

**ENVIRONMENTAL QUALITY DEPLETION BY ANTHROPOGENIC ACTIVITIES IN NIGERIA: FOCUS ON CARBONDIOXIDE (CO<sub>2</sub>) EMISSIONS (1980- 2022)**

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**Abstract**

*The study analyzed the effect of anthropogenic activities on environmental quality in Nigeria with emphasis on Carbondioxide (CO<sub>2</sub>) emissions. The study adopted a historical research design using time series data spanning from 1980 to 2022. Data for this study were analyzed using Augmented Dickey Fuller (ADF) test for stationarity and Vector Error Correction Model (VECM). The result of the Augmented Dickey Fuller (ADF) showed that all the variables were not stationary at level. The result of VECM indicated that in the long run, a percentage increase in Agricultural Gross Domestic Product, fossil fuel consumption, ecological foot print, urbanization and population will increase Carbon dioxide emission by 3.1%, 15.32%, 53.84%, 62.46% and 15.42%, respectively. The study concluded that the specific impacts of agricultural GDP, fossil fuel consumption, ecological footprint, population, and urbanization underscore the complexity of the relationship between human activities and environmental outcomes. The study therefore recommended that efforts should be made by Government and other environmental stakeholders to promote environmental education and awareness campaigns to inform the public about the impact of anthropologic activities on environmental quality.*

**Keywords:** Anthropogenic, Environmental Quality, Carbon emissions,

**Introduction**

The ecosystem encompasses all living things (animals, plants and microorganisms) and non-living things (earth, climate, soil, sun, weather, and atmosphere). All these components make up the environment, and they are critical for the natural and normal functions of all the activities on the planet. In short, they are the foundations of the ecosphere and influence the health of all the systems on earth (Rinkesh, 2023). Due to this intricacy and interconnectedness, any activity that distorts the natural balance of these components affects the ecosystem. Anthropogenic activities top the list as there are numerous human actions affecting this balance, they include deforestation, overpopulation and overconsumption, plastic production, emission of carbon dioxide and other greenhouse gases, destruction of the reefs and production of black carbon.

According to Sahmey, 2020, human impact or anthropogenic impact on the environment

includes changes to biophysical environments and ecosystems, biodiversity, and natural resources caused directly or indirectly by humans, including global warming and environmental degradation. The consequences of altering the environment to meet societal demands are dire and get worse as the issue of human overpopulation persists.

Human reproduction, excessive consumption, over-exploitation, pollution, and deforestation are a few out of many human activities that harm the ecosystem globally, either directly or indirectly. Overpopulation is the root cause of several of the issues, such as biodiversity loss and global warming, which endanger humankind (Perkins, 2017). Soil degradation, poor air quality, undrinkable water, and climate change have all been brought on by these activities. Both natural and anthropogenic processes contribute to the high levels of organic pollutants or chemicals, including pesticides, solvents, halogenated compounds, petroleum hydrocarbons, and

phthalate esters, that contaminate soil and aquatic habitats. These activities contribute to high carbon dioxide emissions to the atmosphere.

Carbon dioxide (CO<sub>2</sub>) also known as carbon iv oxide, is one of the most significant greenhouse gases (GHGs) contributing to global warming. While it is not the most potent GHG per molecule (compared to methane or nitrous oxide), CO<sub>2</sub> is the most abundant anthropogenic GHG and accounts for the largest (66%) share of radiative forcing from human activities (IPCC, 2021) and accounts for about 76–80% of global greenhouse gas emissions from human activities. This includes approximately 74% from fossil fuel combustion and industrial processes and 6% from land use change (e.g., deforestation). It has a very long atmospheric lifetime (a portion can remain for hundreds to thousands of years), making its long-term impact much greater. Despite a lower per-molecule potency, its high concentration and long lifetime makes it the main driver of climate change (Archer, 2005).

According to Adeyanju *et al.*, 2020, anthropogenic activities, primarily the burning of fossil fuels such as coal, oil, and natural gas, are the dominant sources of carbon dioxide (CO<sub>2</sub>) emissions contributing to climate change. However, agriculture, natural resources, and fossil fuels account for a substantial portion of the economies of African nations. A major contributor to man-made global warming, farming and food production have been connected to emissions of CO<sub>2</sub> (Zwane *et al.*, 2023), Increased use of fossil fuels, deforestation, bush burning, livestock grazing, and construction have all been linked to the increase in CO<sub>2</sub> concentrations in the atmosphere (Raihan *et al.*, 2022). According to reports, most African nations' carbon emissions rise as their economies grow (Alaganthiran & Anaba, 2022). This suggests that trash production, agriculture, and the use of fossil fuels are all expected to grow in African nations as their populations rise, which will ultimately lead to increasing greenhouse gas emissions. As a result, there is concern that emissions from Africa might rise sharply.

