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Inter-Regional Dimension of Oil Mining and Sustainable Food Security in the Niger Delta Rural Sub-Region of Ondo State Nigeria

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Abstract

This paper evaluates the effects of oil mining on the livelihood of the people in the rural oil producing area of Ondo State, Nigeria, especially as it affects food security. The study employed quantitative techniques for primary data collection and analysis, while qualitative techniques were used for secondary data collection and analysis. Multi-stage sampling was adopted for quantitative data collection. The first stage involved selection of four local government areas out of eighteen in Ondo State. This was followed by the random selection of fifteen localities within the four local government areas, using balloting system. A respondent was selected from each housing unit for administration of questionnaire. Both descriptive and inferential statistics were used for quantitative data. Chi-square (X^2) was used to test the differences in the level of development between the oil bearing and non-oil-bearing communities; and their respective levels of deprivation in terms of environmental problems, particularly, agricultural productivity (which is fundamental to food security) and general socio-economic activities. The study revealed that water and land pollution resulted into food poisoning, which had negative effects on residents' health; and displacement of farmers and fishermen. The result revealed that the effect of oil production on land, water, farming and healthcare was significant (α=0.000) but insignificant on fishing (α=0.921). The paper suggests anticipatory and precautionary planning approaches to development and environmental management activities (among others) to ensure sustainable food security in the study area.

Keywords: Mining, Sustainable, Food Security, Rural, Niger Delta.

Introduction

Petroleum minerals were discovered in Nigeria in 1928 at Eda in Ebonyi, Anam Clan in Anambra and Agwu in Enugu States; about 20 years before the Oloibiri discovery. The Oloibiri discovery of 1956 had been the most popular in the literature, but it was made after about 50 years of exploration (Ikenna, 2011). Its economic significance notwithstanding, oil mining activities in the Niger Delta have been greeted with a lot of criticisms owing to their negative effects on the ecosystem of the oil producing communities. These effects have impacted on the physical environment and socio-economic life of the people in the area, particularly farming and fishing that are the two indigenous occupations of the people and sources of foods. This has consistently been threatening food security in the study area.

Several studies have established poverty and deprivation as the major problems of the oil producing communities of the Nigerian Niger Delta area. Oil exploration, exploitation, production and distribution have polluted their fishing waters and destroyed their agricultural lands, both of which are the mainstay of their economy. These are the two major occupations of the Niger Delta communities according to several scholars (Ebisemiju, 1966; World Bank, 1993; Omofonmwon; NDDC, 2000 and Odia, 2009). An Ondo State poverty study in1995 and Ondo State Economic Summit 2001(both in Akpata et. al., 2009) and; Opukri and Ibaba (2008) reveal that Ondo State, an oil producing sub-region, has the highest number of poorest people among the oil producing communities in Nigeria. The studies revealed that incidence of poverty in Ondo State had been on the increase. It rose from 5.94% in 1997 to 12.25% in 2006. All these

problems were attributed to lack of physical and socio-economic development that are commensurate with the resources derived in the oil producing rural communities.

This study aims at evaluating the impact of oil production on the livelihood of the people in the oil producing sub-region and non-oil producing sub-region; with focus on differential effects on food security. To achieve this aim, the paper provides answers to the following three main questions:

i. What are the socio-economic characteristics of the people in the study area?
ii. How significant is the differential effect of oil production on the environment of the study area?
iii. How do the effects of oil mining on the environment of the oil producing area of Ondo State affects food security?

Problem of Food Security in the Study Area

The Nigerian oil producing areas, being a resource endowed region of the country, is expected to be safe from poverty, hunger and socio-economic vices, but the reverse is the case. Complaints about hunger, poverty, diseases, death and environmental degradation, which in turn have led to break down of law and order in many occasions in the area, continue to aggravate. Ondo State oil producing area is not an exception. The ecological disturbance, which oil mining is causing has led to both geographical and economic displacement of the people. Reardon *et al* (1998) and Ellis (1998) posited that the low income earned in agriculture and fishing livelihood in the oil producing areas has made farming and fishing households to diversify to non-farming and non-fishing sources for upkeep of their families. Adeyemi (2004) reported oil spillage that happened in Araromi of Ondo State in 1908 as the first of such and which continued unabated for several years in the oil producing sub-region till today; which has badly affected the people of the oil producing sub-region.

Fishing had been the major occupation of the Ilaje and Ese-Odo people. This is not unconnected with the fact that about 75% of their land is riverine, with easy access to the sea (Asani, 2013). This large scale fishing attracts traders and consumers from various parts of the country to Ilaje Local Government. Apart from fishing, livestock and farming rank second as their major occupation. But polluted water has taken over substantial parts of their farm lands and the few farmers that remain are on subsistence, and at peasantry levels.

