

CO₂ EMISSIONS AND ECONOMIC GROWTH IN SOME SELECTED COUNTRIES OF ECOWAS: PANEL DATA APPROACH

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ABSTRACT

Climate change and its impact on economic growth or vice versa is an important burning issue in the present world and therefore the present world and its population, especially in West Africa, are bound to face various calamities in recent times and the excessive emission of carbon (1.8 per cent of total carbon emission by the world's emission) is one of the important reasons behind it. Therefore, it is very important to examine the relationship between carbon emissions and economic growth in the region and for this, the present article is focusing over some selected countries of Economic Community of West African States (ECOWAS) and therefore the 10 ECOWAS countries are selected randomly, out of 15 ECOWAS countries and 32 years of data from 1991-2022 are utilized which is sourced from World Development Indicators (WDI), World Bank and Central Bank of Nigeria (CBN) Bulletins. A panel data regression technique employed for the analysis of data. The Fixed Effect Model (FEM) estimates indicates that the out of eight explanatory variables four are negatively associated with Co₂ emissions and one is statistically significant while other three are insignificant statistically. The Random Effect Model (REM) estimates pointed out that the out of eight independent variables three are having negative effects over the Co₂ emission and five are having positive impact over the emissions. Therefore, the study perceived that emission of Co₂, Gross Domestic Product (GDP) and industrial growth are not enough to lead the climate change in the region.

Keywords: Co₂ Emission, Economic Growth, Panel Data, Clean Energy

1. INTRODUCTION

Climate change is one of the core agenda of the sustainable development and even it is an important goal of the Sustainable Development Goal (SDG). The present world is on race to achieve a higher economic growth at any cost and without degrading the environment and its components it is quite impossible to achieved. Because in most of the cases, the carbon emission and use of energy are having negative impact over the economic growth over the developing countries (Azam, et. al. 2016) and due to the energy consumption and industrial activities, global carbon dioxide (Co₂) emission is rises by 0.9 per cent and equivalent of 321Mt in 2022 and reached at 36.8Gt (IEA, 2022). Sectoral wise carbon emission is, out of 36.8Gt carbon Emission, 116mt is from natural gases, 243 from coal burn, 11.2 Gt from use of oil and the biggest sectorial increase in carbon emission in year 2022 is came from use of electricity and it

went up by 1.8 per cent or 261 Mt, while emission from industrial activities got declined by 23 Mt or 0.2 per cent (IEA, 2022). Though the world wise carbon emission grew in 2022, however, Europe administered declined in it at the rate of 2.5 per cent (70Mt), and due to Covid-19, it is relevantly flat for Chinese economy (0.2 per cent) while emission by United States of America is relatively grew by 0.8 per cent (36Mt.), emission from Asia's emerging and developing economy, excluding China, witnessed 4.2 per cent (206Mt) increased in carbon emission (IEA, 2022). In Africa, it is having smallest share among the all-world's region, and it is ranging between 3.4 to 3.8 per cent since last two decades (IEA, 2022). While the contribution of carbon emission by Economic Community of West African States (ECOWAS) is only 1.8 per cent of total carbon emission by the world (Reginal Climate Strategy Reports on ECOWAS climate change, 2022). Per capita average carbon emission of 10 selected countries of ECOWAS from 1991-2022 and Nigeria is placed on at the top in terms of per capita average carbon emission among the ten selected countries of ECOWAS with 97067.97Mt since 1991-2022 (World Bank, 2022), and Cote D'Ivoire is placed on second highest emitter with 6683.86Mt from 1991-2022 while Guinea Bissau is placed on tenth out of ten ECOWAS countries and it average emission is 288.06Mt since 1991-2022 and Liberia placed on second lowest carbon emitter with 727.42Mt from 1991-2022. Due to the excessive use of energy, most part of the ECOWAS is facing different types of calamities in the present world such as landslides, cyclones, droughts, and excessive case of flooding in most part of the world. Furthermore, the effect of carbon emission is not limited only the harming environment, it is also affecting the level of employment of a country along with Gross domestic Product (Mitić, P., Fedajev, A., Radulescu, M. et. al., 2023). There is another important study (Ayanthi, et. al. 2022) has established a positive relationship between economic growth and carbon emission. Therefore, the current work is tried to point out the association between economic growth and carbon emission and seven more independent variables with the panel data from 1991-2022. The contribution of the study is to fill the time gap, variables gap and employed new Methodology, such as Hausman test used to check the endogeneity in to the taken variables, for ten selected ECOWAS countries. Therefore, to bridge the research gap, the study set three objectives such as to study the effects of economic growth on Carbon dioxide Emission, to investigate the impact of Energy Consumption, Electricity Consumption, and Population growth rate over the emission of Carbon dioxide, and to examine the association between Carbon dioxide Emission and Exports, Exchange Rate and Gross Capital Formation. Therefore, it is pertinent to examine the association between carbon emission and economic growth (GDP) in ten selected countries of Economic Community of West African States and for this, it is important to visit the existing literature.

