

# Innovations

## Poverty and Wood Fuel: The Implication on Global Warming in Nigeria

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**Abstract:** *It was initially observed that lumbering, farming, mining and constructions are the only factors of deforestation in Nigeria today evidence has shown that it is more than the phenomena itemized. Poverty does not only devastate human beings, but also ravaging our green environment or forest. Source of energy for domestic use for people above 56% below poverty line are both fuel wood or charcoal. This research work is an empirical study with its main objective which is to succinctly show how poverty annihilate forest which triggers environmental heat. Other objectives are to: find out the relationship between poverty and deforestation, and to examine the corresponding pattern of increase between poverty and deforestation and the environmental heat. Authors used both primary and secondary data, questionnaire was drawn to elicit information from sampled population and existing data culled from the internet was also used. Data on temperature was also sourced from NIMET, these data were analyzed using Special Package for Social Sciences, correlation and regression analyses were employed. The result showed strong correlation of poverty and deforestation and there is significant relationship. Recommend actions were later advanced which are: promoting clean energy access, reafforestation programmes, poverty alleviation programmes, policy enforcement, and investment in rural electrification etc., for immediate solution to poverty and de-vegetation so as to have a safe haven.*

**Keywords:** *Global warming, Nigeria, Poverty, Wood fuel, Deforestation, Environmental - heat, De-vegetation.*

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### Introduction

Poverty, the state of one who lacks a usual or socially acceptable amount of money or material possession (Britannica, 2024). Merriam-Webster (2024) also states that poverty is the state of being poor: lack of money or possessions.

Studies in poverty and inequality institute (SPII, 2007) explained poverty as inability of an individual or society to function as a full and active member of the society and have individual dignity. Noble, Ratcliffe and Wright (2004) defined relative poverty from three perspectives. Firstly, the relative approach is defined in relation to living standards of a reference group. Secondly, it is defined in terms of resources required to participate fully in society and thirdly, in a narrower way, by reference to the national income and/or expenditure distribution.

Jense (2009) identified four types of poverty as situational poverty which may occur from crisis or loss, this can be temporary. The second is the generational poverty, this is when at least two generations have been born into poverty. Such family may find it difficult to move out of poverty. The third is urban poverty which occurs in metropolitan areas or other cities. Then the fourth is the rural poverty. Ramphoma (2014) in his work understanding poverty, related poverty to dwelling place; access to source or supply of water; availability of electricity; but he failed to relate poverty to other sources of energy used.

### **Problem Statement**

Scholars believe that developing nations contribute little to the global warming and that they face the consequences more than the developed nations. Scholars are of the opinion that deforestation is mainly caused by lumbering industry, agricultural practices, construction of transportation modes, building of factories and houses or public institutions. Man can't do without the use of energy especially domestically to cook. Sources of energy for domestic uses in Nigeria are getting out of the reach of the plebeians of the society, the innumerable therefore result into the use of wood fuel for the daily needs. There is therefore heavy concentration on the forest. This is a poverty induced action, it warrants studying.

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

The main objective of this research is to succinctly point out how poverty in Nigeria triggers global warming. Other objectives are to:

- Find out the relationship of poverty and deforestation.
- Examine the corresponding pattern of increase between poverty and deforestation.
- Suggest workable solutions to the problem.

### **Area of the study**

Nigeria is found in the critical position of Africa; it stays on the map of Africa like the position of the trigger of a gun. Nigeria is always referred to as the giant of Africa simply because of its population and resources that can make her rich and her citizens comfortable. Nigeria is located between the Latitude 04<sup>0</sup>N to 14<sup>0</sup>N and Longitude 03<sup>0</sup> E to 15<sup>0</sup>E. Nigeria is found in West Africa, and bounded by the Atlantic Ocean in the South, Republic of Cameroon in the East, Niger in the North, and Benin Republic in the West. The country was colonized by the British in the early 19<sup>th</sup> century.

and regained its sovereignty in 1960. Presently by reliable estimation Nigeria is believed to be in the range of 230 million by population, with diverse languages, tribes and cultures. This supposed to be the part of the strength of the country, contrarily, it seems to be a major dividing factor. The country Nigeria is endowed with all resources man can think of viz: Forest resources, Water resources, Mineral resources, and Human resources. There is potentiality to be greatly rich but the lion share of the population lives below the poverty line. The nation always from the inception suffer from bad leadership, of course the major factor that makes the micro and macro economies of the country to be in a straitened circumstance. This could not afford majority of the household to have access to other sources of energy except forest.

