

**SURVEY ON SHELLFISH CONSUMPTION IN EGOR AND OVIA-NORTH
EAST LOCAL GOVERNMENT AREAS OF EDO STATE**

BY

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BENIN CITY.**

JUNE, 2024

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**A PROJECT WORK SUBMITTED TO THE DEPARTMENT OF
AQUACULTURE AND FISHERIES MANAGEMENT,
FACULTY OF AGRICULTURE, UNIVERSITY OF BENIN, BENIN CITY
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE
AWARD OF BACHELOR OF AGRICULTURE DEGREE,
B. AGRIC (FISHERIES)**

JUNE, 2024

CERTIFICATION

This is to certify that this project work was carried out by **OKUNDAYE ESTHER OSARUESE** with matriculation number **AGR1800295** of Department of Aquaculture and Fisheries Management, Faculty of Agriculture, University of Benin, Benin City. In fulfillment for the award of Bachelor of Agriculture (B. Agric) degree in Fisheries of University of Benin

PROF. F.A.R EHIGIATOR
(Project Supervisor)

Date

Dr. O.M WANGBOJE
Head of Department

Date

DEDICATION

I dedicate this project to God Almighty, the giver of life, my wonderful parents, Hon. Palmer Okundaye and late Deaconess Rosemary Okundaye, my ever-supportive Uncle and Father Prof. Osaigbovo and my wonderful siblings. God bless you all.

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My profound gratitude goes to God almighty for the grace He bestowed on me to complete this project in health and strength, my King and Maker, I bow in humble adoration. I humbly appreciate my amiable project supervisor Prof. Mrs. F.A.R Ehigiator for her motherly guidance and support throughout the duration of this project. I want to express my sincere gratitude to the highly esteemed lecturers in the department of Aquaculture and Fisheries Management for their moral and academic investment in my life; Dr. O. M. Wangboje (H.O.D), Prof. O.J. Abolagba, Prof. V.A Okonji, Prof. B.S. Aliu, Dr. (Mrs.) A.E. Odiko, Dr. Marinus Egwenomhe, Dr. Ken Omoruyi (my amiable course adviser), Dr. Austin Orowe, Dr. J. Nuntah, Dr. Silver Osayi and other staff, Mr. Iriowen Nosakhere and Mrs. Aniekan Dickson. God bless you all richly.

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ABSTRACT

The study examined shellfish consumption in Egor and Ovia-North East local government area of Edo state. Specifically, the study investigated the socio economic characteristics of sellers, processing, storage and marketing activities of shellfish sellers. The market survey technique was used to collect data from the shellfish sellers across four markets (Oliha, Egor, Oluku and Uselu markets) in Egor and Ovia-North east local government area of Edo state. Structured questionnaire were used to collect data from 110 shellfish sellers using purposive and random sampling technique. The data obtained were analyzed using SPSS descriptive analysis tools. 25 questionnaires were administered to sellers in Oliha markets, 35 in Egor market, 20 in Oluku market and 30 in Uselu market. From the study, it was observed that 100% of the sellers were females ;majority of the sellers (53.6%) were between 30-39 years and while those between 40-49 constituted 30.0%. 95.5% of the sellers involved primarily in trading as their occupation. The study showed that 75.2% of sellers sold variety of shellfish; (91.8%) obtained their shellfish between 8am-10am; 93.6% sold processed shellfish. 91.8% used sun-drying as a method of preservation. 100% of the sellers transported their shellfish to the market by bus. 86.4% of the sellers purchased all sizes. 87.3% of the sellers engaged in individual buying. It was recommended that strategies that promote sustainability, accessibility, and affordability of shellfish products should be improved on and this could involve supporting local producers or promoting alternative distribution channels.

CHAPTER ONE

1.0 INTRODUCTION

Shellfish are aquatic invertebrates that have a hard outer shell, in other words, they are exoskeleton-bearing aquatic invertebrates. The term 'Shellfish' is often used for the edible species of the groups, (belonging to the phylum Mollusca, the class Crustacea (phylum Arthropoda), or the phylum Echinodermata) especially those that are fished or raised commercially. Molluscs includes Sea snails, Mussels, Oysters, Clams, Abalone, Whelks, and Cuttlefish. The Crustaceans include Prawns, Shrimps, Lobsters, Crayfish and Crab. The Echinoderms which are edible in some part of world include Sea urchins, Sea cucumber, Sea stars, brittle stars and feather stars. Shellfish are a popular food source due to their mild flavour, versatility, and nutritional value. About ten thousand (10,000) species of crustaceans, fifty thousand (50,000) species of molluscs and thirteen thousand (13,000) species of fin fish are thought to live in the ocean. (Nybakken, 2001; Jimoh and Lemomu, 2010).

Generally, fish and shellfish meat is considered to be highly nutritious, owing to its content of essential amino acids and proteins, for example, shrimp meat is an excellent source of protein (Yanar and Celik, 2005) and shrimp is one of the most popular species as it is a part of almost every nation's traditional meal rich in protein and minerals. There are a lot of nutritive benefits of shellfish and they include; Protein, Omega-3 fatty acids, vitamin B12, zinc, Iron, copper, potassium, calcium, selenium. Other specific health benefits include heart health, brain health, Immune function and weight loss.

In Nigeria, although enormous amount of money has been geared towards research effort in improving traditional livestock; the average Nigerian still consumes less than 57g protein daily with less than 10g coming from animal protein sources whereas, the average daily per capita animal protein intake in North America, Western and Eastern Europe are 66, 39 and 33g respectively (Igene, 1992; Larmonde, 1993). When we talk about animal protein source, it is obvious that our minds go to vertebrate animals such as poultry, pig, cow, goat and others. The contributions of invertebrates as animal protein sources have been grossly neglected and underestimated.

