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DEMAND FOR AQUACULTURE INSURANCE AND BARRIERS' EFFECTS AMONG FISH FARMERS IN LAGOS, NIGERIA

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ABSTRACT

Boosting aquaculture insurance, as a financial instrument, can assist the sustenance of aquatic food demand in order to cushion fish farmers' income, and ensure adequate farm property safety in Nigeria. This study examined the barriers affecting aquaculture insurance and its related demand determinants, with empirical evidence drawn from fish farmers in Lagos State. The study employed a survey approach cum multiphase sampling technique. A descriptive statistic and Friedman's rank test were adopted in the data analysis. This study contributes immensely with the tabular and graphical models that explain the barriers affecting aquaculture insurance and demand determinants for aquaculture insurance in Lagos State, Nigeria. While a major barrier, from the findings, to demand for aquaculture insurance was recorded due to high cost of insurance premium, poor access to the policy, and the likes; low awareness, poor insurance regulation, poor claims settlement and low financial literacy, among fish farmers, were recorded for demand determinants for aquaculture insurance. The study recommended that aquaculture underwriters should enhance and expand their value-chain processes in a bid to bolster fish farmers' production capacities. However, the government should expand the subsidy net for more fish farmers to have access. With the simplicity of insurance contract design, aquaculture underwriters will gain attraction from farmers, which will, in turn, generate improved premium and their potential profitability.

Keywords: Aquaculture insurance, aquaculture risks, demand barriers, fish farmers, Nigeria

1.0 Introduction

The rising need for aquatic products, globally, is alarming; hence the practice of aquaculture enterprises is the path to attaining sustainable production. Studies (such as Food & Agriculture Organisation - FAO 2020; Mensah et al., 2021; Ninne & Teleki, 2023) had recorded persistent untenable harvest from capture fishing bank; therefore, seeing aquaculture as the only alternative solution to meeting these needs. In Nigeria, the request for fish most often outruns the domestic production. Nigeria has been regarded as the largest producer of fish in the West African Subregions, with Senegal and Ghana behind (ECOWAS Commission, 2020; Olaoye et al., 2020); second producer in Africa behind Egypt (Kaleem & Sabi, 2021); and one of the countries with the highest consumption of aquatic foods (Nwuba et al., 2023). However, meeting the rising needs cannot be without certain challenges and barriers. Scholars had mentioned some of the possible challenges hampering the growth of aquaculture in Nigeria to include but not limited to liquidity insufficiency, inefficient state-of-the-art technology, rising cost of transportation, poaching, poor storage facilities, high labour cost, etc. (Igoche et al., 2019; Oyedele et al., 2023).

The endemic challenges of the practice of aquaculture are the risks usually encounter by fish farmers in many parts of the world. Findings from literature survey regarding aquaculture risks had indicated that while existing studies focused on evaluating ecological risks, climate change risks, and disease-related risks (Atalah, & Sanchez-Jerez, 2020; Kabir et al., 2017; Mohan et al., 2021; Rahman et al., 2021); other studies had focused on risks associated with production, profitability, and economic efficiency (Ali et al., 2020; Asche et al., 2018; Khan et al., 2021). Studies concerned with risk management techniques include Luna et al. (2023), Theodorou, and Tzovenis (2023), and Watson et al. (2018), focused at insurance as a risk control measure for managing aquaculture. Nonetheless, fish farmers' risk perceptions have a crucial role in the decision-making processes (in terms of production, price determination, profitability, economic efficiency, and the likes); only limited studies (such as Oladimeji et al., 2019; Oparinde, 2019; Ugwuja et al., 2017) have been able to analyse risk sources, risk perceptions, strategies for risk management in aquaculture in Nigeria. This, then, create room for more studies to be focused at in the area of demand for aquaculture insurance so as to improve its relevance in Nigeria, West Africa, Africa, and the World at large.

