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Araştırma Makalesi (Research Article)

Assessment of Fish Farmers in Delta State, Nigeria: Livelihoods Strategies

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Abstract: The study assessed the fish farmers' livelihood in Camp 74 community, Oshimili South Local Government Area of Delta State. The study focused on the farmer's socioeconomic profile, contribution of fish farming to fish farmers' livelihood status, challenges of fish farming and strategies employed by fish farmers in tackling challenges. By purposive sampling, a sample size of 50 respondents was used for the study. A well structure questionnaire was used in conducting the research. The data collected were subjected to frequency distribution, linear Regression and Chi-square. The results showed that more respondent (74%) had social benefit from fish farming, youth respondents (62%) are engaged in fish farming as source of livelihood. Respondents (68%) attested that fish farming reduced hunger and increased fish availability all year round with better income generation and savings. It was revealed that the various contributions of selected livelihood components had a pooled mean = 1.67. Again, with the index value = 0.56, it implies a very high impact contribution of aquaculture to livelihood pattern. However, challenges to fish farming were among others high cost of fingerlings (mean = 3.54), weak government support (mean = 3.22) and non-visitation of extension workers (mean = 3.06). Respondents most important strategies to overcome challenges were assessed to improved varieties of fingerlings (mean = 3.42) and inclusion cooperative society in feed supply (mean = 3.12). The regression and chi-square results were significant ($p < 0.05$). Based on these findings, it is recommended that government should participate more in fish farming activities to improve livelihoods.

Delta Eyaleti, Nijerya'daki Balık Çiftçilerinin Değerlendirilmesi: Geçim Kaynakları Stratejileri

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Öz: Çalışmada, Delta Eyaletinin Oshimili Güney Yerel Yönetim Bölgesi'ndeki Camp 74 topluluğundaki balık üreticilerinin geçim kaynaklarını değerlendirilmiştir. Çalışma, üreticilerin sosyoekonomik profiline, balık yetiştiriciliğinin balık üreticilerinin geçim durumuna katkısına, balık yetiştiriciliğinin zorluklarına ve zorluklarla mücadelede balık üreticileri tarafından kullanılan stratejilere odaklanmıştır. Amaçlı örnekleme ile, çalışma için 50 katılımcıdan oluşan bir örneklem büyüklüğü kullanılmıştır. Araştırmanın yürütülmesinde iyi yapılandırılmış bir anket kullanılmıştır. Toplanan veriler frekans dağılımı, doğrusal Regresyon ve Ki-kare'ye tabi tutulmuştur. Sonuçlar, daha fazla katılımcının (% 74) balık yetiştiriciliğinden sosyal fayda sağladığını, genç katılımcıların (% 62) geçim kaynağı olarak balık yetiştiriciliğiyle uğraştığını göstermiştir. Katılımcılar (% 68), balık yetiştiriciliğinin daha iyi gelir yaratma ve

Stratejiler

tasarrufla tüm yıl boyunca açlığı azalttığını ve balık bulunurluğunu artırdığını doğrulamıştır. Seçilen geçim kaynağı bileşenlerinin çeşitli katkılarının karma ortalamasının = 1.67 olduğu ortaya çıkmıştır. Yine, endeks değeri = 0.56 ile, su ürünleri yetiştiriciliğinin geçim kaynağı modeline çok yüksek bir etki katkısı olduğunu ifade etmektedir. Bununla birlikte, balık yetiştiriciliğine yönelik zorluklar, diğerlerinin yanı sıra, yüksek yavru balık maliyeti (ortalama = 3.54), zayıf hükümet desteği (ortalama = 3.22) ve yayım çalışanlarının ziyaret edilmemesi (ortalama = 3.06) şeklindedir. Katılımcıların zorlukların üstesinden gelmek için en önemli stratejileri, iyileştirilmiş yavru balık (ortalama = 3.42) ve yem tedarikinde işbirlikçi toplum (ortalama = 3.12) olarak değerlendirilmiştir. Regresyon ve ki-kare sonuçları anlamlı ($p < 0.05$) bulunmuştur. Bu bulgulara dayanarak, hükümetin geçim kaynaklarını iyileştirmek için balık yetiştiriciliği faaliyetlerine daha fazla katılması önerilmektedir.

