SOCIO-ECONOMIC DETERMINANTS OF HOUSEHOLD FOOD SECURITY AMONG FISH FARMERS IN ODOGBOLU LOCAL GOVERNMENT AREA OF OGUN STATE, NIGERIA

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ABSTRACT

This study examined the socio-economic determinants of household food security among fish farmers in Odogbolu local government area of Ogun State, Nigeria. About 120 fish farmers were selected through a two-stage sampling procedure. Data were obtained with the aid of interview schedule, and analysed using Statistical Package for Social Sciences version 20.0 and subjected to frequency counts, percentage, means, standard deviation, and multiple linear regression models. Results revealed that 43.4 percent of the fish farmers were within 36-50 years age bracket with a mean age of 41.43±11.59 years. Higher proportions were male (83.2%), married (64.6%), and had tertiary education (69.4%). About half (49.6%) reported that adults in their households were food insecure. Fish farming was found to contribute to household food security through increased household income (89.4%), and dietary diversification (87.6%). Also, 51.3 and 31.0 percents indicated that children in households had high and marginal food security statuses respectively. Age (β = -0.421, t = -2.516, $p<0.05$) and household size (β = 0.804, t = 3.795, $p<0.01$) were significant determinants of food security status among adults in fish farming households while household size was the only significant determinant of food security status among the children (β= 0.465, t= 3.065, $p<0.01$). The study concluded that that age as well as household size has great influence on the food security status of fish farming households. It was recommended that more women and younger persons should be encouraged to venture into fish farming in order to improve the food security status of households.

Keywords: Aquaculture, Food insecurity, Household poverty, Hunger, Malnutrition

INTRODUCTION

Aquaculture accounted for 47 per cent of the total global fish production at 171 million tonnes in 2016 (Food and Agriculture Organization – FAO, 2018). According to the data from FAO, global fish production was at its peak in 2016. The total first sale value of fisheries and aquaculture production in 2016 was estimated at USD 362 billion, of which USD 232 billion was from aquaculture production (FAO, 2018). With capture fishery production becoming relatively static since the late 1980s, aquaculture has been responsible for the continuing impressive growth in the supply of fish for human consumption. In spite of her enormous oil wealth, Nigeria is faced with developmental challenges including poverty which affects nearly 75 percent of her population; youth unemployment at the rate of 23.9 percent accounting for 39.9 million of youths; and meeting adequate nutritive requirement of its 211 million people (Business Day, 2012; Macrotrends, 2021). A key agricultural

subsector where government efforts can be directed to solve these three challenges in one fell swoop is through the promotion of fish farming where the nation has huge untapped potentials.

In order to leverage on the potentials of aquaculture, the Nigerian government has implemented several interventions including the National Fadama Development Projects, Nigeria National Aquaculture Strategy, and the West Africa Agricultural Productivity Program. Common indicators of these interventions are accelerating fisheries and aquaculture production, improving socio-economic life, and improving food security. Despite these interventions, the annual domestic fish supply (1.2 million metric tons) is just about one-third of the estimated annual fish demand (3.3 million metric tons) (FBNQuest Capital Research, 2018). The FBNQuest Capital Research (2018) further observed that the nation's per capita fish consumption (13kg) is lower than the global average (21kg). These statistics are indicators of food insecurity in the Nigeria.

One of the earliest definitions of food security was by the FAO in the 2001 report. Food security was defined as a situation existing when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for active and healthy living (FAO, 2002). This definition identifies three dimensions – namely food availability, food accessibility, and food utilization. The fourth dimension (stability) of food security was added at the 2009 World Summit on Food Security. Food stability was regarded as the ability of food systems to withstand both the natural and man-made shocks (FAO, 2009). In linking food security with sustainable development, sustainability was suggested to be included as the fifth dimension of food security (Berry *et al*., 2015).

