



EFFECT OF CRUDE OIL SPILLAGE AND CONSTRAINTS ASSOCIATED WITH ARTISANAL FISHING IN OIL-SPILLED AREAS OF BAYELSA STATE

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Cite this article:

Wilcox G. I. (2024), Effect of Crude Oil Spillage and Constraints Associated with Artisanal Fishing in Oil-Spilled Areas of Bayelsa State. African Journal of Agriculture and Food Science 7(2), 158-168. DOI: 10.52589/AJAFS-JBANFGNS

Manuscript History

Received: 20 Feb 2024

Accepted: 29 Apr 2024

Published: 21 May 2024

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ABSTRACT: *This study considered the effect of crude oil spillage and constraints associated with artisanal fishing in oil-spilled areas of Bayelsa State. The study's goals were to find out the respondents' socioeconomic status, determine how the spill of crude oil affected artisanal fishing, and pinpoint the obstacles to artisanal fishing output in particular oil-spilled areas. A simple random selection technique was employed to select 100 respondents, from whom a questionnaire was used to collect data for the study. Descriptive statistics were used to analyze the data that was collected. Men made up the majority of respondents (77%), according to the study's main findings. In the region where crude oil spilled, 55% of the artisanal fishermen were between the ages of 45 and 55. Married respondents made up 84% of the sample, and 60% had finished secondary school. The respondents had a mean of 25.4 years of experience and an average household size of 6. The main obstacles to artisanal fishing in the areas affected by the spill of crude oil were the following: water pollution, rising consumption, lack of government support, issues with marketing, spoiled fish, funding and credit issues, absence of extension services, climate change and flooding, poor processing facilities, high labour costs, health issues, and a scarcity of fishing baits. This study makes several recommendations, including better processing facilities, increased access to bank loans at lower interest rates for farmers, expanded and strengthened extension services, and the establishment of policies by the government, private citizens, and corporate entities that will boost output and improve the profitability of artisanal fishing.*

KEYWORDS: Crude oil, Spillage, Artisanal, Constraints and Bayelsa.



INTRODUCTION

The traditional way of carrying out fish capture and other marine-related activity in the riverine communities of Bayelsa State, also known as artisanal fishing or subsistence fishing, consists of various small-scale fishing practices using local technology such as nets, hooks, small canoes, cast nets, landlines, basket traps, longlines, set gill nets, purse seines and low-capital. Practices of this nature are undertaken by individual fishing households (Garcia, 2009). For decades, these practices have been carried out to sustain fishing families, raise income to take care of their health, pay children's school fees, and address other issues. Many of these households are of coastal or island ethnic groups (Garcia, 2009). The operating range of small-scale fisheries is around 20 metres of depth contour, with operations extending occasionally to a maximum depth of 40 metres (Inoni and Olaide, 2007).

Their catches, such as fish, crayfish, periwinkles, oysters, etc., are usually (in most cases) not processed and are mainly for local consumption. Due to insufficient capital to expand their businesses, artisanal fishing has failed to expand beyond its present status. The situation of artisanal fishing in Bayelsa State became worse with oil exploration activities due to the discovery of oil in 1956 by oil exploration companies. All attention was turned to oil because it contributed about 85% of the country's foreign exchange earnings (Udotong and Udotong, 2007). Crude oil production has brought unprecedented changes, particularly in the past six decades when it replaced agriculture as a major activity (Ajayi, 2014). It has probably brought both the best and worst of modern civilization to Nigeria (Gbigbi, 2014). As the years went by, oil pollution in the water and on land came to the fore because of the activities of oil pipe vandals and oil pipe leakages (Inoni et al., 2006). The leakages were harmful to the environment, as observed by Obire and Amusan (2003).

This affected the artisanal fishing activities of the fishing households and further impoverished them, as they ended up with little or no catch each time they were out for their fishing activities. For that reason, the socio-economic status of the artisanal fishing community has become of interest in recent years. It is for this reason that this study is carried out to consider the following objectives: the socioeconomic status of the artisanal households, the effects of crude oil spillage on artisanal fishing, and the constraints of the artisanal fishing households in carrying on with their business.