### **Literature Review**

World Bank (2024) projected that about 40.7% of Nigerians are estimated to live below the international poverty line by the end of 2024. This rise in poverty from 2018 which was 40.1% is due to bad economic management and severe inflation. Nigeria is the third highest poverty rate (970.7%) in 2024/2025 in the world after South Sudan which is 82.3%, Somalia 76.3%; Pakistan 68.8%, India 64.9%; Madagascar 63.9%; Burundi 58.5%; and Central African Republic 56.8%. Nigeria is the second world's largest poor population after India. Wolf (2025) itemized six types of poverty which were situation poverty; generation poverty; absolute poverty; relative poverty; urban and rural poverty. All these are seemingly seen in Nigeria. this bad economic management and its result which is poverty is obvious in all sectors of Nigerian economy both in productions and services.

This is also manifested in energy sector and energy uses by the population. Akinmoyeje (2024) stated that 67% households of Nigeria use fuel wood to cook. This was at the wither ward to Sustainable Energy for All (SE4ALL) initiative and the 2021 National Determined Contribution (NDC) of the Paris Agreement. In 2006 population and housing census of the Federal Republic of Nigeria, out of 28,197,085 households, 16,969,612 were using firewood and charcoal for cooking fuel (NPC, 2009).

According to global forest watch.org report (2020), Nigeria had approximately, 20.4million hectares of natural forest which is about 22% of its land area. That very year, the country lost about 207,000 hectares of natural forest. The report went further to say that about 228million metric tons of CO<sub>2</sub> emissions was added to the atmosphere. The period reviewed was a global lockdown when no sector was working including the factories. People used the big amount of lost forest for domestic energy little wonder then why that amount of CO<sub>2</sub> was added to the earth-atmosphere.

About 10% of hectares of land bearing forest was lost between 2020-2021 which is in total of 1.04million (earth.org, 2021). The guardian.org (2021) also reported that 13% of forest cover was lost in 2000. Scholars mostly adduced the spread of deforestation in Nigeria to agricultural expansion, logging and mining

activities but often failed to pinpoint, firewood and charcoal millions of poor people which is the lion share of the population use for cooking. This era of the economic policy of President Ahmed Bola Tinubu where in inflation flies daily and skyrocketing in all economic sectors especially on domestic energy. The kilogramme of cooking gas in currently sold between 1,000 to 1200 naira in the parts of the country. There are even fear of further increase in its price (LGP, 2025). These have forced the poor to run into the natural forest as solace for wood and charcoal as domestic fuel.

More than hundreds of millions of Nigeria use firewood for cooking. This is above 60% of the population and spread across the country (MDPI, 2023), Oloyede et al (2023) and about 67.8% of households in Nigeria use firewood (NBS, 2024). 70% of rural households still perpetually rely on firewood (Times Nigeria Newspaper, 2024). Charcoal also is wide spread and as common as firewood. Fired wood and charcoal are not just consumed, there is increase in carbon dioxide released into the atmosphere yearly. World Bank (2023) in its database on kilotons ranking of CO<sub>2</sub> emission globally, Nigeria was in the 9<sup>th</sup> position with 111,978.10, second highest after Egypt in Africa. When compared emission from 1990 to 2020, CO<sub>2</sub>, kept rising steadily unto 2020 when it fell to 111,978.10 from 119,544.10 in 2019. This a bit fall in metric tons per capital in 2020 might be due to global lockdown caused by covid-19. this is shown on Table 1.