Despite unprecedented effort by international institutions, the population of the undernourished people in the world still constitutes a major problem in most parts of the world. Based on FAO's (2015) assessment, around 795 million people in the world remained undernourished. Nigeria is among the countries that has increasing records of severe food insecurity. Varella (2020) reported that the population of people experiencing hunger increased from 6.4 percent in 2014 to 9.1 percent in 2019. Aquaculture, according to FBNQuest Capital Research (2018), remains largely untapped despite its potential to contribute to food security since millions of the population depend on aquaculture as primary means of livelihood. It however seems impossible for the potentials of aquaculture to be fully actualised because of some setbacks such as the subsistence level of production (Kawarazuka and Bené, 2011). The study area is renowned for fish production in Ogun state despite the current challenges facing the aquaculture sector. Food insecurity is common in both the rural and urban cities despite the increasing number of people involved in fish farming and other agriculture-related occupations.

International food security experts and decision-makers seem unaware of the potential that fish can play in the fight against malnutrition (High Level Panel of Experts - HLPE, 2014; Bene´ *et al*., 2015). The problem is particularly pronounced in debates on how to make food systems more nutrition sensitive, i.e., how to change and improve

food systems in order to advance nutrition (Allison *et al*., 2011). Food security and poverty reduction have been central to the global sustainable development agenda. Recent food security discourse stresses the need for multiple policies, economic and social actions addressing consumer demand, access, supply and nutrition (Grafton *et al*., 2015).

Although aquaculture has been linked to food security, employment generation, income generation, and poverty reduction, few empirical studies have been published with household food security among fish farmers. Previous studies on food security mostly assumed that the adult's food security is equivalent to the household food security. This study, however, considers the food security of both adults and children in the households separately. Therefore, this study has contributed to the bulk of knowledge on food security amongst fish farming households by describing the socioeconomic characteristics of the respondents; determining the food security status of adults and children members of fish farmers' households; and identifying the contributions of fish farming to household food security. The study also tested the hypothesis that there are no significant relationships between the socio-economic characteristics and the food security statuses of adults and children members of fish farming households at 0.05 level of significance.

MATERIALS AND METHODS

This study was conducted in Odogbolu Local Government Area of Ogun state, Nigeria. The local government has its headquarters in the town of Odogbolu. The LGA has an area of 541 km^2 and a population of 127,123 persons (Nation Population Commission – NPC, 2006). This study employed a two-stage sampling procedure to select the sample. The first stage involved a random selection of two of the four prominent fish farm clusters in Odogbolu, LGA. The selected clusters were *Ifeoluwa* and *Asejere* fish farm clusters. Lists of fish farmers in both clusters were compiled with the help of the Secretaries of the fish farmers' groups and associations to give 118 and 82 fish farmers from *Ifeoluwa* and *Asejere* fish farm clusters. This gave a total of 200 fish farmers. Sixty percent of the fish farmers in each of the clusters were then sampled using simple random technique in the second stage which results in the selection of 71 and 49 fish farmers from *Ifeoluwa* and *Asejere* fish farm clusters respectively. This gave rise to 120 fish farmers which served as the sample size for the study but only 113 fish farmers gave consent and agreed to participate in the survey. Data were collected with the aid of interview guide schedule administered by the research team. The data collection was carried out during the monthly meetings of the fish farmers after obtaining approval from the Chairmen of the two fish farm clusters. Data collected were analysed using Statistical Package for Social Sciences – SPSS version 20.0 and subjected to frequency counts, percentages, mean, and multiple linear regression models.

Measurement of variables

Variable such as socio-economic characteristics, contribution of fish farming to household food security, and household food security status were measured as:

Socio-economic characteristics: The respondents' age was measured at interval level as the actual age of the sampled fish

farmers. The fish farmers were then grouped into ≤30 year, 31-40 years, 41-50 years, 51-60 years, etc categories. Sex was measured at nominal level as either Male or Female. Marital status was measured at nominal level as single, married, divorced, and widowed. Household size was measured at interval level as actual number of persons in a household, and categorised into 1-5, 6-10 and >10 persons. Educational attainment was measured at ordinal level as no formal education, primary, secondary and tertiary education. Memberships of cooperative societies and fish farmers' groups were measured nominally as members and non-members.