Even though Nigeria has the largest economy in Africa (Jabaru & Jimoh, 2020; Orji *et al.*, 2021),

with 3.6% annual economic growth (AfDB, 2022) and over half of GDP coming from the primary sector, the growing negative effects of environmental degradation throughout its territory have prompted efforts to find alternative development paths, particularly in reducing CO<sub>2</sub> and other greenhouse gas emissions. The direct reduction of CO<sub>2</sub> emissions caused by human activities and the encouragement of sinks are two examples of mitigation efforts that are crucial for lowering long-term impacts of environmental degradation. Thus, it is necessary to modify emerging corridors in order to achieve the complex aim of harmonising development and climate requirements (Caotano *et al.*, 2020). Therefore, it is still desirable to investigate how human activities impacts on the environment in Nigeria in order to design national development programmes that would include development goals with mitigation of environmental degradation caused by humans for sustainable development.

Anthropogenic practices have been mentioned as one major constraint to improved agricultural activities and household welfare in Nigeria as observed by Adewuyi (2012) in “recent Consequences of Land Degradation on Farmland in the Peri-Urban Area of Kaduna Metropolis, Nigeria”. Bako (2021), estimated the 'effect of anthropogenic activities practices on Agricultural activities in part of Bwari, Area council Abuja, Nigeria. Ignatius (2008) estimated the impacts of anthropogenic factors on the environment in Nigeria. However, these studies failed to explain the long run effects of anthropogenic activities on the environment. Hence, this study was designed to analyze the current relationship between anthropogenic activities and environmental quality depletion using carbon dioxide in Nigeria. Specifically, the study aimed at analyzing the effect of anthropogenic activities on Carbon dioxide emissions in Nigeria. While the tested hypothesis was that anthropogenic activities have no significant effect on Carbon dioxide emissions in the study area.

### **Theoretical Framework**

The Anthropogenic Global Warming (AGW) hypothesis and the standard theory of externalities are the two major theories that are

linked in this study. The UK Meteorological Office (1998) terms the AGW hypothesis as the first theory of climate change, which contends that human emissions of greenhouse gases are causing a catastrophic rise in global temperatures. The link is conveyed through the enhanced greenhouse effect where sun travels through space and reaches the earth. The earth's atmosphere is mostly transparent to the incoming sunlight, allowing it to reach the planet's surface where some of it is absorbed and some is reflected back as heat into the atmosphere. Certain gases in the atmosphere, called "green-house gases," absorb the outgoing reflected or internal thermal radiation, resulting in earth's atmosphere becoming warmer than it otherwise might be. Water vapor is the major greenhouse gas, responsible for about 36-90% of the greenhouse effect, followed by CO<sub>2</sub>, methane, and ozone (UK Met Office, 1998). The theory directly linked human emissions of CO<sub>2</sub> as responsible for the build-up of CO<sub>2</sub> in the atmosphere. For Sabine *et al.*, (2004), there seemed to be a correlation between emissions and CO<sub>2</sub> concentration, and the isotopic carbon ratio indicates that about half of the emissions are still stored in the atmosphere, with the rest having been mostly up taken by the oceans and other water bodies.

Standard theory of externality assumes that climate change involves externality. Thus, the emission of greenhouse gases causes damages to other economic agents for which they are not compensated by the agent responsible for the emission. The standard theory of externalities points to one of taxation of the emitter equivalent to marginal social cost of the externalities generated by it (Ogbuabor & Egwuchukwu, 2017). This theory is associated to emissions trading which is a market-based approach to controlling pollution. Consequently, by creating tradable pollution permits, it attempts to add the profit motive as an incentive for good performance, unlike traditional environmental regulation based solely on the threat of penalties.

At interfaces of change, ecosystems are likely to experience stress and this reflects in some of degradation. These stresses make the ecosystems unhealthy, unstable and unsustainable. This was

described by Rapport *et al.*, (1985) as the ecosystem distress syndrome (EDs). The authors observed that distressed system have disrupted functions. By identifying causes of the stress, recommendation for restoration and conservation can be made. To do this requires the adoption of a framework that integrates all factors like biophysical, social and economic factors driving natural resources use.

