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Comparative Analysis of Artisanal Fishermen Welfare in Core Crude Oil and Non-Core Crude Oil Producing Fishing Settlements in Akwa Ibom State, Nigeria

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Abstract

This study uses data from 300 fishermen that were randomly selected using a multi-stage sampling procedure to comparatively analyze artisanal fishermen welfare in core crude oil and non.-core crude oil producing fishing settlements in Akwa Ibom State, Nigeria. Data were analyzed using descriptive statistics, Z test, multiple regression analysis and Foster, Greer and Thorbeck (FGT) model. Findings reveal a mean age, fishing experience, household size and education of 38 and 40 years, 7 and 5 years, 6 and 5 persons and 10 and 9 years for fishermen in non –core crude oil and core crude oil producing fishing settlements, respectively. Result further reveals that fishing households in non-oil producing settlements had a higher Mean Per Capita Household Expenditure (MPCHE) (₦18, 442.34) than those in the core crude oil producing fishing settlements (₦16, 375.18). The difference in MPCHE for both groups of households was statistically significant at p>0.05 level of significance. Result of poverty levels using the poverty line shows that there were more poor fishermen in core crude oil producing fishing settlements (66.7%) than non – core crude oil producing fishing settlements (54.08). The mean differences in poverty levels using poverty line reveals a statistically significant difference at 10% (p>0.10) level, buttressing a lower well-being in the later. Result of the F non –core crude oil and core crude oil producing fishing settlements erGT model reveals a Head Count Ratio, Poverty Gap Ratio and Poverty Severity values of 0.540 and 0.667, 0.154 and 0.268, and 0.052 and 0.086 for fishing households in non-core and core crude oil producing fishing

settlements, respectively which further buttress a lower welfare status among fishermen in core oil producing fishing settlements. Fishermen welfare was significantly affected by age (p>0.05), household size (p>0.01), fishing experience (p>0.05), oil spillage (p>0.01), extension contact (p>0.01), household income (p>0.05) and fishing assets (p>0.05). Additionally, artisanal fishing was severely constrained by high cost of fishing gears, lack of credit facilities, lack of storage/processing facilities and poor access to extension. Accordingly, institutions should be established to equip fishermen with early warning information on threats and outbreak of oil spillage as well as possible ways of coping with them.

Keywords: Crude oil, Fishing settlements, Artisanal fishing, Fishermen welfare

1.0 Introduction

The potential of artisanal fishing in enhancing the socioeconomic wellbeing of fishermen have been widely acknowledged in empirical literature. For instance, Ifabiyi *et al*., (2023), FAO, (2017) and Ogunsola, (2019) reported that over 80% of Nigeria's total domestic fish production is from artisanal sources. Bamigboye and Koledoye (20220 and Akintola, (2025) attributed 60 percent of domestic fish production to artisanal fishermen which they said support both nutritional needs and livelihood. In addition to providing greater social and environmental benefits including job creation and ecological impacts (Lopez- Angarita *et al.,* 2018), it is a major source of income, cheap protein and employment for the teeing population (Ifabiyi, *et al.,* 2023 and Folala *et al.,* 2022). It provides greater social and environmental benefits including job creation and reduced ecological impacts (Belhabid *et al.,* 2017; Opezz- Amgarita *et al.,* 2018). The Food and Agricultural Organization (2017) pegged the total number of people employed in the Nigerian fishing sector at about 10 million people. Nigeria is among the leading inland fish producing countries in Africa with 0.35 million tons of produce in 2020 which accounts for 3 percent of the world production (FAO, 2022) and 3.2 percent in the country's Gross Domestic Product (NBS 2020; Onyaniran, 2020). FAO (2022) reported that about 600 million people were globally engaged primarily or partially in fishing resulting in the production of 214 million tons of fish and other aquatic life of which 59.8 million tons were exported.

Despite these laudable contributions of artisanal fishing, studies by (Alvernia *et al*., 2025; Nkodo *et al*., 2024 and Falola *et al.,* 2022) continued to decry the poor welfare status of artisanal fishermen in the country. This has been attributed to several factors prominent among which is oil spillage. According to Alvernia *et al.* (2025) oil spillage (which results from oil exploration activities) impacts negatively on the welfare of artisanal fishermen by causing loss of income in affected communities due to offshore community reliance on natural resource as their source of income. Nkodo *et al*. (2024) also reported that oil spillage results in loss of income, leads to food insecurity, deteriorates health status, cause environmental pollution, leads to migration of fishermen out of affected communities and result in abandonment of fishing as a source of livelihood. It also causes reduction in fish catch, (Aniefiok *et al.* (2019) and causes pollution which affects the health status of fishermen (Wilcox and Ojimbam (2024); Barsuto, 2019). Additionally, oil spillage leads to loss of cultural identity (Zabbey and Celestine, 2017) and aggravates food insecurity (Babatunde, 2023). It has also been reported to contribute to environmental pollution (Elim *et al*., 2016; Akinpelu 2021 and NOSRDA, 2023)