1.1 Justification of the Study

The study of shellfish consumption in Egor and Ovia-North East Local Government Areas is justified by its potential to contribute valuable insights into socio-economic dynamics and cultural practices within coastal communities. By exploring consumption patterns, preferences, and perceptions regarding shellfish, the research can shed light on the role of shellfish in local diets and economies. Understanding the factors influencing shellfish consumption, such as taste preferences, availability, and cultural traditions, can inform strategies for promoting sustainable livelihoods and supporting local industries. Additionally, the study can provide valuable data for policy-makers and resource managers to develop regulations and guidelines for shellfish harvesting and marketing, ensuring the long-term viability of coastal resources. Overall, the research holds significance for socio-economic development, cultural preservation, and sustainable resource management in the study area.

Studies on the consumption and utilisation of fish and fish products in Egor and Ovia-North East have been carried out by several researchers, some of which include Omoruyi and Eronmhonbor (2017), and Abolagba and Akise (2011). Iwenegbe and Ijene also surveyed on the acceptability and preference of consumers to snail and its meat in Oredo, Esan West and Etsako. However, scanty or undocumented work to ascertain quantity, available species, preference of consumer and consumption patterns of shellfish in Egor and Ovia-North East has necessitated this study.

1.2 Aim and Objectives of the Study.

The aim of the study is to carry out a survey on shellfish consumption in Egor and Ovia-North East local government areas of Edo state.

The specific objectives of this study are to identify the;

1. species and quantity of shell fishes available to the consumers in Egor and Ovia-North East Local Government Areas of Edo state.
2. availability of shellfish in Egor and Ovia-North East Local Government Areas.
3. consumption patterns of consumers in Egor and Ovia-North East Local Government Areas.

2.0

LITERATURE REVIEW

2.1 Shellfish consumption in Nigeria

Nigeria, with its diverse geographic and socio-economic landscape, presents a fascinating case study for analyzing shellfish consumption patterns. While seafood enjoys relative popularity in the country, shellfish specifically occupies a niche position. This review aims to explore existing surveys on shellfish consumption in Nigeria, identifying key trends, influencing factors, and research gaps. Studies indicate varied preferences for different shellfish species. Shrimp tops the list, with one study by Afolayan *et al.* (2020) reporting 28.36% consumption frequency. Oysters, clams, and snails, though popular in specific regions like the Niger Delta, appear less prevalent nationally. Consumption frequency often falls within the "occasional" category, as observed by Dauda *et al.* (2016) and Afolayan *et al.* (2020). Reasons for this include; Accessibility and affordability, shellfish prices can be higher than other fish varieties, impacting low-income households. Availability may also be limited in certain regions. Socio-cultural factors, some cultural beliefs around shellfish can deter consumption, particularly among inland communities, perceptions of quality and safety: Concerns about hygiene and contamination can discourage purchase, despite the nutritional benefits of shellfish.

2.1.1 Sources of information and purchase decision

Studies show dependence on local fish markets for shellfish purchases (Afolayan *et al.*, 2020). Fishmongers act as crucial information sources, influencing consumer

decisions through advice on quality and freshness. Nutritional value appears to be a significant consideration, with some awareness about the health benefits of shellfish documented (Dauda *et al.*, 2016).

2.1.2 Regional variations

The Niger Delta region emerges as a significant hub for shellfish consumption, likely due to its abundant natural resources and cultural practices. Studies like that by Osuji *et al.* (2020) highlight higher consumption rates and preferences for specific species like mangrove oysters and clams.

2.1.3 Research gaps and future directions

Despite existing surveys, several research gaps remain. Limited national data, most studies focus on specific regions or demographics, making generalizations challenges. In-depth consumer insights, understanding motivations, barriers and perceptions beyond basic consumption statistics is crucial. Sustainability concerns, environmental and social impacts of shellfish harvesting and consumption need evaluation.

2.2 Shellfish consumption in the Niger Delta

The Niger Delta, a vast and ecologically rich region in southern Nigeria, boasts a thriving shellfish industry due to its extensive mangroves, estuaries, and coastal waters. Shellfish, including oysters, clams, mussels, and shrimps, are a vital source of food, income, and cultural significance for numerous communities in the area.

However, understanding the patterns and impacts of shellfish consumption in the Niger Delta requires a comprehensive review of existing literature.

2.2.1 Nutritional value and consumption patterns

Several studies highlight the nutritional value of shellfish consumed in the Niger Delta. They are rich in protein, essential fatty acids, minerals like zinc and iron, and vitamins A and B12. Research by Ajibade *et al.* (2013) in the Niger Delta found oyster meat to contain significant levels of these nutrients, making it a valuable dietary component, particularly for pregnant and lactating women, and children. Studies by Nwabueze *et al.* (2012) and Okonta *et al.* (2015) further revealed diverse consumption patterns across the region. Oysters are often eaten raw, grilled, or stewed, while clams and mussels are commonly incorporated into soups and stews. Shrimps are consumed fresh, dried, or smoked, depending on availability and preservation methods.

2.2.2 Socio-economic and cultural significance

Shellfish harvesting and consumption are deeply intertwined with the socio-economic fabric of the Niger Delta. Research by Adighibe (2010) in Rivers State showed that shellfish gathering provided income and food security for women and contributed to household livelihoods. Men often engage in commercial fishing and shellfish trade, creating employment opportunities within the sector. Shellfish also hold cultural significance in some communities, featuring in traditional ceremonies and rituals (Effiong, 2017).

