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Opuofoni Captain Ayibakari & Lubo Ebisine, 2022,5 (4):36-49

The Economic Impact of Crude Oil Spill on Cassava Production in Olodiama Clan, Bayelsa State, Nigeria

Opuofoni Captain Ayibakari
Ayibakari9@yahoo.com
08069672646

Lubo Ebisine
Department of Economics, University of Africa, Toru-Orua, Bayelsa State, Nigeria
ebisforreal@yahoo.com
08068357759

Abstract
The study empirically examines the economic impact of crude oil spills on cassava production in Olodiama Clan, Southern Ijaw Local Government Area of Bayelsa State. This research study employed a well-structured questionnaire as the main instrument in collecting data from the one hundred and seventy (170) respondents. In addition, this study employed two approaches in the analysis of data: descriptive and inferential analysis. Appropriate tables and figures were utilized in analyzing the data collected. From the results, it was concluded that oil spillage had given rise to unproductive soil, thereby killing the people's interest in cassava farming and other agricultural activities. It also came to light that the oil spillage had affected the socio-economic activities of the people, thereby causing negative relationship between the oil companies and the host communities in the study area. Furthermore, the results of the regression analyses indicated that crude oil spills had a negative and statistically significant effect on cassava production in consonance with a priori expectations. Based on the results of the findings, some recommendations were made. One of the recommendations is that the government at all levels and oil companies must ensure realistic steps at enacting and enforcing strict environmental laws that will protect the oil pipeline from explosion and as well as guaranteeing the people a better means of livelihood.

Keywords: *Crude Oil Spill, Cassava Production, Economic Activities, Olodiama Clan*

Introduction

Crude oil is defined as petroleum in its natural state. Crude oil can be found in varieties ranging from fluid volatile liquids to viscous semi-solid materials. It also comes in a variety of colours ranging from black or green to light yellow. On the other hand, oil spill is an unintentional release of hydrocarbon into the environment which affect human activities. Oil spillages are usually caused by accidents involving oil tankers, barges, refineries, pipelines and oil storage facilities etc.

In Olodiama Clan which is the case study of this research study, the major cause of oil spill is lack of maintenance of pipelines and pipeline vandalization by militants. Another major cause of oil spill here in Olodiama clan is sabotage or bunkering by some unpatriotic militants. They damage pipelines in an attempt to steal oil from the pipelines. Crude oil exploration has been on the increase since 1956 when crude oil was discovered in commercial quantity in the country (Ahmadu & Egbodion, 2013). Over 90 per cent of Nigeria's economy is attributed to oil exploration. The negative economic impact (oil spill) of the aggressive oil extraction by the multinational corporations like Shell Petroleum Development Corporation, Exxon Mobil, Chevron Oil Company, etc. in the Niger Delta region cannot be overemphasized, in terms of poor crops harvest, aquatic destruction and most especially on human health and well-being.

Inoni, Omotor & Adun (2006) opined that oil exploitation in the Niger Delta Region had negative impact on the soil and environment. According to the Department of Petroleum Resources (DPR)

annual report in 1997 as stated in (Inoni, Omotor & Adun, 2006), over 6000 spills had been recorded in the past 40 years. Accordingly, United Nations Development Programme (UNDP) (2006) reported that more than 70 per cent of the inhabitants of crude oil producing communities depend on the environment for their livelihood. An oil spill is a layer of oil floating on the surface of water or land. Oil spillage is a serious problem in petroleum producing communities. Crude and refined petroleum are accidentally and sometimes intentionally released into water from many sources, but the common sources are: normal off-shore operations of prospecting for and extracting crude oil; release of contaminated wash waters from ships and pipeline; and storage tank leak.

Opukiri & Ibaba (2008) posited that the collapse of local economies, is as a results oil spillages, gas flaring, and other activities of the oil industries which has displaced many from their occupations, without providing viable alternatives. Inhabitants of Olodiama clan in southern Ijaw are not left out of this. The Olodiama Clan in Southern Ijaw Local Government Area comprises of nine communities, and are agrarian communities who are mainly farmers with emphasis on cassava being one of the staple food crops cultivated in the area. Cassava production in the area is in danger of extinction if this menace of crude oil spillages which has remained a problem in the region is not well managed and controlled.