In Nigeria, the yearning for fish usually outpaces the local production. Nigeria has been regarded as the largest producer of fish in the West African Sub-regions, with Senegal and Ghana behind (ECOWAS Commission, 2020; Olaoye et al, 2020); second producer in Africa behind Egypt (Kaleem & Sabi, 2021); and one of the countries, in the World, with the highest consumption of aquatic foods (Nwuba et al, 2023). However, Aquaculture insurance has its potential dominance in the Asian continent with evidence from China, India, Indonesia, Vietnam, and Bangladesh; being the top-five countries in the globe, contributing to its development. Egypt, being the top-six country in the world, takes the place of Africa, as it contributes to its advancement (FAO, 2020, Hohl, 2019). Even with the extent of development, aquaculture insurance penetration level to the world aquaculture production is still recorded at 0.06 percent due to socio-demographic and institutional factors which had affected aquaculture production, efficiency, and progression (Hohl

& Kalavakonda, 2021; Rahman et al., 2021). The core objective is to examine the barriers affecting the uptake of aquaculture insurance and its related demand determinants in Lagos State, Nigeria. The specific objectives then are to ascertain the rank analysis of barriers' affecting uptake of aquaculture insurance among fish farmers in Lagos State, Nigeria; and examine the rank analysis of demand determinants for aquaculture insurance among fish farmers in Lagos State, Nigeria. The justification of this study, therefore, is to evaluate the fish farmers' barriers affecting their demand for aquaculture insurance in Lagos State. Lagos State is being chosen being the state with the highest number of metrics tons of fish in Nigeria in terms of its commercial bases regarding production, accessibility for exportation and consumption, technological advancement etc.

2. Review of Related Literature

2.1. Aquaculture Insurance: Developmental Perspective

The evolution of insurance for aquaculture stocks began in 1974, when the first policy was designed for aquacultural risks in the Lloyd's of London and the London Insurance Market (Secretan, 2008 as cited in Zhang, 2021). Aquaculture insurance is seen as a policy designed to safeguard most often aquaculture farms including activities enclosed bays, as well as open ocean farms situated several kilometers offshore (Anrooy et al., 2022a; Zheng et al., 2018). Aquaculture insurance has the prospect to rectifying weather-related events because it is an alternative means of finance in the happenings of unpredicted state of affairs (Mensah et al., 2021).

Insurance, as a financial risk instrument, provides a coping technique to handling aquaculture and its related risks. Its obtainability and costs are impacted by institutional factors cum market transaction costs, also by internal risk encountered by the underwriter. Accessibility of aquaculture insurance is very confined, and often made more available to larger-sized enterprises than the smaller-sized ones (Rahman et al., 2021; Watson, et al., 2018). Anrooy et al. (2022b) stipulated that the underwriting bases for private underwriters to provide aquaculture insurance include financial ability and willingness to sustain strict pong management, maintaining the right water quality, ensuring actual water movement through inlets/outlets, and so on. Perils covered involved both capture fisheries and aquaculture (Nguyen & Pongthanapanich, 2016; Sule et al., 2019).).

Aquaculture insurance provision cannot be without some difficulties such as high cost of premium, incomplete statistical data, financial losses, low awareness, poor record of claims, absence of financial literacy, high moral hazards, among others (Wei et al., 2016; Zheng et al., 2018). while insurance contract is in force, the insurer ought to ensure premium estimation on the basis of average sum insured incorporated in the aquaculture insurance scheme (Tisdel et al., 2012). According to Hohl (2019), premium rates are mainly based on the production mechanisms, perils insured, locations, species, and deductible; for the safety of stock mortality and named perils.

2.2. Theoretical Review

2.2.1. Expected Utility Theory (EUT)

The theory is said to have been propounded by Bernoulli (1738) and later developed and axiomatized in the mid-20th century by Von Neumann and Oska (1944) to deal with risk assessment. This theory explains decisions around uncertainties, due to basic inconsistencies in the assumed underlying

tenets of EUT. It postulates that an individual agent increases his/her expected satisfaction (utility) in decisions to demand or not to demand insurance products. However, such individual decisions are motivated by the curvature of their utility function, which invariably is estimated around risk aversion (Zweifel & Eisen, 2012).

More so, EUT focuses primarily on risk aversion and the linearity of probability estimates. An individual expresses risk aversion under the concave function when marginal utility decreases. Increases in the marginal utility over income (wealth) indicates under a convex function when such an individual displays a risk seeking behaviour. Then, a linear function is obtained when the marginal utility is constant as individual agent exhibits risk neutrality (Ali et al., 2020). The linearity function has been explained in relation with probabilities, invariability regarding positive common origin of transformations, and hinged upon the extreme income in each state of nature (Kulawik, 2023). This theory serves as the basis for which conceptual framework is developed; as it explicates demand-side barriers of aquaculture insurance affecting its demand in Nigeria.