2. LITERATURE REVIEW

In any study, literature review is having an important place to get the research gaps and based on it to sets the objective/s of the study to provide a possible solution of the stated problem. Therefore, the present study is also tried to visit some important literatures pertaining the problem and they are following.

Firmin, V. & Rémy, H. (2020) have done a comparative analysis of some selected countries of Economic Communities of West African States (ECOWAS) for the period of 38 years. They used Vector model of the environmental curve of ECOWAS countries and found that a long-run U shaped relationship and invalidated the hypothesis of inverted U shaped of Kuznets. Moreover, they reported that as per capita increases for poor countries, their carbon emissions decreases while for relatively reach countries, when per capita income increase, their carbon

emission has increases. Based on their findings, they advise to implement a common policy of environmental protection in ECOWAS.

Douglason (2017) has explore the relationship between the environmental degradation and per capita income corroborates the inverted U shape hypothesis in some selected countries of Economic Community of West African States (ECOWAS). He checked the emissions of SO₂ and CO₂ and employed a Fix Effect and Random Effect model. The study reported that in some cases U shape hypothesis exists and in some cases are not. The estimate of the study shows that the environmental quality is relatively low for two indicators (SO₂ and CO₂) which indicates the existence of low level of economic development and therefore suggests are being made to use a fuel tax which can be progressive for some African countries and need to be implement a functional pollution policy.

Mamoudou (2022) tried to explore the impact of shadow economy on economic growth and CO₂ emission in Economic community of West African States (ECOWAS) and for this purpose he used System Generalized Method of Moment (SGMM) and Common Correlated Effects Mean Group (CCEMG) on 14 ECOWAS countries for the period of 36 years data sets. Findings of the study indicates that the shadow economy decreases economic growth and having more significant impact on it rather carbon emission. Based on the findings, the study suggests that there is need to implement a proper pollution policy for the region.

Qi et. al. (2022) employed three variables Toda-Yamamoto model to examine the dynamic relationship among energy consumption, economic growth, and trade in West Africa. They found out that there is a positive impact of energy consumption on economic growth in West Africa. Based on the findings of the study, they advise to develop an integrated energy and trade policy to achieve and maintain long-term economic growth in the region.

Alex et. al. (2022) have examined the relationship among human capital, foreign direct investment (FDI) and economic growth in Economic Community of West African States (ECOWAS) while controlling carbon emissions, urbanization and renewable energy. For this purpose they categorise the ECOWAS into two regions, lower middle income countries (LMIC) and lower income countries (LIC) and took panel data for the period of 27 years. Findings of the study indicates that the rate of human capital, FDI, CO₂ emissions, and urbanization are affecting economic growth of LMIC and LIC. Based on findings, they suggests that the LMIC's and LIC's should have to focus on investing more in human capital development via more expenditure on education and health and to frame a policy to reduce CO₂ emissions by focusing more on renewable energy.

Hongxing et. al. (2020) are tried to fill the gap with the recent empirical methodology to expose the impact of foreign aid, CO₂ emissions, trade openness, and energy consumption on economic growth. Findings of the study revealed that the energy consumption, trade openness, CO₂ emissions foreign aid are having positive correlation with economic growth. Further, study suggest that there is an urgent need to shift from fossil energy to renewable energy and introduce new techniques to derail the pollutant emissions from economic growth.

