The Impact of Environmental Laws on Sustainable Development Goal 11: Empirical Evidence from Offa Town, Kwara State, North Central, Nigeria

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Abstract

This research examined the impact of adherence to environmental laws on achieving Sustainable Development Goal 11 (SDG 11) in Offa town, Kwara State, Nigeria, by 2030. Grounded in the premise of the theory of environmental rule of law for sustainable development by UNEP (2025) and the theory of public enforcement of the law by Polinsky and Shavell (2005), this study employed a multi-stage stratified random sampling method to collect data from 140 randomly selected household heads across 13 areas in Offa town between October 27 and November 20, 2023. Principal Component Analysis (PCA) was utilised to develop an index based on SDG 11 indicators, which included slum existence, public transport accessibility, flooding frequency, insecurity, traffic fatalities, sanitation facilities availability, and clean water access. The model was evaluated using multiple linear regressions with robust standard errors. The findings revealed a negative impact of environmental laws related to environmental protection, urban planning, road traffic, public health, and sanitation on SDG 11, indicating non-compliance among Offa residents that may obstruct the goal's achievement by 2030. Consequently, the study recommended the development of sanitation-focused infrastructure, improved access roads, repaired drainage systems, stricter law enforcement, and enhanced governance practices to foster compliance and progress towards SDG 11.

Keywords: Compliance, Enforcement, Environment, Laws, Sustainable Development Goal 11

INTRODUCTION

In Kwara State, Nigeria, the laws supporting Sustainable Development Goal (SDG) 11 focus on creating sustainable and resilient cities and communities. Central to these laws is the Kwara State Environmental Protection Law of 2006, complemented by the establishment of the Kwara State Environmental Protection Agency. The agency is tasked with managing and safeguarding the environment, as outlined in Section 13 of the Law. Its responsibilities include enforcing water quality standards set by the World Health Organization (WHO), conducting environmental research and assessments, managing noise pollution, and educating the public on proper waste disposal methods. Additionally, it implements actions to combat environmental degradation in industrial and governmental operations (Kwara State Government, 2006a).

The Town Planning and Development Law of 1984 established the Town Planning and Development Authority, outlined in Section 5 of the Law. Its key functions encompass planning and promoting the physical and environmental improvement of the State through organised control of land development. The Authority is responsible for formulating and approving planning schemes for towns and villages, ensuring sanitary conditions and amenities, preserving sites of architectural and historical significance, and developing infrastructure, such as roads, to support urban development (Kwara State Government, 2006b).

There is also the Road Traffic Law, which was first enacted by the government of Kwara State in 1967 and has witnessed remarkable amendments in line with modern trends. The law is cited as Road Traffic Law Cap R5 Laws of Kwara State of Nigeria 2006. Section 1 of the Law provides for the various types of vehicles that are driven on roads across the State as well as the weight load expected to be carried by carriage vehicles. In addition, Section 3 of the law provides that there shall be the establishment of a central motor registry and a principal licensing officer whose responsibility, among other things, is registration and licensing of motor vehicles and trailers. Section 4 of the Law

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also provides that the use of unregistered and unlicensed, or unmarked vehicles be prohibited. It is also prohibited for anyone to drive without a license, and where the license is issued, the government, through the court, can suspend and disqualify the use of such license. Special powers are vested in the police to exercise mutatis mutandis (the power of the licensing authority) (Kwara State Government, 2006c).

In addition, there is the law on Public Health that was first enacted in 1963 as part of the Laws of Northern Nigeria but codified into the Laws of Kwara State of Nigeria Cap P14 2006. The purpose of this Law is to ensure the safety and cleanliness of buildings, lands, and water in the State (Kwara State Government, 2006d).