**Table 1: Nigeria Carbon Emissions (CO<sub>2</sub>)1990 – 2020**

Year	Kilotons	Year	kilotons
1990	72,768.80	2011	94,996.50
1991	81,926.10	2012	95,335.30
1992	91,806.40	2013	108,116.80
1993	86,237.30	2014	114,815.50
1994	78,325.80	2015	107,746.40
1995	86,164.50	2016	110,817.50
1996	100,227.20	2017	108,481.20
1997	98,646.90	2018	113,633.10
1998	88,699.80	2019	119,544.10
1999	87,017.00	2020	111,978.10
2000	97,215.10		
2001	101,945.30		
2002	92,237.60		
2003	100,994.90		
2004	98,724.90		
2005	98,719.00		
2006	88,767.70		
2007	81,122.60		
2008	86,932.00		
2009	76,947.40		

2010	90,055.20
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Source: World Bank, 2020

**Hypothesis**

**H0<sub>1</sub>:** There is no significant relationship between poverty and deforestation in Nigeria.

**H0<sub>2</sub>:** There is no tangible correlation between the rate of poverty and that of deforestation in Nigeria.

**Methodology**

This is a survey research design, that makes use of primary data which involved conducting of questionnaire with households who are the wood fuel users and other stakeholders of forests on wood fuel usage. The secondary data, which involves the use of existing literatures statistics on fuel wood, poverty levels, and the global warming.

**Data Collection**

Household surveys using questionnaire, authors conducted questionnaire with basically educated youth that represent teaming population of fuel wood users. Field observations to fuel wood harvesting and processing etc. Sampling methods including random sampling for the households and the purposive sampling for the field observation. Data was collected in southwest of Nigeria. This is the region that has more forest in the country

**Data Analysis**

Empirical statistics was employed with the use of Statistical Package for Social Science (SPSS). Correlation and Regression analyses were used.

**Results and Discussion**

**TABLE 2: DEMOGRAPHIC PROFILE OF RESPONDENTS (N=200)**

Variable	Frequency	Percentage (%)
<b>Sex</b>		
Male	67	33.5
Female	133	66.5
<b>Age Group (Years)</b>		
16-20	88	44.0
21-30	72	36.0
31-40	22	11.0
41-50	12	6.0
51-60	5	2.5
61-70	1	.5
<b>Qualification</b>		
School Certificate	12	6.0

ND/NCE	77	38.5
BSC/HND	84	42.0
MSC	26	13.0
PHD	1	.5
<b>Status</b>		
Student	106	53.0
Worker	67	33.5
Applicant	27	13.5

The study involved 200 respondents. The demographic breakdown is as follows:

**Sex:** 35.5% Male, 66.5% Female

**Age Group:** Most respondents were between 16–30 years (approx. 80%)

**Qualification:** Majority (94%) had Tertiary education ranging NCE, B.Sc/HND, M.SC, and Ph.D.

**Employment Status:** 33.5% were workers, 13.5% applicants, 53% students,

**Nationality:** All respondents were Nigerian

**Correlation Analysis:** Pearson correlation analysis was performed to test the relationship between poverty and deforestation.

**Table 2: Pearson Correlation Matrix**

Variable	Poverty rate	Deforestation rate	Fuel wood usage
<b>Poverty rate</b>	1.00	0.84**	0.77**
<b>Deforestation rate</b>	0.84**	1.00	0.70*
<b>Fuel wood usage</b>	0.77**	0.70*	1.00

**Note:**  $p < .05^*$ ,  $p < .01$

The correlation matrix reveals a **strong positive correlation** between poverty and deforestation ( $r = .84$ ,  $p < .01$ ), and between poverty and wood fuel usage ( $r = .77$ ,  $p < .01$ ). This suggests that increasing poverty contributes significantly to forest degradation and increased reliance on wood fuel.