Akwa Ibom State is one of the oil producing States in Nigeria where intensive oil exploration activities is carried out and is negatively affected by oil spillage. Oil spillage which emanates from multidimensional sources such as oil theft/ bunker (Information Nigeria 2017; The Guardian, 2016), leakages from pipelines (Aniefiok *et al*. (2018), pipeline vandalization, drilling of oil wells, spillage from storage tanks shipping accidents (Nkodo *et al*., 2024) have affected the economic lives of fishermen in the State. This is further worsened by the poor attitude of oil companies towards payment of compensations to affected fishing communities during periods of oil spillage. For instance, Nkodo *et al*. (2024) reported that since the occurrence of oil spillage in Akwa Ibom State in 2012, Mobil Producing Nigeria is yet to compensate affected fishermen and fishing communities. This has subjected artisanal fishing households in the study area to untold hardship, loss of income and abandonment of livelihood. This in addition to other constraints such as declining catch, obnoxious fishing methods (Mascia *et al*., 2017), poor government support, high cost of fishing gears (Falola *et al*., 2022), climate variability, poor access to credit and lack of fishing information, (Nkodo *et al*., 2024) have further worsened their already vulnerable welfare status.

These challenges call for concern and justify the need to formulate effective welfare policies for artisanal fishing households. This will require an in-depth knowledge of their current welfare status as well as challenges facing them in the study area. Several researches have been done on oil spillage and its effect on welfare of artisanal fishermen in the study area. Etuk and Odebode (2012) examined the perceived effect of crude oil prospecting on livelihood of rural residents in riverine areas of Akwa Ibom State. Udotong (2017) examined effects of oil and gas exploration and production activities on production and management of seafood in Akwa Ibom State. Other studies by Osuagwu and Olaifa, (2018) and Effiong *et al*., (2023) have equally examined the effect of oil spillage on artisanal fish production in the study area. In a more recent study, Nkodo *et al*., (2024) assessed the perceived effect of oil spillage on artisanal fish production in the study area. The general consensus in these studies is that oil spillage affects the welfare of artisanal fishermen. However, the challenge with these studies is that they considered artisanal fishermen holistically without recourse to the fact that the effect of oil spillage on fishing households varies based on the frequency of occurrence of oil spills. This study differs from previous ones in that it focuses on fishermen in both core oil and non-core oil spillage fishing settlements independently. Accordingly, this study estimates the welfare status of artisanal fishermen in core oil and non-core oil producing fishing settlements in Akwa Ibom State, Nigeria. Specifically, it describes the socioeconomic characteristic of fishermen; examines and compares the welfare status of fishermen in core oil and non-core oil spillage areas; estimates the determinants of artisanal fishermen welfare status and identifies constraints to artisanal fishing in the study area.

2.0 Methodology

The study was done in Akwa Ibom State which is among the States in the South-South geopolitical zone of Nigeria. It has a total population of 7,245,935,746 (NPC, 2006) with a total land area of 6,900 square kilometer. It is located in Latitude $4^{0}33^{1}$ and $5^{0}\ 35^{1}$ North and Longitude $7^{0}\ 35^{1}$ and $8^{0}\ 35^{1}$ East. Among Notable crops grown were cassava, banana, plantain, tree crops and vegetables, etc. Fishing is also a major economic activity in some coastal communities like Oron, Mbo, Ibeno, Uruan, Ikot Abasi, Esit Eket and Itu, respectively.

2.1 Sources and Method of Data Collection

Data was collected from primary sources using structured questionnaires that were administered on respondents. Of the 300 questionnaire distributed, 300 were retrieved representing a 100% response rate. This was possible because administration completion and retrieval of the questionnaire was closely monitored by trained field assistants that were recruited for that purpose.

2.2 Sample and Sampling Technique

A multi stage sampling procedure was used in selecting fishermen for the study. First, two Senatorial districts (Eket and Uyo) where intensive fishing is carried out were purposively selected from the three that made up the State. In the second stage, 4 Local Government Areas were purposively selected from both Senatorial districts in the ratio of two from Eket where intensive oil exploration activities occurs and two from Uyo Senatorial district where no oil exploration activity takes place. In the third stage, 3 fishing communities each were selected from the respective two Local Government Areas making a total of 12 fishing communities. In the fourth stage, 25 fishermen were randomly selected from each of the chosen fishing communities making a total of 150 fishermen in the core oil and 150 in the non- oil exploration communities. This gave a total of 300 fishermen that were used for the study. A summary of the sampling plan and size is presented in Table 2.1.