LITERATURE

An oil spill is the release of a liquid petroleum hydrocarbon into the environment, especially the marine system, due to human activity, and is a form of pollution (Common Dreams, 2004). The author explained that oil is released into the ocean or coastal waters but may also occur on land. Common Dreams (2004) went further to explain that spills may be due to the release of crude oil from tankers, offshore platforms, drilling rigs and wells as well as spills of refined petroleum products (such as gasoline, and diesel) and their by-products, and heavier fuels used by large ships such as bunker fuel or the spill of any oily refuse or waste oil. Crude oil and gas pollution is the major environmental hazard caused by crude oil and gas exploration, exploitation, and production in the Niger Delta region of Nigeria and many parts of the world (Ward et al., 2003; Wang et al., 2010 in Ojimba, 2012). Freedman (2018) pointed out that oil pollution is caused by any spillage of petroleum or its refined products. The largest spills



typically involve a discharge of petroleum or bunker fuel to the ocean from a disabled tanker or a drilling platform to an inland waterway from a barge or ship or to land or fresh water from a well-blown out or broken pipeline. Broekema (2015) added that oil spills can have disastrous consequences for society, economically, environmentally, and socially. Crude oil and refined fuel spilt have damaged vulnerable ecosystems in Alaska, the Gulf of Mexico, the Galapagos Islands, France, the Sundarbans, the Ogonilands and many other places. Broekema (2015) further added that the quantity of oil spilt during accidents has ranged from a hundred tons to several hundred thousand tons (e.g. deep-water horizon oil spill, Atlantic Empress, Amoco Cadiz). Oil spills according to Wellman (1999) at sea are generally much more damaging than those on land since they can spread for hundreds of nautical miles in a thin oil slick which can cover beaches with a thin coating of oil. These can kill sea birds, mammals, shellfish, and other organisms they coat.

Numa et al. (2017) explained that crude oil spillage impact negatively on the livelihood of the people, as well as their socio-economic activities and the environment for example, for example, fishing which is the predominant occupation and a means of livelihood of people in the riverine communities does not yield much benefits anymore. This is due to losses of fishing grounds, respiratory difficulties, and mortality of fish because of oil spillage. Davies (2005) reported that artisanal fisheries are fast depleting in Nigeria due to incessant oil spills and as a result, Nigeria's inland water bodies are producing less than 13% of their estimated fishery potential. *Numa et al.* (2017) also added that poverty was higher in artisanal fishing households affected by oil spillage. The exploitation of oil in the Niger Delta region has brought to bear oil spillage and its numerous problems, such problems include contamination of water bodies, danger to aquatic life and destruction of farmlands (Nwilo and Badejo, 2008). Godson (2019) added that the oil and gas exploration activities in the Niger Delta areas have hugely affected the fishing productivity in the host communities, having been the major economic preoccupation of the indigenous people. As such, the natural resources of oil and gas deposits are gradually replacing the economic earnings of the host communities from agricultural lands and fisheries productions, extensive deforestation, and excellent fishing waters.

Alatari et al. (2018) described artisanal fisheries as a fishing system that typically involves fishing households using relatively dug-out wooden canoes that are non-motorized, small fishing vessels, making short fishing trips close to the shore, with fishing systems ranging from hand collection on the beach or more than 20-meter trawlers, seiners, or longlines over 20meter in developed countries. Food and Agricultural Organization (FAO) (2015) described artisanal or traditional fisheries involving fishing households using relatively small fishing vessels, and making short fishing trips, close to shore, mainly for local consumption. However, in practice, the definition varies between countries for example from one-man canoes in poor developing countries, to more than 20-meter trawlers, seiners, or longlines in developed ones. In Mauritius, artisanal fishing is carried out in the lagoon and off the lagoon to depths generally not exceeding loom. Usually, only motorized boats leave the lagoon area. Fishing devices mostly used are hooks and lines, baskets, traps, large nets, canal nets, cast nets, shrimp nets and harpoons (Bhangooli and Kaullysing, 2019). Garcia (2009) said that the artisanal fishing system consists of low technology, low capital and fishing practices undertaken by individual fishing households. Ozyurt (2013) outlined some fishing systems or techniques used by artisans, they include rod tackle, fishing arrows and harpoons, cast nets, and traditional fishing boats. The artisanal fishing system is categorized by several gears which include purse seine nets, beach seine nets, set nets, drifting gill nets and hooks and lines. These gears are operated from dugout