Akpofure *et al* (2000) reported that, on close interview in most of the oil producing communities, complaints like these were evident when crude oil was tasted in cocoyam, cassava tubers, and spinal cords of fishes:

i. endemic disease outburst had been rampant, as a result of crude oil poisoning;
ii. from their sweat, they eat the barest minimum food, which may just sustain them from death;
iii. life now is a matter of grim oil as industrious farmers leave home very early and return terribly frustrated because of poor harvest to meet hungry and angry children who have waited so long for their food;
iv. their grounds (soil), ponds and streams which were formally reliably productive had turned soar and unproductive, making life more uncomfortable and unbearable;
v. their bones, bodies, spirits crack and crunch under the ‘politicks’ and psychosomatic jackboots of neglect, dehumanization and untold hardship mothered and monitored by Multinational Oil Companies and their local collaborators; and
vi. One of the local chiefs interviewed lamented painfully that anytime he sees their degraded physical environment and remembers the level of economic deprivation, their spirit morns within their bones, their wounds are beyond healings, their bowel boils and rest not, their inner resources are ill beneath them for the thought of the contempt from Multinational Oil Companies and their collaborators within the Nigerian ruling class.

These are manifestations of lack of food security in the study area, not to talk of its sustainability, and a great potential for regional underdevelopment.

The Study Area

The Niger Delta of Nigeria covers an area of over 70,000 square kilometers and accounts for about 7.5% of Nigeria's landmass. Extending from Apoi to Bakasi, from Mashin creek to the Bight of Benin, the oil producing coastline approximately covers 560km, which is about 2/3 of 853km, the entire coastline of Nigeria, facing the Atlantic Ocean (Nwilo and Badejo, 2008). The Niger Delta consists of nine of the thirty-six states of the federation, Ondo State being one of them. Ondo State covers an area of 15,195.2 square kilometres and lies at latitude 7° 10' north and longitude 5° 05' east. It has a population of 3,460,877 and a population density of 218 people per square kilometre (2006 census figures). It accounts for 2.5% of Nigeria's total population (Asani, 2013). Edo and Delta States bound Ondo State on the east, on the west by Ogun and Osun States, on the north by Ekiti and Kogi States and in the south; by the Bight of Benin and the Atlantic Ocean. There are 18 Local Government Areas in Ondo State. Ilaje and Ese-Odo Local Government Areas as shown in Figure I are the two oil producing local government areas in Ondo state. They were together as a Local Government (Ilaje/Ese-Odo) prior to October 1st, 1996, when each was made a separate local government by the Federal Government of Nigeria. This portends the fact that geographically, they share the same features; culturally, they align; traditionally, they share the same traits; economically, they share same characteristics; and ecologically, they are identical.