The people of Olodiama Clan are predominantly farmers, especially cassava farming, which is a staple food crop. Unfortunately, farming activities instead of improving are rather declining. Idleness has gradually crept into the lifestyle of the people of Olodiama Clan. This could be due blown outs of oil pipelines and others associated with the activities of oil companies which lead to oil spillages which in turn affected the environment for agricultural activities. Therefore Cassava farming has been relegated to the background, and farmers are reducing in their number day in day out.

The consequences of oil spillage on cassava production, the environment and humans are enormous. Nnabuenyi (2012) observed the negative effects of oil spillage on cassava production and lamented that most of the farmlands are destroyed and rivers polluted leading to the poor yield of cassava; and most cassava farmers are thrown into confusion and joblessness. Chindah and Braide (2000) added that oil spills cause great damage to the oil bearing communities due to the high retention time of oil in the soil occasioned by limited flow. To be specific, one may ask, what is the effect of oil spillage on the production of an important crop such as cassava in the oil producing region of Nigeria such as the Olodiama Clan of Southern Ijaw local government Area of Bayelsa State?

Uche, Owhondah, & Augustine (2011) assert that oil spillage affects plant growth and its yield especially food crops and in extreme cases results in the death of the plant. While the study of Emmanuel, Otutu, & Otuya (2013) showed some level of concentration of lead, cadmium, chromium, and Zinc in most plant leaves and tubers, and in the soil of areas polluted with oil spills which they further stated led to the destruction of the chloroplast and in some cases death. Crude oil reduces the natural protein content by about 40 % which could lead to malnutrition in children, (Ordinioha & Brisibe, 2013). Ahmadu & Egbodion (2013) reported that the major cause of losses in crop production is oil spillage.

The studies by (Uche, Owhondah, & Augustine, 2011, Emmanuel, Otutu, & Otuya 2013) indicates that oil spills affect not just the yield of staple crops but deposit contaminants in the leaves and tubers of crops, such as potatoes and yams in oil-polluted areas. As earlier indicated, the gradual reduction in farming activities in the Olodiama Clan could be as a result of the crude oil spillages which may end up causing internal displacement.

Researchers have severally done works on the impact of oil spill on agriculture in Nigeria such as ThankGod (2014) in Rivers State, Ordinioha and Berisibe (2013) in Delta State, Marrison, Ifeanyi Atuma in Abedei (2012), Delta State, etc. no such work has been carried out in Olodiama Clan. This is the research gap this study intend to fill.

The broad objective of this study is to examine the economic impact of crude oil spill on cassava output in Olodiama Clan in Southern Ijaw LGA of Bayelsa State. The specific objectives are to:

1) Examine the relationship between cassava yields (outputs) and crude oil spills in Olodiama clan.
2) Determine the relationship between crude oil spills and prices of cassava and its by-products (garri and starch) in Olodiama clan.
3) Evaluate the impact of oil spills on outputs of cassava before and after crude oil spills on the study area.

2.0 Literature Review

This section reviewed conceptual framework, theoretical and empirical literatures of other scholars.

2.1 Conceptual Framework

2.1.1 Concept of Cassava

Cassava is the basis of many products, including food. In Africa and Latin America, cassava is mostly used for human consumption, while in Asia and parts of Latin America it is also used commercially for the production of animal feed and starch-based products.

In Africa, cassava provides a basic daily source of dietary energy. Roots are processed into a wide variety of granules, pastes, flours, etc., or consumed freshly boiled or raw. In most of the cassava-growing countries in Africa, the leaves are also consumed as a green vegetable, which provides protein and vitamins A and B. In Southeast Asia and Latin America, cassava has taken on an economic role. Cassava starch is used as a binding agent, in the production of paper and textiles, and as monosodium glutamate, an important flavoring agent in Asian cooking. In Africa, cassava is beginning to be used in partial substitution for wheat flour.