Table 2.1: Sampling plan and sample size

Senatorial District	Local Government Area	Fishing communities	No. of fishermen selected
Eket	Eastern Obolo	-Elekpon	25
		-Edowi	25
		-lagos	25
	Mbo	-Ibaka	25
		-Utan iyata	25
		-Okposo	25
Uyo	Uruan	-Ifiayong	25
		-Nwangiba	24
		-Ishiet	25
	Itu	- Ayadehe (Head bridge)	25
		-Use Ndon	25
		-Obot itu	25
Total	4	12	300

Source: Field survey, 2024

2.3 Method of Data Analysis

Descriptive statistics: Descriptive statistics such as mean, frequency, standard deviation and Likert Scale were used to analyze the data collected.

2.3.1 Likert Scale Rating Technique

This was used to examine the constraints to artisanal fishing. The grading was categorized as "Very Severe = 4", "Not Very Severe= 3", "Severe = 2" and "Not severe = 1" The weighted means for all of them were computed as $\frac{4+3+2+1}{4} = 10/4$ = 2.5. Accordingly, any constraint with a mean score of 2.5 and above were adjudged to be "Severe"

2.3.2 Determination of Welfare Status

The welfare status of fishermen was analyzed using (i) Mean Per Capita Household Expenditure (ii) Poverty lines and (iii) Relative poverty indices using Foster Greer and Thorberck Model (Greer and Thorberck, 1986).

2.3.3 Determining Poverty Levels

Poverty levels of fishing households were determined using the poverty line. In determining the poverty line, household monthly expenditure was adopted. Following the World Bank (1997) approach, the Per Capita Household Expenditure was estimated as follows:

The Per Capita Household Expenditure = $\frac{Total\ Household\ expenditure}{House\ size}$ …….Equation 2.1

The Mean Per Capita Household Expenditure = $\frac{Total\ per\ capital\ househld\ expenditure}{Total\ number\ of\ households.}$ ..Equation 2.2

In line with the work of Falola *et al*. (2022), 2/3 of the Mean Per Capita Expenditure (MPCE) was adopted as the poverty line while 1/3 was used as the criteria to determine extreme or core poverty. Accordingly, fishing households were classified into 3 broad categories based on their poverty levels as:

- **a. Extreme poor:** Those whose Mean Per Capita Expenditure was less than $1/3$ of Mean Per Capita Expenditure
- **b. Moderately poor:** Those whose Mean Per Capita Expenditure was below $1/3$ and $2/3$ of poverty line
- **c. Non-poor:** Those Mean Per Capita Expenditure which lye above $2/3$ of the poverty line.

2.3.4 The Foster-Greer and Thorbeck (FGT) relative poverty model

This was used to estimate the relative poverty indices of fishing households. As previously adopted by Bassey *et al*. (2016), the formula for FGT is presented as

$$P\ \alpha = l/n \quad \sum_{i=1}^{q} \left[\frac{Z - y_1}{Z}\right] \alpha \text{.....Equation 2.3}$$

Where:

Z = poverty line

q = number of individuals living in the household

Y_i= expenditure of household in which an individual lives

α = FGT index and takes the value of 0, 1 and 2

$\sum_{i=1}^{q} \left[\frac{Z - y_1}{Z}\right] \alpha$ is the proportionate short fall of expenditure or income below the poverty line.

Head count ratio (incidence of poverty): When α is raised to zero; the poverty index measured is the head count ratio.

The poverty gap ratio (intensity of poverty): if α is raised to 1, the poverty index measured is the poverty gap ratio: That is $\alpha = 1$

Severity of poverty: if α is raised to 2, the poverty index measured is the severity of poverty. That is $\alpha = 2$

2.4 Multiple Regression Analysis

This was used to estimate factors affecting the welfare status of fishermen in the study area. This was patterned towards the work of Falola *et al*. (2022). In that study, the Cobb-Douglass functional form of the multiple regression analysis was adopted.

The implicit form of the model is stated as follows

$$LnY = \beta o + \beta_1 InX_1 + \beta_2 lnX_2 + \beta_3 in\ X_3 + \beta_4 ln\ X_4 + \beta_5 ln\ X_6 + \beta_7 ln\ X_7 + \beta_8 lnX_8 + \beta_9 lnX_9 + \beta 10\ X_{10} + \mu \text{.....Equation 2.4}$$

Where:

Y = welfare status of artificial fishermen (proxy as the per capital consumption expenditure of a fishing household).

β_0 = constant term

β_1 - β_{10} = the estimated coefficients

μ = error term

X_1 - X_{10} are the explanatory variables

Where:

X_1 = Age of fisherman in years

X_2 = Educational level (years)

X_3= Household size (number of persons)

X_4 = Membership of farmers' union (number of cooperative or farmers' union that a farmer belongs to)

X_5 = Fishing experience (years)

X_6 = Access to extension (Number of sources that a fisherman gets his fishing information from)

X_7 = Oil spillage (1 if a fishing household has experience oil spillage before and 0 otherwise)

X_8 = Marital status (Married = 1, Otherwise = 0)

X_9 = Access to credit (Yes = 1, No = 0)

X_{10} = Household income (Naira)