## Research Methodology

### Study Area

The study area was Nigeria. Nigeria is a West African country lying between longitudes 3<sup>0</sup>E and 15<sup>0</sup>E and latitudes 4<sup>0</sup> and 14<sup>0</sup>N. With a population growth rate of 2.6%, Nigeria has an estimated population of about 210.87 million in 2021 (Statista, 2023). It is situated in the Gulf of Guinea and it is bordered by Benin Republic to the West, Republic of Cameroon and Chad to the East and Niger Republic to the North. The lower course of the Niger River flows southward part of the country in the Gulf of Guinea, with Swamps and Mangrove Forest bordering the Southern part (Oyinbo & Rekwot, 2013). The country has a total area of 923,768 square kilometers with land occupying 910,768 square kilometers and water occupying 13,000 square kilometers (Oyinbo & Rekwot, 2013).

Nigeria has a tropical climate with two distinct seasons; the dry and the wet seasons. It comprises the following ecological Zones: Mangrove Swamp, Rainforest, Guinea Savannah, Sudan Savannah and Sahel Savannah. Its terrain is divided into the South lowlands merging into Central hills and Plateau, mountains in the south and plains in the North. There are arable crops which occupy 33.02 percent of the total land cover; permanent crops occupy 3.14 percent, while others occupy 63.84 percent. Above 70 percent of Nigeria's population is engaged in agriculture. The major agricultural crops produced in the country include cocoa, cotton, palm-oil, maize, rice, sorghum, millet, groundnut, cassava, yam and rubber. The major livestock reared are cattle, sheep, goat, pig, and poultry. The country is endowed with natural resources like natural gas, petroleum, tin ore, coal, limestone, lead and zinc, among others.

### Methods of Data Collection and Analytical Technique

Data for this study were obtained from secondary sources. The data were obtained from Food and Agriculture Organization Statistics (FAOSTAT) and World Bank database. Data were collected on the following variables: population, agricultural GDP, ecological footprint, urbanization, fossil fuel consumption, carbon dioxide emissions. Data for this study were analyzed using Augmented Dickey Fuller (ADF) and Vector Error Correction Model (VEM).

### Model Specification

#### Augmented Dickey Fuller (ADF)

Following Oyinbo and Rekwot (2013) the Augmented Dickey Fuller (ADF) model with the constant term and trend can be specified as follows:

$$\Delta Y_t = \alpha_0 + \alpha_1 t + \beta Y_{t-1} + \sum_{i=1}^p \delta_i \Delta Y_{t-i} + \varepsilon_1$$

----- (1)

Where:

$Y$  is the value of the population, agricultural GDP, ecological footprint, urbanization, fossil fuel consumption, carbon dioxide emissions, ammonia emission, biocapacity and biocapacity reserve.

$\alpha_0$  is the constant

$\alpha_1$  is the coefficient of the trend series

$p$  is the lag order of the autoregressive process

$Y_{t-i}$  is the lag value of order one of  $Y_{t-i}$  and

$\varepsilon_1$  is the error term.

Vector Error Correction Model (VECM)

The vector error correction model was used to model the influence between non stationary I (1) variables with evidence of long run relationship.

The relationship between these variables can be described as:

$$\ln \text{CO}_2t-1 = \beta_0 + \beta_1 \text{Popt-1} + \beta_2 \text{Agdpt-1} + \beta_3 \text{Ubt-1} + \beta_4 \text{Ffc t-1} + \beta_5 \text{Ecft-1} + \Theta \text{ECM}4t + \mu t \dots\dots (2)$$

Where:

$\text{CO}_2t-1$  = Carbondioxide Emissions

$\text{Popt-1}$  = Population

$\text{Agdpt-1}$  = Agricultural GDP

$\text{Ubt-1}$  = Urbanization

$\text{Ffct-1}$  = Fossil fuel consumption

$\text{Ecft-1}$  = Ecological foot print

$\Theta \text{ECM}t$  = error correction term

$\mu t$  = error term

### Results and Discussion

#### Unit root test

Preliminary investigations to ensure stability of time series data on anthropogenic activities and environmental quality was carried out using Augmented Dickey Fuller (ADF) test to determine the presence of unit root, that is to ascertain if the variables are stationary (Table 1). ADF was preferred to test for unit root because includes lagged differences of the time series to correct for serial correlation in the error terms. This makes it more robust than the original Dickey-Fuller test, which assumes no autocorrelation. The result showed that all the variables are not stationary at level. This indicated that they have a random walk (unit root) meaning that their future values do not converge from their past values. A further test at first difference of the entire variables rejected the null hypothesis at 1% as the values of ADF t-statistic are greater in absolute term than the critical values. It is therefore concluded that the series are integrated of order I(1) meaning that the variables are stationary at first difference except urbanization that was stationary on second difference.

