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Full Length Research Paper

Socioeconomic Characteristics and Constraints of Pond fish farmers in Lagos State, Nigeria

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Abstract

This paper aims to describe the socioeconomic characteristics and constraints facing pond fish farmers in Lagos state, Nigeria. The study has adopted a survey research design. It mainly utilized primary data. A structured close-ended questionnaire was administered in a multi-stage, stratified random sampling procedure on fish farmers who own ponds and culture fish in Lagos state, Nigeria. A total of one hundred and twenty (120) fish farmers were selected for the study. Of these, thirty (30) fish farmers were randomly selected from four administrative divisions which are: Ikeja, Lagos, Badagry and Epe division. A purposive sampling of two Local Government Areas (LGAs) based on predominance of fish farming activities in these areas from the administrative divisions namely: Alimosho, Kosofe, Eti-Osa, Lagos Island, Ojo, Amuwo-Odofin, Epe and Ibeju-Lekki while three communities and five respondents were randomly selected from the eight LGAs. The validity and reliability of instrument were established by three experts in the Department of Agricultural Economics. The questionnaire was pre-tested in Itesiwaju LGA, Oyo state and a correlation r=0.90 was obtained. The result obtained from the field indicated an average output of fish per farmer per production cycle was 14,000kg and an average farm size of 1.97ha per farmer. The farmers possess an average farming experience of 11.7years and an average household size of 5.12members as well as an average schooling year of 14.4years. The farmers were young as indicated by mean age of 43years. It further indicated that pond size (mean=2.22) and feed (mean=3.12) were the most significant in pisciculture enterprise in this area. Constraints to pisciculture enterprise in the state were high feed cost ($\bar{X}$>3.8), lack of credit ($\bar{X}$>3.6), high cost of inputs ($\bar{X}$>3.4) and poor technical know-how ($\bar{X}$>3.4).

Key words: Pisciculture, Value chain, enterprise, farming, input, output

Introduction

Fish farming is an aspect of aquaculture that involves all activities associated with the scientific and organized rearing and cultivation of fish. It is a form of controlling of the environment or intervention in the rearing process to enhance production such as regular stocking, feeding, protection from diseases and predators as well as good husbandry practices (Enabulele, 1999). The breeding, rearing, and transplanting of fish by artificial means is called pisciculture, in other words, fish farming (FAO FishStat Plus, 2008). Fish farming is an aspect of aquaculture which involves the cultivation of fishes in ponds, tanks or other chambers from which they cannot escape. A wide range of fish farming does exist including growing of fish in earthen ponds, concrete tanks, cages, pens, run-ways, glass tanks, acrylic tanks, plastic tanks, Race-ways etc. (FAO FishStat Plus 2012). Pisciculture was derived from two words *Pisce*(s) which means fish (es) and *culture* which means rearing, raising or breeding of living things. Pisciculture is therefore defined as a branch of animal husbandry that deals with rational deliberate culturing of fish (es) to a marketable size in a controlled water body. According to Zohar, Dayan, Galili and Spanier (2001), pisciculture is the principal form of aquaculture, while other methods may fall under mariculture. Consequently, there are two main types of pisciculture to be distinguished: (1) the rearing in confinement of young fishes to an edible stage, and (2) the stocking of natural waters with eggs or fry from captured breeders.

Fish farming practices and methods differ by farm size (USAID, 2006). Yela et al, (2011) gave an account that the most prevalent fish-farming practice in the Nigeria and especially Niger Delta is pond culture, simply because, as mentioned earlier, 80% of fish farming is practiced by small-scale out-grower fish farmers. In addition to pond culture, there are others that are being practiced:

Pond Culture: This involves raising fish in earthen ponds which are not raised from the earth but dug out in the ground. With the earthen ponds, water does not have to be changed daily and output is usually good as it is closest to the natural habitat of the fish and contains a lot of micro-organisms, which the fish feed on. The approach to maintaining ponds differ by where they are located:

- If the pond is in the upland area where the floor of the pond does not reach the water table, other sources of water have to be used (like water pumps), to fill the ponds.
- In areas where the floor of the pond is permanently below the water table (like parts of Bayelsa, Delta and Rivers States), water is retained in the ponds throughout the year and there is no need to fill the pond with water.
- Tidal brackish water swamps are where the water covers the mangrove flats in the high tide and recedes in low tide. A well-constructed pond would utilize the tidal water. When the water fills the pond, the sluice gates are locked and the water is trapped and the water can be drained off during low tide using exhaust valves.

Cage Culture: Cage culture occurs when fish are raised in cages that are lowered into a body of water. For successful cage culture, a suitable site should be selected. The shelter should not be exposed to wind or currents from the sea. In some areas the direction of the tidal current reverses daily. In such places, the feeding of the fish should be timed with stationery periods, when the current is about to reverse its course.

Pen Culture: Pen culture occurs when raising fish in an enclosed area of a body of water. The area should be sheltered from violent waves and the floor should be level with firm soil. The materials used for fencing the pen include bamboo, plastics, nylon netting and aluminum meshes. The poles which support the fencing are driven into the floor. The stocking rate is between 20 to 25 fish per cubic meter. For intensive farming, supplementary feeds are applied to support the high density of fish population. Feeding is usually done during stationery or at the slowest moment of the current.