2.2.3 Environmental concerns and sustainability

Despite the benefits, shellfish consumption in the Niger Delta raises environmental concerns. Overfishing and unsustainable harvesting practices, documented by Eke *et al.* (2018), threaten the long-term viability of shellfish populations. Pollution from oil spills and industrial waste can contaminate shellfish meat, posing health risks to consumers (Ekweozor *et al.*, 2014). Addressing these challenges requires implementing sustainable management practices and ensuring environmental protection for the continued well-being of shellfish ecosystems and communities dependent on them.

2.3 Shellfish consumption in Edo state

Shellfish, encompassing molluscs like clams, oysters, mussels, and snails, play a significant role in food security and nutritional intake globally. In Nigeria, Edo state particularly stands out with its diverse aquatic and coastal ecosystems, making shellfish readily available and potentially a crucial dietary component. This review aims to explore existing studies on shellfish consumption in Edo state, examining patterns, preferences, potential constraints, and opportunities for sustainable utilization.

2.3.1 Current consumption patterns

Limited surveys specifically focusing on shellfish consumption in Edo state exist. However, research within broader seafood consumption studies provides some

insights. A 2015 study by Abiodun *et al.* revealed that fish and shellfish contribute over 50% of animal protein intake in Edo households. Specifically, periwinkles (*Turbo spp.*) emerged as a highly consumed shellfish, exceeding shrimp and crayfish in some areas.

2.3.2 Socio-economic and cultural factors

Shellfish consumption in Edo state is influenced by diverse socio-economic and cultural factors. Studies like Ogunbiyi *et al.* (2012) highlight the affordability and readily available nature of certain shellfish, like periwinkles, making them accessible to low-income groups. Cultural practices and preferences also play a role. For instance, the consumption of oysters during traditional ceremonies in certain communities is well documented (Aigbokhan, 2010).

2.3.3 Challenges and opportunities

Despite its importance, shellfish consumption in Edo state faces challenges. Unsafe harvesting and handling practices can lead to health risks (Abiodun *et al.*, 2015). Overfishing and habitat degradation also threaten the sustainability of some shellfish populations (Ezenwaka, 2011). However, opportunities exist for improving sustainable shellfish utilization. Studies like Adebayo *et al.* (2014) emphasize the potential of aquaculture projects for increasing shellfish production and income generation. Additionally, awareness campaigns and improved market infrastructure could strengthen market linkages and support value chains for shellfish in Edo state.

While existing research provides valuable insights into shellfish consumption in Edo state, further dedicated surveys are needed for a comprehensive understanding. Examining specific consumption patterns, preferences, and challenges across different demographics and economic groups is crucial. Additionally, research on innovative practices like aquaculture and value chain development could pave the way for sustainable and beneficial utilization of shellfish in Edo state.

2.4 Survey of Shellfish consumption in Egor and Ovia North East

Shellfish, including oysters, mussels, clams, and shrimp, are a valuable source of protein, minerals, and vitamins, and their consumption is increasing globally. In Nigeria, shellfish consumption is particularly prevalent in coastal communities, providing vital nutritional and economic benefits. This literature review examines existing research on shellfish consumption in Egor and Ovia North East, Edo State, Nigeria, identifying key trends, knowledge gaps, and potential areas for future research.

2.4.1 Existing research

Nutritional Value and Consumption Patterns: Several studies have documented the nutritional composition of Nigerian shellfish, including those found in Egor and Ovia North East (Adewusi *et al.*, 2013; Aletor and Adebayo, 2014). These studies highlight the richness of shellfish in protein, iron, zinc, and calcium, making them crucial for combating malnutrition, particularly among vulnerable populations like children and pregnant women. Research by Nwanta *et al.* (2017) investigated shellfish

consumption patterns in coastal communities of Edo State, finding a preference for oysters and mussels, often consumed fresh or dried. The study also revealed seasonal variations in consumption, with higher intake during harvest periods.

Socio-economic Drivers and Marketing: The socio-economic factors influencing shellfish consumption in Egor and Ovia North East have received limited attention. A study by Akpanah *et al.* (2012) explored the marketing channels for shellfish in Niger Delta communities, including Egor and Ovia North East. They identified local markets, roadside vendors, and direct sales to consumers as primary channels. However, a more in-depth analysis of factors like income, cultural beliefs, and accessibility is needed to understand the socio-economic drivers of shellfish consumption in these specific communities.

Food Safety and Sustainability: Food safety concerns surrounding shellfish consumption have emerged in recent years. Studies have detected heavy metal contamination and microbial pathogens in Nigerian shellfish (Agbogidi *et al.*, 2014; Okonko *et al.*, 2015). These findings raise concerns about potential health risks associated with shellfish consumption in Egor and Ovia North East. Additionally, studies on the sustainability of shellfish harvesting practices in the region are scarce. Further research is needed to assess the environmental impact of harvesting and explore sustainable management strategies for shellfish resources.

2.4.2 Knowledge gaps and future research directions

Despite existing research, significant knowledge gaps remain regarding shellfish consumption in Egor and Ovia North East. Future research should focus on:

Detailed consumption patterns: Conducting household surveys and dietary assessments to quantify shellfish consumption patterns, including species preferences, seasonal variations, and consumption frequency across different demographics.

Socio-economic determinants: Investigating the socio-economic factors influencing shellfish consumption, such as income level, education, occupation, and cultural beliefs, to understand the drivers of demand and potential barriers to consumption.

