

# An Empirical Investigation on the Effect of Environmental Degradation and Poverty in Nigeria

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**Abstract:-** There is a great controversy over the relationship between “environmental degradation and poverty. While some argue that the causality flows from poverty to environment (i.e. poverty granger cause environmental degradation), others argue that the causality flows from environment to poverty (i.e. environmental degradation granger cause poverty). Given the above controversy the study aimed at examining the relationship between environmental degradation and poverty in Nigeria. The study adopted the econometric technique of data analysis. The data were subjected to unit root testing using the Augmented Dickey Fuller (ADF) test and the result established that the variables are stationary at level. This informed the use of multiple regression analysis technique and the result established that a direct relationship exists between environmental degradation and poverty in Nigeria. A direct relationship also exists between total greenhouse emission and poverty level in Nigeria, while an inverse relationship exists between population growth and poverty in Nigeria. The study therefore concludes that environmental degradation in Nigeria”. To remedy the situation, the following policy recommendations were put forward; carbon dioxide emission should be regulated and environmental laws religiously implemented and defaulting companies’ license withdrawn.

**Keywords:-** Environment, Degradation, Poverty, Population and Emissions.

## I. INTRODUCTION

The critical problems facing cities of the developing world include “deteriorating living conditions, increasing rates of death and diseases caused by pollution and poor sanitation. The environmental and social consequences of urbanization are quite visible. Conversion of environmentally fragile areas to shanty towns by indigent migrants highlights the inextricable relationship between environmental degradation and poverty. Environmental degradation is both a cause and consequence of poverty. The slum is the poster child of urban environmental degradation. Poverty puts pressure on people to engage in unsustainable and environmentally unfriendly practices. In order to address the issues of poverty and sustainability on a global scale, The Millennium Declaration was adopted in September 2000. All the member countries of the United

Nations agreed on a set of international development targets, designed to help create a better world”.

“Oil, being the main stay of the Nigerian economy, plays a vital role in shaping the economic and political destiny of the country (Ajiboye, Jawande & Adisa, 2009). Although Nigeria’s oil industry was founded at the beginning of the century, it was not until the end of the civil war (1967-1970) that the oil industry began to play a prominent role in the economic life of the country (Odularu, 2008). With over 40 billion barrels of proven oil reserves and a daily production of about 2.4 million barrels, the country has become one of the major petroleum exporters in the world (Osuoka, 2007)”.

Ranked as the “6th petroleum giant in the Organisation of Petroleum Exporting Countries (Enemugwem, 2010), its recoverable reserves are estimated at 35 billion barrels (Odularu, 2008). Nigeria generates about 95% of its total revenue from oil and gas exports and has earned over \$400 Billion as oil revenue since the early 70s (Agwu, 2013). In 2006, the Nigerian Government estimated it was earning about \$36 billion each year from the petroleum industry (Muritala, T. A & Taiwo, A. (2011). Despite the vast wealth created by petroleum, the benefits have been slow to trickle down to the majority of the population, who since the 1960s have increasingly abandoned their traditional agricultural practices; for instance, annual production of both cash and food crops dropped significantly in the latter decades of the 20th century: cocoa dropped by 43% (Nigeria was the world’s largest cocoa exporter in 1960); rubber dropped by 29%; cotton dropped by 65% and groundnut dropped by 64%. In spite of the large number of skilled, well-paid Nigerians who have been employed by the oil corporations, the majority of Nigerians and most especially the people of the Niger Delta states and the far north have become poorer since the 1960s (Osungade, 2008). The Nigerian economy has thus become almost entirely dependent on oil, with less emphasis been placed on agriculture and other sectors which, prior to oil discovery, were the main stay of the economy”.

Oil spill is categorised into four groups: “minor, medium, major and disaster (Egberongbe, et al., 2006). The minor spill takes place when the oil discharge is less than 25 barrels in inland waters or less than 250 barrels on land, offshore or coastal waters that does not pose a threat to the public health or welfare. In the case of the medium, the spill

must be 250 barrels or less in the inland water or 250 to 2,500 barrels on land, offshore and coastal water while for the major spill, the discharge to the inland waters is in excess of 250 barrels on land, offshore or coastal waters. The “disaster” refers to any uncontrolled well blow out, pipeline rupture or storage tank failure which poses an imminent threat to the public health or welfare”.

