen and showed that most fishermen use more than four fishing methods which enable them adjust to the various seasons. The fishermen mostly sell unprocessed fish directly to the fish processors with smoking the most common method of processing followed by frying.

The study also identified the major constraints of the fishing industry in the area. Among all the groups, financial difficulties ranked highest. Difficulty in getting hired labour was the second highest constraints of the fishermen. Embezzlement of funds by fishermen and fish processors was the second highest for fishmongers whilst poor road to market centers was the third highest constraint for the processors. Whilst some constraints as financial difficulties and difficulties in acquiring hired labour are common among fisher groups, others such as the use of chemicals, embezzlements of funds by fishermen processors and scarcity of firewood differ and underscore different needs of the fisher groups. These constraints can be addressed by Government, VRA, MoFA and other non-governmental organizations to improve livelihood situation of the fishers.

The study also revealed that, the constraints on fishermen range from low investment, no profit to inability to re-invest in their fishing activities. The study further revealed the effects of constraints on the fish mongers as reduced investments.

The study also showed that, difficulty in accessing hired labour by the fisher groups is the underlying factor influencing the use of school pupils. The analysis showed that hired labour is mostly used by the fishers, followed by family and self labour. Among the fisher groups, processors were more likely to have access easily to labour than the fishermen and the traders.

The study further revealed that the most common mode used by the processors in buying their stock was on cash basis, followed by retailing. The research further showed that malaria was the most common disease among the respondents.

The study revealed that about 80 per cent of the fishers were able to finance their health needs. The modes of financing their health need ranged from National Health Insurance Scheme (NHIS), self-financing and other means like family members. The fishers believe that, establishment of community clinics, good roads to the district hospital, potable water,

access to NHIS, education on good sanitation and healthy living, regular check up and sleeping under mosquito nets were some of the solutions to health problems.

The study revealed poor saving habit among fisher groups with approximately 76% without savings account. The inability of the fishers to save was as a result of not having sufficient money and the need to use what is available in running their business activities. The research further revealed that a little above 50% cannot meet their health and domestic needs of clothe and food. Also a little above 40% cannot cater for their children's education and have to rely on additional money sources as borrowing, family members, siblings and customers.

The study further underscored solutions to constraints which are both short-term and long-term. Short term solutions include; financial assistance, diversification of one's investment base, subsidizing inputs and refraining from using chemicals to fish. Long-term solutions include financial support, technical assistance, good roads and proper means of transport, provision of storage facilities and markets. Soft loan is the most common assistance needed by the fishers. The research also shows that approximately, 74% of the fishers engage in other sources of income which range from small scale activities like farming, animal rearing to non-farm activities such as buying and selling. These show the determination of the fishers to meet their needs.

The study further described the various fishing technologies. The study revealed that, fishing technologies as gill net, fish trap, cast net, hook and line and purse seine are very safe fishing method if the appropriate mesh size nets are used. However, if the mesh size nets used are too small, it leads to the harvesting of immature fish which affect the viability and sustainability of the fishing industry. Other fishing technologies as bamboo tubes, gill net and fish trap, 'Atidza' and beach seines poses a threat to the viability and sustainability of the fishing industry.

5.3. Conclusions

To conclude, the research showed that, fishing activity is important in the lives of the major players in the district. The constraints that faced the industry hinder full realization of the potentials of the fishing industry. Governmental and institutional support and attitudinal change of the fishers will help improve the living conditions of the fishers.

5.4. Recommendations

In order to overcome the challenges that confront the artisanal fishing industry, the following recommendations are made. These recommendations will go a long way to improve output and living conditions of the fishers.

First, financial assistance should be given to the fishers. Subsidizing of artisanal fishing inputs and educational facilities should be provided. The solutions to these constraints faced by the fishers, should be a collective responsibility of the fishers, institutions like the Volta River Authority (VRA), Ministry of Fisheries (MoF), Fisheries Department (FD), Volta Basin Research Project (VBRP) and the government. These solutions are divided into long and short term.

5.4.1. Short-Term Measures of Improving Livelihoods of Fishers

In the short-term, financial assistance, diversification of investment base, provision and subsidizing fishing and fish processing inputs are needed. The use of bad fishing methods like Dichlorodiphenyltrichloroethane (DDT) and the 'Atidza' should be discouraged.