3.0 Results and Discussion

3.1 Socio-economic Characteristics of Artisanal Fishermen

Table 3.1 which presents the result of the socio-economic characteristics of fishermen in the study area shows that most fishermen in the non-core (37.3%) and core oil (45.3%) fishing settlements were within 41-50 years of age with mean ages of 38 and 40 years, respectively. This implied that fishermen in the non-core oil spillage settlements were younger than those in the core oil spillage fishing settlements. This might be due to the effect of frequent oil spillage that intermittently results in displacement of fishermen and migration out of the fishing area hereby creating room for new entrance some which were younger with no experience. Nkodo *et al*. (2024) had reported that majority (39.5%) of fishermen in the study area were within 41-50 years age bracket with a mean of 40 years of age; Mefo *et al* (2022) had also reported a mean age of 40 years among fishermen in Rivers State of Nigeria.

The survey result for marital status revealed that most fishermen in the non- core oil (63.3%) and core oil spillage fishing settlements (74%) were married. This indicated that there were more married fisherman in the core oil spillage fishing settlements than non-core spillage fishing settlements. This might likely have negative implication on their welfare status given that marriage is associated with children, hence, more family responsibilities. Nkodo *et al*. (2024) had previously reported the preponderance of married fishermen (57%) in the study areas. In Rivers State of Nigeria, Mefo *et al*. (2022) reported that 70% of fishermen were married. In addition, Antia-Obong *et al.,* (2021) and K.Nkeme *et al.*,(2024) found a similar high percentage

of married poultry farmers in Akwa Ibom suggesting that a high number of married farmers tend to be engaged in animal based farming due to high returns in the business.

Result for farming experience showed that majority (44.6%) of fishermen in non-core oil producing areas had 5 – 10 years' experience while 53.3% of fishermen had less than 5 years' experience. The mean years of experience for fisherman in non-core oil and core oil spillage fishing settlements were 7 and 5 years implying that fishermen in the non - core oil spillage fishing settlements were more experienced. This is the case since frequent oil spillage in the core oil spillage areas leads to displacement and migration of fishermen creating room for inexperienced new entrance into the fishing business Nkodo *et al*. (2024) had reported that most (1%) artisanal fishermen in the study area had between 1 to 10 years' experience with a mean of 9 years' experience. In Rivers State, Nigeria, Tasu *et al.* (2017) had previously reported that fishermen were quite experienced.

The survey result for household size shows that 52.7% and 54% of fishermen in non- core and core spillage fishing settlements had household less than 5 persons while 4.7% and 3.3% had household sizes of above 10 persons, respectively. The mean household size for fishermen in the non-core and core oil spillage communities were 6 and 5 persons, respectively. Nkodo *et al*. (2024) had reported a mean and dominant household size of 6 persons and 6-10 persons, respectively. Studies by Mefo *et al.* (2022) and Tasu *et al.* (2017) also reported a higher household size among fishermen in Rivers State, Nigeria.

The survey result for sex shows that majority of fishermen in the non-core (92.9%) and core oil (85.7%) spillage fishing settlements were male while 7.1% and 14.3% were female. This shows that male fishermen dominated artisanal fishing operations in the study area. Nkodo *et al*. (2024) had also reported that most (61.5%) of fishermen in the study area were males. Mefo *et al* (2022) had previously reported that 86.7% of fishermen in Rivers State were males.

Majority (63%) of fishermen in the core oil and non-core oil (66.7%) spillage fishing settlements belonged to a fishing union. This will facilitate exchange of oil spillage related information among fishermen in the study area. In Rivers State of Nigeria, Mefo *et al.* (2022) had also reported the high membership of cooperative among fishermen (66.7%).

Findings further reveal that 82% and 46.7% of fishermen in the non- core and core oil spillage fishing settlements, respectively, had artisanal fishing as their major occupation. This indicated that majority (53.3%) of fishermen in the core-oil spillage fishing settlements were into part time fishing. They might have been engaging in other economic activities presumably as a coping strategy to ameliorate the effect of incessant oil spillage.

Considering education, result shows that 88% and 82.7% of fishermen in non-core and core oil spillage areas were educated with mean of 10 and 9 years of educational attainment, respectively. This implied that fishermen in the non-core oil spillage fishing settlements were more educated than those in the core oil spillage areas Nkodo *et al*. (2024) had also reported that majority of fishermen (93.5%) in the study area were educated. The high level of education (78.9%) among fishermen was also reported by Mefo *et al*. (2022) in Rivers State, Nigeria.

Access to extension was low in the study area as only 13.3% and 6.4% fishermen in non-core oil and core oil spillage fishing settlements were able to access extension services. This is an indication that access, to modern fishing information and technology will be low in the study area.

The low access to extension services by fishermen in the study area (21.5%) was previously reported by Nkodo *et al*. (2024).

Additionally, fishermen in the non-core oil spillage fishing settlements (10%) were able to access more credit than those in the non-core oil producing area (8%). The low access to credit by fishermen was also reported among fishermen in the study area by Nkodo *et al*. (2024).