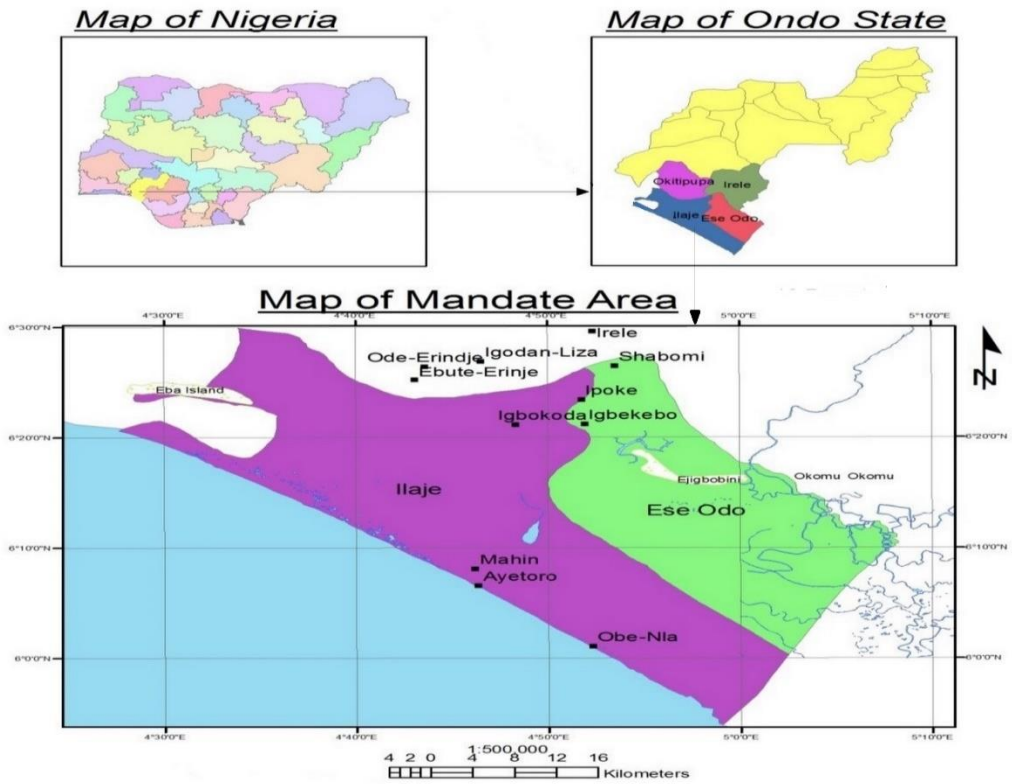

Figure 1: The two Oil Producing Local Government Areas in Ondo State
Source: Authors´ Work, 2020

Literature Review and Conceptual Issues

Literature Review

Tomola (2008) in his work titled; 'Poverty, Environment and Fishing Business in the Coastal Region of Ondo State, Nigeria' observes that oil attracted the oil companies to the region (including the oil producing sub-region of the study area), and the result of their exploration activities, with frequent oil

spillage, resulting to environmental degradation was the destruction of fishing activities, destruction of buildings, low catch of fish and low income. Nwilo and Badejo (2008) document the myriad of effects of oil spill in the oil-bearing sub-region, including the impact on infrastructural facilities. They cited several examples, one of which is the samples of drinking water tested and confirmed inappropriate. They write;

> *''In April 1997, samples taken from water used for drinking and washing by local villagers were analysed in the U.S.A. The samples had 18 ppm of hydrocarbons in the water, 360 times the level allowed in drinking water in the European Union (E.U). Another sample had 34ppm, which is 680 times the EU standard''.*

Nwilo and Badejo further note that, oil destroys plants and animals in the estuarine zone which kills organisms and marine animals like fishes, crabs and other crustaceans. These are part of the major sources of protein for human consumption and a major source of livelihood for the riverine population. Oil poisons algae, disrupts major food chains and decreases the yield of edible food items. Apart from this, it also coats birds, impairs their flight or reduces the insulated properties of their feathers, thus making birds vulnerable to cold. Oil on water surface also interferes with gaseous interchange at the sea surface and dissolved oxygen levels will thereby be lowered. This will in no doubt reduce the life span of marine animals (Leahy and Colwell, 1990 (in) Panda 2013; Atlas and Bertha, 2012). Efforts to solve problem of oil spillage does not help the food chain. The use of oil dispersants to clean spillage also causes toxic effects on plankton thereby poisoning marine animals. This can also lead to food poisoning and loss of lives (Nwilo and Badejo, 2008).

Angela and Ojua (2013) posit that: absence of safe drinking water constitutes a challenge to the people. Owing to pollution of water by oil spills, water supply in majority of the oil bearing states in the region, including Ondo State, come from unsafe supply facilities, including rivers, lakes or ponds, unprotected wells and boreholes. Figure 2 shows poor drinking water situation in Aboto, one of the rural communities in the study area. They made reference to NBS (2005), which also establishes the fact that water supplies are very acute and result in supplies of unsafe water in more than 50 percent of the cases sampled. The lack of potable water has had serious implications for food security and therefore people's health.

Concept of Rurality

The definition of rural has been in dispute for decades (Gilbert, 1982). A plethora of definitions of the term 'rural' have been given and different organizations and agencies define rurality in the ways that best meet their varying needs. For instance, the definition of a Statistician in pursuit of the data for crime rate will be different from that of a Politician seeking additional polling units for his constituency (which is administrative); whereas, a Town Planner, who is undertaking assignments on Master Plan, Regional Plan, Strategic Regional Plan, Local Plan, Structure Plan or Subject Plan will define rurality differently because, his consideration is harmonisation and integration of the available resources (natural and man-made) for the purpose of fulfillment of human welfare. An Economist, who would consider economic variables existing in his area of mandate, compared to the population, will define rurality differently from others. It is therefore important to note that there is no "official" or "universally" accepted definition of the term rural. Since this paper is not meant to be a further contribution to the ongoing international debate on the concept, there will only be a brief description of the concept.