Fish Culture in Tanks: Fish culture in tanks is the practice of rearing fish in tanks made of different materials. The most common are made of concrete but other materials like plastic, wood and fiber glass are also used. Before filling the tank with water, a layer of humus soil is placed at the bottom of the tank. The tank is constructed in such a way that it slopes slightly to one side and a level control pipe is installed at the deeper end. When the level of water is above the gauge line, the water flows into the vertical pipe and drains away.

Borrow-Pits Culture: In states like Bayelsa, Rivers, Delta and Cross River and other coastal states, fish can be raised in borrow-pits in swampy areas. These fish ponds retain water even in the dry seasons. These pits are converted to ponds by making bunds above the flood levels and stocking the fish.

Flow-through System: A flow-through system is the practice of raising fish in tanks (concrete, fiber or other materials) where there is a continuous flow of water and outflow of the used/waste water. There must be an abundance of water and most farms where this is the practice have bore-holes and water tanks with generators. Flow-through system of culturing fish is practiced in an environment where there is an abundant supply of good quality water continuously streaming into the pond. As the water increases in the pond, it removes the waste and uneaten feed through a controlled outlet valve (Mbakaogu (Esq.), 2009).

Water Recirculation System: Water from the tanks are treated and recycled for use. This system allows for mass production of fish where there is limited or poor quality of source water. It is highly technical and capital intensive (Yela et al, 2011).

In Nigeria, total domestic fish production fluctuated between 562,972 to 524,700 metric tons in 1983 to year 2003; while the output of fish farming during this period was 20,476 to 52,000 metric tons. Fish farming accounted for between 3.64 and 9.92% of total domestic fish production in Nigeria within this period, while the bulk of production came from artisanal fishing. Although the outlook of aquaculture production is worrisome given the growing demand for fish and the declining yield of natural fish stocks due to over-exploitation, fish farming still holds the greatest potentials to rapidly boost domestic animal protein supply in Nigeria. Fish production currently contributes 3.5percent of Nigeria's Gross Domestic Product (GDP) and accounts for 0.2% of the total global fish production (CBN, 2011), as well as provides direct and indirect employment to over 6million people (Adekoya, 2004); but if optimally explored has the potential as an enterprise to contribute significantly to the possible creation of 30,000 jobs and generation of revenue of US$160 million per annum, which would invariably improve the agricultural sector and boost the Nation's economy at large (FMARD, 2013). Fish farming is an integral component of the overall agricultural production system in Lagos State, Nigeria. The most part of the state terrain is swampy and prone to seasonal flooding. This makes a vast expanse of land in these areas unsuitable for crop farming. The prevailing hydrographic conditions therefore make fish farming a very attractive alternative source of protein rich food production to which the abundant land and water resources in Lagos State can be put (Inoni and Chukwuji, 2000).

Problem Statement

Fish farming in Lagos state and Nigeria at large till date remains an untapped goldmine based on the fact that Nigeria is a maritime nation, it is also blessed with a vast population of over 160million people and a coastline measuring approximately 853kilometres. According to CBN (2012), there are about 1.75million hectares of suitable land for aquaculture in Nigeria and 25% of this will yield 656,820tons of fish per year when placed under cultivation. Similarly, about 6,450tons of fish can be produced annually from 75,000 hectares of coastal lagoons. In spite of the great potentials of fish farming in the study area, factors such as low technical knowledge on the part of fish farmers and the high cost of production inputs have constrained its contribution to

increase food supply and poverty reduction. Furthermore, the efficiency or inefficiency of utilization of available resources for fish farming has remained an unanswered question in the quest for increased Pisciculture production in Lagos State in particular, and Nigeria at large.

According to FAO (2009), around 50% of fish demanded is currently being met by local supply in Nigeria. Adekoya and Miller (2005) backed this up by stating that domestic fish production of about 500,000metric tons is supplied by 85% of artisan fish-folk. According to Nigeria Bureau of Statistics (NBS, 2011), it was estimated that annual fish demand in the country was about 2.66million metric tons as against the annual domestic production of about 0.78million metric tons, giving a demand-supply gap of about 1.8million metric tons. Regrettably, the supply of food fish has been on the decline and this is due to consistent declines from the country's major source of food fish (Ugwumba and Chukwuji, 2010). This shortfall is said to be abridged by the importation of 680,000metric tons annually consuming about N50billion in foreign exchange (Odukwe, 2007), therefore ranking Nigeria as the highest importer of frozen fish in the world with an annual foreign exchange drain of N50billion (Dauda, 2010; CBN, 2012). The imminent challenge, therefore, is to increase the potentials of pisciculture as well as bridging the wide gap between fish demand and supply in Nigeria.

Objective

The objective of this work is to describe the socio-economic characteristics and constraints of pond fish farmers in Lagos State, Nigeria.

Significance of the Study

The findings of the study will be useful for potential and practicing fish farmers, policy makers, researchers, extension agents and the general public at large. It will unearth the potentials of the fish farmers in their enterprise selection, resource use efficiency and production pattern decisions.

Research Methodology

Study Area

The study was carried out in Lagos state, Southwestern region of Nigeria. This state was chosen because of the abundance of pisciculture enterprises and endowment of the region with water bodies which facilitated the operational existence of fish farms as the major agricultural activity in this region. It is also very familiar to the researcher as it increased the ease of data collection. Lagos State was created on May 27, 1967 by virtue of State (Creation and Transitional Provisions) Decree No. 14 of 1967, which restructured Nigeria's Federation into 12 states *(Lagos State official website, 2013* - lagosstate.gov.ng). Lagos State is an administrative division of Nigeria, located in the Southwestern part of the country; with a land mass spanning over 3345 sq km/1292 sq m, lies between Latitudes 6°35′N of Equator and Longitude 3°45′E of Greenwich Meridian (C-GIDD (Canback Global Income Distribution Database), 2008) possesses a population of 9,013,534 million people (NPC, 2006).