In Nigeria, “50% of oil spills are due to corrosion; 28% to sabotage; and 21% to oil production. Only 1% is due to engineering drills, inability to effectively control wells, machine failures and inadequate care in loading and unloading oil Vessels. Oil spill incidents have occurred in various parts of the coastal areas. Records between 1986 and 2014 alone indicate that 6,817 oil spills occurred in Nigeria, resulting in the loss of approximately three million barrels of oil (UNDP, 2006). This represents an average of 273 oil spills and 115,000 barrels/year spilled during the aforementioned period. Some major spills are the Escravos spill in 1978 of about 300,000 barrels; SPDC’s Forcados Terminal tank in 1978 of about 580,000 barrels; Jesse fire incident in 1998 of about 40,000 barrels”.

In “August and December 2008, two major spills disrupted the lives of approximately 69,000 people living in Bodo, a town in Ogoni land in the Niger Delta. Both spills continued for weeks before they were stopped. Estimates suggest that the volume spilled was as large as the Exxon Valdez spill in Alaska 1989. The most publicised spill in Nigeria occurred in 1980 when a total of 37 million litres got spilled as a result of a blow-out at Funiwa 5 offshore station (). According to DPR, between 1976 and 1996, a total of 4,647 incidents resulted in oil spill of approximately 2,369,470 barrels. Of this quantity, an estimated 1.8 million barrels (about 77%) were lost to the environment. Mobil’s Idaho blows in January, 1999 resulted in spilling 66 of 40,000 barrels of oil (Abosede, 2010). Similarly, Shell reports that it spilled 7,350 barrels of oil between 1989 and 1994; and a total of 221 spills occurred. The amount of oil spilled in Nigeria has been estimated to be around 260,000 barrels per year for the past 50 years according to a report cited in New York Times (Elendu Reports, 2011). Available data indicates that approximately 6%, 25% and 69% respectively of total oil spills were on land, swamp and offshore environment (Galadima, Garba, Leke, Almustapha and Adam, 2011)”.

### Statement of the Problem

Environmental laws and oil multinational companies in Nigeria until recently, “there was no adequate legal and institutional framework by which the problem of environmental degradation could be tackled. The incessant problem of oil spillage, gas flaring and environmental pollution and the resultant destruction of the ecosystem were never given adequate national attention. Nevertheless, there are some latent laws put in place by the Nigerian government to combat the scourge of pollution and related issues. One of these laws is the Petroleum Act of 1969. The Act, among other things, empowers the Commissioner in charge of Petroleum to make regulation on the prevention of pollution of water courses and the atmosphere. The Decree

also required that in accordance with “good oil field practices”, the owner of license and lease takes all practical steps to prevent the escape of petroleum into the water ways and cause little damage as possible to the surface conditions (Balino, 2013)”.

Given the level of “degradation of the environment, rural poverty situation in Nigeria has been persistently high. The incidence of poverty rose from 15% in 1980 to 35% in the urban areas and 40% in the rural areas in 1990 (Muritala, Taiwo and Taiwo, Abayomi, 2011)) which later rose to 43% in 2000s. Between 2001/2014, respective Gini Coefficients of all households in urban and rural Nigeria were 0.394 and 0.379. Corresponding figures for 1998 were 0.520 and 0.510 indicating worsening poverty situation (Ade, 2012). Nigeria like other African countries has a significant number of her populations categorized as poor. Currently, Nigeria ranks 142nd in HDI index worldwide and ranks 40th among world’s poorest countries (World Development Report, 1999). The knowledge that Nigeria is among the world’s poorest countries is not sufficient if the situation in the rural area is not revealed. However, intra country analysis shows that the poverty situation in the rural Nigeria is greater than what obtains in the urban area. Statistics confirms this by showing that 59% of urban households and 70% of rural households are poor. In 1980, 28.3% of the rural population was poor including the moderately poor and core poor. By 1985, the figure rose to 51.4%, though the number of poor in the rural area declined to 46.0% in 2002 and later increased to an alarming rate of 69.8% in 2015”.

The “Associated Gas Re-injection Act Cap 26 (Laws of the Federation, 1980) was another one. The Act compels oil and gas producing companies in Nigeria to submit preliminary programme for gas reinjection. Generally, the above laws have neither been effective in curbing ecological damage caused by oil pollution and gas flaring nor have they been able to prevent activities deleterious to the environment. These laws tend to under estimate the long term problems of environmental damage. Indeed, the laws deal with only measures to prevent pollution while they are silent on the consequences that should follow when pollution occurs (Muritala, Taiwo and Taiwo, Abayomi, 2011)”.