Key among the constraints faced by the fishers is financial. Discussion with fishing groups indicated soft loans from government should be provided. The Volta River Development Act (1961) effectively placed the ownership of the Volta Lake and its surroundings in the hands of the Volta River Authority. It is expected to plan, execute and manage the development of the Volta River. It is therefore imperative that the government of Ghana and the VRA

collaborate to give financial assistance to the fishers to undertake their fishing, processing and trading activities to improve their living conditions.

Linked to the financial assistance, is the provision of inputs and subsidizing of fishing and processing inputs. The Volta River Development Act (1961) requires the VRA to play an active role in non-power potentials in fishery development and distribution of gear and outboard motors as well as supporting research. However, due to reduced revenues in the early 1980s, the VRA cut back on its non-income generating activities (Gordon and Amatekpor, 1999). In order to revive the fishery sector, the VRA, together with the government have to collaborate to provide fishing inputs such as nets and outboard engines to the fishers at subsidized prices to enhance their fishing activities.

Another short-term recommendation for improving the livelihood conditions of the fishers is to diversify their economic activities. Also, as a result of the deprived nature of Kwahu North District, conscious effort must be made by the government, District Assembly, NGOs as well as individuals to create other forms of employment avenues such as cottage industries like bee keeping, grass-cutter rearing, irrigation projects and the growing aquaculture in the fishing communities in order to reduce pressure on the fishery resources. This will also help diversify economic activities and help enhance living conditions in the area.

Other economic activities in the fishing communities like farming and animal rearing together with other non-farm activities such as trading have to be exploited and improved to enhance their living conditions. The diversification of the fisher's economic activities can only be fruitful if social facilities like electricity are extended to these communities.

Linked to the above technical assistance, it is suggested that, opinion leaders, chiefs and assembly members should ensure that, certain types of nets with mesh size less than $1\frac{1}{2}$ inches should not be used within certain periods of the year especially when the river is in flood to

ensure effective breeding of fish. This is because improved activities by the fishermen will enhance activities of other players in the industry.

To ensure effective learning and education of pupils in the fishing communities, the fishers should be educated to know the importance of education and be encouraged not to use school going children in undertaking any work during school hours. The government and the District Assembly should also improve conditions of schools by providing school buildings, teaching and learning materials and teachers to such communities to enhance effective teaching and learning.

5.4.2 Long-Term Measures of Improving Livelihoods of Fishers

Aside the short-term measures, long-term measures are also needed to enhance the livelihood situation of the fishers.

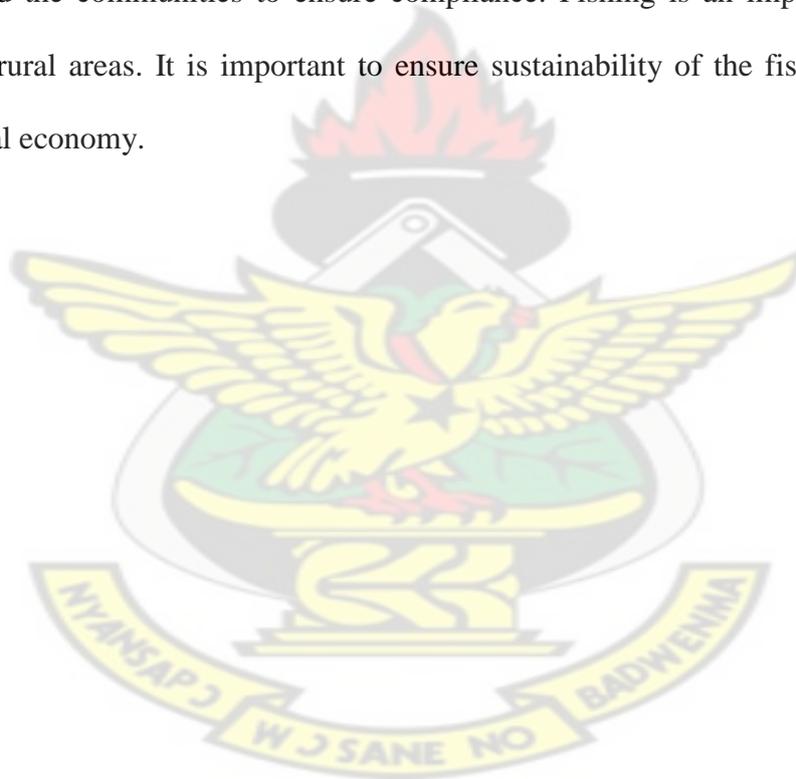
First, technical assistance is needed by the major players in the artisanal fishing industry. The Integrated Development of Artisanal Fisheries (1 and 2) project which became operational in 1989 should be revived financially and with logistical support to enhance the fishing industry. This will strengthen the capability of the Department of Fisheries to develop a management system which involves the main players on a scientific basis within the lake basin and the study area as a whole. Moreover, the Fishery station and Fishery Training Camps established by the Fishery Department (FD) between 1996-2000 at Lawra Fishery Station and Fishery Training Camp at Sabare near Yendi should be established in the study area to train the local population to exploit the fisheries resources in a regulated manner.