**Regression Analysis:** A simple linear regression was conducted to determine the impact of poverty on deforestation.

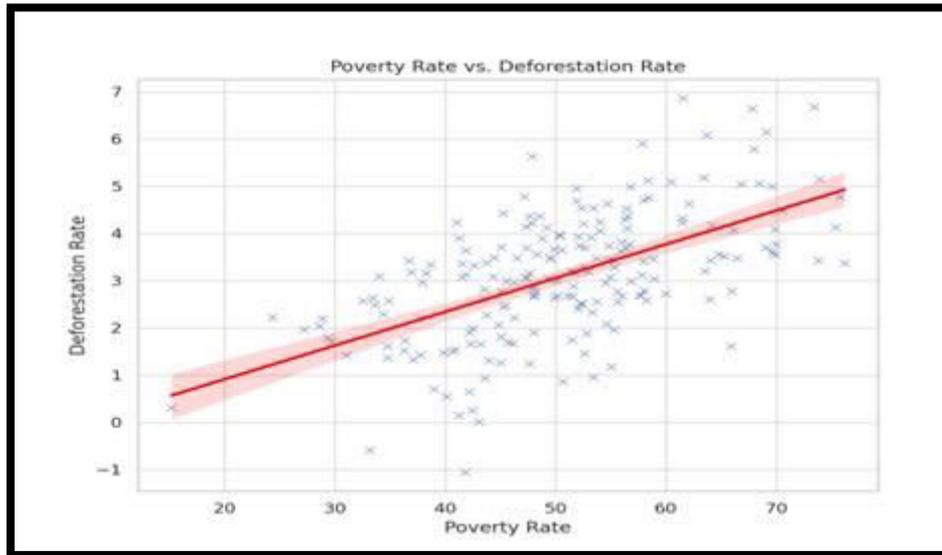
**Table 3: Regression Coefficient for the Effect of Poverty on Deforestation**

Predictor	B	Std. Error	t	Sig.
(Constant)	<b>-2.042</b>	<b>0.021</b>	<b>4.857</b>	<b>0.001**</b>
Poverty rate	<b>0.102</b>			
R <sup>2</sup>	<b>0.71</b>			

**Note:**  $p < .01$

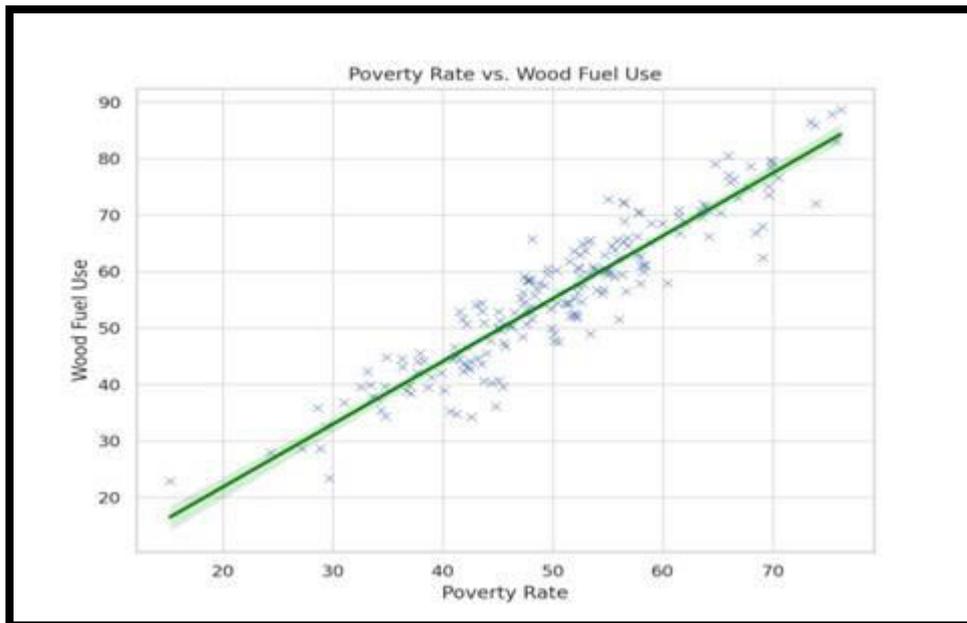
The regression model indicates that poverty significantly predicts deforestation ( $\beta = 0.102$ ,  $p < .01$ ), with an  $R^2$  of 0.71, suggesting that **71% of the variance in deforestation rate** is explained by poverty levels.