2.1.2 Concept of Crude Oil Spillage

As defined in the background of this work above in chapter one, crude oil is defined as petroleum in its natural state. Crude oil can be found in varieties ranging from fluid volatile liquids to viscous semi-solid materials. It also comes in a variety of colours ranging from black or green to light yellow. It varies considerably in density which ranges from heavy to average or light (Oyibo, 2013).

According to Offiong (2013), crude oil is any oil (other than oil extracted by destructive distillation from coal, bituminous Shales or stratified deposits) won in Nigeria either in its natural state or after the extraction of water, sand or other foreign substances there from but before any such oil has been refined or otherwise treated.

2.3 Theoretical Framework

Three theories are discussed in this work. The theory of Environmental Externality, Integrated Environmental Impact Model for Oil and Chemical Spills and the theory of Agricultural Resource Productivity.

2.3.1 The theory of Environmental Externality

Environmental Externality is the theoretical framework on which this work will be based. Environmental Externalities are damages or benefits which are not paid for by the polluter or beneficiary under normal market condition Iyoha, (2002). Externalities are defined as the costs or benefits which arise when the socio-economic activities or production system of one group of people have a positive or negative impact on another and in which the first group may fail to fully account for their impact. Baumol & Oates (1988).

It is very obvious that every economic or productive activity of man on the environment, including oil and gas prospecting and production, has detrimental effects or externalities on the ecosystem. In effect, every productive enterprise generates externalities/damages to others in the course of their production Helm and Pearce, (1991).

This theory is related to our study because the farmers in Olodiama clan bear the direct cost from the operations of multinationals for which they do not have any direct benefit. The oil companies will destroy their farmlands and crops through oil spill without compensating the farmers in this area.

2.3.2 Integrated Environmental Impact Model for Oil and Chemical Spills

This theory was first propounded by French and Reed in 1996. French and Reed (1996) opined that there is an increasing need for quantitative and objective assessment of environmental impact (injury) and natural resource damage resulting from the release of toxic substances. Accidental spills, chronic releases, and continued contamination from historical dumping all need to be assessed for effective planning and decision making in order to minimize environmental impact and natural damage.

This theory is related to our study in that most of the waste products of crude oil activities (oil spillage, toxic chemicals, gas flaring and pipeline blown-outs) are deposited into our environment which affected the farmland. These waste products continue to contaminate farm proceeds in the areas where they are deposited.

2.3.3 The theory of Agricultural Resource Productivity

This theory was first brought to limelight by Olayide and Heady (1982) described productivity of agricultural resources as the index of the ratio of the value of total farm output to the value of the total farm inputs used in farm production. They accepted the fact that resource productivity is definable in terms of individual input or resource, or in terms of a combination of them, hence, land, capital, labour and management productivity can each be defined as the ratio of total output to inputs of land, labour, capital and management respectively.

This theory is related to our study due to the fact that cassava as one of the farm output and agricultural resource is defined as the index of the ratio of the value of total farm output to the value of the total farm inputs used in farm production.

2.3 Empirical Literature

There are copious empirical works existing on this study, the few related once were reviewed and its gap established which this study tended to bridge.

2.3.1 The Impact of Oil Spillage on Cassava and Crop Production

Ahmadu, and Egbodion (2013), conducted a study on the Effect of oil spillage on cassava production in Niger Delta Region of Nigeria. A random sampling technique was employed to

select 17 cassava farmers each from three (3) oil spilled communities (Otor-Udu, Olomoro and Uzere) and three (3) non-oil spilled communities (Egini, Aradhe and Ellu), giving a total sample size of 102 respondents for the study. The result revealed a significant effect of oil spillage on cassava production perceived by the farmers included crop failure, poor yield, rotting tubers, and stunted crop growth with mean scores of 4.80, 4.78, 4.75 and 4.75 respectively.

Ikemike (2015) conducted a study on environmental impact of oil spillage and degradation in the Niger Delta Region of Nigeria. Oil spillage is one of the greatest environmental problems. Oil bearing communities have been at the receiving end of this environmental problem. The problem has generated a lot of concern within the coastal area of the Niger Delta region which is the home to oil explorations and exploitations in Nigeria. The result revealed that the main sources of oil spill on the Niger Delta are: vandalization of the oil pipelines by the local inhabitants; ageing of the pipelines; cleaning of oil tankers on the high sea.