Also, roads should be constructed to reach the fishing communities for easy access. This would enhance free movement of both the traders and the processors to the market centers and would reduce fish spoilage during transportation. The private boat owners should be educated and properly trained to avoid accidents on the lake. The VRA, which is responsible

for certifying sea-worthiness of the boats, should carry out this duty to save lives of the people.

To ensure healthy living in the fishing communities, clinics should be located in some selected fishing communities to cater for emergency cases as and when they occur. Similarly, development of market centers in the study area should be undertaken to enhance trading activities and help improve sanitation conditions in the areas.

Finally, the Fishery Law; Act 625, Section 51 must be enforced with the full participation of the fishers and the enforcement of the laws must be a co-operative effort between the government and the communities to ensure compliance. Fishing is an important economic activity in the rural areas. It is important to ensure sustainability of the fishing industry to support the rural economy.



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APPENDIX 1: Questionnaire to Fishermen

KWAME NKRUMAH UNIVERSITY OF
SCIENCE AND TECHNOLOGY
DEPARTMENT OF GEOGRAPHY AND RURAL
DEVELOPMENT

ARTISANAL FISHING AND RURAL
LIVELIHOODS IN KHAHU-NORTH
DISTRICT, GHANA.

This questionnaire is aimed at obtaining information from fishermen, fish processors and fish- mongers about the way fishing activities are carried out in the Kwahu North Districts towards a Post Graduate thesis. I pledge that all information supplied will be kept confidential and will be used for academic purposes only. Thank you for your co-operation.

FOR FISHERMEN ONLY

Please tick where necessary

1. Sex 1. Male () 2. Female ()
2. Age 1. 20 – 29 () 2. 30 – 39 () 3. 40 – 49 () 4. 50 – 59 and above ()
3. What is your level of education?
 1. No schooling ()
 2. Primary ()
 3. Junior Secondary school ()
 4. Senior High ()
 5. Tertiary () (Specify)
 6. Other (s) () (Please specify).....
4. Marital Status:
 1. Single ()
 2. Married ()
 3. Divorced ()
 4. Widowed ()
 5. Other (s) () (Please specify).....
5. Ethnic group: 1. Ewe () 2. Akan () 3. Ga – Adangbe () 4. Any other () (please specify).....
6. Household size
 1. One ()
 2. Two ()
 3. Three ()
 4. Four ()
 5. Five ()
 6. Six and above () (please specify).....
7. How many people depend on you for a living?
 1. One ()
 2. Two ()
 3. Three ()
 4. Four ()
 5. Five ()
 6. Six and above () (please specify).....

ORGANISATION OF FISHING ACTIVITIES

8. Can you summarise what you do as a fisherman?.....
9. How do acquire your fishing inputs?
 1. Outright purchase () 2. Credit () 3. Any other () (please specify).....
10. Which type of labour do you use in your work? (Tick all that apply)
 1. Self ()
 2. Family labour ()
 3. Hired labour ()
 4. Friends ()
 5. Other (s) () (Please specify).....
11. If you hired labour how do you pay them?
 1. Cash ()
 2. Kind /other means (Please specify).....
 3. Both Cash and Kind ()
12. Which fishing method(s) do you mostly use? (tick all that apply)
 1. Gill nets () 2. Cast nets () 3. Hook and lines ()
 4. Fish traps () 5. "Atidza" () 6. Drive in gear – Wangara ()
 7. Bamboo tube fishing () 8. Gill nets and fish traps – "nifa" ()
 9. Beach seines – Adranyi () 10. Purse seines ()
 11. Any other () (specify).....
13. Do you belong to any fishing group?
 1. Yes ()
 2. No ()
14. If yes, describe how the group works.....
15. How do you sell your product?
 1. Processed ()
 2. Unprocessed ()
 3. Storage ()