The rural areas of Nigeria are inhabited by a large majority, close to 51.7% of the nation's population (United Nations, 2009). They are the major source of capital formation for the country and a principal market for domestic manufacturers (Olatunbosun, 1975). According to Carney (1998), rural dwellers contribute significantly to the gross domestic product, especially in the developing nations of sub-Sahara Africa. But, over the years, their contributions have dropped and are not sustainable. In Nigeria, before the discovery of oil, rural dwellers, with farming as occupation contribute significantly to the economy of the nation through the export of cash crops like cocoa, groundnut, kola-nut and rubber (Oyesola, 2007). In general terms, the rural areas engage in primary activities that form the foundation for any economic

development. There is no doubt that rural areas in Nigeria are directly or indirectly involved in the use of land resources. Yet, despite the importance attached to the rural areas, they have not been receiving the deserved attention in terms of sustainable development.

Majority of these rural areas, particularly the endowed ones are facing several problems, which reduces their productivity. Some of these problems include environmental constraints, infrastructural deficiencies, marketing problems, technological constraints, institutional constraints, high cost of labour, inadequate agricultural incentives and lack of sustainable rural development programmes (Oyesola, 2007). As a result of these problems, the rural areas have always been recognized with underdevelopment, and high propensity for emigration.

Concept of Sustainable Development

The idea of sustainability is multidimensional. In terms of definition, it can be taken from the official international reports, which seek to establish new understandings of the relationship between the environment and development. The World Commission on Environment and Development (WCED), 1987:43 defines sustainable development as 'development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs'. The idea of sustainability, since late 1980s, has been undergoing some sorts of conceptual refinement and theoretical analysis. For example, Munasinghe (1993) and Munasinghe and Cruz (1995) distinguish 'economic', 'social' and 'environmental' sustainability.

Whereas, economic sustainability centres on generating a maximum flow of economic welfare while maintaining the stock of assets; social sustainability is people oriented, identified with the stability and cultural diversity of social systems; and environmental sustainability refers to the preservation, the resilience and adoption of both physical and biological systems. The problems with this concept are those of balance, reconciliation and the values to be placed upon the economic, social and environmental dimensions; to harmonise satisfaction of the present generation and give assurance to the future generation in a wholesale manner. The idea of sustainable development goes beyond application of appropriate scientific or analytical definition and conceptualisation. An in-depth study and application of political economy is equally essential.

The goals of sustainable development are:

i. Resource conservation; which involves continuing supply of resources for future generation.
ii. Built environment; which is concerned with the use of physical resources (natural and man-made) and their impact on land.
iii. Environmental quality; which means that processes that degrade or pollute the environment and thereby reduce its regenerative ability must be avoided.
iv. Social equality; which refers to the need to bequeath to the future environmental resources, at least as good as those that exists today.
v. Political participation; which is avoidance of perspectives of individualism, competition and conspicuous arbitrary consumption (Andrew, 1993).

Oil Mining and the Environment

Mining is the extraction of valuable minerals or other geological materials from the earth from an ore body, lode, vein, seam or reef, which formed the mineralised package of economic interest to the miner (Hartman, 1992). Mining is required to obtain any materials that cannot be grown through agricultural processes, or created artificially in a laboratory or factory. Mining in a wider sense includes extraction of any non-renewable resource such as petroleum, natural gas, or even water. The nature of mining processes creates a potential negative impact on the environment, both during the mining operations and years after the mine is closed. Environmental issues can include erosion, formation of sinkholes, and loss of

biodiversity; and contamination of soil, groundwater and surface water by chemicals from mining processes. Contamination from leakage of chemicals and gases can also affect the health of the local population. While impacts like erosion and sinkholes lead to land degradation and dereliction, which affect farming negatively, contamination of soil and water pollution are capable of introducing toxic and poisonous elements into the food chain. These are apart from reduction in fishing and crop harvests. All these combine to constitute a dangerous threat to food security, raise ecological cost and minimize the desired benefits from mining operations (Hartman, 1992).

Petroleum and natural gas, and their by-products are used in motor vehicles, air planes, ships, heavy machines and other automobiles, cooking, space heating, steam engines; looms as lubricant, medical products and fertilizers. Liquefied petroleum gas is used in refrigerators, water heating, incubators and brooders, to sterilize milking utensils and various other industrial and domestic uses. Despite the benefits listed in the paragraph above, fossil fuels greatly impact negatively on the environment, such as:

i. The release of carbon dioxide, the major producer of greenhouse effect, is mainly due to thermal power generation.
ii. Fly ash disposal from thermal power plant.
iii. Production of the flue gases (carbon dioxide, sulphur dioxide, nitrogen oxide e.t.c) from petroleum products mainly used in transport, manufacturing and residential sectors.
iv. Burying of radioactive waste materials in ocean deeps contaminates the aquatic environment.

These problems can be mitigated by proper utilization of energy, application of improved but appropriate technology, use of cleaner fuels, use of renewable energy sources, waste recycling and the use of efficient energy conservation measures (Asani, 2013).