Another important study has done by **Espoir et. al. (2021)** and with use of panel data and they reported that the 1 percent increase in temperature reduces income by 1.08 percent and rise of 1 percent in CO₂ emissions hike income by 0.23 percent. Therefore, they suggest that the environmental policies need to design to reduce CO₂ emissions in Africa.

Asongu et. al. (2015) have used panel data and examined the relationship between CO₂ emissions, energy consumption, and economic growth of 24 African counties. They found out that there is a long run relationship between energy consumption, CO₂ and economic growth and error

correction mechanism are stable. Therefore, they advise to focus on short run mechanism and use new technology to reduce the carbon emissions.

Ibrahim et.al. (2015) have examined the possibility to use of nonlinear model with the data sets of 15 African countries for the period of 30 years. They found out that the evidence of inverted U shape in five African countries and confirmed Environmental Kuznets Curve (EKC) hypothesis in these five countries. Furthermore, the study also confirmed that the countries like Sudan and South Africa are having low regime energy consumption therefore their economic growth are not so high such as Algeria, Morocco, and Senegal which they have high energy consumption.

Ezeokoye et.al. (2021) employed profit and trend analytics approaches with panel data to examine the impact socioeconomic indicators over the 15 West African countries' economic growth. They used seven variables such as poverty head count ratio, under five mortality rate, government expenditure on education, government expenditure on health, Co2 emission, electricity consumption, food security and real GDP. After careful analysis of data, they found out that the 15 West African countries economies are diverse over the selected indicators of development. Furthermore, it indicates that except Nigeria, the performance of other countries is average in relation to the selected socioeconomic indicators. Based on findings, they suggest that there is an urgent need to implement a sound socioeconomic policy in the region that can be based on pro-development agenda to enhance the socioeconomic status of these countries.

Orekoya & Oluleke (2021) have been examined the nexus of trade openness, energy consumption, and economic development for seven oil producing countries in Africa. These employed Autoregressive Distributed Lag Model for the analysis of the data. The findings indicates that the trade openness and energy consumption having significant impact over the economic development of selected countries. Furthermore, it is recorded that a per cent increase in trade openness decreases economic development about seven per cent in the short run however it increases by twenty eight percent in the long run due to trade openness. Based on the findings of the study, it is suggested that the policies should be in a way to encourage an enabling environment, free trade zone, energy efficiency, and ease of doing business.

Ahmed et.al. (2021) have explored the effects of carbon emissions over the Foreign Direct Investment (FDI), human capital and biocapacity, and energy consumption in some selected West African countries for the period of 47 years. For this purpose, the study employed long run cointegration estimators. The results of the study revealed that there is an existence of inverted U-shaped and N-shaped trends between the variables. Moreover, the estimates indicates that the N-shaped exist only for high carbon emission countries. The study suggests that the new technology should be adopted as soon as possible reduce the carbon emissions in the region.

Bosede & Akintunde (2021) have tried to examine the dynamic linkages between energy consumption, development of Information and Communication Technology (ICT) and quality of environment for six countries in West Africa. The study employed secondary data which are sourced from United States Energy Information and World Development Indicators (WDI). For the analysis of data, study used Generalised Method of Movement (GMM). The results indicates that Co2 emissions increased because of higher energy consumption in the selected countries. Moreover, the development of ICT having negative but statistically significant impact over the quality of environment. Furthermore, the study advises to encourage to formulate such policies which reduces carbon emissions and therefore one can achieve the goal of sustainable development.

Mbanda et.al. (2022) revealed in their study that there is a short run and long run relationship between Carbon emissions and economic growth in Cameroon. Furthermore, they have con-

firmed the existence of EKC hypothesis in the country. For this, they use 44 years of data sets and employed ARDL model for the analysis of it. Based on their findings, they recommended to the government to gear a policy related to reducing the emissions of greenhouse gases and facilitate to adopt the other renewable source of energy in the country.