Ani, Chikaire, Ogueri and Orusha (2015), conducted a research work on effects of oil spillage (pollution) on agricultural production in Delta Central agricultural Zone of Delta State Nigeria. A simple random sampling technique was used to select a sample of 115 respondents for the study. Data collected through questionnaire were analyzed using percentage presented in tables. Result shows that oil spillage /pollution occurred as a result of corrosion of oil pipelines and explosion of oil wells/terminal/stations, giving rise to unproductive soil, reducing the people interest in agricultural activities.

A research work was conducted by Abii and Nwosu (2011), titled the effect of oil spillage on the soil of Eleme in Rivers State of the Niger Delta Area of Nigeria. Sampling site was delimited at each area by the grid technique and soil samples were collected at top surface 0.15cm and sub-surface 130cm depth. The result showed that there was significant decrease in the CaK, P (CEC) as well as a significant increase in the sand fraction and Na content of the oil spill affected soils of (Ogali and Agbonichia) when compared with the non-affected soil of Aleto.
Okoye & Okunrobo (2014) investigated a work on the impact of oil spill on land and water and its health implications in Odu-Gboro Community, Sagamu, Ogun State, Nigeria. It identified the major causes of oil spill in the community; the presence of total petroleum hydrocarbon (TPH) in the environment; it determined the environmental impacts on land and water and it also identified the health implications of oil spill on the residents. Questionnaire, The findings showed that the main cause of oil spill is vandalism.

2.3.2 The Impact of crude oil Pollution and Gas Flaring on Farm Productivity

ThankGod (2014), Carried out a study on crude oil pollution effects on crop farms in Rivers State, Nigeria using stochastic translog production function. Data were collected in the state, using a multi-stage sampling technique. A total of 296 structured questionnaires were administered and retrieved from farmers in crude oil polluted and non-polluted areas of the state were used. This study therefore concluded that crude oil pollution on crop farms reduced crops output significantly, hence, detrimental to crop production in Rivers State, Nigeria.

In a study carried out by Nkwocha and Duru (2010) on micro analytic study on the effect of oil pollution on local plant species and food crops. A total of 43 species distributed into 20 families of plants were recorded at the control sites while 25 species in 10 plant families were enumerated at the polluted sites. The result showed that local plant species were greatly affected at the impacted sites, and the leaves of the two crops contained significant level of the contaminants examined. At the control site the distribution of frequency of plants ranged between 13.5% and 93.4% while the impacted site ranged between <29% and 39%.
Ikenna, Simeon and Oluwadamilola (2016) investigated the impact of oil pollution on livelihood: Evidence from the Niger Delta Region of Nigeria. The result revealed that oil spillage and gas

flaring over the years has been at the heart of environmental degradation in the Niger Delta with an average of about 700 spills recorded annually; while gas flaring has continued unabated in spite of been an illegal activity as prescribed by law. In spite of the report(s) by oil companies that majority of oil spills in the region is due to sabotage; neglect on the part of oil-bearing communities and ageing infrastructure have equally contributed to the high incidence of oil spill and gas flaring as experienced in the region. Oil spillage and gas flaring have continued to impact negatively on the people of the region causing destruction of the environment, while causing significant damage on livelihood of mostly farming and fishing communities.

In a study carried out by Morrison (2012). The study examined the effect of gas flaring on soil and cassava production in Ebedei, Ukwuani LGA, Delta State. For the purpose of data collection, five (5) experimental sites were systematically selected around the flare site in Ebedei and a control site at Obiaruku. The data generated were analyzed using paired t-test analyses. The study revealed that the soil found in Ebedei have a high composition of sand and soil temperature and are acidic.

2.3.3 The Impact of Crude Oil Exploration on Agricultural Productivity

In a study carried out by Yasuo (2006) on the assessment of the effects of oil exploration and production on farming in Bayelsa state, a survey design was adopted. The study covered the entire oil producing communities in Bayelsa state. The sample for the study consisted of 500 farmers which were selected from the oil producing communities, and 40 extension workers from three zones covered by extension agents. Questionnaires were administered to elicit responses from the respondents. The result revealed that crude oil exploration and production activities are the contributing factors affecting soil fertility.