LIVEHOOD ACTIVITIES

16. What is your monthly average income after deducting your expenditure?
.....
17. Is your average income enough to cater for your domestic expenses?
 1. Yes () 2. No ()
18. Are you able to provide adequately for your children's education in terms of playing school fees, using revenue from the fishing?
 1. Yes ()
 2. No ()
19. If NO, how do you pay for children's school fees?
.....
20. Are you able to provide adequately for your children's education in terms of provision of school uniforms, using revenue from the fishing?
21. If NO, how do you provide for your children's school uniforms?
.....

22. Are you able to provide adequately for your children's books using revenue from the fishing?

- 1. Yes ()
- 2. No ()

23. If NO, how do you provide for children's books?

.....

24. Do the fishing activities negatively affect your children's education?

- 1. Yes ()
- 2. NO ()

25. If YES, how?

- 1. Children go to school late ()
- 2. Children absent themselves from school ()
- 3. Drop out

26. What are the common diseases found in your community?

- i)
- ii)
- iii)
- iv)

27. Is any of the diseases in Q. 26 caused by fishing activities?

- 1. Yes ()
- 2. No ()

28. Are you able to finance your health needs?

- 1. Yes ()
- 2. No ()

29. If YES, through what means?

- 1. National Health Insurance ()
- 2. Income from fishing ()
- 3. Any other means () (please specify).....

30. Do you save with bank? 1. Yes () 2. No ()

31. If YES, which bank(s)?

32. What is the balance of cash in the account(s)?

33. If NO, how do you save money from your business?

.....

PROBLEMS AND CHALLENGES

34. What hazard(s) do you face in undertaking your fishing activity?

- i)
- ii.
- iii)
- iv)

35. How do the hazards stated in Q. 35 affect your output?

- i)
- ii.
- iii)
- iv)

36. How do the problem(s) you face in undertaking your fishing activities?

- i)

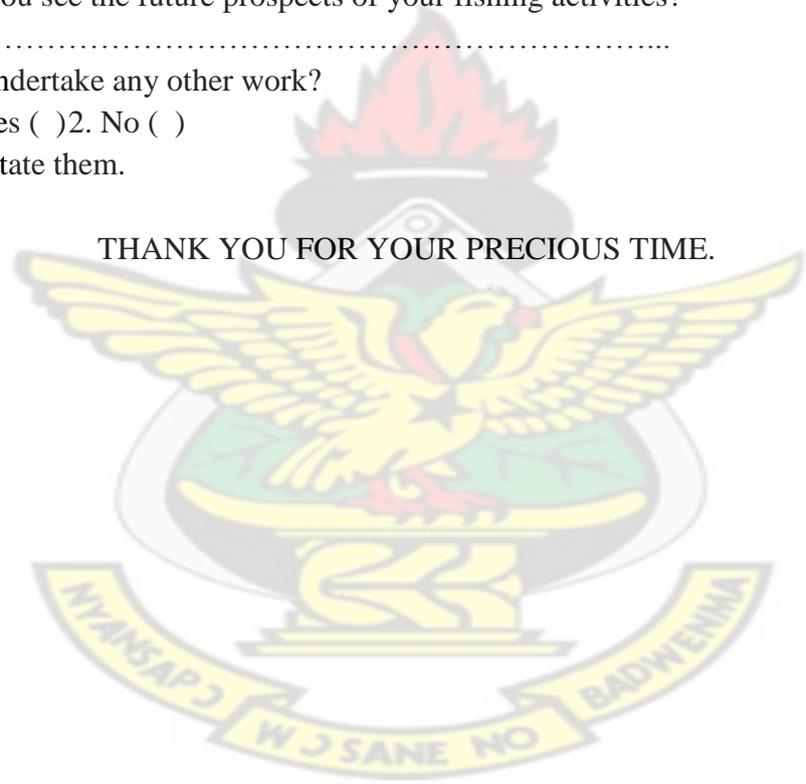
- ii.
 - iii)
 - iv)
37. How do the problem(s) stated in Q.36 affect your work?
- i).....
 - ii.....
 - iii).....
 - iv).....