2.3. Empirical Review

Chilokwu et al. (2019) evaluated the impact of fishery agricultural loans and cooperators' insurance premium on economic growth of fishery production sub-sector in Nigeria. The study adopted ex-post facto research design, in which data were gathered from Nigeria Agricultural Insurance Corporation and Statistical Bulletins of the Central Bank of Nigeria between 1989 and 2015. Data analytical techniques were descriptive statistics, one sample T-test, and regression models. Results from the study showed that agricultural loans have positive and significant effects on fish production with coefficient value of 0.7530, and p-value of 0.000. The findings further revealed that insurance premium has a positive effect on fishing enterprises. The study advised cooperative farmers to persist with agricultural loans to boost fishery manufacture for sustainable economic wellbeing of the fish farmers.

Paptsov et al. (2020) investigated insurance as a marketing determining factor to develop aquaculture in Russia. The study was exploratory in nature. It was observed in the study that fish farmers' needs for insurance vary hinging upon the size and type of aquaculture businesses, the pecuniary structure of their enterprises, and the aquatic organisms' growth. Findings revealed that aquaculture insurance hasn't become a marketing tool to reduce economic risks encountered most times by fish farmers. It was further noticed that the Russian aquaculture industry is devoid of knowledge and experience in fish farming insurance. The study presupposes increase in the demand for knowledge in order to develop the fish farming enterprises.

Akter et al. (2021) evaluated shrimp cultivators' willingness to pay for index-based aquaculture insurance in the South Western region of Bangladesh. This study further investigated several risk factors affecting shrimp farming ranging from virus attack, market failure, diseases outbreak, among others. The study adopted a double-bounded dichotomous model to a dataset of one hundred and twenty randomly chosen participants. Findings revealed that shrimp farmers' willingness to pay is significantly influenced by a number of factors (such as education, age, farm size, field monitoring, food type, monthly individual income, training, and service point distance. This study suggested that insurers and

policymakers should ensure redesign of insurance policies, in connection with exact information, regarding supply-demand chain and evenness of premium payment.

Maltby et al. (2022) examined fish farmers' perceptions of index insurance and coral reef health in the context of climate driven changes in extreme events in Grenada. The study employed exploratory design by taking a cognate perception of reef health and its connections to fishing outcomes and costal protection. Findings showed that most fish farmers perceived extreme circumstance as severe risks to their livelihoods, imparting adversely on their ability to futuristic plans. Also, challenges were raised which centered on accessibility, inclusivity, affordability, and flexibility. These challenges severally posed some barriers on fish farmers, which weaken their uptake in the index related insurance.

In the work of Suresh and Kiran (2023), a retrospective and prospective evaluation of climate change was conducted in reference to marine fishery insurance in India. The study employed both primary and secondary data collection instruments. A snowballing sampling technique was adopted cum a structured questionnaire, from 200 fishermen in the city of Kerala, India. The data gathered was supplemented by Fishermen Welfare Cooperative Development Society in Ernakulam, Kerala; which assisted facilitation of insurance coverage among traditional fish farmers. Findings showed that fishermen got insurance coverage with the credit facilities provided by Cooperative venture supported by the Government of Kerala. The study observed absence of satisfactory insurance products and trouble of verifiability affects its deepening. More findings showed that fishers observed insurance as extra expenses and are of the judgment that the community would be responsible for the loses to a definite extent.

2.4. Literature Gap

Zheng et al (2018) observed that fish farmers' decisions upon the uptake of aquaculture insurance included, among other things, the size of pecuniary losses, level of awareness, farmers' income, and farming experience. For barriers toward aquaculture insurance experienced by fish farmers, according to some earlier studies (such as Hohl & Kalavakonda, 2021; Tisdel et al., 2012; Wei et al., 2016), are high cost of premium, incomplete statistical data, low awareness, poor claims record, among others. Pondering on these numbers of existing literature examined on barriers affecting the uptake of aquaculture insurance demand, streams of researches conducted in this area in Nigeria seem to be rare, and then, appeared not to have been extensively explored. This seems to be a practical, knowledge, and empirical gaps in Nigeria; which therefore calls for this intervention and part of which initiated this study. So, theoretical selection of expected utility theory was another gap filled by this study. Thus, this research differs from subsisting ones conducted in Nigeria, by investigating barriers affecting the demand for aquaculture insurance among fish farmers. There is then the evidence gap in relations to the application of Friedman's rank statistical test.