1. Introduction

Generally, livelihoods can be described as a means through which people secure the necessities of life, it is a means of survival. Livelihoods are highly dynamic and shaped by a variety of different factors and forces that are themselves shifting constantly. The improvement of livelihoods of people in developing countries is the mission of many public and governmental institutions and is successful when communities experience increased well-being and reduced vulnerability through higher incomes, improved food security and the more sustainable use of natural resource (Department for International Development, DFID, 1999).

From time immemorial, fishing has been a major source of food for humanity and a provider of employment and economic benefits to those engaged in this activity. Fish is an important source of dietary protein, micro nutrients and essential fatty acids for millions of the world's poor and contribute to their caloric intake. In farming activities, livelihood components (natural, physical, economic, socio-cultural and human resources assets) play major roles in agricultural advancement, rural growth, welfare status changes, employment opportunities, income generation, environmental stability and governmental support (Okechi, 2004; Adepoju and Obayelu, 2013; Nandi et al., 2014).

Fish farming is a subset of livelihood components. Fish farming also known as aquaculture is a vast growing business in the tropics. Africans and Nigerians are beneficiaries of this livelihood and economic sector. The Nigerian government has contributed in budgetary term and human resources empowerment in this agricultural sector. The south-south region of Nigeria are champion beneficiaries of this livelihood (Olaoye et al., 2013; Ovharhe, 2016).

In the contribution of fish farming to livelihood patterns, after a survey in rural aquaculture, Rouhani and Britz (2004) observed that the management of land, water, infrastructure, finances, fingerlings, feeds, human resources and other inputs or capital investment are major pointers food security and livelihood improvement. They also stressed that extension visits and farmers training are part of livelihood pattern improvement.

However, very little precise information about the real contribution of fishing activities to livelihoods and economies in developing countries (Nigeria inclusive) aiming at eradicating poverty are available (Nandi et al., 2014). Delta State for instance many fishing households are poor and vulnerable, and they are likely to be involve in small scale fishing, it is widely acknowledged that small-scale fishing can generate significant profits, prove resilient to shocks and crises and make meaningful contribution to income and food security. These concerns have made the livelihood pattern and poverty status of the fish farmers to become of great importance. In addressing these concerns, the study was proposed and guided by some objectives.

1.2 Objectives of the Study

The main aim of this work is to assessment the fish farmers' livelihoods in Oshimili South L.G.A Delta State. Specifically the study seeks to address the following objectives to:

- i. Describe the socio-economic profile of respondents,

- ii. Determine the contributions of fish farming to various livelihood components improvement of fish farmers,
- iii. Identify the challenges to fish farming and
- iv. Examine the perceived strategies employed to reduce the effects of challenges on fish farming.

1.3 Hypotheses

The study was guided by two hypotheses:

Ho₁: Socioeconomic characteristics of fish farmers do not contribute to improvement of livelihoods in the study area.

Ho₂: There is no significant relationship between livelihood components and fish farming contributions to livelihood improvement in the study area.

1.4 Conceptual framework of the study

Conceptual Framework: The livelihood components of fish farming (Figure 1) is categorized into six headings; namely: social benefits, vulnerability status, employment benefits, cultural benefits, food security and income generation. A nexus of these entities gives rise to a conceptual framework for this study. The Social benefits comprise of willingness to fish farming and group formation activities coupled with the cultural benefits of keeping farming community norms and rules to avoid conflicts and crisis so as not to affect livelihood status.

The vulnerability status involves the women participation, youth participation and indigents. Incorporating these strata of community profile into fish farming is an added advantage to the productivity rate of the men folks which links the next livelihood component of economic empowerment. The employment benefits in livelihood pattern take into cognizance provision of part-time or full time fish farming businesses, a precursor to food abundance. A strong link in this framework is the household food security benefits component which looks into reduction of hunger and fish availability all year round and guarantee income generation savings and re-investment turn around.