Food safety risks: Conducting comprehensive analyses of shellfish from Egor and Ovia North East to assess levels of heavy metal contamination and microbial pathogens, and evaluating the effectiveness of existing food safety practices.

Sustainable harvesting practices: Investigating the current harvesting practices and their impact on shellfish populations and the broader ecosystem. This could involve collaboration with local communities and stakeholders to develop and implement sustainable management strategies.

Shellfish consumption plays a significant role in the food security and livelihoods of communities in Egor and Ovia North East. Demand for shrimp is estimated to be 1.4 million metric tons per year with a minimum of 0.7 million metric tons supply gap nation wide. Nigerians are a major consumer of fisheries resources including shrimp

(Agbo *et al.*, 2015) .This review highlights the existing research on the nutritional value, consumption patterns, and potential risks associated with shellfish consumption in the region. However, significant knowledge gaps remain regarding the socio-economic determinants, food safety concerns, and sustainable harvesting practices. Addressing these gaps through further research can contribute to promoting sustainable shellfish consumption, ensuring food security, and safeguarding the health and livelihoods of communities in Egor and Ovia North East.

CHAPTER THREE

3.0 MATERIALS AND METHODS

3.1 Study Area

Egor Local Government Area (L.G.A) is one of the eighteen (18) LGAs in Edo State, Nigeria. Egor local government area falls under the Tropical Savannah Climate while the LGA covers a total area of 93 square kilometers. The area is located within latitude 6.47 and 7.15°N of the equator and longitude 5.49 and 6.14°E. The area experiences two major seasons which are the rainy and the dry seasons while the average temperature of the area is at 28 °C. The estimated humidity level of the Egor local government area is estimated at 68 percent

Located in Edo state, South-south geopolitical zone of Nigeria and has its headquarters in the town of Uselu. A number of towns and villages make up of Egor local government area and these include Okhoro, Use, Uwelu, Iguikpe, Ugbighoko, Iguediaye, Evbougide and Oghedaivbiobaa. The population of Egor local government area is estimated at 258,442 inhabitants with the area hosting members of several tribal groups such as the Esan, Bini, and the Owan. The area is home to Christians, Muslims, and traditional worshippers while the Bini, Owan and Esan languages are spoken in the area. Major markets in the area include The Egor community market, Oliha market and Uselu market.

Ovia-north east Local Government Area is also one of the eighteen (18) LGAs in Edo state, Nigeria. It is located in the south-eastern part of the state, bordering Delta

State to the south and Anambra State to the east. The headquarters of Ovia North-East is in the town of Okada. Ovia North-East has an area of 2,301 square kilometers. The population of Ovia North-East was 153,849 at the 2006 census. The major communities in Ovia North-East include Okada, Uhen, Utese, Okokhuo, Uhiere, Isiuwa, Ekiadolor, Oluku, Iguoshodin, Utoka, Oghede, Egbeta, Ora, and Ogbese. The economy of Ovia North-East is mainly based on agriculture, forestry, and saw milling. The area is also home to Igbinedion University, Okada.

3.2. Sampling Size and Sampling Procedure

The Market survey technique was to ascertain sellers perspective during the research. The study focused on sellers of shellfish in Egor and Ovia-North East LGAs of Edo State. A minimum of 50 sellers of shellfish was selected from each of the LGAs. This survey technique was used to directly collect feedback from the target audience and understand their characteristics and expectations (Adi, 2023).

3.3 Sampling Technique

Well-structured questionnaires was used to source information from the shellfish sellers in these two LGAs. A minimum of 50 questionnaires was administered to sellers in each LGA. Sellers were sourced from these four markets namely, Egor community market and Oliha market in Egor LGA and Uselu and Oluku market in Ovia-North East LGAs, Edo state.

3.4 Data Collection

The data was collected by the use of oral and written interviews. The oral interviews technique was adopted when the respondents did not have formal education. In situations where the respondents understands spoken and written English, the written interview was adopted with available assistance from the researcher when necessary.

3.5 Sampling Size

A total of 110 questionnaires was used across the two local governments.

3.6 Data Analysis

Statistical analysis techniques was applied to analyse survey data, including; Descriptive statistics to summarise consumption patterns, preference and perceptions. Cross-tabulation to examine relationships between variables such as socio-economic factors and habits. Regression analysis to identify factors influencing shellfish sellers. Statistical package for social sciences (SPSS) software, 15.0 for window evaluation version is the chosen software that was used for data analysis.

CHAPTER FOUR

RESULTS

A total of 110 questionnaires was administered to the sellers across the two local government areas. 25 in Oliha market (22.7%), 35 in Egor market (31.8%), 20 in Oluku market (18.2%) and 30 in Uselu market (27.3%).

4.1 Socio-Economic characteristics of shellfish sellers in Egor and Ovia-North East.

Gender distribution

As shown in Table 1, the gender distribution of the study shows it is fully dominated by the females. 100% of the sellers were female.

Age

The age ranges varied across the markets in Egor and Ovia-North East. The majority of respondents (53.6%) were between 30-39 years old, followed by 40-49 years (30.0%), 50 and above (15.5%), and 20-29 years (0.9%).

Marital status

All respondents (100.0%) were married.

Educational level

The results from the study showed that majority of respondents (64.5%) had primary education, (32.7%) had secondary education while (2.7%) had tertiary education.

Religion

Most respondents were Christians (97.3%), while the remaining 2.7% were Muslims.

Table 1: Socio-Economic Characteristics of Shellfish sellers in Egor and Ovia-North East.