**Graphical Analysis:**



**Figure 1: Poverty Rate vs. Deforestation Rate**

This scatter plot with regression line shows a moderately strong linear trend — higher poverty is associated with higher deforestation.



**Figure 2: Poverty Rate vs. Wood Fuel Use**

This shows a very strong linear relationship, indicating that poverty is directly tied to increased use of wood fuel.

**Hypothesis Testing:**

**H<sub>01</sub>:** Rejected. There is a **significant relationship** between poverty and deforestation in Nigeria (**p < .01**).

**H<sub>02</sub>:** Rejected. There is a **strong correlation** between the rate of poverty and that of deforestation (**r = .84**).

**Table 4: Temperature Charts**

<b>Abeokuta</b>											
<b>Maximum Temperature (Degree Celsius)</b>						<b>Minimum Temperature (Degree Celsius)</b>					
<b>Month</b>	<b>1984</b>	<b>1991</b>	<b>2001</b>	<b>2011</b>	<b>2022</b>	<b>Month</b>	<b>1984</b>	<b>1991</b>	<b>2001</b>	<b>2011</b>	<b>2022</b>
Jan	34.5	34.3	35.3	34.7	36.3	Jan	23.4	23.5	22.2	21.8	18.5
Feb	36.8	35.4	36.3	35.2	37.5	Feb	24.4	25.1	23.4	24.2	21.5
Mar	34.9	35.3	36.7	35.6	35.7	Mar	25.9	24.8	24.4	24.7	22.5
April	33.4	33.6	34.5	35.2	34.4	April	25.4	24	24.2	24.5	21.2
May	32.7	32.5	32.8	33.8	33.3	May	24.1	24.8	24	24	21
June	31.3	31.6	30.6	31.6	32.5	June	22.9	24.4	23.7	23.9	20.6
July	30.6	29.4	30	29.3	30.4	July	21.7	23.7	23.4	23.8	20.1
Pug	30	28.5	27.9	30	29.7	Aug	22	23.4	23.2	23.6	19.3
Sep	30.3	30.1	29.9	30.9	31.1	Sep	22	23.6	23.2	23.9	20.3
Oct	31.3	30.5	32.2	31.6	32.6	Oct	23	23.5	23.4	23.9	20
Nov	32.7	33.7	34.2	34.3	34.7	Nov	23.8	24.5	24.5	24.3	20.3
Dec	33	33.6	34.7	35.3	36.2	Dec	26.1	26.6	28.5	26.8	18.8
Average	32.625	32.375	32.925	33.125	33.7	Average	23.725	23.325	23.0083	23.1167	18.5667

<b>Ijebu-Ode</b>											
<b>Maximum Temperature (Degree Celsius)</b>						<b>Minimum Temperature (Degree Celsius)</b>					
<b>Month</b>	<b>1984</b>	<b>1991</b>	<b>2001</b>	<b>2011</b>	<b>2022</b>	<b>Month</b>	<b>1984</b>	<b>1991</b>	<b>2001</b>	<b>2011</b>	<b>2022</b>
Jan	33.2	32.1	33.5	33.6	35.6	Jan	22.3	23.3	23	21.6	21.6
Feb	35.4	33.8	35.7	34	35.9	Feb	23.7	24.6	23.4	23.8	23.4
Mar	34	33.7	34.9	34.8	34.7	Mar	24.5	24.7	24.4	25.1	24.6
April	32.6	31.7	32.4	33.7	33	April	24.1	23.3	23.6	24	23.7
May	31.4	31.1	31.6	32	32.4	May	23.1	23.7	23.8	24	23.2
June	30.6	30.2	29.7	30.3	31.1	June	22.7	23.3	22.8	23.3	22.1
July	29.5	28.3	28.3	28.4	28.8	July	22.4	23.1	22.8	22.4	21.9
Pug	29.4	27.8	27.3	28.3	28.5	Aug	22.5	22.6	22.5	22.5	21.4
Sep	28.7	29.1	28.5	30	29.5	Sep	22	22.5	22.4	23	22
Oct	30	29.5	30.8	30.9	31.8	Oct	22.4	22	23.1	22.4	22.1
Nov	32.2	32.1	32.8	33	33.7	Nov	23.3	23.5	24	23.5	23.2
Dec	32.1	32.1	32.7	33.9	35	Dec	21.7	22.2	23.9	22	21.7
Average	31.591	30.958	31.516	31.908	32.5	Average	22.891	23.233	23.3083	23.1333	22.575