Lagos state is located on four principal islands and adjacent parts of the Nigerian mainland. The islands are connected to each other and to the mainland by bridges and landfills (Encarta, 2009). Equally, the metropolitan areas (Colony Province) of Ikeja, Agege, Mushin, Ikorodu, Epe and Badagry were administered by the Western Region (Lagos State Population, 2006). The climatic weather condition of this region has made it favourable for fish farming to take place. It has also allowed for survival and multiplications of various fish species found in this environment (Encarta, 2009). Geographically, the state is located on the Bight of Benin (an arm of the Atlantic Ocean) (Encarta, 2009), which had made the people of Lagos state to engage mostly in fishing enterprises. It is a semi-tropical rainforest vegetation, and has a humid climate with a temperature of about 27^0C *(Lagos State official website, 2013* - lagosstate.gov.ng).

Though, considered as the smallest in terms of area amongst Nigeria's states, Lagos State is arguably the most economically important state of the country, as well as it is the nation's largest urban area (C-GIDD, 2008) and most populated urban area in the whole of Africa (UNDP, 2003). Till date, it remains the center of commerce for the country. Lagos State is divided into five Administrative Divisions, which is then further divided into 20 Local Government Areas (C-GIDD, 2008). The first 16 of the LGAs are the Metropolitan Lagos while the remaining four LGAs (Badagry, Ikorodu, Ibeju-Lekki and Epe) are within Lagos State but are not part of the Metropolitan Lagos. In 2003, many of the existing 20 LGAs were split for administrative purposes into Local Council Development Areas (LCDAs). These lower-tier administrative units now number 56.

Table 1: Administrative Divisions and Local Government Areas of Lagos State

LGA Name	Area (km^2)	Census 2006 population	Administrative capital
Agege	11	459,939	Agege
Alimosho	185	1,277,714	Ikotun
Ifako-Ijaye	27	427,878	Ifako
Ikeja	46	313,196	Ikeja
Kosofe	81	665,393	Kosofe
Mushin	17	633,009	Mushin
Oshodi-Isolo	45	621,509	Oshodi/Isolo
Shomolu	12	402,673	Shomolu
Ikeja Division	*424*	*4,801,311*	
Apapa	27	217,362	Apapa
Eti-Osa	192	287,785	Ikoyi
Lagos Island	9	209,437	Lagos Island
Lagos Mainland	19	317,720	Lagos Mainland
Surulere	23	503,975	Surulere
Lagos Division	*270*	*1,542,279*	
Ajeromi-Ifelodun	12	684,105	Ajeromi/Ifelodun
Amuwo-Odofin	135	318,166	Festac Town
Ojo	158	598,071	Ojo
Badagry	441	241,093	Badagry
Badagry Division	*746*	*1,841,435*	
Ikorodu	394	535,619	Ikorodu
Ikorodu Division	*394*	*535,619*	
Ibeju-Lekki	455	117,481	Akodo
Epe	1,185	181,409	Epe
Epe Division	*1,640*	*298,890*	

Source: (Lagos State official website - lagosstate.gov.ng)

Sample Techniques

A multi-stage sampling technique was adopted for this study. Firstly, four (4) Administrative Divisions out of the five (5) in the state were purposively selected; and these include Ikeja, Lagos, Badagry and Epe division. This was due to the predominance of fish farmers in these zones. The second stage involved the purposive selection of two (2) Local Government Areas each from the above selected four (4) Administrative Divisions of the state, they are as follows: Alimosho, Kosofe, Eti-Osa, Lagos Island, Ojo, Amuwo-Odofin, Epe and Ibeju-Lekki Local Government Area. This is also mainly due to the predominance of fish farmers in this areas. The third stage involved random selection of three (3) communities from each of the eight (8) LGAs selected above. Lastly, the fourth stage randomly sampled five (5) fish farmers from each of the twenty-four (24) communities selected above. This gave a total of 120 respondents to be sampled. The researcher administered this questionnaire himself although sorted the help of extension workers in the state whenever the need arose. The validity and reliability of instrument were established by three experts in the Department of Agricultural Economics. The questionnaire was pre-tested in Itesiwaju LGA, Oyo state and a correlation r=0.90 was obtained.

Data collection

A structured questionnaire was used for primary data collection. The population for this study was made up of all the pond fish farmers in this area. A total of one hundred and twenty (120) fish farmers who practice pisciculture and owned fish ponds in the area were sampled. Primary data was solely used for this study. This was gathered from the responses of those who practice pisciculture and own fish pond via interview and administration of structured questionnaire as well as informal discussion with fish farmers during the field survey.

Model Specifications

The socioeconomic characteristics and constraints of respondents in this area were described using simple descriptive tools such as frequency distribution tables, percentages, averages (mean) and so on.

Results and Discussions

Socio-economic Characteristics of Respondents

The socio-economic characteristics of respondents discussed in this chapter includes age, sex, marital status, educational level, major occupation, farming experience, farm size, labour type and house size.