**Table 1: Result of unit root test**

Variable	Level		First Difference		
	ADF	Prob.	ADF	Prob.	Inference
Agric GDP	-1.9688	0.2988	-6.9058***	0.0000	I(1)
CO <sub>2</sub> Share	-1.8504	0.3515	-6.3491***	0.0000	I(1)
FFC	-2.9310	0.0507	-6.4894***	0.0000	I(1)
EFP	-0.8241	0.8010	-3.5409**	0.0121	I(1)
Pop	-1.6853	0.4304	-5.7338***	0.0000	I(1)
Urbanization	-1.3464	0.5982	-2.3817	0.1533	I(1)
			-4.2603***	0.0018	I(2)

\*\*\* and \*\* Significant at 1% and 5% respectively

Agric GDP = Agricultural Gross Domestic Product, FFC = Fossil Fuel Consumption; EFP= Ecological Foot Print; Pop = Population

**Source:** Author's computation (2023)

### Effect of anthropogenic activities on environmental quality

The result of the effects of anthropogenic activities on environmental quality is presented in Table 2. The Vector Error Correction model shows the short run and long run influence of anthropogenic activities on environmental quality in Nigeria. The result showed that the coefficient of determinant ( $R^2$ ) was 0.6908 indicating that 69% of the variation in environmental quality was explained by anthropogenic activities (population, agricultural GDP, ecological footprint, urbanization and fossil fuel consumption) during the period under review.

The result of VECM as shown in Table 2 indicated that in the long run agricultural GDP, ecological footprint, fossil fuel consumption, urbanization and population significantly influenced environmental quality over the period under review. The result of the study indicated an F statistics value of 2.628 which was statistically significant at 1% level. This showed the overall significance of model. Therefore, the null hypothesis which stipulated that there is no significant influence of anthropogenic activities on environmental quality in the study area is hereby rejected. This is consistent with the findings by Natalia *et al.*, (2023) who reported that human (anthropogenic) activity has a negative impact on nature, including biological diversity, climate, water resources, soils and other ecosystems. This affects the lives of not only animals and plants, but also people, since environmental problems can negatively affect human health, the economy and the social sphere.

The coefficient of agricultural GDP (0.31299) was positive and significant at 1% level. This implies that a unit increase in agricultural GDP will increase carbon dioxide emissions by 3.1%. This can be attributed to the fact that expansion of agricultural activities often involves increased production, which may lead to intensified farming practices. This can involve greater use of machinery, fertilizers, and other inputs, all of which can contribute to higher carbon dioxide emissions and hence affect environmental quality. Egboka *et al.*, (2022) reported that bush clearing and burning for intensive agricultural practices and food production and hunting of animals are commonplace thereby exposing/rendering the lands and the total environment open to the vagaries of the hostile/inclement weather

The coefficient of fossil fuel consumption (1.532) was positive and significant at 5% level. This implies that a unit increase in fossil fuel consumption will increase carbon dioxide emissions by 15.32%. This finding aligns with the well-established understanding that the combustion of fossil fuels, such as coal, oil, and natural gas, is a primary source of carbon dioxide emissions. The positive sign of the coefficient signifies that as fossil fuel consumption rises, so does the release of carbon dioxide into the atmosphere. Karachurina, *et al.* (2023) reported that anthropogenic activities such as fossil fuel consumption affects the lives of not only animals and plants, but also people, since environmental

problems can negatively affect human health, the economy and the social sphere.

The coefficient of ecological footprint (5.384) was positive and significant at 1% level. This implies that a unit increase in ecological footprint will increase carbon dioxide emissions by 53.84%. This can be attributed to the fact that a higher ecological footprint may signify resource-intensive practices, such as excessive water or energy use, which could contribute to elevated carbon dioxide emissions. Muhammad *et al.*, (2021) posited that emissions of industrial and motor vehicle emissions, discharges of industrial effluents and waste, the use of pesticides and herbicides on earth can pollute the environment and pose a threat to human and animal health.

The coefficient of population (1.542) was positive and significant at 1% level. This implies that a unit increase in population will increase carbon dioxide emissions by 15.42%. This can be attributed to the fact that a growing population often leads to increased demand for goods and services, which may result in higher industrial production, energy consumption, and overall carbon dioxide emissions. Illegal and poorly-controlled migration of aliens across the borders, increased and unmanageable population of humans and animals have precipitated serious environmental and insecurity problems nationwide (Egboka *et al.*, 2022).