<b>Ibadan</b>											
<b>Maximum Temperature (Degree Celsius)</b>						<b>Minimum Temperature (Degree Celsius)</b>					
Month	1984	1991	2001	2011	2022	Month	1984	1991	2001	2011	2022
Jan	33.1	33.5	33.3	33.7	35.3	Jan	26.4	28.2	28	27.6	22.7
Feb	35.4	34.9	35.5	34.5	36.7	Feb	29.4	29.4	29.4	29	24.4
Mar	34.2	34.6	35.2	34.8	35.1	Mar	29.6	29.6	29.5	29.7	25
April	32.2	32.7	32.7	33.3	33.1	April	28.3	27.8	27.8	28.3	23.6
May	31.4	31.6	31.9	32.8	32.3	May	27.3	27.5	27.4	28.2	23.6
June	29.9	31	30.1	30.7	31.1	June	26.1	27	26.4	26.8	22.6
July	28.9	29.3	28.6	28.4	29.2	July	25.2	25.8	25.4	25.1	22.5
Pug	29.1	27.7	26.8	28.1	27.9	Aug	25.3	24.8	24.2	25	21.4
Sep	28.8	30.1	28.8	29.9	29.7	Sep	25.4	26.1	25.3	26.2	22.5
Oct	30.2	30	31	30.6	31.5	Oct	26.5	25.8	27	26.5	22.9
Nov	31.2	32.2	33.4	33.1	34.5	Nov	27.4	27.8	28.7	28.4	23.8
Dec	30.9	32	33.3	34.2	35.3	Dec	26.7	26.9	28.5	28	22.9
Average	31.275	31.633	31.716	32.008	32.641	Average	26.966	27.225	27.3	27.4	23.158

<b>Ondo</b>											
<b>Maximum Temperature (Degree Celsius)</b>						<b>Minimum Temperature (Degree Celsius)</b>					
Month	1984	1991	2001	2011	2022	Month	1984	1991	2001	2011	2022
Jan	32.6	31.8	32.8	33.2	34.7	Jan	21.4	22.5	21.9	21.6	22
Feb	35.1	33.1	35	31.2	35.8	Feb	23	23.7	22.3	23.8	23.7
Mar	33	32.3	34.3	31.2	34.7	Mar	23.5	23.8	23.3	24.5	24.8
April	31.2	30.4	31.7	30	31.9	April	23	22.4	23.2	23.9	22.6
May	29.6	30.4	31.3	28.8	31	May	22.6	22.9	22.8	23.8	22.6
June	28.8	29.7	29.7	27.6	30.1	June	22.3	22.1	21.9	23	22.3
July	28.2	27.7	28.5	27	28	July	22	21.7	21.9	22.1	22.1
Pug	26.5	26.8	27	26.4	27.7	Aug	21.4	21.6	21.4	22.2	21.7
Sep	27.8	28.7	28.2	27.6	29	Sep	21	21.7	20.6	22.7	22.2
Oct	29.1	29.3	31	28.2	31.1	Oct	21	21.4	22	22.6	22.6
Nov	32.1	31.7	32.1	30.1	32.9	Nov	22	23.2	23.3	23.8	23.3
Dec	31.3	32.2	33.2	32.4	34.2	Dec	22.4	21.6	23.5	21.8	22
Average	30.441	30.341	31.233	29.475	31.758	Average	22.13	3	22.383	22.341	22.983