Age Distribution of Respondents

Table 2: Distribution of Respondents by Age

Age intervals	Frequency	%
25-30	3	3
31-34	5	4
35-40	47	39
41-44	26	22
45-50	20	17
51-54	10	8
55-60	9	7
61 & above	0	0
Total	120	100

Source: Field survey (2014)

From the table above (Table 2), it can be observed that majority (39%) of the fish farmers falls within the age of 35-40years, followed by respondents within age 41-44years with 22%. On the other hand, only a handful (3%) of the respondents belongs to the age bracket of 25-30years. This is in agreement with the observation of Banjo, Nosiru, Ayorinde and Odusina (2009) who stated that the highest population of 35-40years signifies the productive age which portends better future for fish production. From the above table, the result suggests that the farmers' falls within the economically active age (below 60years). With the current high rate of unemployment in the country, most young people have been reported to resort into fish farming. The figure below (Fig 1) clearly depicts the age distribution of fish farmers in this area.

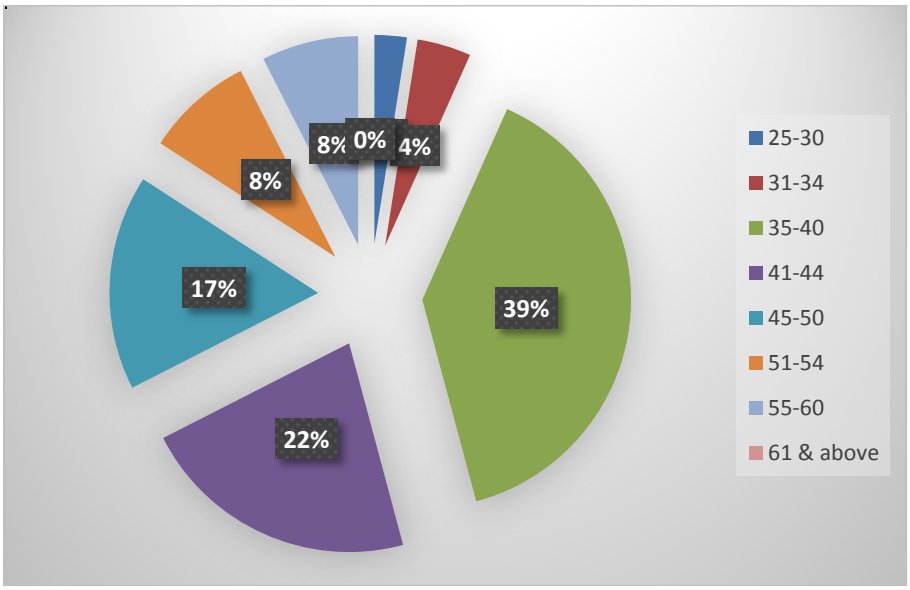

Figure 1: Depicts Respondent Age Distribution
Source: Field survey (2014)

Sex Distribution of Fish Farmers

Table 3: Sex Distribution of Respondents

Gender	Frequency	%
Male	72	60
Female	48	40
Total	120	100

Source: Field survey (2014)

Table 3 showed that from a total of 120 pisciculturist sampled in this area, majority (60%) were males while the remaining (40%) were females. This is consistent with earlier studies of Omolike, 2005; Ighere, 2005 and Banjo et. al. (2009), who noted that the dominance of males in fish farming enterprise conforms to the fact that fish farming, is highly laborious and technically demanding, which is an area where male thrive. Also in concordance to this is the report of Agboola (2011) who stated that the higher number of male participation in fish farming indicated the extent of gender sensitivity on occupation like farming, which could be attributed to the fact that agricultural production is faced with a lot of risk and uncertainties and women are risk averse, so is the result of drudgery that aquaculture business is involved in. Further, Fig 2 clearly depicts the distributions of respondents in this enterprise.

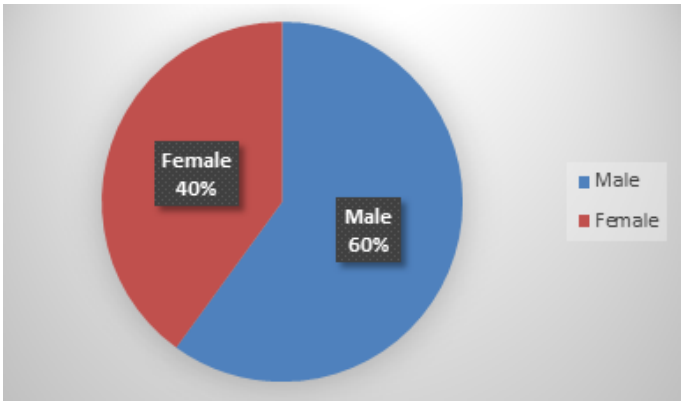

Figure 2: Depicts Sex Distribution of Respondents
Source: Field survey (2014)

Marital Status of Respondents

Table 4: Distribution of Respondents by Marital Status

Marital distribution	Frequency	%
Married	96	80
Single	20	17
Divorced	4	3
Widowed	0	0
Total	120	100

Source: Field survey (2014)

From the table 4, it is evident that 80% of the respondents were married while only 17% were single and 3% divorced. This could be attributed to the western culture and tradition of this area where people are encouraged to marry at an early stage in life. Fig 3 clearly depicts the distribution of respondents according to their marital status.