To ensure further reduction of environmental degradation, “a well-articulated policy towards the environment emerged with the enactment of the Harmful Waste (Special Criminal Provision, etc), Decree No. 42 of November, 1988. The Decree prohibits the purchase, sale, importation, transit, transportation and storage of harmful waste in the country. This Decree prescribes life imprisonment for those who contravene its provisions. This legal section was followed a month later by Decree No. 58 of 1988, establishing the Federal Environmental Protection Agency (FEPA). FEPA was charged with the stringent responsibility of protection and development of the environment in general (Massimo, 2014). The FEPA Decree as amended by Decree No. 59 of 1992 accorded the Agency virtually unlimited powers and functions for the protection of the Nigerian environment. The emphatic provisions in

Sections 4 and 5, dealing with functions and responsibilities of the Agency are un-mistaken. It was in the realization of its mandate that FEPA has issued about eight Guidelines and Regulations dealing with different aspects of the Nigerian environment”.

In “May, 1999, the Federal Ministry of Environment was established and FEPA was absorbed into it. The decision to create a full -fledged ministry of environment was informed by the need to bring together all activities within the government machinery that are related to environmental and sustainable development to give environmental matters top priority attention. The new ministry guided by a policy thrust predicated upon Environmental Renewal and Development Initiative (ERDI) was to take full inventory of the nation's resources, assess the level of environmental damage and design and implement restoration measures”.

Despite the above “well -articulated strategies by the government to reduce the degradation of the environment to enhance economic growth, the FEPA Decree which is the boldest and most comprehensive attempt at giving legal teeth to the protection and sustainable development of the Nigerian environment has not fared very well due to an initial baseline ecological audit of the oil-bearing enclave of the Niger Delta without which, it is impossible to monitor the impact of oil and gas exploration and production over time that failed woefully (Ogbonnaya, 2011). It is also worth noting that despite the enormous powers conferred on FEPA, it has not been able to apply legal sanctions on any defaulting oil firms in Nigeria”.

There is a rapidly growing literature on the linkage between “poverty and the environment, yet there is relatively little empirical work linking the variables together in a consistent manner. Leach and Mearns (2012) and Reardon and Vosti (2055) provide two examples of quite wide conceptual frameworks. These authors focus particularly on how local level resource use is influenced by conditioning factors (Reardon and Vosti) or structuring processes (Leach and Mearns). In contrast to such wide frameworks, formal economic models typically focus on the unilateral links from poverty-induced high discount rates or short time horizons to overuse of environmental resources, possibly also with a feedback from a deteriorating resource base to lower income in the future. Again there is no general consensus in the literature as regard the direction of causality between poverty and environment. Mark (2016) stated that the causality flows from poverty to environment, while Blanchard (2017) opined that the direction of flow is environment to poverty. Against the above background, and given the inconsistencies in the literature the study is set to empirically examine if environmental degradation is responsible for the wide-spread of poverty in Nigeria”.

#### **Aim and Objectives of the Study**

The aim of the study is to examine the relationship between environmental degradation and poverty in Nigeria. The specific objectives are to;

- a. Investigate the impact of total green-house emission on poverty in Nigeria.
- b. Examine the effect of carbon dioxide emission on poverty in Nigeria.
- c. Determine the impact of industrial sector emission on poverty in Nigerian.

#### **Research Hypotheses**

- a. The higher the carbon dioxide emission, the higher the poverty level in Nigeria.
- b. The higher the industrial sector emission, the higher the poverty level in Nigeria.
- c. The higher the total green-house emission, the lower the poverty level in Nigeria.

## **II. THEORETICAL LITERATURE REVIEW**

### **Absolute Poverty Theory**

Absolute Poverty, conceptualized in absolute terms, refers “to a state in which an individual or society lacks the necessary resources for subsistence. Obioha (2011) argued that a condition of life where there is malnutrition, illiteracy, diseases, squalid surroundings, high infant mortality, and low life expectancy as to be beneath and reasonable deficiency of human decency is absolute poverty. These mark most African societies, both urban and rural, although what obtains in the rural areas is generally higher in indices. African rural societies especially live in near total deprivation of certain basic necessities of life, including food. There are insights into what poverty situation in dominant agricultural economy are (Ajaka 2016). Their studies revealed that the poor in the agrarian economy live in communities served by bad roads, inadequate water supply, and education and electricity services and have small farm hold and mainly grow food crops for their own consumption. These are lacking in the lives of most African individuals and communities, which translate to a state of absolute poverty. This is so because it involves a judgment of basic human needs and is measured in terms of the resources required to maintain health and physical efficiency. The assumption also is that there are minimum basic needs for all people in all societies”.