3. Research Methods

This study, which was empirical, adopted descriptive analysis, captured the thoughts of fish farmers' perceptions with respect to barriers effects of aquaculture insurance on its demand in Lagos State. This study employed survey design supported by quantitative method to provide clarity to fish farmers' views of essential decisions concerning aquacultural insurance policies in Nigeria. The total number of individuals engaged in fish production, as empowered by

the Lagos State Government in 2023, was recorded at not less 20,000, which was set to be the population of the study (Punch, 2022). The study employed a multiphase sampling technique comprised of judgmental and convenience in nature. For judgmental sampling technique, fish farmers' judgments were required for thoughtful elicitation of information relating to aquaculture production, efficiency, quality, cost, risks, and profitability. For convenience sampling, fish farmers were engaged on their readiness and availability. The data gathering instrument employed was a structured questionnaire. The questionnaire was self-developed with respect to the notable concepts and variables studied. The choice of the survey technique was due to fitness to the adopted research design, its economic nature, and simplicity in distribution (Sallies et al., 2021). To this end, a Taro Yamane's formula was applied, as cited in Israel (2013) as

$$n = \frac{N}{1+Ne^2}$$

$$n = \frac{20{,}000}{1 + 20{,}000\ (0.05)^2} = 392$$

392 copies of questionnaire were distributed among fish farmers in different locations in Lagos, most specially Badagry, Ikorodu and Epe divisions. Out of the total distributed questionnaire, 329 copies were retrieved while 284 of the collected copies were finally adopted for the data analysis; giving a response rate of 72 percent.

The study measurement of validity consisted of construct, and content validity. While construct validity was structured in line with convergent and discriminant views of earlier studies, content validity was conducted among experts in aquaculture, and insurance which enable the draft useful research instrument adopted, in this study, for the data gathering. Thus, the reliability test was conducted with a Cronbach alpha above the standard 0.7 for all concerned constructs. These concluding results were in conformity with statistical intervention of the exactitude of the adopted scales, and the paramountcy of the internal stability.

4. Results and Discussion of Findings

4.1. Descriptive Analysis of Participants Responses

Table 4.1: Participants' Bio-Data Information

Variable	Response Label	Frequency	Percentages
Gender	Male	132	46.5
	Female	152	53.5
Age Bracket	18 but less than 30	30	10.6
	30 but less than 40	47	16.5
	40 but less than 50	91	32.0
	50 but less than 60	59	20.8
	60 yrs. & above	57	20.1
Educational Qualification	BSc./HND	172	60.6
	Master Degree	48	16.9
	Doctorate Degree	07	2.5
	Professional	05	1.8
	Others	52	18.2
Business Scale	Large Scale	24	8.5
	Medium Scale	148	52.1
	Small Scale	112	39.4
Capital Structure	Less than #500,000	65	22.9
	#500,000 but less than #1,500,000	105	37.0
	#1,500,000 but less than #2,500,000	60	21.1
	#2,500,000 but less than #3,500,000	18	6.3
	#3,500,000 & above	36	12.7
	Yes	195	68.7

Awareness of Aquaculture Insurance	No	89	31.3
Existence of Aquaculture Insurance policy	Yes	79	27.8
	No	203	71.5
Claims History	Yes	26	9.2
	No	258	90.8

Source: Field Survey, 2023

Table 4.1 above reveals that while more than fifty-three percent of the participants were female, the remaining forty-seven percent were male. This is an indication that more female genders are on engaged in the aquaculture enterprises. For the *age bracket*, more responses (i.e., thirty-two percent) was recorded for those fish farmers that were 40 years but less than 50. While twenty-one percent was recorded for those fish farmers that were 50 years but less than 60, twenty percent for those 60 years and above, seventeen percent for 30 years but less than 40, and ten percent was recorded for 18 years but less than 30. This is an indication that most of the fish farmers interacted with were from 40 years and above. For *educational qualification*, most fish farmers hold BSc/HND with a sixty-one percent reaction. While seventeen percent of the participants hold Master's degree, nineteen percent was recorded for others (OND, SSCE, etc.), two percent and one percent for those fish farmers that hold Doctorate degree and Professional certificate. These responses indicate that most fish farmers that responded to the research instrument were all graduates.

For *business scale*, many of the fish farmers were both of medium-sized and small-sized enterprises with respective responses of fifty percent and forty percent. Only eight percent was recorded for large-sized fish farmers. This is an indication that most aquaculture businesses in Lagos State are of medium and small enterprises. For *capital structure*, thirty-seven percent was recorded for those fish farmers whose capital were #500,000 but less than #1,500,000. While twenty-three percent was recorded for those whose capital were less than #500,000, twenty-one percent was recorded for #1,500,000 but less than #2,500,000. Thirteen percent and six percent were recorded, respectively, for those participants with #3,500,000 & above, and #2,500,000 but less than #3,500,000. This affirms the earlier claims around the business scale hence most participants had their capital from those less than #500,00 to #2,500,000.