canoes (FAO, 2007). In Nigeria, most artisanal fishers use gears such as cast nets, handlines, basket traps, longlines, set gillnets and beach and purse seine (Inoni and Oyaide, 2007). Yao *et al.* (2019) in their study highlighted the variety and abundance of the fishermen's means of production in the area. They reported that the system used in fishing includes boats and gears such as gill nets, bow-nets, fish traps, longlines, setups including bamboo, cut wood and PVC tubes, hawks, three types of hand-crafted harpoons, handlines, and arrow fishing. In general, Smith and Basurto (2019) opined that the term small-scale artisanal fishery evokes a mental image of small, traditional fishing craft equipped with low-tech gear requiring labour-intensive fishing methods. Fishing boats and gear are the most common characteristics.

MATERIALS AND METHODS

The study area was Bayelsa State, located in the core of the Niger Delta region. It has a projected population of 2,278,000 people using an annual growth rate of 2.91% per year (National Population Commission (NPC), 2006). The state's economy is dominated by the petroleum industry, fishing and farming, palm wine tapping, and the making of local gin, which also constitute the economic activities of the area. 100 respondents were selected through a simple random sampling method for the study. At stage I, the four local government areas of Southern Ijaw, Brass, Yenagoa, and Ogbia were purposefully selected. At stage II, twenty communities were purposely selected from the four local government areas of the state affected by the oil spillage. At stage III, five artisanal fish farmers were selected randomly to arrive at 100 respondents.

Data from the respondents were analyzed using descriptive statistical tools such as frequency, means, and percentages.

RESULTS AND DISCUSSION

Socio-economic Characteristics of Artisanal Fishers in Crude Oil-Spilled Areas

Gender of Artisanal Fishers

Table 1 shows that (77%) of the artisanal fishers were males while (23%) of them were females. It can be implied that artisanal fishing in the area was mostly dominated by males. Thus, it has been seen as an occupation for men in Bayelsa State, Nigeria. This finding agrees with previous work on artisanal fishing in the riverine showing that males dominate the enterprise (Tasie, Wilcox and Kalio, 2020).

Age of Artisanal Fishers

Age is an important socioeconomic factor in any productive enterprise because it affects productivity and output. Table 1 shows that the age group (56-66 years) consisted of 18%, 45-55 years (55%), and 34-44 years old were 25% of the respondents, while those less than 34 years of age were 2%. The table also showed further that the respondent's mean age was 49 years. Thus, it can be implied that artisanal fishing in the study area was carried out by mostly aged fishers and corroborates the works of Tasie and Wilcox (2018), Tasie *et al.* (2020) and Anyanwu, Wilcox, Okafor and Eneyo (2022).



Educational Attainment of Artisanal Fishers

Education opens the space for enlightenment, effective communication and understanding to adopt innovations that can enhance productivity and output in agricultural enterprises. Table 1 presents the educational attainment of the respondents in the area. It was observed that the majority (60%) of the respondents had secondary education, 14% had primary education, and 16% of the respondents had tertiary education. This implies that 90% of the respondents had one form of formal education or the other which will enhance the adoption of technology that could improve productivity.