### **Relative Poverty**

Quite different from “absolute poverty, relative poverty is on the contrary measured in terms of judgments by members of a particular society of what is considered as reasonable and acceptable standard of living and style of life according to the conditions of the day (Fields, 1988). Individuals in African societies can then be seen as poor when their resources are so seriously below the average, when compared with that of other members of the society. This becomes clearer and obvious when one looks at the poverty situation in urban and rural societies in Africa. The conclusion drawn most often is that rural Africa is relatively poor, or there is relative poverty in rural areas of Africa. It is important to note that anthropologists favour relative definition and conceptualization of poverty because of the methodological bias towards comparison, which is one of the main cruxes of anthropological studies”.

### Structural Poverty

“Structural poverty is a long-term poverty of individuals due to their personal and social circumstances, while conjunctural poverty is temporary poverty into which ordinary self-sufficient people are thrown by crisis or particular circumstances (Iniaghe, Iniaghe and Godswill, 2013). African societies and members suffer from both structural and conjunctural poverty. Structural in the sense that the poverty situation tends to be projected to last for a long time, taking into consideration the debt burden imposed on the society by their rulers and government. The debt overhang is excruciating and seems unending in a short time. Poverty in African societies in this regard is self-inflicted and sustained. On the other hand, African societies could also be seen as suffering from conjunctural poverty. This assertion makes sense if one assumes that African societies have been well off before colonialism, and have been dragged into poverty because of their relationship with western societies. This could be the case because African societies were self-sufficient within their own standard before westernization. The introduction of various colonial policies in the last century and lately the globalization phenomenon stretches African societies into somewhat temporary situation that could be described as poverty, pending when the societies realize their condition, perhaps in the long run. From the foregoing description, rural poverty is a multivariate phenomenon in African societies in which economic and non-economic dimensions and a number of other socio-economic variables are relevant to its identification. The rural poor in Africa form an economically and socially heterogeneous group characterized by landlessness, tenancy, sharecropping, small peasant land holding, landless labourers, artisans’ fishermen, hunters, women and other vulnerable groups (Ogbonnaya, 2011). These characteristics make struggle to survive the more central issue to the life of the rural poor in Africa (Dixon, 1993)”.

### III. EMPIRICAL LITERATURE REVIEW

Numerous studies have been conducted to investigate the relationship between environmental degradation and poverty in Nigeria and economic growth.

Muritala, Taiwo and Abayomi (2011) study attempts to empirically examine “the trends as well as effects of poverty and environmental degradation in Nigeria over the last decades (1970-2008) using econometrics model with Ordinary Least Square (OLS) technique. The paper test for presence of stationary between the variables using Durbin Watson unit root test. The result reveals absence of serial correlation and that all variables incorporated in the model were non-stationary at their levels. In an attempt to establish long-run relationship between poverty and environmental degradation, the result reveals that the variables are co integrated at 5% and 10% critical level. The findings show that there that there is a positive relationship between real poverty and environmental degradation. It could therefore be recommended that government should promote environment+ free, high level degradation to reduce poverty in Nigeria”.

Iniaghe, Iniaghe, and Godswill (2013), regarded the “Niger delta region as the reservoir of oil and gas for exploitation and exploration. Discovered over five decades ago, oil became and has remained the backbone of the Nigerian economy, accounting for over 90% of the country’s foreign exchange revenue. Today, however, despite the enormous resources that are abound in the region; the large revenues accrued from the region have barely touched the Niger Delta region: the region is marked with deprivation, underdevelopment and unemployment, with majority of its people living in poverty. Similarly, the environment is heavily defaced as a result of crude oil spillages during exploitation and transportation and oil leakages from obsolete pipelines with delayed remediation processes. The development of the area has remained a major challenge for the Nigerian State, with local communities expressing their dissatisfaction with Government efforts. Similarly, exploration activities, which have largely been unsustainable, have resulted in deterioration of the region; with marked effects on land degradation, water pollution and loss of mangrove via oil spillages. These effects have subsequently created restiveness among the youths and crisis between the youths of the region and the Nigerian Government. Establishment of spill centres along coastlines, undertaking actions to minimise risk of oil spills, elimination of gas flaring and more importantly, supervision of the conduct of oil companies licensed to explore oil in the region, implementation of development programmes, provision of infrastructure and basic amenities, among others have been noted to bring about sustainable development and stability in the region”.