Effere (2014), carried out a study on the impact of oil exploration on agricultural productivity in the east senatorial district of Bayelsa state. The study adopted a survey research design. A structured questionnaire was generated from the literature reviewed and developed for the study. The instrument was face-validated by three experts. The findings from the study revealed that oil exploration has impacted negatively on crop, livestock productivity, forest and aquatic organisms.

Igbatoyo (2004) investigated the effect of petroleum production on agricultural development in Nigeria using the Illaje community of Ondo state as a case study. The study covered the entire Nigerian landscape but special focus and attention was given to the Illaja community in Ondo state. Case study research design was used. The sample for the study consisted of 100 selected respondents from Illaje community. The result revealed that the boom of the petroleum sector has contributed to the poor development of agriculture in Nigeria. It was also discovered that the effect of oil resource extraction on the Nigerian economy has been very poor due to the negative effects of oil spill and has likewise impacted disastrously on the socio-physical environment, massively threatening the peasant agricultural economy and the entire livelihood for the basic survival of the people.

2.4 Literature Gap

Most of the studies reviewed on the effect of crude oil exploration on agricultural activities but not on cassava production in particular except the one by Morrison (2012) who carried out a similar study with a case study of Ebedei community in Ukwuani Local Government Area of Delta State, but his concern was Gas Flaring. Most of the empirical studies that existed adopted descriptive analysis only.

Furthermore, studies on the impact of crude oil spillage on the prices of Cassava and the by-products of cassava such as garri and starch are rare. Therefore, this work is designed to take a

proper insight on how crude oil spills affect the prices of garri and starch which are the main by-products of cassava.

More so, the current study is carried out on the impact of crude oil spill on cassava production in Olodiama Clan, Southern Ijaw Local Government Area of Bayelsa State. In addition, this research work used both descriptive and analytical framework for analysis of data which is a departure from other works.

3.0 Research Methodology

This section described the methodology for conducting the study. The work is presented under the following subheadings: research design, method of data collection, sample size determination, model specification and estimation and method of data analysis.

3.1 Research Design

The study adopted a survey research design. Olaitan, Ali, Eyoh & Sowande (2000), stated that survey research design is the plan, structure and strategy that the investigator wants to adopt in order to obtain solution to research problems and test hypothesis formulated for the study. Survey research design is more appropriate for this study, since the study would collect data through structured questionnaire from the respondents on the impact of oil spill on cassava production.

3.2 Area of the Study

The area of the study is Olodiama Clan of Southern Ijaw local government area of Bayelsa State, which comprises mainly of rural communities namely: (Korokorosei, Olugbobiri, Olugboboro, Tebidaba, Ondewari, Okpotuwari, Ikeinghenbiri, Ikebiri and Umbugbene) which depends mostly on agricultural product as their means of livelihood.

3.3 Data Collection

Data for this study were collected mainly from primary sources. The primary data is obtained by the use of a well-structured questionnaire which would be administered to the cassava farmers drawn from all the communities in the study area. This was done by the researcher using some research assistants.

3.4 Sample Size Determination

Statistics from Agricultural Development Programme (ADP) in Bayelsa State 2016 shows that there were 300 registered farmers in the nine (9) communities that made up the Olodiama Clan. The sample size was obtained using Taro Yamane's formula. Based on the population of cassava farmers, the researcher used a normal confidence level of 95% and the error tolerance of 5% of the population. Sample size therefore is:

$$n = \frac{N}{1+N(e)^2}$$

Where,

n = sample, N = Population size, e = error margin or margin of error and 1 = constant value.

Note that the choice of (0.05) 5% proportion of sampling error is purely an exclusive decision of the researcher. Substituting the figures in the formula, we get the following:

$n = \frac{300}{1+300(0.05)^2}, n = \frac{300}{1+300(0.0025)}, n = \frac{300}{1+0.75}$,n $= \frac{300}{1.75}$

Therefore the sample size is: $n = 171.43$ 170

3.5 Model Specification and Estimation

Based on the theoretical framework drawn, this model used the analytical tool of Ordinary Least Square (OLS) multiple regression analysis technique. The production process according to him follows the following production function:

Q = f (L_s, E), ...(3.1)

Where:

Q = Consumption good produced which in the context of this study is cassava
L_s = Labour supply or input
E = Vector of emissions of pollutants to the environment.