SOLUTIONS AND PROSPECTS

38. Do you think the problems stated in Q.36 can be solved?
- i).....
 - ii).....
39. What type of assistance would you need to enhance your work?
.....
40. How do you see the future prospects of your fishing activities?
.....
41. Do you undertake any other work?
1. Yes () 2. No ()

If yes, please, state them.

THANK YOU FOR YOUR PRECIOUS TIME.



APPENDIX II: Questionnaire to Fish Processors

KWAME NKRUMAH UNIVERSITY OF
SCIENCE AND TECHNOLOGY
DEPARTMENT OF GEOGRAPHY AND RURAL
DEVELOPMENT

ARTISANAL FISHING AND RURAL
LIVELIHOODS INKWAHU-NORTH
DISTRICT, GHANA.

This questionnaire is aimed at obtaining information from fishermen, fish processors and fish-mongers about the way fishing activities are carried out in the Kwahu North Districts towards a Post Graduate thesis. I pledge that all information supplied will be kept confidential and will be used for academic purposes only. Thank you for your co-operation.

FISH PROCESSORS ONLY

Please tick where necessary

PERSONAL DATA

1. Sex 1. Male () 2. Female ()
2. Age 1. 20-29 () 2. 30-39 () 3. 40-49 () 4. 50-59 and above ()
3. What is your level of education? 1. No schooling () 2. Primary () 3. Junior Secondary/Middle () 4. Senior High () 5. Tertiary () 6. Others () (Please Specify).....
4. Marital Status
1. Single () 2. Married () 3. Divorced () 4. Widowed () 5. Separated ()
6. Others () (Please Specify).....
5. Household size. 1. One () 2. Two () 3. Three () 4. Four () 5. Five ()
6. Six and above () (Please specify)
6. How many people depend on you for their living? 1. One () 2. Two () 3. Three () 4. Four () 5. Five () 6. Six and above (Please specify)
7. Ethnic group 1. Ewe () 2. Akan () 3. Ga-Adangbe () 4. Others (Please specify).....

ORGANIZATION OF FISHING ACTIVITY

8. Briefly describe how you started as a fish processor.....
9. How do you acquire your stock before processing? 1. Outright purchase () 2. Credit () 3. Any other () (Please specify).....
10. How do you sell your products?.....
11. Which processing method(s) do you mostly use?.....
12. Do you consider any of the processing method(s) dangerous? 1. Yes () No ()
13. Can you summarize what you use in your processing?
14. Which type of labour do you use in your processing? 1. Self () 2. Family () 3. Hired labour () 4. Friends () 5. Others () please specify.....
15. If you use hired labour, how do you pay them? 1. Cash () 2. Kind () please specify..... 3. Both cash and kind ()

LIVELIHOOD SITUATION

16. How much income do you make after deducting your expenses?
17. Do you think you make enough revenue? 1. YES () 2. No ()
18. Are you able to provide effectively for your children's education in terms of paying school fees, provision of uniforms, books etc. 1. Yes 2. No

19. If yes, do you only use income from the processing to do that? 1.Yes 2.No
20. How does the fish processing activity negatively affects your children's school going?
Please state.....
21. What are the common diseases found in your community?
(i)..... (ii)..... (iii).....
22. Which of the stated diseases are as a result of the work you do? Malaria and Anaemia
23. Are you able to finance your health problems? 1.Yes () 2.No ()
24. If yes, do you use income generated from fish processing alone to do that? 1.Yes 2. No
25. In your view, how can the health of fish processors in your community are improved?
(i)..... (ii)..... (iii).....
(iv)..... 2. No ()
27. If yes, what do you think accounts for that?
i).....
26. Do you see processors migrate to other communities to start or engage in other occupation from your community? 1.Yes()
ii).....
iii).....
iv).....
28. Do you save with any bank?
1. Yes () 2. No ()

PROBLEMS AND CHALLENGES

29. What constraint (s) do you face in undertaking your fish processing activities?
i).....
ii).....
iii).....
iv).....
30. What hazards do you face in undertaking your processing activities?
i).....
ii).....
iii).....
31. How does the above stated hazards affects your work?
.....
.....
.....