Ogbonnaya (2011) asserts that “there is no ecological zone which has been so degraded and laid waste than the Niger Delta region of Nigeria. The bounties of nature bestowed on this geographical area have gradually been turned into its instruments of poverty and squalor. The coastal area, mainly the Niger Delta from which much of Nigeria's petroleum is produced is composed of many ecosystems of great economic and social importance, yet the area remains grossly underdeveloped and the people improvised. Studies have shown that the oil producing companies contribute to the degradation of the environment which in turn exacerbates poverty and underdevelopment despite abundant body of environmental laws against such practices. This paper seeks to examine the nature of oil industry - induced environmental crisis and its attendant socio-economic consequences in the Niger Delta. The paper argues that due to the lackadaisical attitude of government towards the enforcement of environmental laws, oil firms have taken undue advantage to perpetuate sub-standard environmental practices. It concludes that there is the need to reassert the enforcement of environmental laws in Nigeria in order to curb the excesses of the oil firms and reduce underdevelopment in the Niger Delta”.

Nwagbara Ucharia, Abia, Uyang and Ejeje (2012) study is a “contribution to the on-going debate on the topical issues of poverty, environmental degradation and sustainable development by highlighting the divergent views

and attempting an explanation of the diversity. Poring through the literature, the authors observed that there are three discernable debaters on the trajectory between poverty, environmental degradation and sustainable development namely: those who argue that the poor (the South) is the major cause of environmental degradation as a result of high population and increased pressure on environmental resources; those who contend that the high consumption propensity of the rich (the North) is the main factor in environmental degradation; and, those who argue that both the rich and the poor, in varying capacities, contribute to the unsustainability of the environment”.

Dang (2013) observed that “there are many socio-economic and environmental challenges associated with living in our environment today. However, successive Nigerian administrations from the colonial era paid little attention to environmental issues. This paper examined the effects of environmental degradation and the risk or threat it poses to sustainable economic development in Nigeria. The paper adopted the theoretical approach in the evaluation of the effects of environmental degradation on Nigeria and its implication for sustainable economic development. The paper posited that a high number of cases of diseases such as cancer, tuberculosis, viral diseases etc. are consequences of environmental pollution which poses great challenge to sustainable economic development among others. Cases of floods, erosions and drastic drop in agricultural output as a result of environmental degradation were also identified. The paper therefore submitted that since our national development policy objective is to achieve rapid economic growth and improvement in individual welfare on a sustainable basis a range of enabling policies, economic instruments and incentives are required to propel this development process in the desired direction”.

Oduwaye and Lawanson (2012) examine “the environmental problems confronting the Lagos Metropolis. The problems are both natural and man-made and can be grouped into physical, sociological and management. After describing the phenomena of poverty and environmental degradation, the paper examines the nature of prevalent environmental problems in the Lagos Metropolis and the causes and consequences. It was discovered that the urban poor play a major part in causing these problems. They are also particularly vulnerable to the consequences of problems. Lagos metropolis is quite far from achieving any of the targets of the Millennium Development Goals. The paper concludes by advancing good urban governance as a

strategy for achieving a sustainable Lagos Mega-city and meeting the targets for the MDG’s”.

**IV. MODEL SPECIFICATION**

**Analytical Framework**

This present research is anchored on the research study carried out by Onwumere, Ibe and Okpara (2012) to investigate the impact of environmental degradation on poverty in Nigeria from 1980-2016. The data used are those of;

- POV = Poverty rate
- POP= Population rate
- GTX= government expenditure

In adopting the above model, we re-specified the model which helped to shape the present study. Thus, the functional relationship in this present study replicates the above model but with major scope and methodological differences and thus is represented as;

$$POV = f(POP, Co_2, TGE, IDE) \tag{1}$$

Where:

- POV = Poverty rate
- POP= Population rate
- Co<sub>2</sub> = Carbon dioxide emission
- TGE = Total green-house emission
- IDE = Industrial sector emission

Accordingly, the econometric form of the model is stated as:

$$POV_t = \beta_0 + \beta_1 POP_t + \beta_2 CO_2 + \beta_3 TGE_t + \beta_4 IDE_t + \mu_t \tag{2}$$

Where

- POV = Poverty rate at time ‘t’
- POP= Population rate at time ‘t’
- Co<sub>2</sub> = Carbon dioxide emission at time ‘t’
- TGE= Total green-house emission at time ‘t’
- IDE = Industrial sector emission at time ‘t’

$\beta_0$  = Constant term.