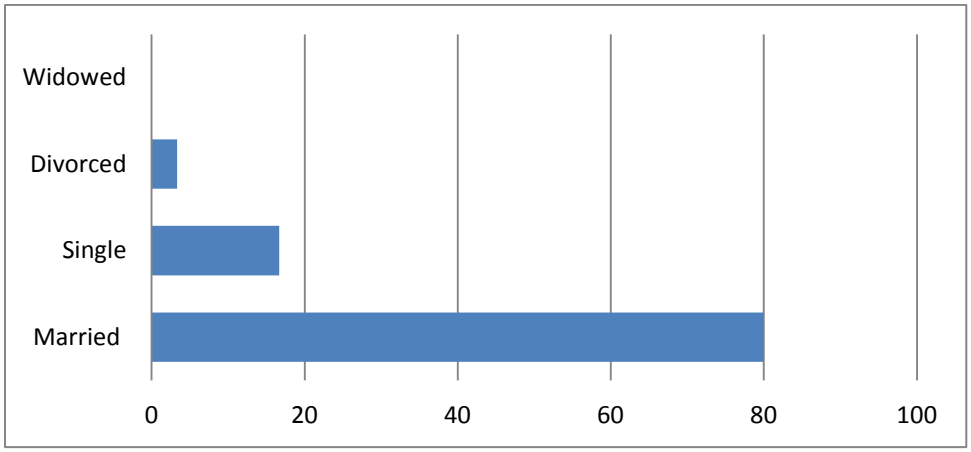

Figure 3: Depicts Marital Distribution of Respondents
Source: Field survey (2014)

Educational status of respondents

Table 5: Educational status of respondents

Educational status	Frequency	%
Primary	4	3
Secondary	72	60
Tertiary	44	37
no-formal	0	0
Total	120	100

Source: Field survey (2014)

Education is the most imperative factor influencing management and the adoption of any technology. Table 5 shows that the respondents were found to be distributed over a wide range of educational backgrounds with majority (60%) of the respondents possessing secondary education and 44 respondents (37%) were found to possess tertiary education with only very few (3%) respondents indicating to have only completed primary education. It was also noted that none of the respondent indicated not possessing any form of education. This can be adjudged from the fact that fish farming requires a lot of technicalities which would at least require the fish farmer to be enlightened in order to understand the requirements of this livestock such as feed type, feeding rate, feed quality, fertilizer requirement/measurement, treatment and measurement of fish weight gain versus feed intake and so on. The result from the Table 4.4 is in agreement with an earlier study by Yusuf, Ashiru and Adewuyi (2002) and Agboola (2011) which stated that this is an indication of high literacy level which may be required for effective management of fish farms. Also, the positive influence of education on farmers' acceptance of improved farm practices has been established by several studies (Onemolease et al, 2000; Tshiunza, Lemchi and Uloma, 2001). Fig 4 is a clearer picture of this illustration.

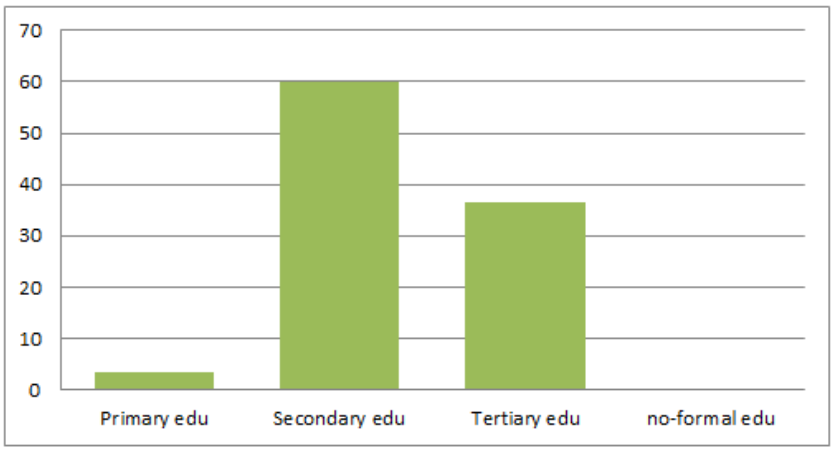

Figure 4: Depicts the Educational Status of Respondents
Source: Field survey (2014)

Farming Experience of Respondents

Table 6: Farming Experience of Respondents

Farming experience	Frequency	%
1 - 5yrs	0	0
6 - 10yrs	60	50
11 - 15yrs	40	33
16 - 20yrs	20	17
21 & above	0	0
total	120	100

Source: Field survey (2014)

Farming experience is an important aspect in fish farming and agriculture at large. From Table 6, it was observed that majority (50%) of the respondents had experience between 6 – 10years followed by 40 respondents who had their experience between 11-15years (33%) and the remaining respondents having

theirs in the range of 16-20years (17%). An average experience age of 15years exists among the fish farmers in this area. This is in line with opinion of Onemolease, and Oriakhi (2011) who noted that experience is highly needed in the enterprise of fish farming. Fig 5 clearly illustrates this discussion.

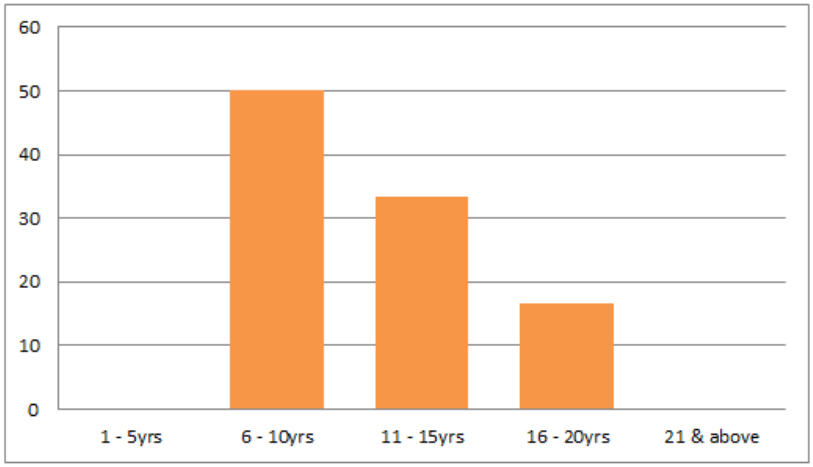

Figure 5: Depicts Farming Experience of Respondents
Source: Field survey (2014)