Concept of Food Security

Food security refers to the availability of food and access to it. A household is considered food-secure when its members do not live in hunger or fear of starvation. It is a measure of resilience to future disruption or unavailability of critical food supply due to various risk factors such as drought, shipping problems, shortage of energy, economic instability, policy summersault, wars, e.t.c (FAO, 2012).

The World Health Organization (WHO) defines three facets of food security viz;

(i) Food availability; which is having sufficient quantities of the desired food on a consistent basis.
(ii) Food access; which refers to having the required economic and physical resources to obtain appropriate foods for a nutritious diet.
(iii) Food use; which means the appropriate use based on knowledge of basic nutrition and care, as well as adequate water and sanitation.
(iv) The FAO (2006) improved on the three facets listed by the WHO by adding the stability of the three dimensions of food security overtime.

An alternative view may define the concept of food insecurity as referring only to the consequence of inadequate consumption of nutritious food, considering the physiological essence of food by the body as being within the domain of nutrition and health.

Materials and Methods

The study is essentially both descriptive and analytical in nature and therefore relies heavily on field survey and complemented by desk works. However, the study explored both formal and informal sources of information which involved both primary and secondary sources of data. A total of 1485 copies of questionnaire were administered among the residents in the study area. Secondary data include population figures of the local government areas obtained from the National Population Commission (NPC), Ondo State and reports of the existing research works carried out on the area of study.

Out of the eighteen (18) local government areas in Ondo State, four (4) local government areas, which are Ese-Odo, Ilaje, Okitipupa and Irele formed the sampling frame for the study. Ese-Odo and Ilaje Local Government Areas are in the oil-bearing sub-region, while Okitipupa and Irele are in the non-oil producing sub-region. The oil-bearing local government areas are the major focus of the study, purposively selected while the non-oil bearing local government areas were selected based on contiguity (with the oil bearing local government areas). Fifteen communities were randomly selected for data collection for the study.

The total population of the sampled communities (148,574) was the sampling frame and the sample size of 1.0% was selected. 1,485 respondents were therefore selected for questionnaire administration across the sampled units. Although, the number of questionnaire administered varied between the sampled communities, out of 1,485 questionnaires administered, only 1,375 copies (92.6%) were completed and returned. The number of respondents selected for questionnaire administration in each locality was obtained based on its population in relation to the total population of the total population of the fifteen (15) localities in the four (4) selected local government areas. This is as expressed in equ 1:

$$\frac{P_1}{P_2} \times 1{,}485 = n \qquad (1)$$

Where P_1 = Population of each enumeration area (locality)
P_2 = Total population of the fifteen (15) localities selected
n = Number of respondents/questionnaires in each enumeration area (locality)

The study employed both quantitative and qualitative techniques. The study employed both probabilistic and non-probabilistic sampling techniques. Under the probabilistic sampling technique, multi-stage sampling was used. The first stage involves the selection of four local government areas out of eighteen in Ondo State. This is followed by the random selection of fifteen (15) localities within the four local government areas, using balloting system. Individual respondent was selected from each housing unit for administration of questionnaire. Chi-square was used to test the level of significance of the effect of oil mining and production on the environmental elements as it affects food security in the area.

Results and Discussion

This section of the research assesses the effects of crude oil exploration, exploitation and subsequent production on the environment of the study area, both oil producing and non-oil producing sub-regions, as they affect food security. The format used was based on the knowledge of the researcher about the attitude of the people in the area during the reconnaissance survey to the study area. Apart from the frequency count for each of the variables listed, percentages were calculated for the purpose of comparison between the two sub-regions. In order to know the real effects of oil on both physical and socio-economic environment parameters, chi-square test was conducted to ascertain the level of significance of these effects.

Differential Socio – Economic Characteristics of the Respondents

This section discusses the inter-regional differentials of socio-economic characteristics of the respondents. This is particularly to reveal what each of the sub-regions (oil producing and non-oil producing) demonstrates vis-à-vis each of the variables used to measure the socio-economic differentials. Table 1 reveals that, insignificant percentages of the people in both sub-regions have primary education (8.4% in oil producing, 16.1% in non-oil producing); improved secondary education (38.1% in oil producing, 43.3% in non-oil producing). There are more people with tertiary education in the oil producing area (37.25%) than in the non-oil producing area (13.8%). The preponderance of people with secondary education in both areas is also an index of growth and socio-economic development potential. Farming

was the most preferred occupation in the non-oil producing area (34.6%), whereas fishing was the most preferred in the oil producing sub-region, (23.1%). Except in trading, where the non-oil producing area recorded larger percentage than the oil producing, the oil producing had larger number of its people in other occupation categories. Concerning the living standard of the people in the study area, Table 1 revealed that majority are living below average. The statistics revealed that, generally, 52.6% earn between 21,000 and 50,000 Naira per month; but it is fair in the non-oil-bearing sub-region (61.4%) compared to 48.3% in the oil-bearing communities. While only two persons earn above 100,000 Naira in the whole area, and which was found in the oil producing sub-region; 28.8% of the oil producing community, and 14.5% of the non-oil producing population are living in poverty (below 21,000 Naira per month). From the analysis, it can be inferred that, people in the non-oil producing fared better in terms of standard of living.