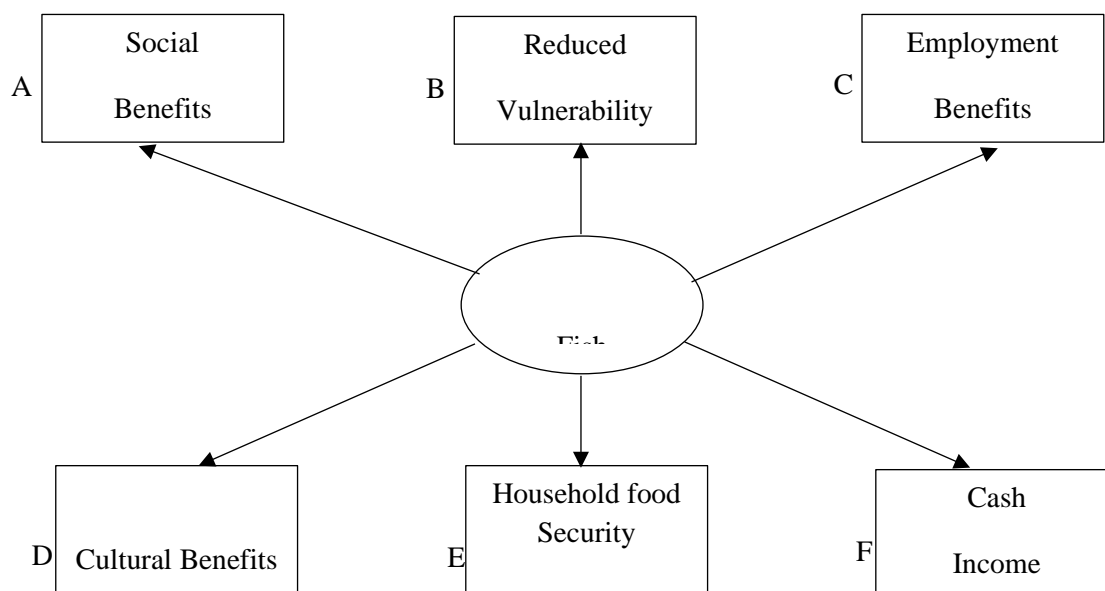


Figure 1. Livelihood framework components: contributions of fish farming (by proxy).

2. Material and Methods

2.1. Study area

The study was carried out in Oshimili South LGA which lies on latitude $6^{\circ}34'$ – $645'E$ and longitude $5^{\circ}59'$ - $608'N$ (Ministry of Lands, Survey and Urban Development, 2003). The area is agrarian associated with water bodies. Precisely, the study took place among the communal ponds sited in Camp 74, a farming community between the Delta State Government House and Delta State University, Asaba Campus, Asaba.

Sampling Technique and Sample Size: The sample for the study was drawn from the population of 80 fish farmers in Camp 74 in Oshimili South Local Government Area of Delta State. Based upon this, a purposive sampling technique was used to achieve a sample size of 63% of fish farmers. This resulted to a sample size of 50 fish farmers as sample size. A purposive sampling method was used because only 63% of the fish farmers had functional and successful aquaculture system.

Method of data collection: Relevant primary data was collected from respondents with the use of segmented semi-structured questionnaire comprising of objectively related questions to the study.

Measurements of Variables: Respondents' socio-economic characteristics were measured with standard gauge example, age and farming experience were measured in years, pond sizes in hectares.

Contributions of fish farming to livelihood status: This was measured by categorizing livelihood components into: social benefits, vulnerability status, cultural benefits, food security and income generation. The designated weight assigned to the various categories were High = 3, Medium = 2, Low = 1 and Nil = 0. ($3+2+1+0 = 6/4 = 1.5$) Cut off mean = 1.5 ($>1.5 =$ high contribution; $<1.5 =$ low contribution). Upon these profile, respondents were asked to decide which aspect fish farming contributed to their livelihoods whether high, medium, low, or none as decision making yardstick (DFID, 1999).

Challenges to fish farming in livelihood patterns: A ten-parameter standard was used to outline optional statements from which respondents decided whether their challenges to fish farming were very serious, serious, not very serious or not serious based on a 4 point Likert-type scale with 2.5 as cut-off mark for judgments.