Farm Size

Table 7: Farm Size of Respondents

Farm Size (ha)	Frequency	%
0.1 – 1.0	34	29
1.1 - 2.0	54	45
2.1 - 3.0	24	20
3.1 - 4.0	0	0
4.1 - 5.0	4	3
5.1 - 6.0	4	3
6.1 & above	0	0
Total	120	100

Source: Field survey (2014)

Land is a fixed asset and a scarce one at that, which constitutes one of the major factors of production in farming and agriculture at large. Table 7 shows that majority of the fish farmers own a farm holding in the range of 1.1ha to 2.0ha (45%) while closely followed by farmers with holdings in the range of 0.1ha to 1.0ha (29%) and 2.1ha to 3.0ha (20%). Only few farmers (3%) indicated a farm holding in the range of 4.1ha to 5.0ha and 5.1ha to 6.0ha respectively. This is in line with the result obtained from the survey carried out in 1973/74 by the Federal Office of Statistics as reported by Olayide (1980), which noted that small-scale farms were classified to range between 0.1ha and 5.99ha and they constitute about 80.78% of all farm holdings, the medium scale farms range from 6.0 to 9.99ha and constituted about 13.59% of all farm holdings while large farms range from 10.0ha and above and constituted about 5.63% of all farm holdings. Furthermore, this also agrees with PIND (2011) who observed that a considerable large population of the fish farmers are small farmer holders and are fragmented despite the vast opportunities in this enterprise. Therefore, making it so difficult to harmonize the opportunities and integrate these farmers to work together. The implication of the above result is that most of the population in this fish farming enterprise is only operating solely and not as a team which makes development very hard to achieve. Fig.6 depicts clearly these illustrations.

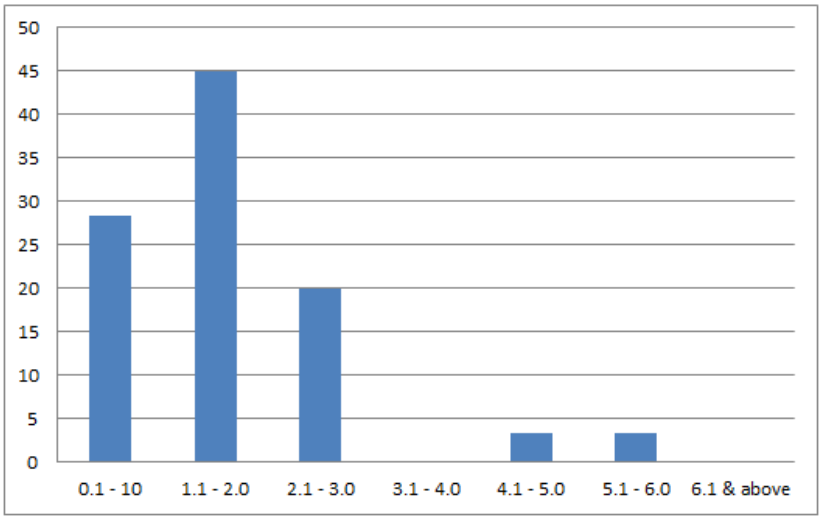

Figure 6: Depicts farm size of respondents
Source: Field survey (2014)

Household Size

Table 8: Distribution of Household Size of Respondents

Household Size	Frequency	%
1-5membrs	64	53
6-10members	56	47
11-15membrs	0	0
16 & above	0	0
Total	120	100

Source: Field survey (2014)

In most farm families, household size actually means more labour that is why most African and developing countries household size tends to consist of an average number of 5 to 6 members. From Table 8, it is seen that the majority (53%) of the respondents possess between 1-5 household members closely (47%) followed by respondents with 6 to 10 household members. No respondent indicated more than 11 household members or above 16 household members. On the average, there exist an average household size of 6.5, which is in agreement with above stated observation as well as the observations of Onemolease *et al.,* (2000; 2011) as they imply that pisciculture farmers have large household which is believed to constitute an important labour source for them. Fig 7 depicts clearly this illustration.

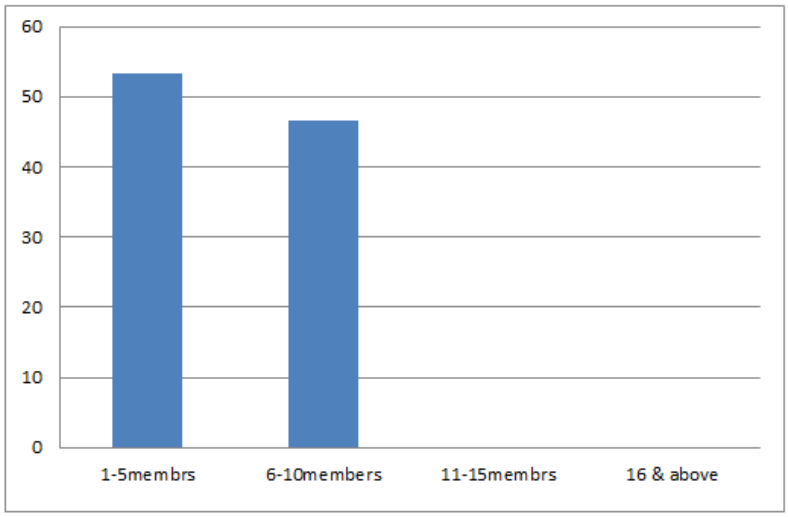

Figure 7: Depicts Household Size of Respondents
Source: Field survey (2014)

