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Effect of Farmers' Participation in Research Activities on Fish Production in Delta State, Nigeria

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Abstract

The study assessed the effect of farmers' participation in research activities on fish production in Delta State, Nigeria. The specific objectives were to: ascertain the level of participation of fish farmers in research activities and estimate the level of production by fish farmers in the study area. The study adopted a descriptive survey research design. A multi-stage sampling technique comprising purposive and random sampling procedures was adopted in the selection of a sample size of 180 respondents for the study. Data were collected using structured questionnaire and were analyzed using descriptive statistics such as frequency counts, percentages and mean while simple linear regression model was employed in testing the null hypothesis at 5% level of significance. The result on fish farmers' levels of participation in research activities indicated that farmers highly participated in establishing pilot farm clusters ($\bar{x} = 2.47$), monitoring of trials ($\bar{x} = 2.27$) and On-farm research ($\bar{x} = 2.01$) in the study area. The result also revealed that the majority (67.2%) of fish farmers had a stocking density of above 700 fishes. The majority (74.4%) of fish farmers also harvested fishes at 3-6 months. The simple linear regression result revealed a positive and significant effect (14.139***) of participation in research activities on the production of fish farmers in the study area at 1% level of significance. Based on the findings of this study, the study therefore concluded that farmers' participation in research activities had positive effect on fish production in Delta State, Nigeria. The study therefore recommended amongst others that fish farmers be encouraged to participate more in establishing pilot farm clusters, monitoring of trials and On-farm research in order to further boost fish production in the study area.

Keywords: Effect, Farmers, Participation, Research Activities, Fish Production.

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Introduction

Fish farming is an important agricultural activity in Nigeria contributing to the country's economy, food security and sustainability and satisfying the global demand for fish products (Akinboye, 2024). Fish production is strategically positioned as an alternative to the continuous decline in fish supplies experienced by capture fisheries and has livelihood opportunities potentials (Ekanem *et al.*, 2024). It has also been reported that the fisheries sub-sector contributed 1.09% of the country's total Gross Domestic Product in 2020 and 0.9% in Quarter 3 of 2021 having grown by 2.27% in Quarter 2, 2021 from 3.24% in Quarter 1, 2020 and 5.68% in Quarter 2, 2020 (National Bureau of Statistics, 2021). Ifie and Erhiegun (2024) put the demand-supply gap of fish in Nigeria as 1.0 million metric tonnes while fingerlings demand-supply gap is over 500 million. The average Nigerian consumes roughly 41% of their total protein from fish, which is less than the average global intake of 13.3 kg per person annually (Balami *et al.*, 2019; Ashley-Dejo and Adelaja, 2022).

Fish farming is regarded as a key agricultural and food-producing sector throughout the world. However, the growth recorded is still very poor which makes it difficult to realize the major goal of fish farming in Nigeria which is to improve our local fish production due to a lack of necessary and needed technical information on fish farming that will enhance high productivity (Akinboye, 2024). Various attempts have been made by the Nigerian government through research institutes such as the Nigerian Institute for Oceanography and Marine Research (NIOMR) and the National Institute for Freshwater Fisheries (NIFFR) to develop and disseminate improved fish technologies to farmers with the overall aim of increasing fish production and supply of fish products. However, despite these efforts to boost fish production, there still exist a wide gap between demand for fish and domestic supply in Nigeria (Ashley-Dejo *et al.*, 2017; Ogunmefun and Achike, 2018). Fish farmers also face numerous challenges related to production techniques, diseases control, feed management, market opportunities and environmental concerns which could be linked to inadequate information hence, to address these challenges, fish farmers require reliable and updated information to make informed decisions (Akinboye, 2024).

Farmers' competency in fish production depends on the effectiveness of the training they receive (Ohanu and Obiora, 2025). As fisheries technology is continuously changing, the fish farmers in the bid to increase production, need appropriate skills for the use of these technologies. For this reason, it is necessary to arrange timely training programmes for farmers, in order to acquire the necessary knowledge and skills in different aspects of improved fish farming. With the efforts of research and extension services in Nigeria, there are improved packages on fish production. However, the extent to which farmers' participation in research activities has specifically influenced fish production in Delta State has not been extensively studied, hence the need to empirically investigate the effect of farmers' participation in research activities on fish production in Delta State, Nigeria.