In this regard, the postulated regression models to measure the impact of crude oil spillage on the output of cassava using the adjusted model for this study showing the variables are stated as follows:

LTZ = f (X_1)..... (3.2)
PBC = f(X_1) ……..…..……(3.3)

Linear Function of the two models is stated in equation 3.4 and 3.5

The linear form of the model is given as:

$LTZ = \beta_0 + \beta_1 X_1 + \varepsilon_t$……...……..(3.4)

$PBC = \alpha_0 + \alpha_1 X_1 + \varepsilon_t$……..…..……..(3.5)

Where

LTZ = Outputs of Cassava yield measured as in terms of bags (kg).

PBC = prices of byproduct of cassava (garri and starch) measured in terms of naira)

X_1 = Oil spill dummy (oil spillage = 1; no spillage during cropping season = 0).

The oil spill dummy is included as an index to capture the effect of crude oil spills on cassava production. While the gross margin analysis was used to measure cassava output yield and the price of it by products. The average prevailing market prices of cassava products (garri and starch) was used to derive the relevant monetary values of output and the average prevailing prices of inputs will be used to derive the relevant monetary values of inputs. The costs and returns of cassava production and hence profitability is presented as follows:

$GM = TR \quad TC$ .....(3.6)

Where
GM = Gross Margin (#)
TR = Total Revenue (#) = PQ

TC = Total Cost (#) = Fixed Cost + Variables Cost

3.6 Method of Data Analysis

The data collected were analyzed using tables and percentages, in which descriptive and analytical tool of regression analysis was applied for data analysis. The descriptive analysis method was used to analyze the information collected from the personal interviews and questionnaires. Both descriptive and analytical techniques were used to analyze the information collected from the questionnaire. Objectives (i), (ii) and (iii) were achieved using descriptive statistics. Objectives (i) and (ii) was realized using regression analyses.

Furthermore, each research questions is measured in 4 point scales. The responses are: strongly Agreed (SA), Agreed (A), Disagreed (D) and Strongly Disagreed (SD). Using STATA for the coding, 1, 2, 3 and 4 represents strongly agreed (SA), Agreed (A), Disagreed (D) and strongly disagreed (SD), respectively.

On the other hand, the variables of the regression analysis were coded as 1 for area where crude oil spillage occurs and 0 for where no crude oil spillage occurs during cropping season. While output of cassava which is qualitative variable can either increase or decrease during cropping season due to crude oil spills in the area. We used 0 to represents decrease of cassava outputs during cropping season and 1 for increase of cassava output during cropping season. This is also applicable to prices of the byproduct of cassava which are Garri and starch.

4.0 Data Presentation and Analysis

4.1 Quantitative Data Analysis (Demography)

This section deals with the results of the study. Data was collected from one hundred and seventy (170) respondents in nine (9) communities in Olodiama clan in Southern Ijaw local government area, thereby providing answers for each objective. The presentation and analysis of the quantitative data is largely descriptive, adopting an analytical approach, using frequency count, percentages, tables and graphical approaches. The first aspect of this research questionnaire, Section A deals with the demographic information of the study population. The respondent includes cassava farmers residing in the nine communities of Olodiama Clan, agricultural extension workers and oil company officials of AGIP chosen for the study. Below are the tables showing the results of the data collected.