Variables	Frequency	Percentage (%)
Gender		
Male	0	0
Female	110	100
Total	110	100
Age		
20-29	1	0.9
30-39	59	54.5
40-49	33	34.6
50 and above	17	10.0
Total	110	100
Marital status		
Married	110	100
Single	0	0
Widowed	0	0
Divorced	0	0
Total	110	100
Educational level		
Primary	71	64.5
Secondary	36	32.7
Tertiary	3	2.8
Total	110	100
Religion		
Christian	107	97.3
Islam	3	2.7
Others	0	0
Total	110	100
Household size		
1-5	64	58.2
6-10	45	40.9
11-15	1	0.9
Total	110	100
Market experience		
1-10	73	66.4
11-20	25	22.7
21-30	8	7.3
Greater than 30	4	3.6
Total	110	100

Primary Occupation		
Farming	5	22.7
Trading	105	7.3
Others	0	3.6
Total	110	100
Member of cooperative		
Yes	8	7.3
No	102	92.7
Total	110	100
Benefit of joining		
Access to funds	50	40
Security	60	60
Total	110	100
Source of capital		
Cooperative	0	0
Loan from bank	0	0
Personal savings	75	82.7
Loan from family	35	17.3
Total	110	100

Source: Field Survey, 2024

Household size

The study shows that the majority of respondents (58.2%) had a household size of 1-5 members, (40.9%) had a household size of 6-10 members and (0.9%) has 11-15 members.

Market experience

The majority of respondents (66.4%) had 1-10 years of marketing experience, (22.7%) had 11-20 years, (7.3%) had 21-30 years and greater than 30 years (3.6%).

Primary occupation

Most respondents (95.5%) were traders, while a small percentage of (4.5%) were farmers.

Member of cooperative society

The table indicates that only 7.3% of respondents were members of a cooperative society, while the majority (92.7%) were not members.

The benefits of being a member; among the respondents who were members of a cooperative society, the majority (60.0%) reported security as the benefit, (40.0%) recorded access to funds as the benefit.

Source of capital

The study shows that the majority of respondents (82.7%) sourced their business capital from personal savings and (17.3%) sourced theirs as loans from family and friends.

4.2 Fish Processing, storage and methods

Source of shellfish

In Table 2, it was showed that majority of the sellers (94.5%) got their shellfish from the market while (5.5%) got theirs from the waterside.

Number (type) of shellfish sold

From the study Table 3, showed that (75.2%) of the shellfish sellers sold three different type of shellfish, (14.7%) sold four types, (7.3%) sold two type, (1.8%) sold just one type and (0.9%) sold five different types.

Most purchased shellfish

Majority of the sellers (78.2%) reported that all the shellfish they have for sale are highly purchased by consumers, (14.5%) reported that Crayfish is most purchased, (5.5%) said it's the both shellfish they offer for sale while (1.8%) said it's Prawn. (Table 4)

Time of day for obtaining shellfish

The majority of the respondents (91.8%) obtained their shellfish between 8am-10am, (7.3%) obtained theirs by 3pm-6pm and (0.9%) obtained theirs by 11am-2pm. (Table 5)

Availability of shellfish throughout the year

The study showed that most respondents (97.3%) could get shellfish all year round while only (2.7%) could not (Table 6).

Fresh or processed shellfish

The majority of the respondents (93.6%) sold processed shellfish while (3.6%) sold both fresh and processed and (2.7%) sold only fresh shellfish. (Table 7)

Table 2: Source of shellfish

Variables	Frequency	Percentage (%)
Fishermen	0	0
Waterside	6	5.5
Market	104	94.5
Total	110	100

Table 3: Type of shellfish sold

Variables	Frequency	Percentage (%)
1	2	1.8
2	8	7.3
3	82	74.5
4	16	14.5
5	2	1.9
Total	110	100

Table 4: Best selling shellfish

Variables	Frequency	Percentage (%)
All sold	86	78.2
Both sold	6	5.5
Crayfish	16	14.5
Prawn	2	1.8
Total	110	100

Table 5: Time of day for obtaining shellfish

Variables	Frequency	Percentage (%)
8am-10am	101	91.8
11am-2pm	1	0.9
3pm-6pm	8	7.3
Total	110	100

Table 6: Availability of shellfish throughout the year

Variables	Frequency	Percentage (%)
Yes	107	97.3
No	3	2.7
Total	110	100

Preservation method

The most common method of preserving shellfish was sun-drying used by (91.8%) of the sellers, (5.5%) used smoke drying while (2.7%) used cold storage. (Table 7)

Most demanded form

Majority of the respondents (92.7%) said the most demanded form of shellfish was smoked, (3.6%) said it's frozen, (2.7%) said it's live while (0.9%) said it's cooked. (Table 7)

Spoilage experience

The majority of the respondents (89.1%) usually experienced spoilage of shellfish while only (10.9%) did not. (Table 7)

Transportation method

All respondents (100.0%) transported their shellfish to the market by bus. (Table 7)

Table 7: Fish processing and storage method

Variables	Frequency	Percentage (%)
Fresh or processed shellfish		
Fresh	3	2.7
Processed	103	93.6
Both	4	3.6
Total	110	100
Preservative method		
Sun-dry	101	91.8
Smoke-drying	6	5.5
Cold storage	3	2.7
Total	110	100
Most demanded form		
Live	3	2.7
Frozen	4	3.6
Smoked	102	92.7
Cooked	1	0.9
Total	110	100
Spoilage experience		
Yes	98	89.1
No	12	10.9
Total	110	100
Transportation method		
Bus	110	100
Keke	0	0
Boat	0	0
Okada	0	0
Total	110	100

Source: Field Survey, 2024

4.3 Marketing activities

Sizes purchased

As shown in Table 8, among the respondents who provided information on sizes purchased, the majority (86.4%) purchased all sizes, (11.8%) purchased small sizes, (0.9%) purchased medium sizes and (0.9%) purchased large sizes.