SOLUTION AND PROSPECTS

32. How can the problem stated in Q. (29) be solved?
i).....
ii).....
iii).....
iv).....
33. What type of assistance would need to enhance your processing activities?
i).....
ii).....

- iii).....
- iv).....
- 34. How do you see the future prospects of your fish processing activities?
 - i).....
 - ii).....
 - iii).....
 - iv).....
- 35. Do you undertake any other work?
 - 1. Yes () 2. No ()

THANK YOU FOR YOUR TIME

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APPENDIX III: Questionnaire to FishMongers

Questionnaire to Fish Mongers

KWAME NKRUMAH UNIVERSITY OF SCIENCE
AND TECHNOLOGY
DEPARTMENT OF GEOGRAPHY AND RURAL
DEVELOPMENT

ARTISANAL FISHING AND RURAL
LIVELIHOODS IN KWAHU-NORTH
DISTRICT, GHANA.

This questionnaire is aimed is at obtaining information from fishermen, fish processors and fish-mongers about the way fishing activities are carried out in the Kwahu North Districts towards a Post Graduate thesis. I pledge that all information supplied will be kept confidential and will be used for academic purposes only. Thank you for your co-operation.

FOR TRADERS ONLY

PLEASE TICK WHERE NECESSARY

PERSONAL DATA

1. Sex 1. Male () 2. Female ()
2. Age 1. 20 – 29 () 2. 30 – 39 () 3. 40 – 49 () 4. 50 – 59 and above ()
3. What is your level of education?
 1. No schooling ()
 2. Primary ()
 3. Junior Secondary school ()
 4. Senior High ()
 5. Tertiary () (Specify)
 6. Other (s) () (Please specify).....
4. Marital Status:
 1. Single ()
 2. Married ()
 3. Divorced ()
 4. Widowed ()
 5. Other (s) () (Please specify).....
5. Ethnic group: 1. Ewe () 2. Akan () 3. Ga – Adangbe () 4. Any other () (please specify).....
6. Household size
 1. One ()
 2. Two ()
 3. Three ()
 4. Four ()
 5. Five ()
 6. Six and above () (please specify).....
7. How many dependants do you have?
 1. One () 2. Two () 3. Three () 4. Four () 5. Five () 6. Six and above ()Please specify.....

ORGANIZATION OF TRADING ACTIVITY

- 8. Briefly describe how you started as a trader (fishmonger)
.....
.....
- 9. Describe briefly what you do as a trader?
- 10. Are you part of any mongering group or organisation?
 - 1. Self financing ()
 - 2. Financial institution
 - 3. Credit Union ()
 - 4. Any other source (specify).....
- 11. Are you a financier of any fish processor or fish processing group?
 - 1. Yes ()
 - 2. No ()
- 12. If Yes, state source of fund(s)?
 - 1. Self financing ()
 - 2. Financial institution ()
 - 3. Credit Union ()
 - 4. Any other source.....
- 13. Do you sell your product(s) within or outside the district?
 - 1. Within ()
 - 2. Outside the district ()

LIVELIHOOD SITUATION

- 17. What is your monthly average income after deducting your expenditure?
- 18. Is your average income enough to cater for your domestic expenses?
 - 1. Yes ()
 - 2. No ()
- 19. Are you able to provide adequately for your children’s education in terms of paying school fees, provision of uniforms and books using revenue from your trade?
 - 1. Yes ()
 - 2. No ()
- 20. If No, how do you cater for your children’s education?
- 21. Do the mongering activities negatively affect your children’s education ?
 - 1. Yes ()
 - 2. No ()
- 22. If Yes, how?
 - 1. Children go to school late ()
 - 2. Children absent themselves from school ()
 - 3. Drop out ()
- 23. What are the common diseases found in your community?
 - i)
 - ii)
 - iii)
 - iv)
- 24. Are you able to finance your health problems?
 - 1. Yes ()
 - 2. No ()
- 25. If YES, through what means?
 - 1. National Health Insurance ()
 - 2. Income from fishing ()
 - 3. Any other means () (please specify).....
- 26. How do you think the health problems in your community can be improved?
.....
- 27. Do you save with bank?