Household Size of Artisanal Fishers

Household size has its pros and cons. The large household size provides labour and reduces the cost of hiring labour for sole proprietor enterprises (Daudu, Matanmi, Komolafe & Ajibola, 2014). It also reduces the quantity of the product that will be brought to the market for sale because much of it will be consumed. This is in line with Unongo (2010), Nlerum and Bagshaw (2015) and Tasie, Ejiogu, Onubuogu and Wilcox (2017). Table 1 indicates that the majority (40%) of the respondents had family members between 5 - 6 persons and 35% had 7 - 8 persons with a mean household size of 7 persons. The implication is that labour could be available, free, and cheap for fishing households.

Fishing Experience of Artisanal Fishers

Long years of experience develop skills for better management of resources and enterprises. Table 1 reveals that the majority (41%) of the respondents had 20–29 years of experience, 13% had 30 - 39 years of experience, 10% had 40–49 years of fishing experience, and 6% had experience of over 50 years with an average of 25 years of fishing experience. This implies that the respondents had good years of experience and could have better skills to manage the oil spill challenge.

Other Occupation Engaged by Artisanal Fishermen in Bayelsa State.

The distribution of other occupations by the respondents in Table 1 shows that 71% of the respondents engaged in crop and mini livestock farming, 2% were in boat renting, while 1% are engaged in fish processing and marketing. The result further revealed that 7% of the respondents were into net making as non-fishing sources of income, 5% traded alongside fishing, 4% are engaged in local gin making, 3% were into palm wine tapping, 3% worked with the civil service, and 4% combined fishing with hunting and gathering of wild fruits and other forest resources. This implies that most of the respondents combined fishing with many other forms of economic activities to increase their financial support to the households.

**Table 1: Socioeconomic Characteristics of the Artisanal Fishers in the Study Areas**

Characteristics	Crude oil spilled area		
	Frequency (n=100)	Percentage	Mean
Gender	Male	77	77.0
	Female	23	23.0
Age (years)	Less than 34	2	2.0
	34-44	25	25.0
	45-55	55	55.0
	56-66	18	18.0
Educational Level	Illiterates	10	10.0
	Primary	14	14.0
	Secondary	60	60.0
	Tertiary	16	16.0
Household Size	Less than 5persons	15	15.0
	5-6 persons	40	40.0
	7-8 persons	35	35.0
	9 persons and above	10	10.0
Years of Fishing Experience	Less than 10	6	6.0
	10-19	24	24.0
	20-29	41	41.0
	30-39	13	13.0
	40-49	10	10.0
	50 years and above	6	6.0
Other Occupation type	Farming	71	71.0
	Boat renting	2	2.0
	Fish processing/marketing	1	1.0
	Net making	7	7.0
	Trading	5	5.0
	Local gin making	4	4.0
	Palm wine tapping	3	3.0
	Civil service	3	3.0
	Hunting	4	4.0

Source: *Field Survey, 2021.*

Effects of Crude Oil Spillage on Artisanal Fishermen

The effects of the oil spill were felt by artisanal fishermen of all categories. There was a physical and economic effect. The physical effects were seen on the environment, waterways, the mangrove forest, canoes, nets, traps, and baskets used for fishing. As shown in Table 2, all responses from the research questions came back positive, or 100 percent. The impacts of the oil, however, were much worse in the mangroves and on aquatic organisms living in the zone and on the ocean bed. Crabs, periwinkle, oysters, and shrimps were therefore much more affected by the oil and collectors of these animals would have suffered bigger economic losses. Regrettably, the artisanal fishermen are unable to quantify the effects of the oil spillage.



Therefore, the study adopted the descriptive statistical analysis approach using categorical responses (Yes/No), frequency distribution, and percentages.