$\beta_1, \beta_2, \beta_3, \beta_4$  = Parameters to be estimated

**V. DATA PRESENTATION, ANALYSIS, AND DISCUSSION OF RESULTS**

**Diagnostic Tests**

**(a) Correlation Matrix Test**

**Table 4.2: Correlation Matrix Test, 1980 -2016**

	<b>POV</b>	<b>CO<sub>2</sub></b>	<b>POP</b>	<b>TGE</b>	<b>IDE</b>
<b>POV</b>	1.000000	0.074169	-0.015469	-0.021885	-0.011215
<b>CO<sub>2</sub></b>	0.074169	1.000000	-0.096408	-0.264915	0.046540
<b>POP</b>	-0.015469	-0.096408	1.000000	0.357279	-0.090469
<b>TGE</b>	-0.021885	-0.264915	0.357279	1.000000	-0.164730
<b>IDE</b>	-0.011215	0.046540	-0.090469	-0.164730	1.000000

*Source: Author’s computation(E.View9.0)*

“The correlation between CO<sub>2</sub> and poverty variable exhibited a strong positive relationship of about 0.074169 or 74 percent and it is not in line with economic theory since an increase in CO<sub>2</sub> leads to more damages to the environment thereby causing poverty in Nigeria. The correlation between population and poverty is negatively weak and stood at about -0.015469 or 15 percent. This is not in line with economic theory and a-priori expectations. As population increases, poverty decreases in Nigeria. The correlation matrix between total green-house effect and poverty indicates that there is a weak negative correlation of about -0.021885 or 21 percent in absolute term. The relationship is

in not line with economic theory since total green-house emission and poverty has positive relationship from a-priori expectation. The correlation matrix between industrial sector emission and poverty indicates that there is a weak negative correlation of about -0.011215 or 11 percent in absolute term. The relationship is not in line with economic theory since industrial sector emission and poverty has positive relationship from a-priori expectation. The results in terms of correlation show that there is absence of multicollinearity since entire variables were less than 0.80 in their values”.

**Table 4.3: Descriptive Statistics Result**

	CO <sub>2</sub>	POP	TGE	IDE
Mean	5.444118	11.65706	16.18147	40.75059
Median	1.335000	7.210000	13.64000	27.15500
Maximum	100.0000	88.79000	173.9500	96.90000
Minimum	0.400000	0.380000	0.180000	11.91000
Std. Dev.	16.89994	15.78882	29.01141	29.23707
Skewness	2.374324	3.726484	2.905356	1.838722
Kurtosis	2.459980	2.341638	1.32843	2.138918
Jarque-Bera	2.034821	2.583541	3.748459	5.402676
Probability	0.387652	0.7289503	0.093846	0.067116
Sum	13.51387	23.53400	59.01734	34,82520
Sum Sq. Dev.	9425.062	8226.466	27774.83	28208.60
Observations	34	34	34	34

*Source: Author’s computation (E-View 9.0)*

A “critical look at Table 4.3 shows that the mean values for all the variables are 5.444118 percent for CO<sub>2</sub>, 11.65706 percent for population, 16.18147 percent for total green-house and 40.75059 percent for industrial sector emission for between 1980 to 2016. The median values for all the variables are 1.335000 percent for CO<sub>2</sub>, 7.210000 percent for population, 13.640000 percent for total green-house and 27.15500 percent for industrial sector emission between 1980 to 2016 respectively. The median is known as a measure of the centre of distribution

and very less sensitive to outliers than the mean. The maximum values for all the variables are 100.0000 percent for CO<sub>2</sub>, 88.79000 percent for population, 173.9500 per cent for total green-house and 96.90000 percent for industrial sector emission between 1980 to 2016 respectively. The standard deviation shows the level of volatility in the variables. It displays the rate at which each variable deviates from the mean value. Industrial sector emission is the most volatile at 29.23707 while population rate with the value of 15.78882 is the less volatile”.