Table 1: Differential Socio – Economic Characteristics of the Respondents in Oil Producing and Non-Oil Producing Areas

Variables	Oil Producing		Non-Oil Producing		Total	
	Frequency	%	Frequency	%	Frequency	%
Level of Education						
No formal Education	74	8.00	28	6.30	102	7.40
Primary	78	8.40	72	16.10	150	10.90
Secondary	353	38.10	194	43.30	547	39.80
Post-Secondary	75	8.10	92	20.50	167	12.10
Tertiary	345	37.20	62	13.80	407	29.60
Others	2	0.20	0	0.00	2	0.10
Total	**972**	**100.00**	**448**	**100.00**	**1375**	**100.00**
Occupation						
Farming	126	13.60	155	34.60	281	20.40
Fishing	214	23.10	75	16.70	289	21.00
Trading	168	18.10	89	19.90	257	18.70
Professional	120	12.90	33	7.40	153	11.10
Artisan	147	15.90	50	11.20	197	14.30
Civil servant	150	16.20	46	10.30	196	14.30
Others	2	0.20	0	0.00	2	0.10
Total	**927**	**100.00**	**448**	**100.00**	**1375**	**100.00**
Income Level (in Naira)						
10,000 or less	80	8.60	9	2.00	89	6.50
11,000 – 20,000	187	20.20	56	12.50	243	17.70
21,000 – 50,000	447	48.30	275	61.40	722	52.60
51,000 – 75,000	47	5.10	23	5.10	70	5.10
76,000 – 100,000	2	0.20	0	0.00	2	0.10
Above 100,000						
Total	**972**	**100.00**	**448**	**100.00**	**1375**	**100.00**
Size of Household						
1 – 3	126	13.60	78	17.40	204	14.80
4 – 6	671	72.40	283	63.20	954	69.40
7 – 9	118	12.70	81	18.10	199	14.50
10 and above	12	1.30	6	1.30	18	1.30
Total	**927**	**100..00**	**448**	**100.00**	**1375**	**100.00**

Source: Authors' Field Survey, 2020

The reason for the non-oil producing communities giving higher preference to agriculture is that they have fertile agricultural land, being upland communities while the people in Ilaje and Ese-Odo Local Government Areas do not have such land. Their (oil communities) agricultural lands have been taken over by water, and the little that remains have been polluted by toxic wastes from petroleum products. Some of them, who engage in farming, go outside oil-affected lands to farm in other communities. Interaction with many of the fishermen confirmed that they go as far as the Atlantic Ocean to have access to fresh water for commercial/large scale fishing, since their water had been polluted. In an earlier research work, Asani (2013) reported that 99.8% of the people in the oil-bearing communities confirmed that their water had been polluted, which had caused many fishermen both geographical and economic displacement; 84.0% complained of land pollution, which greatly lowered their agricultural productivity and their fishing business and water supply negatively affected.

Table 2 reveals the summation of the physical and socio-economic effects of oil production on the environment as expressed by the respondents. From the views of respondents, as indicated in the oil producing area, it is clear that perception of people reveals negative impact of oil production in the area. The respondents scored negative impacts very high on all the variables except on fishing (40.2%). The percentages of negative perception were above average while the lowest being 78.9% on housing as against the positive perception, which was generally low. The perception was different in the non-oil producing area where the negative perception of the effects of oil production was scored lower than in the oil producing area. It is also revealed that water supply and social security recorded the highest negative response. 93.3% of the people indicated negative effects on water supply and 93.0% on social security as shown in Figure 2. Next to these were the effects on land, which recorded 89.2% negative response, education (86.7%); and health infrastructure (86.5%).