3.2 Welfare Status of Artisanal Fishermen in Core Crude Oil and Non-core Crude Oil Spillage Fishing Settlements

In analyzing the welfare status of artisanal fishermen in core oil spillage and non-core spillage fishing settlements, this study adopted the approach of Falola *et al*. (2022). In that study, Per Capita Consumption Expenditure and poverty levels of fishermen were used as proxies for artisanal fishermen welfare.

3.2.1 Welfare Analysis Using the Mean Per Capita Household Expenditure

Table 3.2 presents the categorization of consumption expenditure of fishing household in the study area. Food expenditure accounted for the highest proportion of consumption expenditure in the non-core (54.8%) and core oil spillage fishing settlements (53.6%) while non- food consumption expenditure accounted for 45.2% and 46.4% respectively. This shows that the largest part of artisanal fishing household's income was on food consumption. This is in line with the opinion of Falola *et al*., (2022) who reported that food expenditure accounted for 52.42

Table 3.1: Socio-economic characteristic of artisanal fishermen

Variable		Non-core oil spill fishing settlement	Mean	Core oil spill fishing settlement		Mean
Variable	**Frequency**	**%**		**Frequency**	**%**	
Age:						
Less than 30	8	5.3		10	6.7	
30-40	19	12.7	38	27	17.2	40
41- 50	56	37.3		68	45.3	
51 - 60	60	40		40	26.7	
Marital Status						
Married	95	63.3		111	74	
Single	42	28		28	18.7	
Divorced	4	2.7		6	4	
Widow(er)	9	6		5	3.3	
Fishing experience						
Less than 5 years	60	40		80	53.3	
5 - 10	67	44.6	7	53	35.3	**5**
11 - 15	16	10.7		10	6.7	
Above 15	7	4.7		7	4.7	
Household size						
Less than 5	58	38.6		64	42.7	
5 – 10	85	56.7	6	81	54	**5**
Above 10	7	4.7		5	3.3	
Gender						
Male	140	93.3		135	90	
Female	10	6.7		15	10	
Membership of fishing union						
Yes	100	66.7		95	63	
No	50	33.3		50	37	
Major occupation						
Fishing	123	82		70	46.7	
Non-Fishing	27	18		80	52.3	
Education						
No formal education	18	12		26	17.3	
Primary school	61	40.6	10	57	38	**9**
Sec. School	70	46.7		67	44.7	
Tertiary institution	1	0.7		0	9	
Access to extension						
Yes	10	5.3		20	13.3	
No	140	93.3		130	86.7	
Access to credit						
Yes	15	10		12	8	
No	135	90		138	92	

Source: Field survey data, 2024

percent of artisanal fishermen income in Nigeria. Elsewhere in Brazil Travsso *et al*. (2021) also reported that food expenditure accounts for a substantial proportion of monthly household expenditure. A breakdown of the various components of the non-food consumption expenditure shows that procurement of boat, fishing gears etc accounted for 13.3% and 13.2% transportation cost (9.1% and 9.1%), savings (13.3% and 13.2%) clothing (7.0% and 6.4%) for non-core oil an core oil spillage areas, respectively. Other expenditures were on education (4.8% and 4.6%) housing (3.8% and 3.6%) and health (2.3% and 1.9%) for both catering of fishing households, respectively. The high expenditure on health incurred by fishermen in core oil spillage area may be attributed to the effect of rampant oil spillage that affects their health status which made them incur so much expense on their health. Smith and Basurta (2019) reported that oil spillage complicates the health condition of fishermen creating hypertension due to mental strains and physical trauma which affects their quality of life. The low consumption expenditure on basic non-food items e.g health, education, clothing and housing signifies a poor standard of living among Nigerian fishermen and was previously reported by Fashola *et al*. (2022).

However, the Mean Per Capita Household Consumption Expenditure (MPCHE) was ₦18, 442.34 and ₦16, 375.18 for fishermen in non-core and core oil spillage areas, respectively. The difference in Mean Per Capita Household Expenditure (₦2,067.16) was further analyzed using a Z test statistics. Result reveals a significant difference at $P > 0.05$ level of significance. Hence, we can reject the null hypotheses and conclude that there was a significant difference in mean per capital household expenditure between both groups of fishermen. The lower expenditure profile of fishermen in core crude oil spillage fishing settlements can be likened to the effect of incessant occurrence of oil spills which have impacted respectively on the income of fishermen thereby constraining their consumption expenditure. Since the Mean Household Consumption Expenditure was adopted in this research as one of the key indicators of fishermen welfare, results implies that fishing household in the non-core oil spillage fishing settlements were better off in terms of welfare than those in core oil spillage area.