**Table 4.4: Unit Root Test Result (ADF)**

Augmented -Dickey Fuller Test							
Variables	Levels			First difference			Order of integration
	ADF Stat	Test critical value (5%)	Remark	ADF Stat	Test critical value (5%)	Remark	
				<b>-5.967750</b>	<b>-3.540328</b>		
POV	-9.792460	-3.544284	S	-3.965373	-3.690814	S	1(0)
CO <sub>2</sub>	-7.075842	-3.673616	S	-3.965373	-3.690814	S	1(0)
IDE	-8.191575	-3.759743	S	-2.438640	-3.828975	S	1(0)
POP	-5.439616	-3.595026	S	-4.042714	-3.557759	S	1(0)
TGE	-5.314070	-3.557759	S	-9.759024	-3.568379	S	1(0)

Note: the ADF tests for H<sub>0</sub>X<sub>t</sub> as 1(1) against H<sub>1</sub>X<sub>t</sub> as 1(0)

Source: Authors’ computation (E.view 9.0)

Note: (1) NS = Non – stationary  
(2) S = Stationary

From Table 4.4 above, “the variables were integrated of the same order 1(0), using the ADF test to determine the time series properties of the model. It was ascertained that

the ADF test statistics is greater than 5 percent critical value. All the variables were stationary at levels and even stationary at their first differences. All the variables in the

model are homogeneous of order 1(0) thereby fostering the problem of spurious regression associated with time series

data. In order words, the variables could be co-integrated”.

**Table 4.5 Unit Root Test Result (P-P)**

P-P Test							
Variables	Levels			First difference			Order of integration
	P-P Stat	Test critical value (5%)	Remark	P-P Stat	Test critical value (5%)	Remark	
Pov	-5.968092	-3.540328	S	-35.35006	-3.544284	S	1(0)
CO2	-5.606303	-3.548490	S	-5.606303	-3.548490	S	1(0)
IDE	-5.751858	-3.557759	S	-17.51246	-3.574244	S	1(0)
POP	-5.914582	-3.548490	S	-4.166563	-3.557759	S	1(0)
TGE	-5.311927	-3.557759	S	-33.04626	-3.568379	S	1(0)

**Note: the PP tests for H<sub>0</sub>Xt as 1(1) against H<sub>1</sub>Xt as 1(0)**

**Source: Authors’ computation (E-view 9.0)**

**Note: (1) NS = Non – stationary**

**(2) S = Stationary**

From “Table 4.5, the P-P test unit root procedure is used to confirm the presence or absence of unit root in the model. This was carried out to determine the time series properties of the model. The results indicate that the P-P statistics is greater than the 5 percent test critical values. The variables from the estimated result were integrated of the same order 1(0). The variables in the model were became

stationary at levels and even stationary at their first differences and are therefore homogeneous of order 1(0). This helped in eliminating the problem of spurious regression often associated with time series data. In order words, the variables could be co-integrated. To ascertain this, we apply the Johansen Co-integration procedure”.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-3.389339	1.062703	-3.189356	0.0032
LOG(CO2)	0.021148	0.164391	2.128645	0.0084
LOG(IDE)	-0.071295	0.131389	-0.542628	0.5911
LOG(POP)	1.050893	0.271097	3.876450	0.0005
LOG(TGE)	0.345412	0.104891	3.293059	0.0024
R-squared	0.762014	Mean dependent var		0.594642
Adjusted R-squared	0.594766	S.D. dependent var		1.230707
S.E. of regression	0.957450	Akaike info criterion		2.876003
Sum squared resid	29.33477	Schwarz criterion		3.093694
Log likelihood	-48.20605	Hannan-Quinn criter.		2.952749
F-statistic	6.870285	Durbin-Watson stat		2.239071
Prob(F-statistic)	0.000413			

**Source: Author Computation (E-View 9.0)**

The “adjusted R<sup>2</sup> value is 0.594766. The systematic variation in the dependent variable is about 60 percent and it is explained by the independent variables. The remaining 40percent are captured by the error term.The log of carbon dioxide emission ( CO<sub>2</sub>) coefficient is 0.02, which implies a positive and significant relationship exist between carbon dioxide and poverty in Nigeria. A percentage increase in CO<sub>2</sub> will result to 0.02percent increase in poverty level. This is line with apriori expectation. Given the above result the null hypothesis is rejected and the alternative retained giving the probability value of 0.0084. The reason of this may be that the inhaling of carbon dioxide from the atmosphere causes cardiac diseases, which affect negatively the health

of the people. This health problem affects negatively the productivity of the people thereby giving rise to poverty.The coefficient of industrial sector emission IDE is -0.071 is negative but not significant giving its probability value of 0.8911.Thus, the null hypothesis is retained and the alternative hypothesis rejected.The coefficient of population (pop) is 1.05 and it is statistically significant confirming the theoretical expectation. This implies a positive and significant relationship exist between population and poverty in Nigeria. This implies that a percentage increase in population all things being equal will result in 1.05 per cent increase in poverty level in Nigeria. The implication is that an increase in population all things being equal implies

more mouth to feed and this will affect the rate of savings in the economy. This will in turn affect the level of productivity adversely and by extension increase the level of poverty in the country. The coefficient of total green house emission (TGE) is 0.35 and statistically significant giving the probability value of 0.002. This shows that a direct relationship exist between TGE emission and poverty in Nigeria. A percentage increase in total green house emission will result in 0.35 percent increase in poverty level in Nigeria all things being equal. This may be because the green house emission affects the soil fertility and by extension its productivity which in turn affect the poverty level in the country”.