Perceived strategies to manage fish farming challenges among livelihood patterns: Various proposal statements were laid out for respondents to tick as applicable using a four (4) point Likert scales with corresponding weight of “strongly important = 4”, “important = 3”, “not important = 2” and “not very important = 1” with a cut-off point of 2.5 ($4 + 3 + 2 + 1 = 10/4 = 2.5$).

Note: In all the Likert scale computed, an index value (x) was generated. This is applicable to Ofuoku and Ekorhi-Robinson (2018) who generated an index value from a rating scale by dividing the pooled mean with the highest weight in the rating scale. The index value (x) ranges as where $0 < x \leq 1$. Where any index value ≥ 0.5 , it is measured high impact in the analysis.

All data generated were statistically subjected to frequency count and percentages and inferential statistical where applicable with hypothesis analysis:

H₀₁: Socioeconomic characteristics of fish farmers do not contribute to improvement of livelihoods in the study area (this was analyzed with Regression).

H₀₂: There is no significant relationship between livelihood components and fish farming contributions to livelihood improvement in the study area (This was analyzed with Chi Square).

Regression Analysis

The hypothesis one was analyzed by multiple Regression

H_{01} : There is no significant difference between fish farmers' socio-economic characteristics and their contributions to livelihood patterns.

Linear, semi-log, double log and logistic forms of regression were used in the analysis. A lead equation was used to make a conclusion based on the following:

Relative magnitude of the R^2

Relative f cal value of the models

The function that showed more statistical significance

The Logistic Regression Equation is stated as

$$\text{Log}(\pi) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \dots + \beta_m x_m$$

Where:

Log = Training needs

b_0 = Constant

b_1 to b_6 = Regression Coefficient of six variables

X_1 = Age of farmers

X_2 = Sex of farmers (male, female)

X_3 = Marital status of farmers

X_4 = Educational level of the farmers

X_5 = Farming Experience

X_6 = Types of Pond

X_7 = Stocking rate

X_8 = Management System

X_9 = Contact with Extension Agents

X_m = Random error

Semi-log functional form of Regression

$$Y = \log b_0 + b_1 \log X_2 + b_3 \log X_3 + \dots + b_6 \log X_6 + e$$

$$\text{Log } Y = \log b_0 + b_1 \log X_1 + b_2 \log X_2 + b_3 \log X_3 + \dots + b_6 \log X_6 + e$$

3. Results

3.1 Socio-economic characteristics of respondents

Results in Table 1 shows that male (76%) were more than female (24%). This implies that fish farming is male dominated in the sampled area. The mean age of respondents is about 37 years. This indicates that youths are more involved in the fish farming business.

The marital status of respondents presented in revealed that 50% of sampled populations were single. This, also buttressed the fact that more youth are involved in the business of fish farming as a source of livelihood.

The educational qualification of the respondents revealed that a greater population (38%) of the respondents had HND/B.Sc. as highest level of educational attainment. The mean farming experience of respondents was 4 years. Only 4% of respondents had between 7 and 11 years of experience in fish farming. This connotes that majority (88%) were young in the fish farming industry which was supported by Ovharhe and Gbigbi (2016) in a similar study with the Delta State Fadama III project.

The average pond size was 0.79Ha; earthen ponds (54%) were more in use than concrete ponds (40%) and tarpaulin ponds (6%) respectively. This finding relates to that of Ovharhe *et al.* (2020) where they reported that in backyard farming, fish farmers have limited sizes of ponds

On contact with extension agents, while 26% of the respondents had contact. The few that had contact could be deduced to the degree of cosmopolitanness with respect to farm proximity to the Faculty of Agriculture, Delta State University, Asaba Campus, Asaba. Ovharhe (2016) reported the poor attention given to fish farmers in the Niger Delta area. A clarion call upon extension workers attitudinal change!