Also, the coefficient of urbanization (-6.246) was negative and significant at 1% level. This implies that a unit increase in urbanization will decrease carbon dioxide emissions by 62.46%. However, this is not in line with apriori expectation as increase in urbanization is expected to bring about an increase in carbon dioxide emissions. This finding is synonymous with results obtained by Ignatius (2008) who reported that urbanization had a negative elasticity with environmental quality and reduces the effect of the impact. This is particularly when cities are designed with sustainability in mind. Although there are drawbacks to urbanization, there are also chances to lower CO<sub>2</sub> emissions through creative design, cutting-edge technology, and successful policy execution.

The result further showed that, in the short run the coefficient of error correction term (ECT) is negative (-0.1962) and significant at 1% probability level. This means deviation from long run equilibrium is corrected for, within the year at adjustment speed of 1.962%.

In the short run, the coefficient of ecological footprint (2.5037) and (2.577) has positive elasticity and significant at 1% level during the first and second year respectively. This implies that a unit increase in ecological footprint in the short run will accelerate carbon dioxide emissions by 25.037% and 25.77% during the first and second year respectively. This can be attributed to the fact that, if the ecological footprint is driven by high levels of consumption in the short run, especially of goods and services with significant carbon footprints, it could contribute to increased emissions.

The coefficient of population (0.1684) has positive elasticity and significant at 1% level during the second year. This implies that a unit increase in population in the short run will accelerate carbon dioxide emissions by 1.68% during the second year. This can be attributed to the fact that in the short run, the impact of population growth on carbon dioxide emissions might be more direct and immediate, driven by increased demand for resources, energy, and goods. Population growth, urban expansion, road construction, logging, mining, likely lead to land use change and destruction of natural habitats of many species of animals and plants which in turn affects the environment.

Also, the coefficient of urbanization (31.813) has positive elasticity and significant at 1% level during the first year. This implies that a unit increase in urbanization in the short run will accelerate carbon dioxide emissions by 318.13% during the first year. This can be attributed to the fact that in the short run, urbanization may lead to rapid changes in energy consumption patterns, increased industrial activities, and heightened transportation needs, all contributing to a significant short-term surge in carbon dioxide emissions. This finding is in line with Egboka *et al.*, (2022) who opined that urbanization is accompanied by quasi-industrial growth that generates many poorly-disposed solid/liquid/ gaseous waste products. These introduce severe pollution and contamination

products into the environment which exacerbate the incidences of climate change and biodiversity change with their attendant environmental damages.