As shown in Table 2 the artisanal fishermen included in the study all claim that the fishing environment was affected by the oil spillage (100%). The pollution thus affected the quantity and quality of fish caught (100%), which further affected their income as they have very low incomes. The hardships of this enterprise can be seen in the low social class of their living areas, the low standard of housing, and the simple equipment used. The long hours of hard work as well as the simple clothes worn are evidence of the effects of oil pollution and poverty. The income is also highly unstable, which was confirmed by fishermen from the study areas. Fishing is hard since it doesn't give a stable income. Sometimes they get fish, and sometimes they do not. It depends on the season and the temperature of the water. This finding is corroborated by the findings of Peipke (2006). Equipment used in the process was not spared as they needed to be replaced almost regularly or managed. They are forced to spend longer time at sea just for them to get a little catch for the day or leave their traps over several days.

Table 2: Effect of Oil Spillage on Fish Caught and Equipment Used in Fishing in Crude Oil Spilt Areas of the Study.

Oil Spillage	Response	Frequency	Percentage
Did it affect the environment where you do your fishing?	Yes	100	100
	No	0	
Did it affect the quantity of fish caught?	Yes	100	100
	No	0	
Did it affect the quality of fish caught?	Yes	100	100
	No	0	
Did it affect the fishing equipment?	Yes	100	100
	No	0	
Did it affect your income?	Yes	100	100
	No	0	
Did it affect the time you spend each day you are out for fishing?	Yes	100	100
	No	0	
Did it increase your spending because you must replace damaged equipment?	Yes	100	100
	No	0	

Source: Field survey, 2021.

Constraints of Artisanal Fishing

Artisanal fishers in the study area encountered problems in the cause of their fishing activities. The constraints are presented in Table 3 water pollution was indicated by the respondents as the most serious constraint to artisanal fishing with a mean score of 3.26, it was a high constraint, others are lack of government support and marketing problems (2.99); funding and credit problems and lack of extension services (2.98). Other high constraints estimated include high cost of labour (2.97), flooding/climatic condition problems (2.96), marketing problems (2.94), increase in consumption (2.92), spoilage of fish caught (2.82), labour shortage (2.73), and decline in fish caught (2.56) ranking, sixth, seventh, eighth, and ninth, tenth, eleventh and twelfth, respectively.



Table 3: Constraints to Artisanal Fishing Households in crude oil Spilled Areas of the study

Constraints	Very serious (4)	Serious (3)	Not serious (2)	Not a constraint (1)	Total score	Mean	Decision
Water pollution	52	25	20	3	326	3.26	High
High cost of labour	35	41	10	14	297	2.97	High
Flooding/Climate condition problem	28	35	33	4	296	2.96	High
Spoilage of fish caught	32	30	26	12	282	2.82	High
Lack of government support	50	10	29	11	299	2.99	High
Increase in consumption of fishes caught	58	9	2	29	292	2.92	High
Labour shortage	29	35	16	20	273	2.73	High
Decline in fish catch (output)	27	30	15	28	256	2.56	Constraint
Health problems	35	30	30	6	294	2.94	High
Lack of extension service	41	30	15	14	298	2.98	High
Marketing problems	50	10	29	11	299	2.99	High
Funding and credit problem	41	30	15	14	298	2.98	High

Source: Estimated from field survey, 2021 data. Items with mean values up to and above 2.50 were constraints on household artisanal fishing.

IMPLICATION TO RESEARCH AND PRACTICE

By this study on the effects of oil spills on artisanal fisheries, we have gained a better understanding of the risks associated with oil production. This information can then be used to develop policies and practices that can help to prevent oil spill and mitigate their impact.

CONCLUSION

The results of the study showed that artisanal fishing was grossly affected by oil spill pollution in the study areas. The artisanal fishermen were affected economically as the physical environment where they carry out their fishing and related fishing activities was affected. Due to the constraining factors associated with artisanal fishing in the study areas, it is recommended that the government in liaison with oil companies, should formulate appropriate



policies that will promote safety, and all required for drilling activities. More so, immediate, and thorough clean-up of polluted waters should be carried out.

FUTURE RESEARCH

Future research on the fishing activities of artisanal fishermen can be carried out to consider the effects on their livelihood adding or removing some of the variables used in this study.

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