Selling price

Majority of the respondents ((90.9%) sold shellfish within the price range of #100-#500, (0.9%) each sold for #510-#1000, #2010-#2500 and above #2500 while (6.4%) sold at any price requested by the consumer from #100 and above.

Profit range

The majority of respondents (82.6%) make a profit between #10,000-#20,000, (11.0%) make #21,000-#30,000, (3.7%) make #31,000-#40,000 and (2.8%) make #41,000 and above.

Group buying

Most respondents (88.2%) did not engage in group buying while (11.8%) engaged in group buying.

Individual buying

The majority of the respondents (87.3%) engaged in individual buying while (12.7%) did not.

Benefits of Group purchase

Majority of the respondents said it helps them minimize expenses, others said it's more secured traveling in group than traveling alone.

Willingness to buy from a fish farmer

The majority of respondents (68.2%) were willing to buy from a farmer while (31.8%) were not willing.

Table 8: Marketing activities

Variables	Frequency	Percentage (%)
Sizes purchased		
Small	13	11.8
Medium	1	0.9
Large	1	0.9
All sizes	95	86.4
Total	110	100
Selling Price		
#100 - #500	100	90.9
#510 - #1000	1	0.9
#2050 - #2500	1	0.9
Above #2500	1	0.9
Any price	7	6.4
Total	110	100
Profit range		
#10,000 - #20,000	90	81.8
#21,000 - #30,000	12	10.9
#31,000 - #40,000	5	3.6
#40,000 and above	3	2.8
Total	110	100
Group buying		
No	97	88.2
Yes	13	11.8
Total	110	100
Individual buying		
Yes	96	87.3
No	14	12.7
Total	110	100
Willingness to buy from a farmer		
Yes	75	68.2
No	35	31.8
Total	110	100

Source: Field Survey, 2024

Reasons

Those willing to buy from a fish farmer said it's cheaper and fresher while those not willing to buy from them said they're not available at the markets and it is stressful locating them.

CHAPTER FIVE

5.0 DISCUSSION

5.1 Socio-Economic Characteristics of Fish sellers

5.1.1 Gender distribution

The results obtained from this study showed that women dominated the shellfish marketing. Abiodun (2014) observed that females dominated the shellfish marketing which was attributed to the fact that other fishing activities were hectic hence the females were restricted to the sales while the males engaged in catching the fish. Sunday *et al.* (2020) showed in his study that 64.8% of respondents were female and 35.2% were male.

5.1.2 Age

Results from this study showed that women between the ages of 30-39 were majority in the market. A study carried out by Idowu (2012) found that majority of the sellers were between 36-40 years and age range 46-55 years was 20%. A study by Shuaibu *et al.* (2012) in Niger state showed that majority of the sellers were within the age range of 30-39 and the mean of age distribution was 33.

5.1.3 Marital status

The findings of this study indicated that fish marketing was a source of livelihood for the marketers and their families. This is in line with a study by Afolabi (2009), who

observed that marketers were dominated by married people 56.67%, single people 26%, widowed people 11.33%, and divorced people (6.0%). A study carried out by Agbebi F.O (2018) showed that 5.0% of the sellers were single, while 91.3% were married and 3.7% were widowed. This shows that these sellers are in this business to cater and support the needs of their family members. Furthermore, this dominance of married sellers could arise from the demanding nature of fish marketing which requires the support of family members in the business.

5.1.4 Level of education

Findings from this study is similar to that observed in Adamawa state by Madugu and Edward (2011) who stated that fish marketers with primary education were 55.0%, those with secondary education were 35.0%, 6.25% had tertiary education and those without formal education were 3.75%. A. A. Ayelaja *et al.* (2021) carried out a study that showed that 12.5% had no formal education, 36.7% had tertiary education while 11.6% had just primary education 39.2% had secondary education. This shows that majority of the sellers understood English and can understand whatever will be taught to them to improve marketing methods.

5.1.5 Religion

Results from this study showed all respondents were Christians. In Nigeria, the religion practiced varies across from place to place, though majority are Christians and Islam with Christianity dominating in the south while Islam dominates in the North. The study done in Ekiti by Adekunmi *et al* (2021) shows that Christians were

91.4% while 8.6% were Muslim.

5.1.6 Household size

In a study done by Agbebi F.O (2018) larger percentage (46.3%) of the fish marketers had a household size of 6-10 persons and this study is in contrast with the results of this study. In another study done by Adekunmi *et al* (2021) , majority (86.7%) of the sellers had a 1-5 household size , 7.6% had a 6-10 household size and this has close similarities with the result of this study. This shows that the sellers might have no need to hire extra labour as their family members will assist in the market activities.

5.1.7 Market experience

Results from this study showed that 66.4% had 1-10 years of marketing experience. Similar result was found in Gbokoda Ondo by Agbebi *et al.* (2018) showed that the fish marketers/sellers had a market experience averaging 16.5 years and 46.3% of the marketers had a 11-20 years of experience as majority. This is in contrast to the findings made in this study where majority had a 1-10 years market experience. Baba (2015) found that 73.6% had 1-10 years of experience which aligns with the results of this study. This shows that quite a number of the population of shellfish sellers are new to the business of shellfish.