Objectives of the Study

The broad objective of this study was to assess the effect of farmers' participation in research activities on fish production in Delta State, Nigeria. The specific objectives include the following: ascertain the level of participation of fish farmers in research activities and estimate the level of production by fish farmers in the study area.

HO1: Participation in research activities has no significant effect on the production level of fish farmers in the study area.

Materials and Methods

The study was carried out in Delta State, Nigeria. The State has twenty-five (25) local government areas with a land mass of 16,842 square kilometers and an estimated population size of 5,636,100 inhabitants (National Population Commission (NPC), 2022). Delta State lies between longitude 5° 00' and 6° 45' East; and latitude 5° 00' and 6° 00' North of the equator (Umehai *et al.*, 2024). The State also has a monsoon climate with a yearly temperature of 28.64°C (83.55°F), its average annual rainfall is 241.52mm (Delta Climate Summary, 2023). Delta State is also richly endowed with fertile agricultural land which is suitable for farming and fishing. The State is located in the Niger Delta region and the environment contains veritable fishing areas and villages that are scattered including numerous water bodies like lagoons, rivers, creeks, and swamps (Umehai *et al.*, 2024). The area is known to have two distinct seasons which are the dry and the rainy seasons. The inhabitants are majorly engaged in fishing, crop and animal production. Others are known for oil prospecting, civil services, trading and commerce (Okwuokenye, 2022).

The population of the study comprised all fish farmers in Delta State, Nigeria. At the first stage, the three agricultural zones of the State, namely, Delta Central, Delta North and Delta South were selected. At the second stage, three (3) blocks from each zone were purposively selected. They are Patani, Isoko South and Ughelli North for Delta Central, Oshimili South, Oshimili North and Anochia South for Delta North, and Uview, Ethiope West and Sapele for Delta South, making a total of nine (9) blocks. The purposive selection of these nine (9) blocks was due to the intensity of fish farming in the blocks. At the final stage, simple random sampling technique was used to select twenty (20) fish farmers from each of the selected (9) blocks, making a total of 180 fish farmers for the study (see Table 1). Primary data were obtained with the aid of structured questionnaire, and analyzed using descriptive and inferential statistics such as frequency, percentages, means and simple linear regression.

Model Specification

To ascertain the level of participation of fish farmers in research activities was realized using a 3 point rating scale of; regular = 3, occasionally = 2 and never = 1. In using the 3 point rating scale, a mid-point was obtained by adding 3, 2

and 1 which gave 6 and when divided by 3 gave a mean score of 2.0. For the purpose of decision making, any mean score ≥ 2.0 was adjudged high participation while any mean score < 2.0 was adjudged low participation.

The hypothesis testing for significant effect of participation in research activities on the production level of fish farmers in the study area was estimated using simple linear regression. Given as;

$$Y = f(X) \dots\dots\dots (1)$$

The model is expressed explicitly as;

$$Y = b_0 + b_1X_1 + ei \dots\dots\dots (2)$$

Where,

Y = Level of fish production

X = Level of participation in research activities

b_0 = regression constant

b_1 = slope of the regression that the extent by which the dependent variable (Y) is predicted by the independent variable (X)

ei = error term.

Results and Discussion

Objective 1: Ascertain the level of participation of fish farmers in research activities in the study area.

The result in Table 2 revealed that farmers highly participated in establishing pilot farm clusters ($\bar{x} = 2.47$), monitoring of trials ($\bar{x} = 2.27$) and On-farm research ($\bar{x} = 2.01$) in the study area. This implies that fish farmers highly participated in the establishment of pilot farm clusters, monitoring of trials and On-farm research in Delta State. Fish farmers would likely participate in research activities that would expose them to the development of improved fish technologies that would assist them in improving their productivity. This finding is in agreement with Akinboye (2024) who reported that fish farmers in Lagos and Osun States sought information on water quality management ($\bar{x} = 2.12$), fish species selection ($\bar{x} = 1.90$) and fish stocking ratio ($\bar{x} = 1.77$). This finding further implies that efforts should still be directed by the government, ministry of agriculture, extension agencies, research institutes and rural development experts towards increasing the participation of fish farmers in research activities in order to boost fish production in the study area.