1. Yes () 2. No ()

PROBLEMS AND CHALLENGES

28. What hazard (s) do you face in undertaking your trading activity?

- i)
- ii.
- iii)
- iv)

29. Do the hazards in Q. 29 affect your profit?

1. Yes () 2. No ()

30. What problem(s) do you face in undertaking your mongering activities?

- i)
- ii.
- iii)

31. Do these problems in Q.31 affect your trade?

1. Yes () 2. No ()

SOLUTIONS AND PROSPECTS

32. How can the above stated problem(s) be solved?

- i).....
- ii).....

33. What type of assistance would you need to enhance your trade?

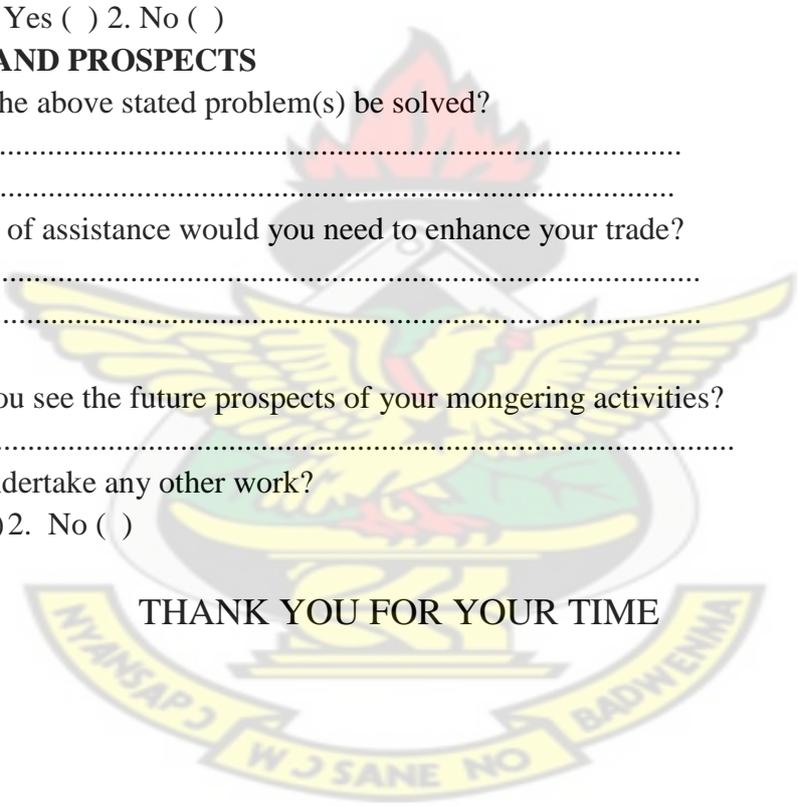
- i).....
- ii).....

34. How do you see the future prospects of your mongering activities?

.....

35. Do you undertake any other work?

1. Yes () 2. No ()



THANK YOU FOR YOUR TIME

APPENDIX IV: Questionnaire to Stakeholders (Head of Fishermen, Traditional Authorities and Assembly Members).

Questionnaire to Stakeholders (Head of Fishermen, Traditional Authorities and Assembly Members).

KWAME NKRUMAH UNIVERSITY OF
SCIENCE AND TECHNOLOGY
DEPARTMENT OF GEOGRAPHY AND RURAL
DEVELOPMENT

ARTISANAL FISHING AND RURAL
LIVELIHOODS IN KWAHU-NORTH
DISTRICT, GHANA.

This questionnaire is aimed at obtaining information from stakeholders about the way fishing activities are carried out in the Kwahu North Districts towards a Post Graduate thesis. I pledge that all information supplied will be kept confidential and will be used for academic purposes only. Thank you for your co-operation.

FOR STAKEHOLDERS ONLY.

1. What activities do you undertake as a leader in your community?
2. What do you think about the fishing technologies used in your community?
3. Which fishing technologies do you think is detrimental to the sustainability of the fishing industry?
4. How have you collaborated to enhance fishing activities in your communities?
5. What challenges do you face in collaborating with other communities?
6. Do you interact or engage with any governmental institutions?
7. If you engaged with any other institutions, as stated in Q. 6, what are some of the decisions taken with them?
8. Do you receive, any assistance from any organisation?
9. If you received any assistance as stated in Q.8, what type of assistance do you receive?
10. How do you foresee the prospect of the artisanal fishing industry?

THANK YOU FOR YOUR TIME