For *awareness of aquaculture insurance*, sixty-nine percent claimed to be aware while the remaining thirty-one percent were unaware. This implies the level of insurance awareness among fish farmers. For the *existence of aquaculture insurance policy*, while twenty-eight percent claimed that they hold aquaculture insurance policy, seven-two percent did not hold such policy. This indicates, according to the responses gathered from the fish farmers, that aquaculture insurance is still unpopular among fish farmers in Lagos State, Nigeria. For *claims history,* over ninety percent of fish farmers in Lagos State have not made any insurance claims, which supported their claims of majority not holding the policy.

4.2. Descriptive Analysis of Research Variables

Table 4.2: Barriers affecting uptake of Aquaculture Insurance

Variables	Scale Level					Mean	Std Dev.
	SD	D	U	A	SA		
	1	2	3	4	5		
Inadequacy of government subsidies has affected my uptake of aquaculture insurance	9.5	13.7	22.9	37.0	16.9	3.38	1.193
High cost of insurance premium has affected my uptake of aquaculture insurance	2.8	12.7	32.4	32.0	20.1	3.54	1.037
Difficulties in accessing aquaculture insurance has affected my uptake of the policy	9.5	18.7	16.9	30.3	24.6	3.42	1.298
Poor understanding of aquaculture insurance has affected my uptake of the policy	5.3	31.3	20.8	19.4	23.2	3.24	1.263
I have low trust for aquaculture insurance providers thereby, affected my uptake of the policy	7.7	28.9	17.3	21.1	25.0	3.27	1.321
Poor access to appropriate claims payment has affected my uptake of aquaculture insurance	8.1	25.4	16.9	20.8	28.9	3.37	1.345

Source: Field Survey, 2023

In Table 4.2 (and Fig 4.1), the barriers items for which data were gathered from the entire participants were *inadequacy of government subsidies, high cost of insurance premium, difficulties in accessing aquaculture insurance, poor understanding of aquaculture insurance, low trust for aquaculture insurance providers, and poor access to appropriate claims payment.* The participants reacted to the numerous items, wherein 54 percent expressed their agreement in terms of *shortage of subsidies from government*, 23 percent indifferent, and 23 percent indicated their disagreement. For *high cost of insurance premium*, while participants expressed 52 percent in support, 32 percent were in undecided with it. Then, only 16% disagreed. As for the *difficulties in accessing aquaculture insurance*, 55 percent of the entire participants exhibited their agreement, 17 percent were indecisive, and 28 percent disagreed. For *poor understanding of aquaculture insurance,* 43 percent agreed, 21 percent undecided, and 36 percent expressed their displeasure. For *low trust for aquaculture insurance providers*, 46 percent agreed, 37 percent disagreed, and 17 percent indifferent. For *poor access to appropriate claim payment*, 49 percent agreed, 17 percent indecisive, and 34 percent expressed discontent. The mean and standard deviation scores support the outcomes. This implies that fish farmers' judgments towards the survey items were normally distributed and centered around the mean. The result of the descriptive statistics on barriers affecting uptake of aquaculture insurance clearly show that all the participants have similar judgment about all the subject matters as there are no pertinent variations in the distribution of the participants' judgments.

Figure 4.1: The Graphical Model explains the Barriers affecting Uptake of Aquaculture Insurance among Fish Farmers in Lagos State