<b>Ile-Ife</b>											
<b>Maximum Temperature (Degree Celsius)</b>						<b>Minimum Temperature (Degree Celsius)</b>					
Month	1984	1991	2001	2011	2022	Month	1984	1991	2001	2011	2022
Jan	33.1	33.2	34.2	33.7	34.7	Jan	15.6	20.7	18.8	17.5	18.9
Feb	35.4	33.9	36.1	33.6	36.3	Feb	21.2	23.2	19.4	22.3	22.1
Mar	33.9	33.6	36	33.9	34.9	Mar	22.6	23.5	23.4	23.5	24.1
April	31.7	31.4	33.1	33.2	32	April	23.9	22.1	22.9	22.8	22.7
May	30.7	30.6	31.3	31.9	30.9	May	22.7	22.8	22.4	23.3	22.4
June	29.7	30.2	30	30.3	29.7	June	22	22	21.9	22.3	22

July	29.1	28.3	28	28.2	28.2	July	21.3	21.8	21.9	21.8	22
Pug	29	27.4	26.7	27.8	27	Aug	21.1	21.4	21.2	21.6	21.2
Sep	28.8	29	28.7	29.2	28.4	Sep	21.6	21.4	21.3	22	21.9
Oct	30.3	29	30.7	30.3	30.5	Oct	22.3	21	22	21.4	21.7
Nov	31.1	31.6	33.3	32.7	32.8	Nov	23	21.8	22.9	21.7	22
Dec	31	32.5	34.3	34.1	34.4	Dec	21.2	18.6	22	16.5	19.5
Average	31.15	30.89	31.86	31.57	31.65	Average	21.54	21.69	21.67	21.39	21.40

Source: NIMET (2025)