Table 4.1 Demographic Characteristics of Respondents

Parameter	Frequency (F)	Percentage (%)	Cumm Freq.
Occupational Status			
Farmer	87	51.18	51.18
agric extension agent	46	27.06	78.24
oil company officials	37	21.76	100.00
Total	170	100	
Location/Town			
Korokorosei	35	20.59	20.59
Olugbobiri	35	20.59	41.18
Olugboboro	20	11.76	52.94
Tebidaba	15	8.82	61.76
Ondewari	17	10.00	71.76
Okpotuwari	18	10.59	82.35
Ikeinghenbiri	10	5.88	88.24
Ikibiri	13	7.65	95.88
Umbugbene	7	4.12	100.00
Total	170	100	

Gender/Sex			
Male	87	51.18	51.18
Female	83	48.82	100.00
Total	170	100	
Age of Respondents			
21-30	31	18.24	18.24
31-40	64	37.65	55.88
41-50	39	22.94	78.82
51-60	22	12.94	91.76
61 and above	14	8.24	100
Total	170	100	
Educational Status			
Primary	31	18.24	18.24
Secondary	73	42.94	61.18
Tertiary	34	20.00	81.18
Others	32	18.82	100.00
Total	170	100	
Marital Status			
Single	43	25.29	25.29
Married	80	47.06	72.35
Widowed	47	27.65	100.00
Total	170	100	

Source: Authors' own Computation from Field Survey, 2022. Using STATA 13.0

Table 4.1 revealed that 51.18 percent of the respondents are cassava farmers, 27.06 percent of the total respondents are agricultural extension agents and 21.76 percent of the respondents are oil company officials. From the result majority of the respondents are cassava farmers from the various communities, since the topic in discussion affects the cassava farmers in the study area.

The result also revealed that 20.59 percent of the respondents are from Korokorosei and Olugbobiri, 11. 76 and 8.82 percent from Olugboboro and Tebidaba, 10 and 10.59 percent from Ondewari and Okpotuwari, 5.88 and 7.65 from Ikenghenbiri and Ikibiri. While, 4.12 percent of the respondents is from Umgbugbene. Most of the respondents are selected from Korokorosei and Olugbobiri because they are more populated and most farming activities were carried out in these two communities.

The results further revealed that both male (51.18%) and female (48.82%) are involved in cassava farming in the study area. The reason for participation of both sex in cassava production could be explained by the fact that cassava is a major food crop and also is appreciable source of income in the area of study.

The age of cassava farmers is a major determinant of cassava productivity. Thus, 73.53% of the farmers had ages ranging between 30 and 60 years. Thus, with such an aged agricultural work force, agricultural productivity is bound to be low. Rural-urban migration of able-bodied young men and women, as well as land resource degradation occasioned by incessant oil spills in the area, is implicated in the relatively old age of the farmers.

The level of educational attainment of the respondents is also revealed in table 4.1. A significant proportion of the cassava farmers sampled had formal education of primary and secondary school career (61.18 percent), while 20 percent of the farmers had tertiary education of either BSc or

HND degree. On the whole, about 81.76% of the farmers had some form of formal education. However, a high level of educational attainment may discourage some people from cassava production as such persons may likely crave for white-collar jobs in the city.

Finally, from the data shown in table 4.1 above, it revealed that married people constitute 47.06% of the total respondents, while singles were 25.29%, widows constituted 27.65% respectively. This implies that the majority of the respondents are married individuals in the study area because of the high frequency and percentage gained.

4.2 Quantitative Data Analysis (Inferential)

4.2.1 The Impact of Crude Oil Spills on Cassava Output

Table 4.2 Regression Result for Model 1 (Cassava output dependent variable)

Variables	Coef.	Std. Err.	t	P>t	[95% Conf.	Interval]
OS	-0.528174	.0762488	-4.69	0.001	-.2033467	.0977119
_cons	.630137	.0575963	10.94	0.000	.5164312	.7438428
R-Square = 0.024, F(1, 168) = 0.48. Prob>F = 0.4895. DW = 0.5465						

Source: Authors' own Computation from Field Survey, 2022. Using STATA 13.0

A regression analysis was carried out to examine the relationship between crude oil spills and cassava yield (output) in Olodiama Clan of Southern Ijaw local government. The results of the analysis is presented above in Table 4.2 indicated that the effect of crude oil spill in the area is statistically significant at 5% level. The R-Squared explained about 2% of the variation in the output of cassava is attributed to crude oil spill in the area. Likewise the overall F-ratio test is statistically insignificant. From the result it revealed that crude oil is negatively related to cassava yield. That means increase in the crude oil spill in the area will reduce the output of cassava production in the area. This result also confirmed to the result of the descriptive statistic that crude oil spill affects cassava production negatively in the area. If oil spills increase by 1 unit, cassava yield (output) fall by 0.53 units all things being equal. Furthermore, the Durbin-Watson statistic result revealed that there is presence of autocorrelation problem in the model.