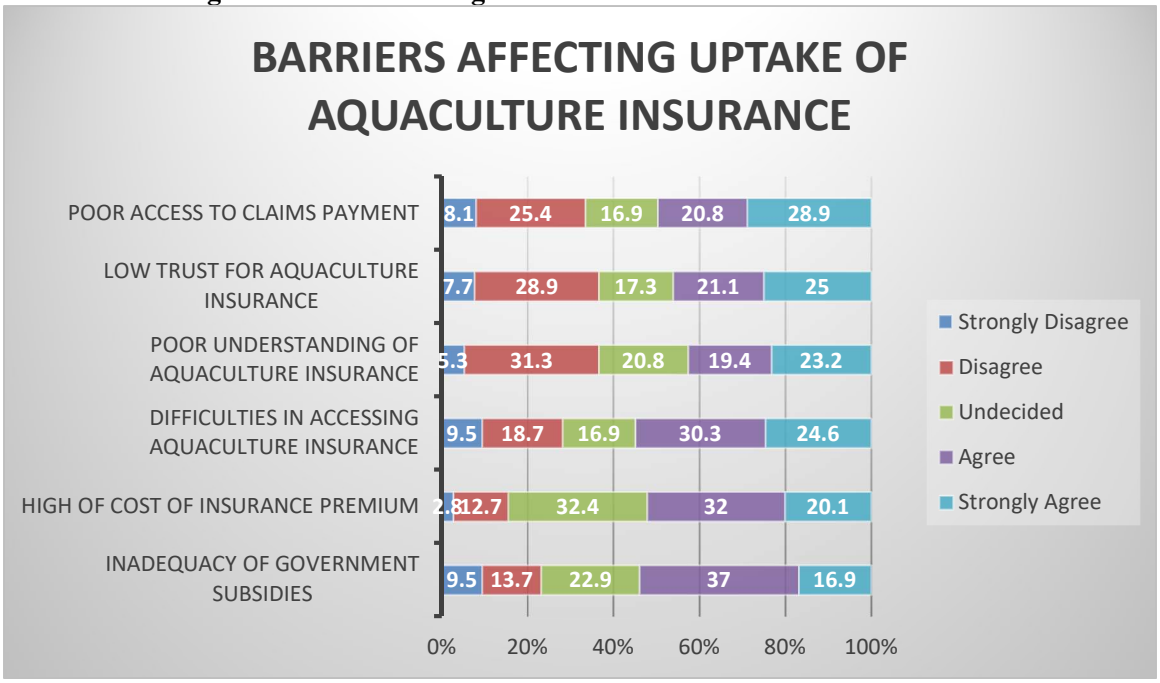


Table 4.3: Demand Determinants of Aquaculture Insurance

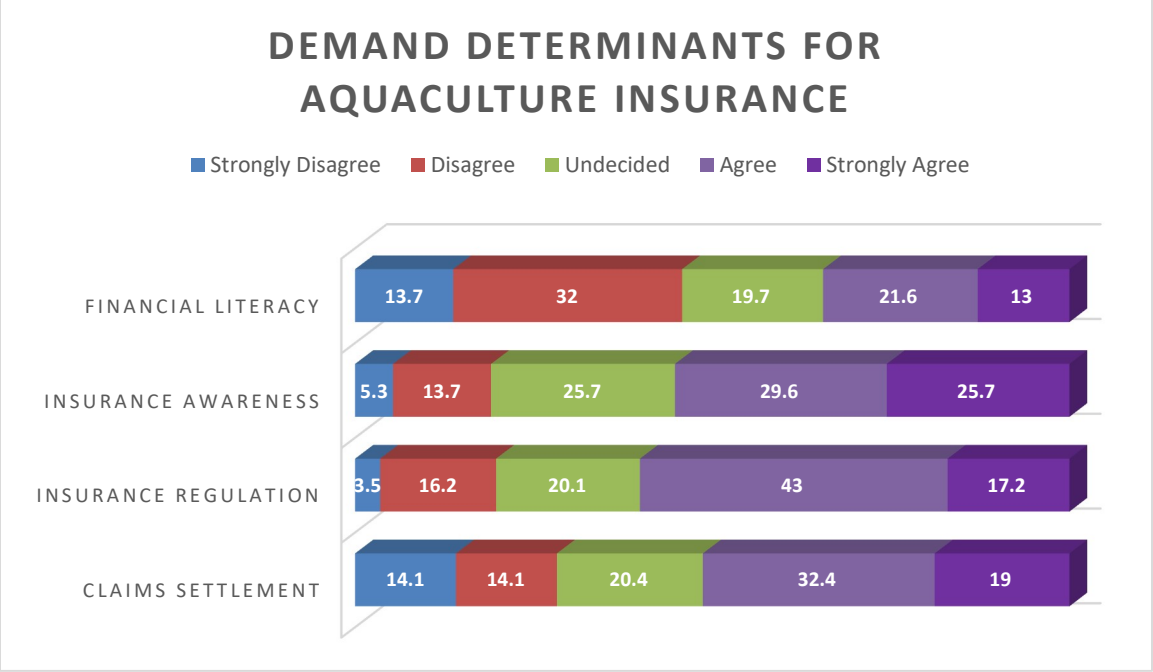
Variables	Scale Level					Mean	Std Dev.
	SD	D	U	A	SA		
	1	2	3	4	5		
Claims settlement provided from aquaculture insurance policy has not encourage my desire	14.1	14.1	20.4	32.4	19.0	3.28	1.310
Insurance regulation has not encourage my demand for aquaculture insurance	3.5	16.2	20.1	43.0	17.3	3.54	1.064
Risk awareness regarding aquaculture insurance is low, thereby, affecting negatively the demand for the policy	5.3	13.7	25.7	29.6	25.7	3.57	1.164
My level of financial literacy has negatively affected my demand for aquaculture insurance	13.7	32.0	19.7	21.6	13.0	2.88	1.264