5.1.8 Primary occupation

In this study, it is shown that (95.5%) were traders while (4.5%) were farmers. Bolarin *et al.* (2022) made a finding in Epe, Lagos that 56.7% of the sellers primary occupation was just trading. This is in line with the result found in this study, it can be

deduced that trading is their main source of livelihood hence needs access to all year round shellfish supply to stay in business all year.

5.1.9 Membership of a cooperative society

The results of this study showed that only (7.3%) were members of a cooperative society while (92.7%) were not. A study by Agbebi et al (2018), 71.3% were not in a cooperative society. The two major benefits of sellers joining a cooperative society in this study was to gain access to funds and security from overtaxing and others which is a limitation for them.

5.10 Source of capital

This study showed that majority of the sellers (82.7%) got their capital from personal savings while (17.3%) got theirs from loan from family and friends. Obayelu (2016) carried out a study in Ogun state where 54.2% of sellers got capital from personal savings. In both studies, it is seen that sellers that source their capital from financial institutions were very low this could be as a result of high interest rate and lack of collateral to gain access to these funds and can affect or slow down the growth rate and expansion of their business.

5.2 Fish processing, storage and methods

5.2.1 Source of shellfish

The study showed that 94.5% bought their shellfish from the market as majority of the sellers sell processed shellfish and as such may necessarily not buy from the fish farmer or fishermen. The few sellers that sell fresh shellfish get theirs from the fishermen cutting the increased cost of purchase generated by middle men. This

finding agreed with the result of Madugu and Edward (2011), who asserted that fish distribution channels are usually short to reduce the activities of middlemen thus reducing exploitation. Based on their source of shellfish, the time for obtaining the shellfish varies alongside, (the sellers that get theirs from the market and those that get from the fish farmers).

5.2.2 Number (Type) of shellfish sold

The results from the study showed that 75.2% sold three (3) types of shellfish, this is because variety will increase the patronage from the consumers. This concurs with a study done by Adebayo (2014) where it's stated that the fish marketers sold a variety of fish including freshwater and marine species as well as fresh and smoked crayfish.

5.2.3 Most purchased shellfish

The observation from the study showed that Majority (78.2%) sold all the shellfish that's available for sale at equal patronage from the consumers. Others said it's Crayfish that's mostly purchased by the consumers. In a study by Felix (2019) in Delta state, daily shrimp market is a staple in the region with the majority of local resident relying on shrimp for their livelihood. Consumers enjoy shrimp for it's taste and health benefits. The shrimp industry plays a significant role in enhancing both the quality and quantity of protein consumed by the community. This means that with better size and competitive pricing, shellfish farmers can infuse themselves in the shellfish marketing channel as consumers is very high in these locations.

5.2.4 Sell fresh or processed

The results from the study showed that majority of the shellfish sellers sold processed

shellfish and just a little fraction sold both fresh and processed. A study done by Abdulhameed (2021) in Nassarawa found that the marketing efficiency for fresh fish was calculated at 2.93 (293%), while the efficiency for smoked fish marketers was estimated at 8.60 (860%). This suggest that both fresh and smoked fish marketing in the study area is efficient, with smoked fish marketing being notably more efficient.

5.2.5 Preservation method

According to the results from this study, the most common method of preserving shellfish is sun-drying (91.8%). This is due to the type of fish sold and the method of preservation available for them to use. A study done in Kogi by Yetunde (2022) showed that majority of the marketers smoked their fish to preserve and add taste. This is a trace for interested shrimp farmers to make another source of income by smoking and selling to consumers or local marketers.

5.3 Market activities

5.3.1 Price range

The results from this study showed that majority of shellfish sellers (97.1%) sold shellfish within the price range of N100 – N500. This showed that majority of the consumers bought to consume immediately and not to preserve unless in a situation where wholesalers sold to retailers. The results from this study showed similarities with study done by Folasade (2017) whose study showed that the average selling price per unit of fish was N405 and this is in line with the majority of sellers selling at N100 – N450.

5.3.2 Profit

The results from the study showed that majority (82.6%) of the shellfish sellers made a profit between N10,000 – N20,000, this shows that the shellfish business is quite profitable and sustainable to the lifestyle of the sellers. In a study done by Folasade (2017) in Lagos, gross profit of fish sellers was N24,230. This is a similarity of the result where over 60% of the fish marketers made a profit range of N21,000 – N30,000. This showed that the shellfish business was a profitable business.

5.3.3 Size of shellfish sold

From the results, it was shown that majority of the shellfish sellers (86.4%) sold variety of sizes of shellfish (i.e small, medium and large). This concurs with the study done by Foluso (2018) where it is implied that sellers sold varying sizes of fish to maximize profit. Although, most of the sellers sold mostly medium sized fish, however, they also sold small and large or just small and medium or medium and large.

5.3.4 Probable patronage of shellfish farm.

The results showed that majority of the shellfish sellers (68.2%) were willing to buy from a farmer if their quality and quantity can be met. In a study done by FAO, (2016), 635,000 people were involved in Aquaculture and Aquaculture contributed 300,000 metric tons to the total fish consumed that year in Nigeria. This was an improvement to the fish produced or farmed in Nigeria which was supplied to fish marketers as there is already a market and demand to meet.

CHAPTER SIX

CONCLUSION AND RECOMMENDATION

6.1 Conclusion

Shellfish is a great source of protein and other essential nutrients needed by humans. It has a lot of specific health benefits which include heart health, brain health, immune function and weight loss making it highly recommended by dieticians and health practitioners. Although in Nigeria, the contributions of invertebrates as animal protein sources have been grossly neglected and underestimated.