Distance of Farm to the Market (km)

Table 9: Frequency Distribution of Respondents According to Farm Distance

Farm Distance (Km)	Frequency	%
0.1 – 1.0	34	29
1.1 - 2.0	54	45
2.1 - 3.0	24	20
3.1 - 4.0	0	0
4.1 - 5.0	4	3
5.1 - 6.0	4	3
6.1 & above	0	0
Total	120	100

Source: Field survey (2014)

Farming distance is also a factor worth considering in terms of volume of production in fish farming and agriculture at large. This is due to the fact that a lot of factors must be considered before and after production of agricultural products such as market, demand of the product, competition, mode and type of transportation, access to the market and so on. Therefore, Table 9 showed that majority (45%) of the farmers live between a range of 1.1km to 2.0km away from the market while 29% of the respondents live between the range of 0.1km to 1.0km to the market and only 20% of the respondent claim to live between a range of 2.1km and 3.0km from the market. Only few (8%) respondent indicated living between 4.1km and 6.0km away from their point of sales. The implication of this result is that most farmers living very far apart from the point of sale might be discouraged from producing more due the fact that they will have to spend more to transport their produce to the point of sale, also the aspect of poor transportation means also needs consideration not to mention the poor mode of conveying this produce to the market. This is in agreement with the opinion of Ali, et al. (2010), as they observed that transportation of fry and fingerlings was a problem in the study area. Not only that the transportation system as a whole was unsatisfactory here; the mode of conveying the fries and fingerlings also leaves much to be desired. The prevailing fry transportation system is traditional as described by Saha and Chowdhury (1956), and results in lowering of vitality of the fry and resultant mortality. Ali et al (2010), further noted that transportation problems had been reportedly noted to cause about 20-30% mortality of fry. This eventually forces most fish farmers to sell at the farm gate therefore reducing any additional margin they could have gained. Fig.8 depicts a clearer picture of this illustration.

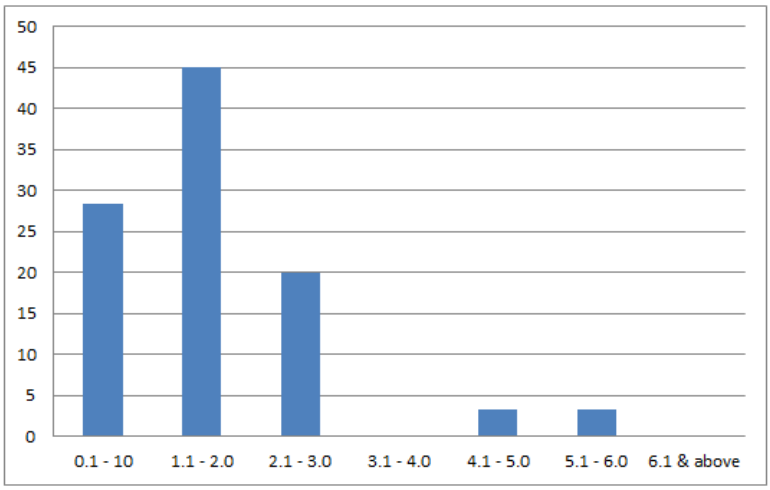

Figure 8: Depicts respondents' farm distance to market (km)
Source: Field survey (2014)

Constraints Facing Pond fish farmers

Table 10: Constraints Facing Pond fish farmers

Constraints	Strongly Agree (SA)	Agree (A)	Disagree (D)	Strongly Disagree (SD)	Mean
Poor Hatching techniques /skill	80 (320)	20 (60)	8 (16)	12 (12)	3.4 (408)
lack of supply of fry/fingerlings	52 (208)	44 (132)	12 (24)	12 (12)	3.1 (376)
high cost of feeds	96 (384)	22 (66)	2 (4)	-	3.8 (454)
lack of water supply	60 (240)	52 (156)	4 (8)	4 (4)	3.4 (408)
lack of capital/finance	84 (336)	24 (72)	6 (12)	6 (6)	3.6 (426)
Disease and pest	60 (240)	48 (144)	8 (16)	4 (4)	3.4 (404)
Lack of organized market	60 (240)	40 (120)	8 (16)	12 (12)	3.2 (388)
Poor Transportation	44 (176)	68 (204)	4 (8)	4 (4)	3.3 (392)
Poor storage facilities	52 (208)	44 (132)	8 (16)	16 (16)	3.1 (372)
Poor market information	56 (224)	40 (120)	14 (28)	10 (10)	3.2 (382)
High cost of inputs	84 (336)	16 (48)	12 (24)	8 (1)	3.4 (409)
Others, specify	-	-	-	-	-

Source: Field survey (2014)