Table 1. Respondents' socio-economic profile of (n = 50)

Parameters	Frequency	Percentage (%)	Mean/Mode
Sex			
Male	38	76	Male
Female	12	24	
Age of Respondents (years)			
21-30	10	20	
31 -40	24	48	36.9
41-50	15	30	
51 -60	1	2	
Marital Status			
Single	25	50	
Married	21	42	Single
Divorced	3	6	
Widowed	1	2	
Education Qualification			
Secondary	17	34	
OND/NCE	13	26	HND/B.Sc.
HND/13.Sc.	19	38	
M.Sc./Ph.D.	1	2	
Farming Experience(years)			
1 -3yrs	21	42	
4-6yrs	23	46	3.5
7-11yrs	2	4	
Pond Sizes (Ha)			
0-1.0	37	74	
1.1 -2.0	12	24	0.79
2.1 -3.0	1	2	
Stocking Density			
1.000 - 2,999	12	24	
3. 000-4,999	25	50	
5,000 - 6,999	8	16	4,319.56
7,000 - 8.999	3	6	
9.000-10,999	2	4	
Management System			
Sole pond	37	74	Sole pond
Integrated	13	26	
Types of pond			
Concrete	20	40	
Tarpaulin	3	6	Earthen pond
Earthen pond	27	54	
Fish Stock			
Heterobrachus	30	60	
Clarias	14	28	Heterobrachus
Tilapia (mixture)	6	12	
Contact with Extension Agents			
Yes	13	26	
No	37	74	No

3.2 Contributions fish farming to livelihood status

Facts in Table 2 gives a detail analysis of fish farming in the study area showing the benefits of fish farming with respect to various aspect of the farmers' livelihood pattern such as social benefits, ability to tackle the vulnerable groups, employment benefits, cultural benefits, food security and cash income generation. Ofuoku *et al.* (2006) commented that cooperative farmers contributed to household food security than non-cooperative farmers which to their higher income status.

On the social benefit of fish farming, it was observed that a high category (74%) of

the respondents are willing to practice fish farming; while, an average number of respondents (50%) are involved in group formation activities as a result of fish farming. Ofuoku *et al.* (2008) reported that the better the cohesiveness in group formation, the better the accessibility to agricultural inputs, assets and farming opportunities.

Vulnerable groups of targeted women (48%) are proud of the fish farming activity. Youth respondents (62%) are engaged in fish farming as source of livelihood. Respondents (70%) are into aquaculture as a part-time business venture.

The fish farming has little or no conflict with the norms and values of the community where they operate as only 6% conflict with customs was recorded under high category. Respondents' opinion on Camp 74 community being the study as a tourist attraction site was very low, 12%. This calls for an upgrade of the potentials in that locality. Respondents' (68%) remarked that on food security, fish farming reduced hunger and fish availability all year round. Respondents (64%) generated surplus income for banking purpose. Okoedo-Okojie and Ovharhe (2012) emphasized on information sourcing and training of farmers in record keeping so as to manage the cash flow in farm business. The livelihood accrued from the various contributions of selected livelihood component had a pooled mean = 1.67. Again, with the index value = 0.56, it implies a very high impact contribution of aquaculture to livelihood in general. This is a better report than Ovharhe (2016) findings. He reported that aquaculture contribution to livelihood was at a medium scale.

Table 2. Fish farming contribution to respondents' livelihood status (n = 50)

Item	High (3)	Medium (2)	Low (1)	Nil (0)	Modal Remark
<i>Social Benefits:</i>					
Willingness to practice fish farm	37 (74)	11 (22)	2(4)	0	High
Group formation activities	13 (26)	25 (50)	12(24)	0	Medium
<i>Vulnerability Status:</i>					
Women participation	24 (48)	21 (42)	5(10)	0	High
Youth participation	31 (62)	10 (20)	9(18)	0	High
<i>Employment Benefits:</i>					
Provision of part time Business	35 (70)	10(20)	5(10)	0	High
Full time business	26 (52)	21 (42)	3(6)	0	High
<i>Cultural Benefits:</i>					
Non-conflict with community Norms and values	23(46)	19(38)	5(10)	3(6)	High
Opportunity for tourist attraction sites	6(12)	14 (28)	21(47)	9(18)	Low
<i>Food Security:</i>					
Reduction of hunger	34 (68)	13 (26)	3(6)	0	High
Fish availability all year Round	27 (54)	16(32)	7(14)	0	High
<i>Cash Income Generation:</i>					
Harvest Period	39(78)	11(22)	0	0	High
Cash Surplus for Banking	10(20)	32(64)	5(10)	3(6)	Medium
Mean =1.67; Index value = 0.56 (Impact: high contribution)					