3.2.2 Welfare Status of Artisanal Fishermen Using Poverty Lines and Relative Poverty Indices

Table 3.3 presents the result of the poverty status and relative poverty indices that were also estimated as welfare indicators to further examine the differences in welfare status of fishermen. The Mean Per Capita household expenditure was N18,442.34 and N16,375.18 while the estimated poverty line $^{2}/_{3}$ of MPCHE was N12,294.89 and N10,916.79 for fishermen in non-core and core oil spillage areas. The poverty line estimated using $^{1}/_{3}$ of MPCHE were N6,147.45 and N5,458.39 for fishermen in non-core and core crude oil spillage fishing settlements, respectively. Using these poverty lines, fishing household were adjudged poor if

their per Capita expenditure was lower than N18,442.34 and N16,375.18 and non-poor if the reverse was the case. Additionally, if the Household Per Capita Expenditure was less than N6,147.45 and N5,458.39 for fishing household in non-oil and core oil spillage areas, such households were adjudged as core or extremely poor.

Table 3.2: Consumption expenditure of artisanal fishing households in the study areas

Category of expenditure	**Non-core oil spillage**		**Core oil spillage area**	
	Amount (₦)	**%**	**Amount (₦)**	**%**
Food expenditure	70,228.22	54.5	60,144.83	51.8
Non- food expenditure				
Clothing	7936.14	6.2	6875.33	5.9
Savings	9674.38	7.5	8283.62	7.1
Investment	16,146.87	12.5	12,258.96	10.6
Education	6130.11	4.8	5400	4.7
Health	1998.33	1.6	6396.18	5.5
Transportation	11,924.24	9.3	12,511.11	10.8
Housing	4,738.12	3.7	4146.76	3.6
Total	128,776.41	100	116,016.76	100
MPCHE	18,442.34		16,375.18	
Mean difference in MPCHE	₦2,067.16			
Zcal = 6.473 at 0.05 d.f				

Source: Computed by author using field survey data, 2024

Accordingly, Table 3.3 shows that 46.0 and 33.3% of fishermen in non-core crude oil and core crude oil spillage fishing settlements were non-poor 36.0 and 41.4% were moderate poor while 18.0 and 26.0% were core poor, respectively. This indicated that most fishermen (56.7%) in core oil spillage areas were poorer than those in the non-core crude oil spillage fishing settlements (54%). The difference in poverty status of these two categories of fishing households computed using Z statistics yielded a significant difference at 10% (p> 0.1) level of significance. This furthers the evidence that fishermen in core-oil spillage areas had lower welfare status in terms of poverty status than those in non-core oil spillage areas.

Table 3.4 further presents the result of the Foster, Greer and Thorbecke (FGT) Model that was estimated to further examine the difference in poverty incidence (an indicator of welfare status) among fishermen in non-core and core crude oil spillage fishing settlements. From Table 3.4, when the relative poverty was measured for fishermen in the non-core spills areas the head count ratio was 0.540, denoting that about 54.0% of artisanal fishing household were poor, the income gap ratio that measured the intensity of poverty was 0.154. This implied that the poor artisanal individual fishermen income transfer requires about 15.4 percent to bring them to the poverty line. The severity of poverty was 0.052 indicating that 5.22 percent of the artisanal fishing households suffer severe poverty.

However, when the relative poverty was measured for fishing households in the core crude oil producing fishing settlements, poverty incidence increased to 0.671. This shows that 67.1% were poor and that about 12.8% more artisanal fishermen were thrown into poverty. The income gap ratio also increased to 0.268 denoting that the poor individual fishermen now need about 26.8% income transfer to bring them to the poverty line. This will need about 11.4% income transfer to bring them to the poverty line. The severity of poverty was 0.086 showing that 8.6% suffers from severe poverty. The difference in head count ratio, Poverty gap ratio and poverty severity were 0.128, 0.114 and 0.032 respectively. This difference (though not tested statistically) can be attributed to the effect of the incessant oil spillage in the core oil spillage areas. It also implied that fishermen in the core oil spillage areas had lower welfare status (poorer) than those in the non- core spillage areas.

Table 3.3: Poverty status of artisanal fishermen using Poverty lines

Poverty indicators	**Core oil spillage**		**Non-core oil spillage**	
MPCHE	16,375.18		18,442.34	
Poverty Line ($^2/_3$ OF MPCHE)	10,916.79		12,294.89	
Poverty Line ($^1/_3$ OF MPCHE	5,458.39		6,147.45	
Poverty Status	**Number**	**%**	**Number**	**%**
Non-poor	50	32.9	69	45.7
Moderate poor	61	41.4	54	35.7
Core poor	39	25.7	`27	18.6
Total Number of poor fishermen	100		81	
Mean number of poor fishermen	0.54		0.66	
Standard deviation	0.48		0.12	
Mean difference	0.12			
Zcal value	1.92*			

Source: Computed by author using field survey data, 2024

Table 3.4: Relative poverty indices of fishermen using Foster Greer and Thorbeck Model

S/No	Poverty indices	Core oil spillage areas	Non-Core oil spillage areas
1	Head count ratio (P_0)	0.671	0.543
2	Poverty gap ratio (P_1)	0.268	0.154
3	Poverty severity (P_2)	0.086	0.052

Source: Computed by author using field survey data, 2024

3.2.3 Determinants of Artisanal Fishermen Welfare Status

Table 3.5 presents estimates for factors that affect artisanal fishermen welfare. The estimated R^2 was 0.7068, implying that about 70.6% of the variability in the welfare status of artisanal fishermen was explained by the explanatory variable included in the model. The welfare status of fishermen was influenced by age, educational attainment, household size, membership of fishing union, fishing experience, oil spillage, extension access and fishing assets.