Contribution of fish farming to household food security: This was measured with an 8-item scale self-developed based on Cunningham (2005)'s discussion on the contributions of aquaculture on food security. The response options were Yes or No.

Food security status: This was measured by adapting the 18-item Household Food Security Survey (HFSS) developed by United States Department of Agriculture – USDA (2012) which is an experience-based measure over a period of 12 months. The HFSS consists of 10 items for adult household members and 8 items for children (persons younger than 18 years) which were used for adult and children food security statuses respectively. Fish farmers were asked to choose a frequency defined as "often true," "sometimes true," or "never true" to describe their responses to the questions regarding food availability, food access, food utilization and food stability for their household. Responses were scored in the following manner: "often true" and "sometimes true" were coded as affirmative (value=1), "never true" was coded as negative (value=0). Each of the items were scored with a "1" if the response indicated food insecurity and "0" if it did not. The minimum and maximum possible scores were 0 and 10 for the adult scale respectively. The children scale has scores ranging from 0 to 8. Based on the scores, the adult food security status was categorised as 0: High food security, 1-2: Marginal food security, 3-5: Low food security, and 6-10: Very low food security. Concerning the food status of children, they were categorised as High food security (0), Marginal food security (1-2), Low food security (3-4) and Very low food security (5-8).

RESULTS

Socio-economic characteristics of fish farmers

The results in Table 1show that majority (83.2%) of the fish farmers were male while 16.8 percent were female. The highest proportion (43.4%) of the fish farmers were within 36-50 years age bracket with the mean age of the fish farmers being 41.43±11.59 years. Close to two-thirds (64.6%) of the fish farmers were married while about one-third (28.3%) were single. Table 1 reveals further that 60.2 percent of the fish farmers had household size of 1-5 persons; 34.5percent had 6-10 persons while the mean household size was 5±3 persons. Close to 70 percent of the fish farmers had tertiary education, while 27.4 percent had secondary education. Also, more than three-fifths (61.9%) of the sampled fish farmers were members of cooperative society while 38.1 percent were non-members. All (100%) of the fish farmers were members of fish farmers' groups.

Table 1: Distribution of fish farmers by their socio-economic characteristics (n = 113)

Socio-economic characteristics	Frequency	Percentage	Mean (STD)
Sex			
Male	94	83.2	
Female	19	16.8	
Age (years)			
21-35	37	32.7	
36-50	49	43.4	**41.43 (11.59)**
51-65	23	20.4	
>65	4	3.5	
Marital status			
Married	73	64.6	
Single	32	28.3	
Widowed/divorced	8	7.1	
Household size (persons)			
1-5	68	60.2	
6-10	39	34.5	**5 (3)**
>10	6	5.3	
Education			
Primary	3	2.7	
Secondary	31	27.4	
Tertiary	79	69.9	
Membership of cooperative society			
Member	70	61.9	
Non-member	43	38.1	
Membership of fish farmers' groups			
Member	113	100	
Non-member	0	0	

***means multiple responses allowed**
Source: Field survey, 2018

Contributions of fish farming to household food security

Results in Table 2 reveal that majority of the fish farmers claimed that fish farming had contributed to household food security through increased household income (89.4%), dietary diversification (87.6%), increased stability of food supply (86.7%), utilization of idle lands (86.7%), increased employment opportunities (79.6%), reduced malnutrition (77.0%), reduced household expenses on protein consumption (74.3%), and increased food consumption (69.9%).

Table 2: Contribution of fish farming to household food security

Contribution to household food security	Frequency	Percentage
Increased household income	101	89.4
Dietary diversification	99	87.6
Utilization of idle land	98	86.7
Increased stability of food supply	98	86.7
Increased employment opportunities	90	79.6
Reduced malnutrition	87	77.0
Reduced household expenses on protein consumption	84	74.3
Increased food consumption	79	69.9

Source: Field survey, 2018

Food security status of the fish farmer household

Table 3 reveals that 28.3 and 22.1 percents of the adults in the fish farming households were highly and marginally food secured respectively while 36.3 and 13.3 percents had low and very low food security status respectively. It also reveals that 51.3 and 31.0 percents of the children in the fish farming households had high and marginal food security statuses respectively.