Note: Figures in parentheses are percentages. Decision yardstick: mode usage of High, Medium, Low or None. Cut off mean =1.5 (≥ 1.5 = high contribution; < 1.5 = low contribution; with Index value > 0.5)

3.3 Challenges to fish farming livelihoods

Values in Table.3 shows that the most serious constraints were high cost of fingerlings (mean = 3.54) high cost of fish feeds (mean = 3.52), weak government support (mean = 3.22) and non-visitation of extension workers (mean = 3.06). Meanwhile some other challenge were noticed though they posed no challenges. For instance an absence of storage facilities (mean = 2.28) small pond size issues (mean = 2.14), scarcity of improved breed of fingerlings (mean = 2.00), weak cooperative management issue (mean = 1.92), poor water quality management (mean = 1.86) and low market strategies (mean = 1.76). According to Dibb and Sally (2006) they noted that most marketers believe that a key focus their activities is the differentiation of their product proposition vis a vis competing product and service as aquaculture business

is competitive. The pooled mean = 2.53 with an index value = 0.63.

Table 3. Respondent challenges to fish farming (n=50)

Parameters	Very Serious	Serious	Not very serious	Not Serious	Total	Mean
High cost of fingerlings	35(140)	10(30)	2(4)	3(3)	177	3.54
High Feed cost of feeds	34(136)	8(24)	8(16)		176	3.52
Weak government support	27(108)	9(27)	12(24)	2(2)	161	3.22
Non-visitation of extension workers	23(92)	12(36)	10(20)	5(5)	153	3.06
Absence of storage facilities	14(56)	18(54)	16(32)	2(2)	114	2.28
Small pond size	5(20)	11(33)	20(40)	14(14)	107	2.14
Scarcity of improved breed of fingerlings	8(32)	3(15)	14(28)	25(25)	100	2.00
Weak corporative management	6(24)	5(15)	18(36)	21(21)	96	1.92
Poor water quality management	3(12)	5(15)	24(48)	18(18)	93	1.86
Low market strategies	5(20)	2(6)	19(38)	24(24)	88	1.76
Pooled mean = 2.53; Index value = 0.63 (Impact: high challenges)						

Note: Figures in parentheses are scores from Likert-type scale. Cut off mean =2.5

(≥2.5 = important challenges; <2.5= unimportant challenges; with Index value > 0.5)

3.4 Perceived Strategies Employed to Overcome Fish Farming Challenges in Livelihoods

Entries in Table 4 shows that uppermost in the strategies employed by respondents overcome fish farming challenges were assessed to improved varieties of fingerlings (mean = 3.42), inclusion of government agricultural activities (mean = 3.36), conduct of regular fish farming training (mean = 3.18), inclusion cooperative society in feed supply (mean = 3.12) and linkage to extension agencies (mean = 3.04). The use of middle men to market products (mean = 1.44). This low response connotes that it as an unimportant strategy like other ones. Therefore, middle men are not necessary for fish business in the study area. The result agrees with the findings of Mwangi (2008) that the small enterprise fish farming success does not need middle agents rather needs for strong markets, cooperatives, access to seed, feed, credit and transport and a focus on profit. The pooled mean = 2.93 and index value = 0.73.

Table 4. Respondents' perceived strategies employed to overcome challenges (n = 50)

Parameter	Strongly Agree (SA)	Agree (A)	Disagree (D)	Strongly Disagree (SD)	Total	Mean
Exposure to varieties of fingerlings	26 (104)	21 (63)	3 (6)		171	3.42
Inclusion of government agricultural activities	29 (116)	14 (42)	3 (6)	4 (4)	168	3.36
Conduct of regular fish farming training	17 (68)	25 (75)	8 (16)		159	3.18
Inclusion corporative society in feed supply	22 (88)	12 (36)	16 (32)		156	3.12
Linkage to external agencies	23 (92)	9 (27)	15 (30)	3 (3)	152	3.04
Use of middle men to market products	0	2 (6)	18 (36)	30 (30)	72	1.44
Pooled mean = 2.93; Index value = 0.73 (Impact: high important strategies)						

Note: Figures in parentheses are scores from Likert-type scale. Cut off mean =2.5

(≥2.5 = important strategies; <2.5 = unimportant strategies; with Index value > 0.5)

Results of hypothesis

H₀₁: Socioeconomic characteristics of fish farmers do not contribute to improvement of livelihoods in the study area.