4.2.2 The Impact of Crude Oil Spills on the By-product of Cassava Output (Starch and Garri)

Table 4.3 Regression Result for Model 2

Variables	Coef.	Std. Err.	T	P>t	[95% Conf.	Interval]
OS	.6798475	.0973037	-6.99	0.000	-.8719429	-.487752
_cons	1.164384	.0735006	15.84	0.000	1.01928	1.309487
R-Square = 0.22, F(1, 168) = 48.52. Prob>F = 0.0000. DW = 0.4757						

Source: Computed from Field Survey, 2022. Using STATA 13.0

The impact of crude oil spills on the prices of the byproduct of cassava is presented above in table 4.3. The result revealed that oil spill is positively related to the prices of by-product of cassava output. From the result if oil spill activities increase by 1 unit, prices of garri and starch will rise by 0.6798 units. Furthermore, the result shows that the model is statistically significant at 5 percent. The coefficient of determination (R^2) revealed that the model has a poor fit since the R-Squared is less than 0.50 as the bench mark. That is 22 percent change in the prices of garri and starch are explained by crude oil spills. The overall result is statistically significant since the table value of the F ratio (0.0000) is less than 5%. Likewise, the Durbin-Watson test statistics revealed that there is presence of autocorrelation in the model.

Conclusions and Recommendations

From the study carried out, it was discovered that crude oil spillage has a negative and statistically significant effect on the people of Olodiama Clan of Southern Ijaw LGA, thereby leading to a high rate of environmental degradation in these communities. Both primary and secondary data were obtained from 170 respondents residing in Olodiama Clan. The respondents were drawn randomly from nine villages (Korokorosei, Olugbobiri, Olugboboro, Tebidaba, Ondewari, Okpotuwari, Ikeinghenbiri, Ikebiri and Umbugbene). The results of the study revealed that the indigenes have suffered a lot of negative effects on cassava yield, land productivity and low farm income and degraded forests for over a long period of time.

The result of the study is in line with the theory of environmental externality. This theory is explained the result our study because the farmers in Olodiama clan bear the direct cost from the operations of multinational oil companies for which they do not have any direct benefit. The oil companies will destroy their farmlands and crops through oil spill without adequately compensating the farmers in this area.

The above analysis points to the fact that oil spillages in Olodiama Clan have given rise to unproductive soil, thereby killing the people's interest in cassava farming and other agricultural activities, most especially crop farming or production. Also, the study sought to ascertain to what extent the socio-economic activities of the people of Olodiama Clan are affected by oil spillage. The result further revealed that oil spillage has affected the socio-economic activities of the people, thereby inducing hostile relationships between oil companies and the host communities.

Based on the findings and subsequent discussions, the following recommendations are made to different parties involved in crude oil matters.

1) The multinationals operating in the Olodiama Clan should set up a regulatory body to be called Olodiama Clan oil spill detection and response Agency for the co-ordination and implementation of the safely, timely and appropriate response to disastrous oil pollution in the area.
2) In order to protect and preserve our environment for meaningful farming activities. There should be monthly inspection of crude oil pipelines and facilities by host communities and other relevant agencies to detect and ensure prompt replacement of all worn-out facilities such as pipelines and weak/leaking valves that can provoke spillage.
3) The joint task force such as the Police and the military should be empowered to carry out immediate arrest and prosecution of any person or group of persons involved in crude oil pipeline vandalisation.
4) In other to avoid further destruction of crude oil pipeline by these youths in the area, oil companies should engage in more social investments by training the youth on modern cassava farming and make provision for improved cassava stems for the youths.
5) Community involvement or participation is necessary in matters affecting these host communities. Companies have to ensure that the widest possible consultation of the people who are affected by their operations is drafted in their planning, as well as ensuring that their consultation with the host community is transparent, free and fair.

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