Table 3: Household food security status -Adult and children category

Household category	Food security status	Frequency	Percentage
Adult	High Food Security (0)	32	28.3
	Marginal Food Security (1-2)	25	22.1
	Low Food Security (3-5)	41	36.3
	Very Low Food Security (6-10)	15	13.3
Children	High (0)	58	51.3
	Marginal Food Security (1-2)	35	31.0
	Low Food Security (3-4)	6	5.3
	Very Low Food Security (5-8)	14	12.4

Source: Field survey, 2018

Result of hypothesis testing

$H_0$1: Socio-economic characteristics of fish farmers were not significant determinants of household food security.

This hypothesis was tested in two folds, firstly amongst the adult members of the fish farmers' household and secondly amongst the non-adult (younger than 18 years) members.

$H_0$1a: Socio-economic characteristics of the fish farmers were not significant determinants of adult food security status in fish farming households

Results in Table 4 reveal that age (B = -0.421, t = -2.516, $p<0.05$) and household size (B = 0.804, t = 3.795, $p<0.01$) were significant determinants of food security status among adults in fish farming households. It also reveals that the R=square value was 0.37 while the F-value was 2.283.

Table 4: Regression results on the socio-economic determinants of adult food security status of fish farming households

	Unstandardized Coefficients		Standardized Coefficients	T	p-value
	B	Std. Error	Beta		
Constant	3.203	1.348		2.376	0.023
Age	-0.421	.167	-0.506	-2.516	0.017*
Sex	0.513	.390	0.187	1.316	0.197
Religion	-0.256	.253	-0.149	-1.012	0.319
Marital status	0.313	.192	0.279	1.637	0.111
Household size	0.804	.212	0.618	3.795	0.001**
Education	-0.308	.274	-0.168	-1.125	0.268
Primary Occupation	-0.106	.101	-0.159	-1.057	0.298
Secondary Occupation	-0.032	.085	-0.059	-.375	0.710
Member cooperative Society	-0.175	.281	-0.093	-0.624	0.537
F = 2.283, R-square = 0.37, p-value = 0.039					

*and** means significant determinants at 0.05 and 0.01 levels of significance.

$H_0$1b: Socioeconomic characteristics of the fish farmers were not significant determinants of the children food security status.

As shown in Table 5, household size was a significant determinant of food security status among the children in fish farming households (B= 0.465, t= 3.065, p<0.01).

Table 5: Socio-economic determinants of children food security status of fish farming households

	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
Constant	.800	.968		.827	.414
Age	-.152	.120	-.270	-1.263	.215
Sex	.126	.280	.068	.449	.656
Marital status	.142	.137	.188	1.036	.307
Household size	.465	.152	.530	3.056	.004*
Education	-.070	.196	-.057	-.359	.722
Primary Occupation	-.064	.072	-.141	-.884	.383
Member cooperative society	.191	.202	.151	.950	.349
Religion	-.008	.182	-.007	-.043	.966
Secondary Occupation	-.087	.061	-.236	-1.423	.163
F = 1.558, R-square = 0.286, 0.167					

*means significant determinant at 0.01 level of significance

DISCUSSION OF FINDINGS

Findings from the study analysis revealed that the fish farmers were dominated by people within 31-40 years age bracket. The mean age indicated that the fish farmers were in their prime age and hence, economically active. The finding agrees with Aihonsu and Olatingiri (2012), Balogun and Akinyemi (2017), Ajayi and Olutumise (2018) and Oyetunde-Usman and Olagunju (2019) who reported that fish farming was dominated by economically active persons. It implies that these set of farmers could increase their productivity if necessary resources are made available. Due to the active nature of people in this age bracket, they can closely monitor their fish farms. It could also be deduced that the sampled fish farmers have dependants who highly depend on them for survival; hence the need to invest in fish farming as a means of supporting their families.