Source: Field Survey, 2023

In Table 4.3 (and Fig 4.2), the barriers items for which data were gathered from the entire participants were *claims settlement, insurance regulation, insurance awareness, and financial literacy.* The participants reacted to the numerous items, wherein 51 percent expressed their agreement in terms of *claims settlement*, 21 percent undecided and 28 percent indicated their disagreement. For *insurance regulation*, while participants expressed 60 percent in support, 20 percent were both for undecided and disagreed respectively. As for *risk awareness*, 55 percent of the entire participants exhibited their agreement, 25 percent were indecisive, and 19 percent disagreed. For *financial literacy,* 35 percent disagreed, 20 percent undecided, and 45 percent expressed their

support. The mean and standard deviation scores support the outcomes. This implies that fish farmers' judgments towards the survey items were normally distributed and centered around the mean. The result of the descriptive statistics on demand determinants of aquaculture insurance clearly show that all the participants have similar judgment about all the subject matters, except for financial literacy, as shown in the distribution of the participants' judgments.

Figure 4.2: The Graphical Model explains the Demand Determinants for Aquaculture Insurance among Fish Farmers in Lagos State



4.3. Hypotheses Testing

4.3.1. Friedman's Rank Test

Friedman's symbiotic analysis test, represented by K, measures repeatedly identical population with same median. Friedman's test presupposes, under a null hypothetical atmosphere, that the dependent variable has similar underlying constant distribution, which thus require at least an ordinal measurement (Eisinga et al., 2017). However, data, under the Friedman's rank test, are always pitched in a symbiotic tabular model consisting 'n' rows and 'k' column. Friedman's test ascertains if the rank combined effects for each of the conditions estimated is different largely from the estimations which could be expected by prospect (St. Laurent & Turk, 2013).

Table 4.4: Results of Friedman's Rank Test on Barriers affecting the demand for Aquaculture Insurance

S/N	Survey Items	Mean Rank	Rank
1.	Inadequacy of government subsidies	3.41	4
2.	High cost of insurance premium	3.74	1
3.	Difficulties in accessing aquaculture insurance	3.68	2
4.	Poor understanding of aquaculture insurance	3.33	5

5.	Low trust for aquaculture insurance providers	3.31	6
6.	Poor access to appropriate claims payment	3.53	3

Source: Researchers' Computations, 2023

Table 4.5: Chi-Square Results from the Friedman's Test

N	284
Chi-Square	19.751
Df	5
Asymp.sig.	.001

a. Friedman Test

The analytical outcomes of the Friedman's test signify the existence of a statistically significant variance in barriers affecting uptake of aquaculture insurance [inadequacy of government subsidies, high cost of insurance premium, difficulties in accessing aquaculture insurance, poor understanding of aquaculture insurance, low trust for aquaculture insurance providers, poor access to appropriate claims payment, X^2 (5, n=284) = 19.751, $p < 0.05$]. Consequently, taking critical scrutiny of the mean estimations suggested a descending layer in fish farmers' insights from *high cost of insurance premium* (3.74), to *difficulties in accessing aquaculture insurance* (3.68), to *poor access to appropriate claims payment* (3.53), to *inadequacy of government subsidies* (3.41), to *poor understanding of aquaculture insurance* (3.33), to *low trust for aquaculture insurance providers* (3.31). The significance of these barriers' effects influencing the uptake of aquaculture insurance were plainly ranked to give grounds for the above clarifications.