Figure 2: Moribund borehole project depicting poor water supply in the study area
Source: Authors' Field Survey, 2020

In the oil producing sub-region, 84.0% of the respondents affirmed that the effects of oil production on land in their respective areas is negative, compared with a whole 100% in the non-oil producing sub-region who gave positive expression. This cannot be divorced from the fact that since oil is neither mined nor processed on their land, the people in the non-oil producing area could not have considered the effect negative. The chi-square test conducted showed that while the effect of oil on settlement pattern was held constant, it was very significant for land as the P-value is 0.000 with calculated value of 1235.968. Due to the fact that the frequency counts and percentages alone cannot reveal the real impact of oil exploration and production on one variable compared to others, it is pertinent to subject the results to statistical test(s) that would reveal the magnitude of the impact, hence application of chi-square test in order to know the significance of oil production on one variable compared to the others as revealed in Table 3.

Table 2: Differential Effects of Oil Production on the Environment of the Study Area

	Oil Producing				Non-Oil Producing				Total			
	Positive		Negative		Positive		Negative		Positive		Negative	
	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%	Frequency	%
Housing	195	21.10	730	78.90	265	59.80	178	40.20	460	33.60	908	66.40
Land	148	16.00	779	84.00	443	100.00	-	-	148	10.80	1222	89.20
Power Supply	9	1.20	918	99.00	94	21.20	349	78.80	103	7.50	1267	92.50
Water Supply	2	0.20	925	99.80	94	21.20	349	78.80	96	7.00	1274	93.00
Education	2	0.20	925	99.80	180	40.60	263	59.40	182	13.00	1188	86.70
Health	5	0.50	922	99.50	180	40.60	263	59.40	185	13.50	1185	86.50
Farming	191	20.60	736	79.40	351	79.20	92	20.80	542	39.60	828	60.40
Fishing	554	59.80	373	40.20	266	60.00	177	40.00	820	59.90	550	40.10
Commerce	27	2.90	900	97.10	439	99.10	4	0.90	466	34.00	904	66.00
Social Security	6	0.60	921	99.40	86	19.40	357	80.60	92	6.70	1278	93.30
Settlement	-	-	927	100.00	-	-	448	100.00	-	-	1375	100.00

Source: Authors' Field Survey, 2020

Fatusin (2010) asserts that before the coming into operation of Chevron's Oil Mining activities in the area in 1997, good water supply used to be abundant. Women did not have to travel long distance before getting water for their families. Due to oil activities however, many surface water bodies became polluted, some directly from oil spillage and gas flaring, others from hydrocarbon leakage from tankers. A UNDP (2006) report estimates that only 20.0% to 24.0% of rural oil producing communities has access to safe drinking water. This has implications for the general health, environment, economic activities and sustainable livelihood in the oil producing areas (Babatunde, 2010). Gabriel (2004) also documents that in Ondo State oil producing communities, tidal incursions, due to soil erosion (a product of oil exploration hazards) forced women in some villages such as Apata, Awoye, Ojumote and so on to paddle for at least twelve hours into other parts of Ondo and Edo States in search of fresh drinking water as shown in Figure 3.

Figure 3: Paddling canoe to far places in search of drinking water
Source: Authors' Field Survey, 2020

A striking revelation from the analysis is the effect of oil production on commerce. The low level of fishing activities, which is a threat to food security, resulting from environmental hazards has led to low income, low demand for goods and services and ultimately high poverty level. More than 95.0% of the people in the oil producing communities in Ondo State live below poverty line (Tomola, 2008). Also, literature have it that about 95.0% of waste gases (a by-product of oil) from the production field and operation of the refineries are flared. Gas flaring pollutes the air and suppresses plant growth around

flaring sites. In cassava for example, there is decrease in length, weight, starch, protein and ascorbic acid (vitamin C) content (Asani, 2013). This greatly affects agricultural productivity, which is an economic mainstay and major source of food items in the study area. Angela (2007), cited in Zango and Yahya (2020) studied the effects of dredging and canal construction on the environment of the study area and raised the following observations;

i. Accelerated riverbank erosion and bank failure, towns and villages along the routes will disappear.
ii. Accelerated pollution of the water ways resulting from the increase in water traffic.
iii. Loss of fishing livelihood due to the heavy pollution from ships and barges.
iv. Loss of farming livelihood, due to canalization and commandeering of farmlands to dump the dredged-up material along the banks, which consists of high silicate material detrimental to farming in most food crops.
v. Destabilisation of waterways as the river seeks to cope with the overload and re-establish meanders along the altered courses;
vi. Migration of the salt-water marine environment into the freshwater marine environment with the resultant destruction of freshwater ecosystems.
vii. Increased risk of severe flooding due to the increased carrying capacity of the river that is transmitted downstream.
viii. Loss of use of freshwater for drinking purposes due to pollution by heavy-duty oil ships.

These findings, particularly, ii, iii, iv, vi and viii constitute serious threat to food security, both quantitatively and qualitatively.