The findings from this study indicated that majority of the fish farmers were male. This result agrees with earlier findings of Alawode and Jinad (2014) and Oladimeji *et al.* (2017) that in Nigeria, fish farming is an activity taken up by males. This could also be as a result of the tediousness and physical strength fish farming requires for a successful managerial operation. Adeoye *et al.* (2020) also asserted that fish farming business is mainly dominated by men while women are mostly involved in processing and other post-harvest activities. Agbebi (2012) also attributed male dominance in fish farming to the laborious intensive nature of its operations.It was also revealed that most of the fish farmers were married.

The survey showed that the fish farming households were predominantly composed of 1-5 persons. This suggests small family size among the fish farmers and consequently, they are likely to rely on hired labour as family members may not be sufficient in fish farming business. This disagrees with the statement of Oluwasola and Ajayi (2013) that in small scale farm enterprises, the family size is sufficient to sustainably manage the business. In relation to food insecurity, Adepoju and Oyegoke (2018) reported that household size positively related to food insecurity since larger household sizes face higher economic burden in feeding its members. Over two-thirds of the fish farmers had tertiary education; hence they will be flexible to adopt modern innovation which they perceive to be capable of yielding higher incomes. This is in conformity with the findings of Bala (2016) which stated that education is important in creating positive mental attitude towards adoption of modern farming innovations.

More than half of the interviewed fish farmers were members of cooperative society and all of them belonged to fish farmers groups and associations. Active participation in cooperative activities tend to attract benefits in terms of helping members in mobilizing resources within society for agricultural operations and marketing, as well as access to inputs at cheaper rates. It also enables members to take advantage of economies of scale in production, processing and marketing of agricultural produce. This corroborates the findings of Odetola *et al.* (2015) who observed that cooperative society is an avenue for fish farmers to attract government intervention, as government agencies do not deal with farmers at individual level.

On the household food security status, it was affirmed that close to half of the adult fish

farmers were food insecured while less than 20 percent of the children were also food in-secured. This supported the findings of Oyetunde-Usman and Olagunju (2019) who reported that about half of the farming households in Nigeria were food insecure. This is a pointer to the fact that most household heads channeled income and other means of livelihood to the upkeep of their children and family needs. This is however not a good situation for the fish farming households as this does not ensure the sustainable development as only well-fed adults can take adequate care of their younger ones.

Fish farming was reported to contribute to household food security through increased stability of food supply, increased employment opportunities, increased household income, increased food consumption, reduced malnutrition, and reduced household expenses on protein, dietary diversification and utilization of idle land. This is in line with the position of Cunningham (2005) which thought of aquaculture as an important mechanism for local food security through improved food availability and access as well as more effective food utilization.

Food security status of adults in fish farmers' households was significantly determined by household size and age. The negative relationship between fish farmers' age and household food security status implies that older fish farmers' households were less food secured than younger fish farmers' households. However, household size was the only significant determinant of food security among the children in fish farmers' households. The implication is that older adults might have been left unfed on many occasions in order to ensure that the children were well fed in families with larger household sizes. The R=square value indicated that 37 percent of the food security status of fish farming households could be explained by the socio-economic characteristics.

CONCLUSION AND RECOMMENDATIONS

Fish farming in Odogbolu Local Government Area of Ogun State was dominated by male, married, educated persons who are members of cooperative societies and fish farmers' groups. Close to half of the interviewed fish farming households were food insecure with respect to adult members. Fish farming was also found to have contributed immensely to household food security in terms of stable food supply, employment generation, increased household income, reduced malnutrition, increased food consumption, and reduced household expenses on protein consumption, dietary diversification, and utilization of idle lands. It was concluded that age and household size were the significant socio-economic variables that influence household food security of fish farmers.

Based on the findings, the study recommends that women and younger persons should be encouraged to venture into fish farming in order to improve the food security status of households. Non-members of cooperative societies are encouraged to join and actively participate in cooperative societies.

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