Umar et.al. (2023) explored the nexus between export, capital formation, use of energy and CO₂ emission for Pakistan. They employed ARDL model with the data ranging from 1981-2020. The results indicate that the export is having inverse relationship with carbon emissions in both short and long run. Furthermore, it indicates that the increase in carbon emission also lowering the export. However, the uses of energy having higher impact over the emission both in the short and long run. Based on the findings, the study suggests that it is urgent need to facilitates the use of renewable energy in the country to reduce emission for sustainable development.

From the above literature review, one can concluded that most of the studies have tried to establish the relationship between economic growth and energy consumption. To satisfy the objectives of the study, all most all the studies have employed secondary data and used different techniques such as ARDL estimators, Fixed Effect Model and Random Effect Model for panel data. The present study has also used updated secondary data from 1991-2022 and employed Fixed Effect Model, Random effect Model techniques for the data analysis over the eight independent variables with the emissions of CO₂. Furthermore, to check endogeneity in the models a Hausman test are used.

3. METHODOLOGY

For the possible solution of the problem, the study relied on panel data analysis technique on secondary data for the period of 1991-2022 which are sourced from World Development Indicators, Central Bank of Nigeria (CBN) Bulletins and employed Fixed Effect Model (FEM) and Random Effect Model (REM) and further to check the feasibility of the model a Hausman Test is employed. The functional model of the panel data regression can be expressed as follow:

$$CO_2 = F(GDP, EXP, EXCRT, ENRGCON, ELECTRCON, GCF, POPGRO, INDUSTGRO) \quad (1)$$

Where, GDP= Gross Domestic Product, Exp=Exports, ExcRt= Exchange Rate, EnrgCon= Energy Consumption, ElectrCon=Electricity Consumption, GCF= Gross Capital Formation, PopGro= Population Growth Rate, IndustGr = Industrial Growth Rate.

Equation 1 shows functional relation among the dependent and independent variables and cannot be estimated. For the estimation, one can need to transform equation 1 into the regression equation 2 which is given below in the log form and Equation No2 can be transform into equation No3.

$$\ln CO_{2, it} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln Exp_{it} + \beta_3 \ln ExcRt_{it} + \beta_4 \ln EnrgCon_{it} + \beta_5 \ln ElectrCon_{it} + \beta_6 \ln GCF_{it} + \beta_7 \ln PopGro_{it} + \beta_8 \ln IndustGr_{it} + \mu_{it} \quad (2)$$

$$\ln Y_{it} = \alpha + \beta_1 \ln X_{it1} + \beta_2 \ln X_{it2} + \beta_3 \ln X_{it3} + \beta_4 \ln X_{it4} + \beta_5 \ln X_{it5} + \beta_6 \ln X_{it6} + \beta_7 \ln X_{it7} + \beta_8 \ln X_{it8} + \mu_{it} \quad (3)$$

Therefore, to satisfying the objectives of the study one can need to frame the hypotheses, as others have set such as **Bosede & Akintunde (2021)**, **Ahmed at.al. (2021)**, which are following: **Ho1:** Economic Growth does not have any impact over the Carbon dioxide Emission, **Ho2:** Emission of Carbon dioxide does not influence by Energy Consumption, Electricity Consumption, and Population growth rate, and **Ho3:** Carbon dioxide Emission does not have any impacts by Exports, Exchange Rate and Gross Capital Formation.

4. DESCRIPTIVE STATISTICS

One can see the growth rates of ten selected ECOWAS countries and per capita carbon emission from table 1. Since Nigeria placed on top of the carbon emitter in the region but tin terms of average economic growth it placed on second (4.02%), while Ghana registered highest average economic growth in the region (5.37%). It is evident from the table 1 that the Gross Domestic Product and Co2 emission is not in same direction which is invalidate the assumption that if the country emitting more Co2 then its economic growth will be high. At least in case of ECOWAS region it is not sustained.