The age of fishermen were significant at 5% level but had an inverse relationship with welfare status; indicating that the welfare status of fishermen will decrease with increasing age. This is the case since younger fishermen are strong, agile and energetic enough to either intensify their fishing efforts or partake in other oil fishing income generating activities that can generate additional income to them than older fishermen. With such high liquidity their chances of spending more on consumption is expected to be higher. This result agrees with previous finding by Falola *et al*. (2022) who also reported an inverse relationship between age and welfare of artisanal fishermen.

Household size co-efficient was also negative and significant at 1% level, indicating that welfare status of fishermen will decrease with increasing household sizes. Higher household sizes will imply higher dependents which invariably translate into higher financial obligation.

Hence, fishermen with higher household sizes will have so many responsibilities to meet. Because they rarely save, acquisition of sophisticated fishing gears, infrastructure and investment in welfare enhancing technologies will be low. This will affect their welfare status compared to those with fewer household sizes. This finding agrees with the opinion of Falola *et al*. (2022).

The variable for fishing experience was positive and significant at 5% level. The positive sign mean that welfare status of fishermen will increase with increasing experience. Since experience is associated with skills acquired through several years of trial and error, experienced fishermen are expected to leverage on their skills acquired through experience to boost their output and income through which they can increase their consumption expenditure than in experience fishermen. This result is in line with those of Falola *et al*. (2022)

The estimated coefficient for oil spillage was negative and significantly related to fishermen welfare at 1% level. This is the case, especially in the core oil spillage areas where the effect of oil spillage is often worse. This finding agrees with those of previous researchers who reported

that oil spillage affects the welfare of fishermen in various ways (Aniefiok *et al.*, 2018; Nevalaimen *et al*., 2017; Ileke *et al*., 2019 and Osuagwu and Olaife, 2018).

The variable for extension contact was significant and negatively related to the welfare status of artisanal fishermen. This implied that regular access to extension services will reduce the welfare of fishermen. This result is counter intuitive given that extension are associated with welfare enhancing innovations and information and as such, expected to boost the welfare of fishermen. However, this might reflect the low access to extension services by fishermen (21.5%) in the study area.

The variable for household income and value of fishing assets was also positive and significantly at 5% levels respectively. Their positive coefficients indicated that the welfare status of fishermen will increase with increasing household income and fishing assets. Higher household income indicates higher liquidity which translates into higher per capita expenditure. The plausible explanation for fishing assets is that fishermen with sophisticated fishing equipment will more likely fish effortlessly and also record higher catches than those with curve fractional fishing equipment. The higher catch will imply higher income. A similar result was reported by Falola *et al*. (2022).

Table 3.5: Multiple repression estimates for the determinants of welfare status of fishermen

Variable	Coefficient	Standard error	T value	P value
Constant	1212.24	294.233	4.12***	0.000
Age	-0.0194	0.0091	2.111**	0.003
Education	73.465	46.467	1.581	0.113
Household size	134.164	38.821	3.456***	0.001
Membership of fishing union	121.037	105.158	1.151	0.252
Fishing experience	96.574	45.340	2.130**	0.034
Credit access	-20.083	19.468	1.032	0.309
Oil spillage	-0.892	0.1745	5.111***	0.000
Marital status	12.132	10.861	1.117	0.252
Extension contact	24.003	6.949	-3.454***	0.001
Household income	148.102	73.675	2.011**	0.044
Fishing assets	41.263	16.973	2.431**	0.014
R^2	0.70638			
Adjusted R^2	0.6724			
F Ratio	13.32			

Note: ***,and ** and * simply significant at 1%, and 5% levels, respectively.

Source: output of computer software

Table 3.6: Constraints to artisanal fishing in the study area

Constraints	Very severe	Severe	Not too severe	Not severe at all	Mean
High cost of fishing gears	230	70	-	-	3.76
Lack of credit access	140	130	25	15	3.35
Lack of storage/processing facilitate	150	110	30	10	3.33
Poor access to extension	122	144	26	8	3.26
Lack of appropriate fishing reputation	105	89	70	9	3.15
Effect of oil spillage	132	89	70	9	3.15
High extortion by maritime securities	95	160	38	7	3.14
Scarcity/high cost of labor	105	126	60	9	3.09
Low government/ institutional support	109	120	58	13	3.08
Poor infrastructure	88	160	30	22	3.06
Low output catch	97	133	48	22	3.01
Effect of climate change	60	150	90	-	2.90
Activities of seas robbers	100	89	88	23	2.89
High/multiple taxing by community youth and government revenue agents	70	142	70	18	2.88
Frequent use of explosion and chemicals for fishing leading to death of fishes and other aquatic lives	64	161	40	35	2.84
Lack of adequate training for fishermen	26	59	133	82	2.09
Inadequate access to fishing information	30	50	132	88	2.07
Frequent deforestation of mangrove palm that use to be suitable habitat for fishes	20	35	80	165	1.70
Growth of water Lycinth and other aquatic weeds that disrupt the free movement of fishing boats in creeks	10	30	125	35	1.37