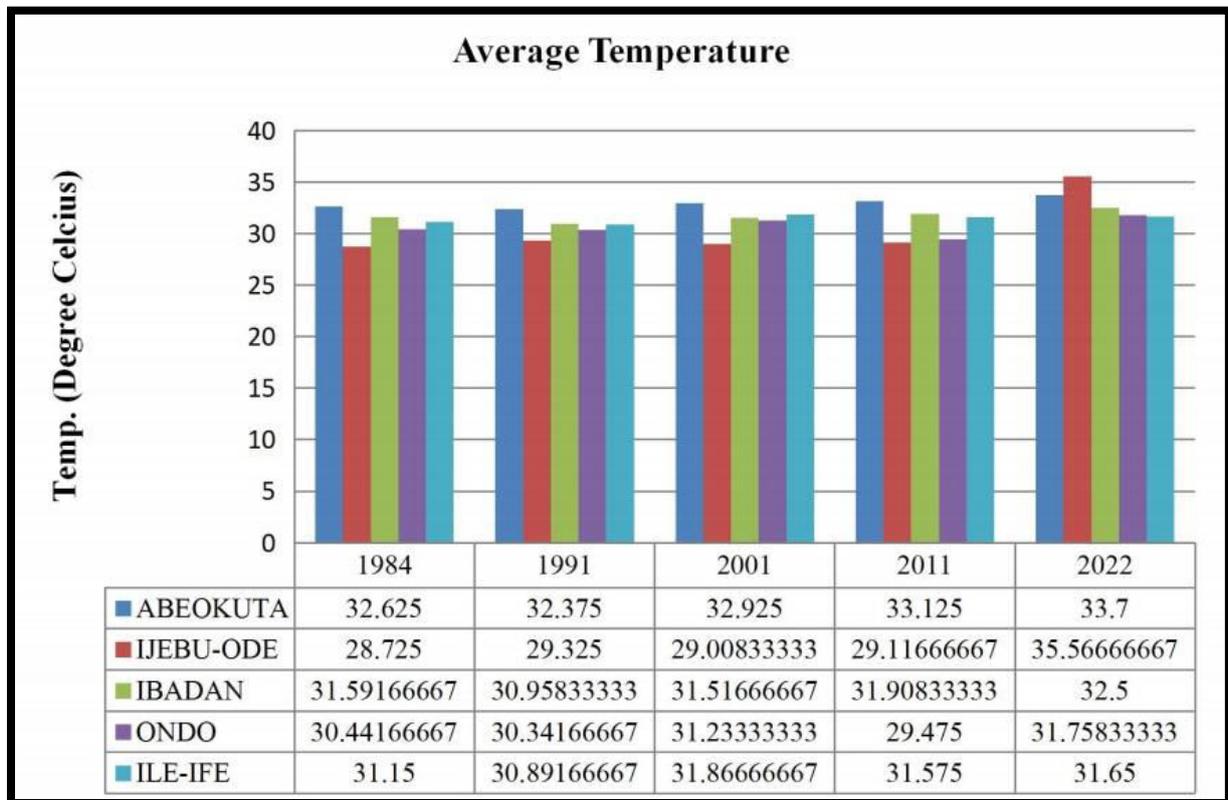


Figure 3: Trend in Average Temperature over Years  
Source: Author’s Study (2025)

**Discussion**

The results of this study affirm that poverty is a key driver of deforestation and increased the use of wood fuel in Nigeria. The high dependence on biomass energy, especially among low-income households which is the lion share of the population, exacerbates forest depletion, leading to more carbon emissions and contributing to global warming (Ogunbameru, 2022; FAO, 2023).

Furthermore, rural households often rely on wood fuel due to the lack of affordable and accessible alternatives, such as electricity or liquefied petroleum gas (LPG) (Eleri et al., 2019). This vicious cycle deepens poverty and environmental degradation, underscoring the interconnectedness of socioeconomic and environmental issues.

The findings are consistent with global literature that links poverty to increased environmental degradation (World Bank, 2021). The Nigerian scenario is

particularly critical given its rapid population growth and urbanization, and increase in poverty which further strain forest resources and visa viz increase in environmental heat due to continuous increase in carbon dioxide and carbon (Oloyede et al, 2025) as shown in table 2 (Abeokuta, Ijebu ode, Ibadan, Ondo, Ile Ife) and in figure 3. The calculated average temperature of these settlements in the table, which is graphically shown in figure 3 keeps increasing ranging from 30<sup>0</sup>c to 35<sup>0</sup> c of the base years used. Although, deforestation increases albedo, it also increases Co<sub>2</sub>and there is also continues carbon sequestration. All these are the root cause of the global warming.

### **Conclusion and Recommendations**

Now that it is glaring beyond a reasonable doubt that poverty ruins forest even much more than logging, agriculture and even mining. Immediate policies that will instantaneously ameliorate the problem must be put in place. Such policies are discussed below as there commendations.

- 1. Promote Clean Energy Access:** Investment in affordable solar and LPG solutions can reduce wood fuel dependence (IEA, 2022). Good percentage of the population should be made to have access to clean energy such as solar, hydroelectricity etc. This will shift attention of people away from the use of fuel wood which ruin forest eco system.
- 2. Reforestation Programmes:** Implement community-based afforestation and forest monitoring. These are initiatives aimed at restoring forest cover by planting trees in areas where forests have been depleted due to deforestation via: wood fuel; wildfires; agriculture; logging etc. These programmes are necessary in fighting climate / global warming.
- 3. Poverty Alleviation Initiatives:** Improve livelihoods through job creation, education, and micro-financing. These are activities and strategies put in place to reducing or wipe off poverty in the society. It includes raising the standards of living of citizenry, improving societal facilities, and the general wellbeing of all and sundry.
- 4. Policy Enforcement:** Strengthen forestry laws to curb illegal logging. This is a way of making sure that there is rule of law in the society. This means regulations or laws are followed in the entire system and among the citizenry of the country. This involves forming a policy to protect forest for instance, which should be technically structured, well communicated, plan full monitoring, and establish adequate penalty for the erring citizens without fear or favour.
- 5. Invest in rural electrification** to reduce wood dependence: Rural electrification such as bringing rural settlement into hydroelectricity national grid, facility for solar energy and all other clean energy or power should be established in the rural communities. The salient point here is to shift the

attention of the rural communities away from the use of forest as the source of energy.

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