Table 1. Average Value of Eight Indicators for Ten Selected ECOWAS in 31 Years

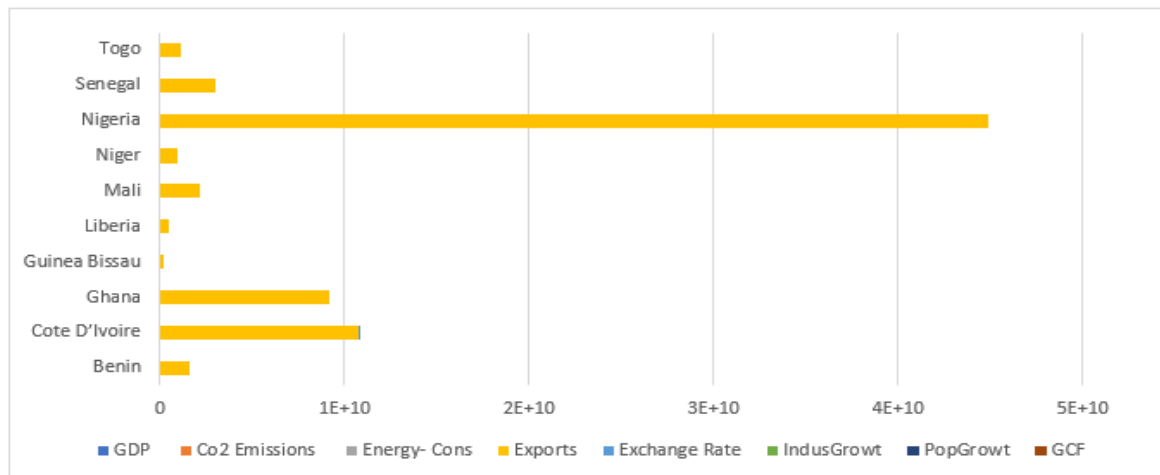
Country	GDP	Co2 Emissions	Energy-Cons	Exports	Exchange Rate	Indus Growth	Pop Growth	GCF
Benin	4.57	3472.58	357.60	1641629782	528.13	16.81	2.98	18.03
Cote D'Ivoire	3.55	6683.86	473.20	10794353505	528.17	18.15	2.70	16.47
Ghana	5.37	9985.16	320.94	9157961598	1.71	25.25	2.46	21.15
Guinea Bissau	2.39	288.06	51.54	156161399.4	528.17	13.12	2.42	15.66
Liberia	2.48	727.42	DNA	434575966.1	76.64	8.99	2.76	0.76
Mali	4.54	2088.71	DNA	2116998969	528.17	20.08	2.89	20.26
Niger	4.00	1174.84	168.96	906162928.41	528.17	20.85	3.53	21.00
Nigeria	4.02	97060.97	685.73	44885092395	153.04	28.22	2.60	28.10
Senegal	3.81	6125.81	259.85	3036106597	519.42	23.56	2.58	22.91
Togo	3.44	1683.55	414.96	1169883143	528.17	18.54	2.53	19.09

Source: Author's Calculation is based on World Development Indicators, World Bank

Note: Gross Domestic Products (GDP) taken as in per centage, Co2 Emission in kilo ton (kt), Energy Consumption is taken as kilogram oil of equivalent per capita, Net Exports in US Dollar, Exchange Rate is an Average Official Exchange Rate against per US Dollar, Industrial Growth is taken as percentage of GDP, Annual Population Growth Rate is taken in percentage, Gross Capital Formation (GFC) taken as percentage of GDP.

DNA: Data not available.

Figure 1. Average Value of Eight Indicators for Ten Selected ECOWAS in 31 Years



Source: Author's Calculation is based on World Development Indicators, World Bank

Table 2. Total Value of Eight Indicators for Ten Selected ECOWAS in 31 Years

Country	GDP	Co2 Emissions	Energy- Cons	IndusGrowth	PopGrowth	GCF
Benin	141.81	107650.00	11085.66	520.99	92.53	592.70
Cote D'Ivoire	110.06	207200.00	14669.22	576.18	83.60	510.45
Ghana	166.57	309540.00	9949.13	754.36	76.15	655.79
Guinea Bissau	74.00	7070.00	1597.58	393.30	74.99	485.55
Liberia	76.93	22550.00	DNA	278.59	85.45	23.58
Mali	140.65	64750.00	DNA	622.58	89.71	628.09
Niger	123.85	36420.00	5237.91	646.30	109.36	651.10
Nigeria	154.56	3008889.99	21257.73	874.70	80.70	837.35
Senegal	118.14	189900.00	8055.28	758.74	79.99	710.12
Togo	106.64	52190.00	12863.83	574.76	78.44	591.84