**Structural Stability of the Model**

The model from the CUSUM and CUSUM Sum of Square indicates that the model is structurally stable over the periods of the investigation as can be seen below:

Fig 1

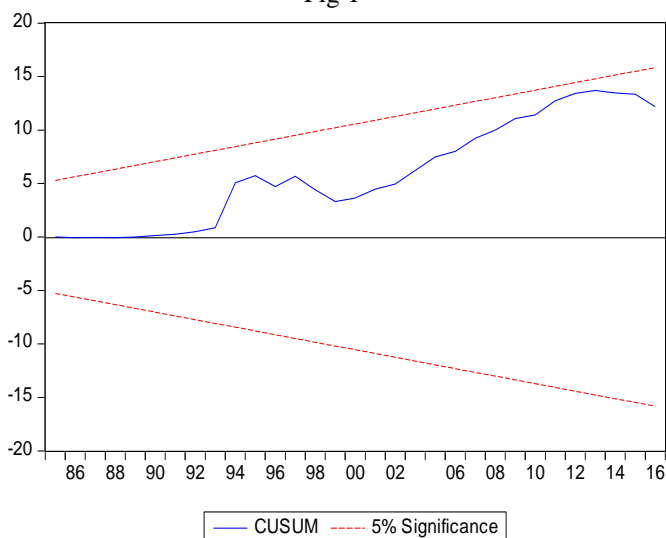
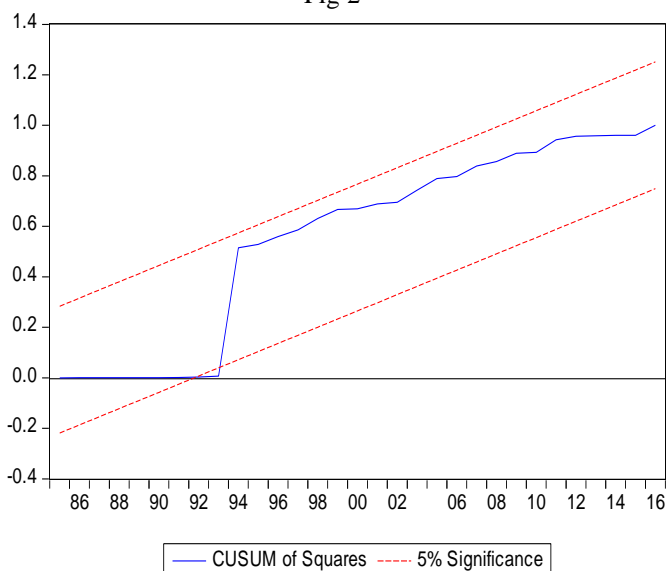


Fig 2



**VI. CONCLUSION**

The study employed “the ordinary least square (OLS) estimation techniques to examine the effect of environmental degradation and poverty using data from 1980 to 2016. The empirical analysis from the model indicated that only POP and TGE variables are key environmental factors while CO<sub>2</sub> and IDE were not significant explanatory factors impacting on the poverty in Nigeria. The result shows that these variables could significantly bring about improvement in Nigeria in the long-run given the result. Again, there is stability in model using the CUSUM and CUSUM of Square test for structural stability. The outcome from the model is amenable for policy formulation and implementation in the period of the review”.

**RECOMMENDATIONS FOR POLICY**

In the light of the empirical evidence, the following recommendations for policy consideration and formulation are given;

- a) Carbon dioxide emission should be controlled by the regulatory agency responsible for its control since it is inimical to health and consequently surges poverty.
- b) Considering that result indicated a positive relationship between Total green-house effects as increasing poverty, responsible government agencies should step up actions and policies to reduce it emissions.
- c) Nigeria has high industrial emissions and putting relevant laws to control it will save the environment and hence reduce poverty.
- d) Overall, population law aimed at controlling it and monitoring mechanism to ensure no family gives birth to more than four children should be enshrined in the laws of the land. Penalty and higher taxes should be levied on those who default the order.

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