The result in Table 5 shows that socio economic characteristics had significant effects on fish farming contribution to livelihood p< 0.05. The R² = 0.421 implies that 42.1% variation in farmers contribution to livelihood is accounted for changes in the socioeconomic

characteristics of famers in the area.

Among the nine (9) socio economic characteristics regressed, five (5) were found significant $p < 0.05$. Educational qualification of the respondents is significant ($p=0.011$, $p < 0.05$, b 0.66) with the estimated intercept of 0.66 implies that a ten-unit increase in education will lead to more than 66% change in livelihood, farming experience is significant ($p=0.036$, $p < 0.05$, b 0.32) with the estimated intercept of 0.32 implies that a ten-unit increase in farming experience will lead to more than 32% change in livelihood. Number of fish stocked is significant ($p=0.04$, $p < 0.05$, b 0.792) with the estimated intercept of 0.792 implies that a ten unit increase in number of fish stocked will lead to more than 79.2 % change in livelihood. Management system used is significant ($p= 0.054$, $p < 0.05$, b 0.239) with the estimated intercept of 0.239 implies that a ten unit improvement in management system adopted will lead to more than 23.9% change in livelihood, Type of pond used is significant ($p=0.018$, $p < 0.05$ b 0.207) .With the estimated intercept of 0.207 implies that a ten unit improvement in types of pond will lead to more than 20.7 % change in livelihood. Fish stock is significant ($p= 0.026$, $p < 0.05$, b 0.38). With the estimated intercept of 0.38 implies that a ten unit increase in education will lead to more than 38% change in livelihood.

Table 5. Result of the linear regression

Model	Unstandardized Coefficients		Standardized	T	Sig.
	B	Std. Error	Beta		
(Constant)	39.769	7.522		5.287	.000
Sex	-.391	1.185	-.061	-.330	.743
Age	-.020	.084	-.051	-.233	.817
Marital Status	.393	.805	.092	.488	.628
Edu Qualification	.663	.645	.200	1.028	.011*
Farming Exp.	.320	.328	-.204	.974	.036*
No. of Fish stock	-.005	.000	.081	.420	.047*
Mgt System	2.390	1.203	.356	1.987	.054
Types of Pond	-.207	.567	-.067	-.364	.018*
Contact with Ext. Agents	3.257	2.031	.485	1.603	.117

Note: *Significant at $p < 0.05$

The result of the second hypothesis:

Ho₂: There is no significant relationship between livelihood components and fish farming contributions to livelihood improvement in the study area.

Findings in Table 6 there is a significant relationship between farmer's livelihood and contribution of fish farmer $p < 0.05$. The breakdown is as follows:

Social benefits have a significant relationship with farmers contribution to livelihood in the study area $p < 0.05$, $X^2_{39.64} > X^2_{tab} 9.34$ in terms of group.

Vulnerability status has a significant relationship with fish farmers contribution to livelihood $p = 0.002$, $p < 0.05$ and $X^2_{cal}, 12.52, 20.88 > X^2_{tab} 9.34$.

Employment status has significant relationship with farmers contribution to livelihood in the area $p < 0.05$, $X^2_{cal} 31.00, 17.50 > X^2_{tab} 9.34$. Employment generation contribution to farmer's livelihood in the study area.

Cultural benefits is significantly related with farmer contribution to livelihood in the study area. $P = 0.000$, $p < 0.05$ and the $X^2_{cal} 23.92, 10.32$ are greater than $> X^2_{tab} 8.34$.