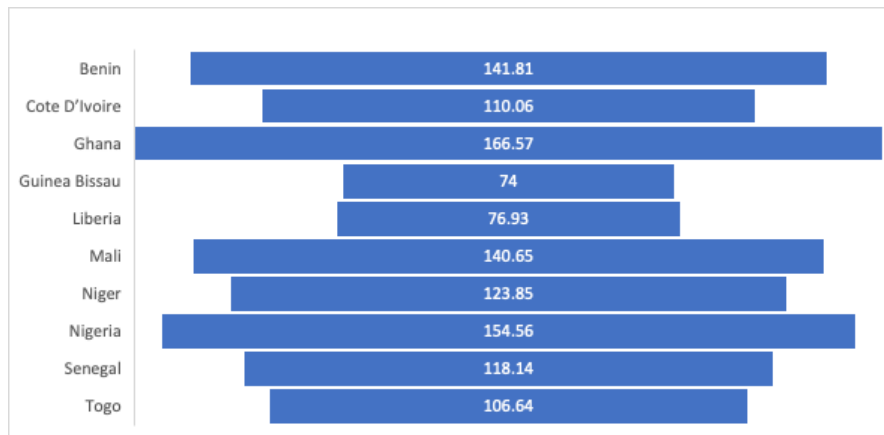
Source: Author's Calculation is based on World Development Indicators, World Bank

Note: Gross Domestic Products (GDP) taken as in per centage, Co2 Emission in kilo ton (kt), Energy Consumption is taken as kilogram oil of equivalent per capita, Industrial Growth is taken as percentage of GDP, Annual Population Growth Rate is taken in percentage, Gross Capital Formation (GFC) taken as percentage of GDP.

DNA: Data not available.

Table 2 shows the total value of Eight indicators for ten selected ECOWAS countries and here also Nigeria is on Top in terms of Gross Domestic Product (GDP), carbon emissions, energy consumption, industrial growth rate, and Gross Capital Formation (GFC). While Guinea Bissau is having tenth position in terms of carbon emission, Gross Domestic Product (GDP), energy consumption, and population growth. From the total value of all eight selected indicators, carbon emission and economic growth are showing positive association which is opposite to the average value. Therefore, it is needed to see the association between carbon emission and economic growth in totality instead of in average.

Figure 2. Total Value of Eight Indicators for Ten Selected ECOWAS for the Periods of 31 Years



Source: Author's Calculation is based on World Development Indicators, World Bank

5. RESULTS AND DISCUSSION

The study relied on panel data set for the period of and for the appropriate analysis of the data a Fixed effect model (FEM) and Random Effect Model (REM) are employed. The result of FEM is given below 3 and estimates of the FEM indicates that the Gross Domestic Product (GDP) and Carbon dioxide are having negative association, and it is contrary because as economic growth increase carbon dioxide emission increase and vice versa. However, in this case, it shows negative and statistically insignificant relation, and this result is supported by [Douglasson \(2017\)](#). Which means ECOWAS countries does not reached at that level of economic growth where the emission of carbon dioxide will be more. Furthermore, out of eight explanatory variables 4 are having negative association with Co2 such as energy consumption, Gross Capital Formation (GCF), Gross Domestic Product (GDP), and population growth while other four are having positive relation with emission of Co2 such as access of electricity, exports, exchange rate, and industrial growth. Moreover, out of eight independent variables, four are having statistically significant at one per cent level such as access of electricity, energy consumption, exports, and exchange rate while other four are having significant impact over the emission of Co2 such as GFC, GDP, industrial growth, and population growth however they are statistically insignificant. These results are supported by [Mamoudou \(2022\)](#). Furthermore, the probability of F statistics is showing significant at one per cent which indicates that the estimated equation is highly specified.