This study revealed that majority of the shellfish sellers are females, married and fall within the age range of 30-39 and majorly source their shellfish from the market. This study also showed that all shellfish sold by the sellers are highly sought-after by consumers including the crayfish across the four markets in Egor and Ovia-North East local government areas Edo state.

In conclusion, this study has provided valuable insights into shellfish consumption patterns in Edo state. By understanding the prevalence, preferences and influencing factors, we can develop strategies to promote safe and sustainable shellfish consumption practices.

Further research is recommended to address the limitations identified in this study and to gain a more comprehensive understanding of this important food source.

6.2 Recommendations

Based on the findings from this research, the following is recommended:

1. The study showed that majority of the shellfish sellers across the various markets sold only processed shellfish and attributed it to the lack of storage facilities necessary for the fresh shellfish due to the fact that they are highly prone to spoilage when not properly preserved. Provision of storage facilities like the cold room, freezers and refrigerators at affordable prices will encourage more sellers in the sales of fresh shellfish.
2. The ministry of health should partner with other organisations to raise awareness about the health benefits of shellfish through targeted campaigns, seminars, and on various online platforms. This will increase protein consumption and also boost the economy.
3. Strategies that promotes sustainability, accessibility and affordability of shellfish products should be improved on. This could involve supporting local producers or promoting alternative distribution channels, giving loans to shellfish sellers and fish farmers to improve their business and ensuring continuous supply and availability.

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APPENDIX

**DEPARTMENT OF AQUACULTURE AND FISHERIES MANAGEMENT
FACULTY OF AGRICULTURE
UNIVERSITY OF BENIN
BENIN CITY, EDO STATE**

TOPIC: SURVEY OF SHELLFISH CONSUMPTION IN EGOR AND OVIA-NORTH EAST LOCAL GOVERNMENT AREAS OF EDO STATE

Dear Respondents,

The purpose of this research is to take a survey on shellfish available for consumption in Edo State. This research also ascertains the shellfish most consumed, the method of preservation, and how profitable the business is. Kindly tick and answer carefully where appropriate. You are assured the information provided shall be kept strictly confidential and used only for the study.

OKUNDAYE ESTHER OSARUESE

Researcher

INSTRUCTIONS: Please tick the boxes, if Yes or No, supply an answer where your opinions are needed.

SECTION A: SOCIO-ECONOMIC CHARACTERISTICS OF SELLER

1. Gender: Male [] Female []
2. Age: a. Below 20 years [] b. 20-29 years [] c. 30-39 years [] d. 40-49 years [] e. 50 years and above
3. Marital Status Marital Status: a. Single [] b. Married [] c. Separated/Divorced [] d. Widowed [] e. Widower []
4. Level of Education: a. No formal education [] b. Primary education [] c. Secondary education [] d. Tertiary education [] e. Others (specify)

5. Religion: a. Christianity [] b. Islam [] c. Others (specify)
6. Household size: a. 1 - 5 [] b. 6 – 10 c. [] d. 11 – 15 [] e. Greater than 15 []
7. Marketing Experience: a. 1 – 10Yrs [] b. 11 – 20Yrs c. [] d. 21 – 30Yrs [] e. Greater than 30Yrs []
8. Primary Occupation: a. Farming [] b. Trading [] c. Fishing [] Others please specify)
9. Membership of Cooperative society: Yes [] No []
10. What are the benefits of joining a cooperative? Access to funds [] Security []
11. Source of business capital a. Loan from banks [] b. Co-operative society (osusu) [] c. Personal savings [] d. Loan from family and friends []

SECTION B: FISH PROCESSING, STORAGE AND METHODS

12. Source of your shellfish. a. Fishermen [] b. waterside [] c. market
13. How many types of shellfish do you sell? 1 [] 2 [] 3 [] 4 [] 5 []
14. What's your best-selling shellfish? _____
15. What time of the day do you get your shellfish? a. 8am - 10am [] b. 11am - 2pm [] c. 3pm - 6pm
16. Do you get shellfish all year round? a. Yes [] b. No []
17. Do you sell fresh or processed? a. Fresh [] b. Processed [] c. Both []
18. How do you preserve your fish? a. Sun-dry [] b. smoke drying [] c. cold storage room/freezer [] others []
19. Which of these forms is the most demanded: a. live [] b. Frozen [] c. Smoked [] d. cooked [] e. Others []
20. Do you usually experience spoilage of shellfish? a. Yes [] b. No []
21. Method of transporting shellfish to the market? a. Bus [] b. Keke [] c. Boat [] d. Okada []

SECTION C: MARKETING ACTIVITIES

22. Sizes you usually buy? a. Small [] b. medium [] c. large []
23. How much do you sell the shellfish? ₦ 100-~~₦~~ 500 [] ~~₦~~ 510-N1,000 [] ~~₦~~ 1,010-~~₦~~ 1500 [] ~~₦~~1,510-N2,000 [] ~~₦~~ 2,010-~~₦~~ 2,500 [] ~~₦~~ 2,510 and above []
24. How much profit do you make? ~~₦~~ 10,000-N20,000 [] ~~₦~~ 21,000-N30,000 [] ~~₦~~ 31,000-~~₦~~ 40,000 [] ~~₦~~ 41,000 and above.
25. Do you buy individually or in groups? Group: Yes [] No [] Individually: Yes [] No []
26. If Yes, what are the benefits of group purchase? _____
27. Would you buy from a farmer? Yes [] No []:
Reason_____