From Table 10, it was observed that all the constraints identified in this enterprise were accepted using the 4-point Likert scaling, as most of the constraints had above a mean score of 2.5. For the case of this study, major constraints will be identified in order to proffer long lasting solutions to them. It was observed by the entire 120 respondents in a multiple response scenario that cost of feed ranks (3.8) highest on the Likert 4-point rating scale while closely followed by lack of capital/finance (3.6), high cost of inputs (3.4), poor hatching techniques (3.4), pest and diseases (3.4) and lack of water supply (3.4) respectively topped the list major constraints facing fish farming enterprise in this area amongst other constraints identified. This is in agreement with the observations of Adewumi and Olaleye (2010), Agboola (2011), Onemolease, and Oriakhi (2011); the Foundation for Partnership Initiatives in the Niger Delta (PIND) (2011) and finally, Yela, et al., (2011), as they rightly noted that the inability of the aquaculture sector to exploit growth opportunities rests on numerous constraints that hold back the fish sector, nationally and in the other areas as well. Lack of quality, cost-effective fish feed and shortage of quality, fast-growing fingerlings are two key factors that are imposing the biggest brake on the sector. The combined cost of feed and fingerlings contributes to as much as 65% of the cost of production. High cost of available inputs has served as a disincentive to aspiring small-scale producers, dissuading many from creating a stable demand for the inputs. On the other hand, high costs of inputs have also resulted in high priced products, which have restrained the sector's growth opportunities despite a burgeoning demand for fish.

Further effects of high cost of inputs in fish farming as rightly pointed forward by PIND (2011) has led to a continuous increase in the imports of frozen fish by almost 20% per annum to meet demand at a price consumers seem willing to pay; while domestic farmed fresh fish on the other hand are retailed at prices as much as 100% to 120% higher than imported frozen fish, while domestic capture fish are priced far higher, by almost 325%. Consequently, import of frozen fish is nearly as large as domestic production, and rising. Industry experts predict that imports will continue to rise, particularly since domestic production appears to be lagging. What this result means is that if these constraints are not properly tackled, fish farming will continually lag behind imported fish despite the improvement recorded in the past baring in mind our vast potential to improve.

Recommendations According to Respondents

Table 11: Recommendation of Respondents

S/No	Recommendations	Frequency	%
1.	Provision of credit/finance	58	25
2.	Provision highly developed market structures	24	10
3.	Provision of water facilities	25	11
4.	Provision of good roads	12	5
5.	Improve extension services	18	8
6.	Provision of storage facilities	94	40
7.	Others, Specify	-	-
	Total	231*	100

*Multiple responses
Source: Field survey (2014)

From Table 11, most of respondents recommended a multiple solutions to their major constraints both in pisciculture enterprise and value chain. It can be deduced from Table 11 that a total of 231 responses were indicated of which (on a 100% scale), majority (60%) of the respondents recommended provision of storage facilities closely followed by (25%) provision of credit facilities. Only a handful (11%, 8% and 5%) recommended provision of water facilities, improvement on extension service delivery and provision of good roads to the constraints facing their quality performance in value chain and pisciculture enterprise in this area. This result is in line with the observations of Omalese et al (2011), Yela et al (2011) and Agboola (2011), who jointly believed that storage facilities is mostly required in pisciculture enterprise to enable farmers to store their product in times of gluts as well as to control the market prices. Furthermore, this result agrees with the opinion of Zeller and Sharma (1998) as they rightly noted that Agricultural credits play a vital role in economic transformation and rural development. Agricultural credit is a crucial input required by the smallholder farmers to establish and expand their farms with the aim of increasing agricultural production, enhancing food sufficiency, promoting household and national income. It enables the poor farmers to tap the financial resources and take advantage of the potentially profitable investment opportunities in their immediate environment. In support of the above statement, Kohansal and Mansoori (2009) also opined that the need for credit facilities is necessitated by the limitations of self-financing, uncertainty pertaining to the levels of output, and the time lag between inputs and output. From the above result, the respondents strongly believe that if quality storage facilities and credit facilities are provided for them, they would do better in terms of increasing the quantity and quality of their produce.

Recommendation

Based on the results of this study, the following recommendations are given:

The pond fish farmers should:

- Embark on practices like formation of cooperatives that would enhance procurement of credit facilities and attraction of both government and Non-governmental agencies which would bring along essential inputs required for value chain pisciculture.
- Improve their farm productivity by embarking on practices that would enhance procurement of inorganic fertilizers for their production. This could include organizing themselves into forming a cooperative society within their locality, if there is none; such a cooperative should pool the resources of the members for bulk purchase of inorganic fertilizers, feed and other resources required for efficient production.
- Explore every available credit opportunities within their community, such as commercial banks, credit and thrift societies among others. Government could also place more emphasis on credit facilities toward agricultural production in general and fisheries in particular; such include Agricultural Credit Guaranteed Scheme Fund which enhanced credit availability to the farmers and taking care of tangible proportion of any default so as to encourage the commercial banks to make credit facilities available to farmers. The fish farmers should carefully consider an economic reduction in fertilizer utility in the study area, thereby reducing the cost of production and raising the profit margin of their respective farms.

The Government should: Structure and Institutionalize Business Information Outreach and Technical Support for pond fish farmers. This could be achieved by:

- Encouraging Business and Technical Information Services through Developing a Pisciculture Business Training Module for use by Fingerling Producers as an embedded service which could go alongside credit/incentive procurement for pond fish farmers.

- Developing easy to use training materials and help train fingerling producers recognized by ADP to be certified pisciculture business trainers.
- Supporting the on-going dissemination of business and technical training material to a wider network of pisciculture producers through these fingerling producers, by assisting in setting up and providing feedback for the initial training sessions.

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