Table 3. Fixed Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	9167.826	1990.064	4.606	0.000
ELECTRICITY	147.334	19.622	7.508	0.000
ENERGYCONS	-15.983	4.1783	-3.825	0.000
EXCRATE	6.217	2.248	2.765	0.006
EXPORTS	9.470	2.320	4.083	0.000
GCF	-7.686	37.789	-0.203	0.839
GDP	-1.627	49.587	-0.032	0.973
INDUSTGRO	44.726	60.609	0.737	0.461
POPGRO	-106.426	170.370	-0.624	0.532
R-squared	0.985			
Adjusted R-squared	0.984			
F-statistic	1144.968			
Prob(F-statistic)	0.000			

Source: Author's Calculation

After running the Fixed Effect Model (FEM), we run Random Effect Model (REM) and the results of it is given in table 4. The estimates of REM revealed that the out of eight explanatory variables, three are having negative impact over the emissions of Co2 such as access to electricity, GFC, and Industrial growth while other five are having positive association with emissions of Co2 such as energy consumption, exchange rate, exports, GDP, and population growth. Moreover, out of eight four are having statistically significant at one per cent level such as access to electricity, energy consumption, exchange rate, and population growth while other four are having impact over the emission of Co2 while they are statistically insignificant. Furthermore, the probability value of F statistics indicates that the REM equation is perfectly specified.

Now we need to compare table 4 results with the table 3 and one can easily concludes that the estimates of FEM revealed that the association among the emission of Co2 and GDP are having negative relation while REM estimates indicates that there is positive relation between the Co2 emission and GDP, and therefore the REM results is quite admissible which is also supported by [Qi et.al. \(2021\)](#). Finally, to verify the feasibility of the chosen model for the estimates and to make an appropriate policy suggestion, we need to ran a Hausman test over the both REM and FEM results and after the analysis of both Hausman test results, we found that the probability value of Chi square is not significant statistically in case of FEM (results of FEM is not included), while it is statistically significant at one percent level in case of REM (table 5), which indicates that the Random Effect Model is an appropriate model for the analysis of the data sets.

Table 4. Random Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6740.396	3451.556	1.952	0.051
ELECTRICITY	-9.069	4.026	-2.252	0.025
ENERGYCONS	5.280	2.215	2.383	0.017
EXCRATE	1.160	2.310	5.035	0.000
EXPORTS	7.831	37.659	0.207	0.835
GCF	-23.781	49.466	-0.480	0.631
GDP	77.584	60.341	1.285	0.199
INDUSTGRO	-77.567	170.259	-0.455	0.649
POPGRO	141.850	19.524	7.265	0.000
R-squared	0.290			
Adjusted R-squared	0.271			
F-statistic	15.419			
Prob(F-statistic)	0.000			

Source: Author's Calculation

Table 5. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	94.713088	8	0.0000

Source: Author's Calculation

6. CONCLUSION AND RECOMMENDATIONS

Present study is examined the relationship between emissions of Co2 and GDP, electricity consumption, energy consumption exchange rate, exports, Gross Capital Formation (GFC), industrial growth, and population growth of some selected countries of Economic Community of West African Studies (ECOWAS). For this purpose, 22 years of secondary panel data are used. For the analysis of data FEM and REM estimates are employed and to check the endogeneity of the model a Hausman test are used. Results of Hausman test is in favour of REM and one can see from the table 5.

Therefore, the study suggests that there is an urgent need to encourage the use of renewable energy and related technique in this region to reduce the carbon emissions. Since the impact of population growth over the emissions of Co2 is positive (very high) and statistically significant (Table 4) therefore, it is important to make a proper population policy to have control over the population growth in the region. Moreover, the exchange rate is also having positive and statistically significant impact over the emissions of Co2, therefore it urgent need to have check and balance over the exchange rate in the region and for this there is a need to diversify the economies rather to dependent over the one source of revenue specially in Nigeria.

Based on the discussion, findings, and suggestions are limited and therefore it is having a scop for further research and for this it is needed to include more variables and extend the timeframe up to 2023. Moreover, one can see it country wise problem because the nature of the country, such as population, economic growth, industrial growth, and other factors are different therefore it can be seen separately.

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CONFLICT OF INTEREST

The author/s declares no conflict of interest.

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COMPLIANCE WITH ETHICAL STANDARDS

Not Applicable.

ETHICAL APPROVAL

Not Applicable

DATA AVAILABILITY:

On request one can get the data. Email: bholakhan1512@gmail.com

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