Measurement of Effects of Oil Production*:* Chi-Square was used to analyse the level of the effects of oil production on the variables considered in this section of the paper. On most of the variables measured as shown in Table 3, the effects of oil production are very significant. The P value is 0.000 for effects on housing, farming, public health, power supply, water supply, social security, education, and lands. However, it is different for fishing, which has p value of 0.921, which shows that the effect is not significant; and on settlement pattern, it is constant. It is a general knowledge that, anything that affects the land, water, farming, even, housing; is a threat to food security. So, generally, the people in the study area are paying the price of hosting the natural resources that is the mainstay of the Nigerian economy.

Table 3: Chi Square Showing Variation in the Effects of Oil Production

Variables	Chi-Square (X^2)	Df	P-Value	Remark
Housing	201.405	1	.000	Significant
Farming	430.914	1	.000	Significant
Fishing	0.010	1	0.921	Not Significant
Power Supply	176.750	1	.000	Significant
Water Supply	202.925	1	.000	Significant
Social Security	168.508	1	.000	Significant
Education	425.040	1	.000	Significant
Settlement				Constant
Commerce	1235.547	1	.000	Significant
Land	862.968	1	.000	Significant
Health	412.519	1	.000	Significant

Source: Authors' Computation, 2020

Conclusion and Recommendation

This paper has been able to establish the link between oil mining and environmental degradation, which leads to infrastructure deficit; with consequent negative effects on food security in the oil producing area of Ondo State, Nigeria. The inference from the chi-square table, particularly the values calculated for land, farming, fishing, water and settlement pattern are a great threat to food security in the study area. The inter-regional analysis summarises that; the effects of oil mining and production on food security is

worse in the oil producing sub-region than in the non-oil producing sub-region. In essence, sustainability of food security is more assured in the non-oil producing sub-region than in the oil producing sub-region; and eventual declining regional development.

The paper therefore recommends integration of oil mining activities, agriculture and environmental management; land reclamation to return mined lands into usable conditions; and intensive pollution abatement in the oil producing sub-region. These will, to a large extent, correct the inequality between the oil producing and non-oil producing local government areas, particularly in the area of food security.

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Annexure
Chi-Square tests of effects of oil production

Effect on Housing

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	201.405[a]	1	.000		
Continuity Correction[b]	199.673	1	.000		
Likelihood Ratio	197.261	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	201.258	1	.000		
N of Valid Cases	1368				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 148.96.

b. Computed only for a 2x2 table

Effect on Farming

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	430.914[a]	1	.000		
Continuity Correction[b]	428.465	1	.000		
Likelihood Ratio	443.392	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	430.599	1	.000		
N of Valid Cases	1370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 175.26.

b. Computed only for a 2x2 table

Effect on Fishing

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	.010[a]	1	.921		
Continuity Correction[b]	.002	1	.967		
Likelihood Ratio	.010	1	.921		
Fisher's Exact Test				.953	.484
Linear-by-Linear Association	.010	1	.921		
N of Valid Cases	1370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 177.85.

b. Computed only for a 2x2 table

Effect on Health

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	412.519[a]	1	.000		
Continuity Correction[b]	409.094	1	.000		
Likelihood Ratio	423.945	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	412.218	1	.000		
N of Valid Cases	1370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 59.82.

b. Computed only for a 2x2 table

Effect on Power Supply

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	176.750[a]	1	.000		
Continuity Correction[b]	173.849	1	.000		
Likelihood Ratio	171.888	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	176.620	1	.000		
N of Valid Cases	1370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 33.31.

b. Computed only for a 2x2 table

Effect on water Supply

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	202.925[a]	1	.000		
Continuity Correction[b]	199.714	1	.000		
Likelihood Ratio	209.014	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	202.777	1	.000		
N of Valid Cases	1370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 31.04.

b. Computed only for a 2x2 table

Effect on Security

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	168.508[a]	1	.000		
Continuity Correction[b]	165.526	1	.000		
Likelihood Ratio	166.127	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	168.385	1	.000		
N of Valid Cases	1370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 29.75.

b. Computed only for a 2x2 table

Effect on Education

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	425.040[a]	1	.000		
Continuity Correction[b]	421.538	1	.000		
Likelihood Ratio	446.393	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	424.729	1	.000		
N of Valid Cases	1370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 58.85.

b. Computed only for a 2x2 table

Effect on Land

	Value	Df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	862.968[a]	1	.000		
Continuity Correction[b]	859.545	1	.000		
Likelihood Ratio	1059.257	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	862.338	1	.000		
N of Valid Cases	1370				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 191.10.

b. Computed only for a 2x2 table