Objective 2: Estimate the level of production by fish farmers in the study area.

The result in Table 3 shows that the majority (67.22%) of the respondents had a stock size of above 700 fishes while 18.33% stocked within 500 to 700 fishes. This indicated that most of the fish farmers in the study area were relatively medium-scale producers which agrees with the findings of Ekanem *et al.* (2024) who reported that 43.3% of sampled fish farmers in Akwa Ibom State had a stock size of 100-1000 fishes. This finding further implies that fish farmers in Delta State may be propelled to seek for technical know-how on more efficient fish farming practices through their participation in research activities in order to boost their production.

Hypothesis: Test for significant effect of participation in research activities on the production level of fish farmers in the study area.

The simple linear regression result of the test of significant effect of participation in research activities on the production level of fish farmers in the study area is presented in Table 4. The r^2 value (0.681) implies that about 68.1% of the variation in the production level of fish farmers was explained by the independent variable (participation in research activities), indicating goodness of fit. The F-ratio of 14.139 was statistically significant at 1% level of significance indicating that the participation of fish farmers in research activities had significant effect on their production in the study area. This further implies that an increase in the participation of fish farmers in research activities leads to a corresponding increase in their production level in the study area. This finding is plausible in that fish farmers would be able to improve their levels of production through first-hand knowledge obtained in the development of improved fish technologies as a result of their participation in research activities in the study area. Agbabiaka and Okeke (2024) noted that continuous research and extension services are needed to enhance the skills and knowledge of fish farmers in order to boost their productivity because fish farming requires a lot of technical and scientific knowledge to be successfully undertaken.

Conclusion and Recommendations

Based on the findings of this study, the study therefore concluded that farmers' participation in research activities had positive effect on fish production in Delta State, Nigeria. Fish farmers also highly participated in the establishment of pilot farm clusters, monitoring of trials and On-farm research in the study area. Therefore, it recommended that:

1. Fish farmers should be encouraged to participate more in establishing pilot farm clusters, monitoring of trials and On-farm research in order to further boost fish production in the study area. Attention of the research institutes should also be directed towards research activities which witnessed low farmers participation in order to ascertain possible reasons and further encourage their participation in those activities.

2. There is also the need for research institutes to increase their involvement of fish farmers in their activities in order to further improve their production levels and increase fish production in the study area. This is because farmers' participation in research activities had positive effect on fish production in the study area.

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Tables

Table 1: Schematic presentation of sampling procedure

Agricultural Zone	Block	No of selected farmers
Delta North	Oshimili South	20
	Oshimili North	20
	Anochia South	20
Delta Central	Patani	20
	Ughelli North	20
	Isoko South	20
Delta South	Uvwie	20
	Sapele	20
	Ethiope West	20
Total		180

Table 2: Level of participation of fish farmers in research activities in the study area

Research Activities	Regular	Occasionally	Never	Total score $\sum F \bar{x}$	Mean score $\bar{x}$	Decision
On-farm Adaptive Research	19(57)	58(116)	103(103)	276	1.53	Low
On-farm Research	59(177)	64(128)	57(57)	362	2.01	High
Establishing pilot farm clusters	104(312)	56(112)	20(20)	444	2.47	High
Generation of current technologies	20(60)	94(188)	66(66)	314	1.74	Low
Monitoring of trials	69(207)	90(180)	21(21)	408	2.27	High
Grand mean					2.00	High

Source: Computed from field survey data, 2017

Table 3: Level of production by fish farmers in the study area

Level of fish production	Frequency (n =180)	Percentage (%)
Stocking density (no of fishes)		
<500	26	14.44
500 -700	33	18.33
>700	121	67.22

Source: Computed from field survey data, 2017

Table 4: Simple linear regression result of the test of significant effect of participation in research activities on the production level of fish farmers in the study area

Parameter	Coefficient	Standard error	t-value
Constant	2.337	0.146	16.046***
Participation in research activities	0.248	0.066	3.760***
r-squared	0.740		
Adjusted r-squared	0.681		
F-statistic	14.139***		

Source: Computed from field survey data, 2017

** = significant at 5% and *** = significant at 1%

H_0 rejected at 0.05 level.