Food security has a significant relationship with fanners' contribution to livelihood in the study area. $P < 0.05$ as $X^2_{cal} 30.04, 12.04$ are greater than $> X^2_{tab} 8.34$.

Cash income generation has a significant relationship with farmers contribution to livelihood in the study area $p < 0.05$. The $X^2_{cal} 15.68, 42.64$ are greater than ($>$) the X^2_{tab} . This result agrees with Adepoju and Obayelu (2013) in a study on livelihood diversification and welfare of rural household, they reported that income from non - farm activities as well as income from a combination of non -farm activities and farming activities impacted welfare positively.

In summary, the relation between livelihood components and fish farming contributions to livelihood improvement. The relation between these variables were significant at $p < 0.05$. Fish farming contributions was significant to all the livelihood components as improvement was noticeable in social benefits, vulnerability status, employment benefits, cultural benefits, food security and cash income generation.

Table 6. Result of the Test statistics (Chi-square)

Livelihood components	Chi-square	Df	Sig.
<i>Social benefits</i>			
Willingness to fish farming	39.64	3	0.000*
Group formation activities	6.28	3	0.043*
<i>Vulnerability status</i>			
Women participation	12.52	3	0.002*
Youth participation	20.88	3	0.000*
<i>Employment benefits</i>			
Provision of part-time business	31.00	3	0.000*
Full time business	17.56	3	0.000*
<i>Cultural benefits</i>			
Conflicts with community norms and values	23.92	3	0.000*
Opportunity for tourist attraction cites	10.32	3	0.000*
<i>Food security</i>			
Reduction of hunger	30.04	3	0.016*
Fish availability all year round	12.04	3	0.000*
<i>Cash income generation</i>			
Harvest period	15.68	3	0.002
Cash surplus for banking	42.64	3	0.000

Note: *Significant at $p < 0.05$

4. Discussion and Conclusion

The mean age of respondents in similar livelihood venture was different with the findings of Ofuoku et al. (2006), they reported that less youths were interested in aquaculture in Delta State. In another vein, Ofuoku et al. (2006) report that more married folks were interested in aquaculture in Delta State.

On educational attainment, Ovharhe, (2019) had similar findings where he reported that a good number of graduates were in aquaculture amongst other farming enterprises in Delta State. The mean age of farmers in aquaculture was justified in a similar findings by Ovharhe and Gbigbi (2016). They reported that youths were more interested in fish farming enterprise as source of livelihood. Ofuoku et al. (2006) and Ofuoku et al. (2008) agreed with the findings that social benefits and empowerment of vulnerable groups contribute to livelihoods of farmers. Currently, the study area is occupied with many fish farming activities. Rouhani and Britz, (2004) reported that women and youth folks played active contribution to rural livelihoods in the aquaculture sector.

Various challenges faced the fish farmers as enlightened it the results. This implies that the challenges facing fish farmers were though slightly high but could easily be managed to ensure productivity. Mwangi (2008) emphasized that fish farmers can surmount challenges when favourable attention are given to their felt needs by government or other donor agencies. Again, the strategies employed to overcome the challenges were tactful. This suggest that the proposed strategies had high impacts to manage the livelihood constraints of respondents.

Based on the findings, the study concluded that males were more than females in fish farming with respect to fish farmers' contributions to livelihoods. Majority were single youths. A greater population of the respondents had tertiary degree. Less than 1 hectare earthen ponds sizes were more in use than other types of ponds in stocking. Fish farming contributed to livelihood through social and cultural benefits, youth and women participation, part-time and full time business towards food security and income generation. The study discovered that the challenges facing fish farming livelihood pattern were high and the proposed strategies to overcome these challenges were important. Thus, it was ascertained that fish farming contributed to livelihood improvement in the study area.

In an attempt to sustain fish farmers' contributions to livelihoods in the study area and its environs, the study recommends the following that:

- More efforts should be given to sourcing and availability of improved varieties of fingerlings,
- There should be greater inclusion of government agricultural activities,
- Regular conduct of fish farming training sessions should be upheld,
- To reduce cost of feeds, there should be inclusion of cooperative society synergy in feed supply,
- Urgent needs should be made to link fish farmers and extension agencies for greater productivity and marketability of produce.

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