**Table 2: Influence of Anthropogenic Activities on Environmental Quality**

<b>Cointegrating Eq:</b>	<b>CointEq1</b>						
CO <sub>2</sub> (-1)	1.000000						
AGDP(-1)	0.31299						
	[3.64900***]						
FFC(-1)	1.53186						
	[2.50318**]						
EFP(-1)	5.384018						
	[7.55899***]						
POP(-1)	1.541755						
	[9.0546***]						
URB(-1)	-6.245804						
	[-7.2703***]						
<b>Error Correction:</b>	<b>D(CO<sub>2</sub>)</b>	<b>D(AGDP)</b>	<b>D(FFC)</b>	<b>D(EFP)</b>	<b>D(POP)</b>	<b>D(URB)</b>	<b>D(BCR)</b>
CointEq1	-0.196279	-0.574096	-0.019784	-0.001044	-0.427861	-0.005643	-0.141115
	[-4.2641***]	[-1.61483]	[-0.78190]	[-0.06812]	[-2.815***]	[-2.0331**]	[-1.18793]
D(CO <sub>2</sub> (-1))	-0.013213	-0.279700	0.063630	0.038693	-0.361214	-0.004558	-0.236337
	[-0.09063]	[-0.24840]	[0.79400]	[0.79714]	[-0.75053]	[-0.51852]	[-0.62815]
D(CO <sub>2</sub> (-2))	-0.299229	0.789248	-0.046006	-0.011173	-0.011503	-0.004446	0.002745
	[-2.01334***]	[0.68756]	[-0.56314]	[-0.22580]	[-0.02344]	[-0.49608]	[0.00716]
D(AGDP(-1))	0.022418	-0.751239	-0.007941	-0.001154	0.098359	0.001479	-0.103118
	[0.90081]	[-3.908***]	[-0.58052]	[-0.13928]	[1.19726]	[0.98555]	[-1.60558]
D(AGDP(-2))	0.006353	-0.303626	0.017776	0.004690	0.033792	0.001251	0.052960
	[0.29349]	[-1.81606*]	[1.49394]	[0.65079]	[0.47288]	[0.95807]	[0.94801]
D(FFC(-1))	-0.560998	-10.30114	-0.025263	-0.086921	-0.228360	-0.002187	-0.503569
	[-1.25117]	[-2.974***]	[-0.10250]	[-0.58226]	[-0.15428]	[-0.08087]	[-0.43518]
D(FFC(-2))	-0.411991	-5.306818	-0.031004	0.169616	-1.520576	0.003947	-3.061568
	[-0.95769]	[-1.59718]	[-0.13111]	[1.18424]	[-1.07072]	[0.15216]	[-2.7576**]
D(EFP(-1))	2.503763	11.42552	0.149642	0.042152	4.587883	0.101139	3.843957
	[2.91413***]	[1.72176]	[0.31685]	[0.14736]	[1.61755]	[1.95209*]	[1.73361]
D(EFP(-2))	2.577249	12.70719	0.312351	0.113973	4.784154	0.042741	5.553411
	[3.03715***]	[1.93884]	[0.66963]	[0.40341]	[1.70783]	[0.83525]	[2.5358**]
D(POP(-1))	0.168432	0.337778	0.016820	0.006848	-0.427765	-0.001007	0.020341
	[2.56910***]	[0.66707]	[0.46672]	[0.31371]	[-1.97647*]	[-0.25463]	[0.12022]
D(POP(-2))	-0.056301	1.347260	-3.00E-05	0.003910	-0.195852	-0.000119	-0.081569
	[-0.83384]	[2.5834**]	[-0.00081]	[0.17394]	[-0.87867]	[-0.02916]	[-0.46811]
D(URB(-1))	-15.31147	196.6258	-1.326536	-1.275510	33.93618	0.844691	7.771783
	[-1.78784]	[3.305***]	[-0.31331]	[-0.49737]	[1.33462]	[1.81856]	[0.39097]
D(URB(-2))	31.81320	-205.1012	1.511494	1.502610	12.36480	0.212246	-1.405736
	[3.6741***]	[-3.067***]	[0.31759]	[0.52127]	[0.43261]	[0.40652]	[-0.06291]
R-squared	0.690834	0.740486	0.282886	0.327420	0.589014	0.533756	0.561394
Adj. R-squared	0.428042	0.519899	-0.326662	-0.244272	0.239676	0.137449	0.188580
Sum sq. resids	0.400049	23.86440	0.120878	0.044345	4.359683	0.001455	2.664404
S.E. equation	0.141430	1.092346	0.077742	0.047088	0.466888	0.008529	0.364993
F-statistic	2.628829	3.356890	0.464091	0.572721	1.686087	1.346823	1.505827
Log likelihood	32.60165	-45.08089	55.34100	74.39363	-12.78112	139.3202	-3.425152
Akaike AIC	-0.768508	3.320047	-1.965316	-2.968086	1.620059	-6.385272	1.127640
Schwarz SC	0.007191	4.095746	-1.189617	-2.192387	2.395757	-5.609574	1.903338
Mean dependent	0.032661	0.048007	-0.002576	0.021272	0.026060	0.020113	0.077577
S.D. dependent	0.187008	1.576500	0.067496	0.042214	0.535443	0.009183	0.405193

\*\*\*, \*\* and \* indicate stationary at 1%, 5% and 10% level of significance

NB: values in bracket are t-statistics;

Source: Author's computation (2023)

### Conclusion and Recommendations

The study assessed the effect of anthropogenic activities on environmental quality in Nigeria from 1980 – 2022. The study provides compelling evidence that anthropogenic activities significantly influence environmental quality in Nigeria. The specific impacts of agricultural GDP, fossil fuel consumption, ecological footprint, population, and urbanization underscore the complexity of the relationship between human activities and environmental outcomes. The unexpected negative coefficient for urbanization in the short run raises questions for further exploration.

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Based on the findings of this study, it is therefore recommended that:

- i. Governments can incentivize the transition to renewable energy sources, such as solar and wind power, and support research and development efforts for cleaner energy alternatives to mitigate the impact of fossil fuel consumption on environmental quality.
- ii. Efforts should be made by Government and Non-Governmental Organizations to promote environmental education and awareness campaigns to inform the public about the impact of anthropogenic activities on environmental quality.

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