Table 4.6: Results of Friedman's Rank Test on demand determinants for Aquaculture Insurance

S/N	Survey Items	Mean Rank	Rank
1.	Claims settlement	2.42	3
2.	Insurance regulation	2.67	2
3.	Insurance awareness	2.78	1
4.	Financial literacy	2.14	4

Source: Researchers' Computations, 2023

Table 4.7: Chi-Square Results from the Friedman's Test

N	284
Chi-Square	57.391
Df	3
Asymp.sig.	.000

a. Friedman Test

The analytical outcomes of the Friedman's test signify the existence of a statistically significant variance in demand determinants for aquaculture insurance [claims settlement, insurance regulation, insurance awareness, financial literacy, X^2 (3, n=284) = 57.391, $p < 0.05$]. Consequently, taking critical scrutiny of the mean estimations suggested a descending layer in fish farmers' insights from *insurance awareness* (2.78), to *insurance regulation* (2.67), to *claims settlement* (2.42), to *financial literacy* (2.14). The import of these demand determinants for aquaculture insurance were significantly ranked to give grounds for the above clarifications.

4.4. Discussions of Findings

This study confirms fish farmers' perceptions of barriers affecting the uptake of and demand determinants for aquaculture insurance.

The results showed that '*high cost of premium'* is ranked first which noted the highest perceived importance characterised by the selected fish farmers in Lagos State, Nigeria. This result corroborates the study of Tisdel et al. (2012) who noted that while insurance contract is in operation, the underwriter ensures premium estimation on the basis of average sum insured enshrined in the aquaculture development. Also supported with the findings is Hohl (2019), wherein premium rates largely hinge upon production mechanisms, the species, the perils insurance, the location and deductibles.

The outcomes further signified that '*difficulties in accessing aquaculture*

insurance' is perceived as significant by the fish farmers; hence it is ranked second. This result is supported by recent studies (such as Anrooy et al., 2022b; Nguyen & Pongthanapanich, 2016; Zheng et al., 2018) who that the difficulties in providing aquaculture insurance are principally shown in incomplete statistical data and financial losses.

The results also confirmed '*poor access to claims payment'* as one barrier limitation to aquaculture insurance; hence it was ranked third. The result is supported by recent studies of Anrooy et al. (2022b), and Tisdel et al. (2012), who noted poor claims settlement as a major factor militating against the uptake of aquaculture insurance.

The results further proved that '*inadequacy of government subsidies'*, as one barrier affecting uptake of aquaculture insurance; hence it is ranked fourth. This result is in consonant with recent studies (such as Tisdel et al., 2012; Wei et al., 2021) who pointed at insufficiency of government subsidies as a major problem.

The results affirmed that '*poor understanding of aquaculture insurance'* is ranked fifth among the barriers' metrics by fish farmers in Lagos state. The result supported earlier studies (such as Sule et al., 2019; Zheng et al., 2018) who affirmed low level of aquaculture insurance understanding among fish farmers.

The results ranked '*low trust for aquaculture insurance providers',* among the various barrier metrics, as sixth. The result is supported by the studies of Anrooy et al. (2022a); Watson et al. (2018); and Wei et al. (2021); who refuted low trust being displayed by fish farmers.

As for the demand 'determinants for Aquaculture insurance', The results affirmed that fish farmers ranked *insurance awareness, insurance regulation, claims settlement and financial literacy* as first, second, third, and fourth. These findings are in consonance with earlier such studies of Anrooy et al. (2022b); Sule et al. (2019); Mensah et al. (2021).

5. Conclusion and Recommendations

Without element of doubt, aquaculture risks (such as ecological, production, market, regulatory, technological, personal risks, etc.) present critical challenges to fish farmers and their related income, perceptions, preferences, and other economies of scale for survival. This study therefore investigated the fish famers' barriers metrics affecting aquaculture insurance uptake and its related demand determinants. Findings being drawn showed the opinions of the selected participants where '*high cost of premium', 'difficulties in accessing aquaculture insurance', 'poor access to claims payment', 'inadequacy of government subsidies', 'poor understanding of aquaculture insurance' and* '*low trust for aquaculture insurance providers'* were all ranked accordingly. Further results showed a similar rank analysis for *insurance awareness, insurance regulation, claims settlement, and financial literacy* as demand metrics for aquaculture insurance.

Based on these outcomes, the researchers suggested that aquaculture insurance providers should advance and increase the awareness campaign among fish farmers. Also, aquaculture insurers should enhance and expand their value-chain processes in a bid to bolster fish farmers' production capacities. However, government should expand the subsidy net for more fish farmers to have access. Insurance providers should, indeed, design their aquaculture insurance policies in the simplest and most acceptable form, so as to attract fish farmers' beliefs and patronage. With the simplicity of insurance contract design, aquaculture underwriters

will gain attraction from fish farmers, which will, in turn, generate improved premium and their potential profitability.

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