Source: field survey data, 2024

3.2.4 Constraints to Artisanal Fishing in the Study Area

Table 3.6 presents the challenges faced by artisanal fishermen in the study area. High cost of fishing gear was the most severe ($\bar{x} = 3.76$) challenge, followed by lack of credit ($\bar{x} = 3.35$), lack of storage/processing facilities ($\bar{x} = 3.33$), poor access to extension ($\bar{x} = 3.26$), lack of appropriate fishing regulation ($\bar{x} = 3.16$), effect of oil spillage ($\bar{x} = 3.15$) and high extortion by maritime securities/high cost of labour ($\bar{x} = 3.09$), low government/institutional support ($\bar{x} = 3.08$), poor infrastructure ($\bar{x} = 3.06$), low output/catch ($\bar{x} = 3.01$), effect of climate change ($\bar{x} = 2.90$), activities of sea robbers ($\bar{x} = 2.89$), high/multiple taxes by community youths and government revenue agents ($\bar{x} = 2.88$), and frequent use of explosives and chemicals for fishing leading to death of fishes and other aquatic live ($\bar{x} = 2.84$), lack of appropriate fishing regulation was reported by Ifesinachi (2018) as a constraints to artisanal fishing. His estimation placed the value of illegal, reported fishing in Sub-saharan Africa at $1billion annually. In Bayelsa State of Nigeria, Wilcox (2024) also reported that artisanal fishing was constrained by funding and audit issues, absence of extension services, climate change and flooding, poor processing facilitates and high labour cost. Falola *et al*. (2022) had also reported inadequate credit facilities, lack of government support, lack of storage facilities, high cost of fishing gears, issues of pricing, poor catch, lack of extension programme and inadequate processing equipment as constraints militating against artisanal fishing in Nigeria. Wilcox and Ojimba (2022) also listed the constraints to artisanal fishing, as crude oil pollution, lack of extension services, lack of credit facilities, use of chemicals for fishing, lack of storage facilities

and oil spillage, respectively. In the study area, Otti *et al.*, (2024) had also listed lack of credit, poor income, theft and high cost of fishing gears as constraints to artisanal fishing.

Other constraints listed by Nkodo *et al*. (2024) include lack of storage facilities, high cost of fishing equipment, high cost of labour, low and declining catch, lack of processing facilities, lack of technical training, climate variability, poor access to fishing information, increase activities of sea robbers, extortion by maritime securities and multiple taxes by communities and local government revenue agents.

Among the minor challenges were lack of adequate training for fishermen ($\bar{x} = 2.09$), access to fishing information ($\bar{x} = 2.07$), frequent deforestation of mangrove palm which used to be suitable habitat for fishes ($\bar{x} = 1.70$), and growth of water hyacinth and other aquatic weeds that disrupt the free movement of fishing boats in creeks ($\bar{x} = 1.37$).

4.0 Conclusion

In this study, welfare status of artisanal fishermen in core oil and non-core oil producing communities has been estimated. Findings have shown that fishermen in the non-core oil producing communities had higher education, accessed more credit, had more capital formation, earned more income and had lower poverty indices and levels than those in core oil producing areas. Also a greater proportion of household incomes for both category of fishing groups' were expended on food. Additionally, welfare status of fishermen were significantly influenced by

age, household size, fishing experience, oil spillage, extension contact, household income and fishing assets. Numerous challenges facing artisanal fishing were also identified. In the face of these challenges, the study concluded that fishermen in the non-core fishing areas had higher welfare status than those in the core oil spillage areas.

Recommendations

The following recommendations are offered based on the findings of this work.

(I) Institutions should be established to equip fishermen with early warning information on threats and outbreak of oil spillage as well as possible ways of coping with them.

(i) Monitoring institutions should be set up that will monitor the activities of maritime security and revenue collection agents as a way of reducing extortion and multiple taxes.

(ii) Adequate fishing regulations should be made to regulate fishing operations as such institutions will restrict the use of toxic chemicals and explosives for fishing. These institutions should also be empowered to compel oil companies to urgently pay compensation to affected fishermen during oil spills. If possible, a special court should be set up to carry out accelerated persecution of defaulters.

(iii) Subsidies in the form of basic fishing inputs should be given to fishermen as an avenue to boost their income and welfare status.

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