The Kwara State Roads Maintenance Law Cap K46 Laws of Kwara State of Nigeria was first enacted in 2004 and later codified into the Kwara State Laws 2006. The Kwara State Roads Maintenance Agency was established for the implementation of the law. The functions and powers of the Agency were provided for under Sections 9 and 10 of the Law and include, ensuring the efficient and effective maintenance of all existing roads and facilities in the State, demolishing structures constituting public nuisance on roads, ensuring sustainable use of direct labour in the areas of road construction and maintenance, planning and managing the development and implementation of the road safety standard, planning and development of strategies that ensure efficient and effective movement of traffic on the roads and ensuring the implementation and preparation of Master Plans and schemes for an effective road maintenance policy in the State (Kwara State Government, 2006e).

The Kwara State government also enacted the law on water supply and usage and codified it into the Kwara State Laws of Nigeria Cap K48. Kwara State Water Supply and Sanitation Agency were created to see to the implementation of the Law. The functions of the Agency as provided in Section 13 of the Law include planning, budgeting, implementing, monitoring and evaluating rural water and sanitation activities, providing integrated safe water supply, sanitation and health education programmes, encouraging and promoting proper waste disposal, making efforts in ensuring continuous service of rural water supply and sanitation schemes in the respective benefitting communities through the maintenance and repairs of boreholes, making efforts in ensuring that adequate portable water is supplied in rural areas regularly and surveying, drilling, installing boreholes pumps (both hand and motorized pumps) and providing clean portable water for the use of rural dwellers (Kwara State Government, 2006f).

Related to the law on water supply and usage is the law on sanitation enacted in 2004 and codified into the Laws of the Kwara State of Nigeria in 2006. Section 1 (a), (b), (c) and (d) of the law provides for the duty and obligation of the house owner, tenant, and occupier to keep the tenement clean. Section 2 of the law provides that every owner or occupier of a tenement shall provide for dustbin with a cover. Section 3 provides that every commercial vehicle should carry a litter bin for the use of the passengers. Sections 4–9 provide for prohibitions. These restrictions include the act of discarding waste in public spaces, hindrance or inappropriate disposal of refuse, forbidding individuals from affixing handbills and safeguarding government posters. Additionally, the prohibitions extend to the construction of structures in road setbacks, misuse of open spaces, keeping domestic animals, and cutting roads without obtaining approval (Kwara State Government, 2006g).

The law on sanitation also provides for other obligations/prohibitions which are contained in Sections 11, 12, 13, 14, 15 and 16. These obligations/prohibitions are maintenance of sewage and septic tanks, keeping vacant lands away from refuse, rubbish, overgrown weed or offensive materials, covering of vehicles and containers to transport refuse, prohibition of waste burying, storage or burning in tenement and use of incinerator without a permit(Kwara State Government, 2006g).

The launching of the Sustainable Development Goals (SDGs) after the expiration of the Millennium Development Goals (MDGs) in 2015 was meant to reinforce the laws and the commitments of the government in making the cities and communities safe, inclusive, resilient and sustainable(i.e. the key components of SGD 11) which in turn are determined by access to adequate, safe and affordable housing and basic services such as safe water, sanitation and electricity, to safe, affordable, accessible and sustainable transport systems. Inclusive and sustainable urbanisation and capacity to participate in policies that affect the people, access to safe, inclusive and accessible green and public spaces, upgrading of slums and informal settlements and adaptation to climate change and resilience to disasters are also essential (see, UN, 2023ab; UNEP, 2023; UNDP, 2016; UNSD, 2023).

The most important of the laws that have a direct bearing on SDG 11 (i.e. making the cities and communities safe and sustainable for the improvement of the living standard of the people) is the Sanitation Law of 2004 (which was codified into the Laws of the Kwara State of Nigeria on sanitation in 2006) (Kwara State Government, 2006g). However, pieces of evidences how that despite these laws by the State government (more specifically at the Local Government levels), the conditions of infrastructural facilities such as sewage and septic tanks continued to deteriorate. In informal settlements and slums, insecurity and traffic fatalities in the cities and communities continued to rise.

For instance, in 2019, only 2.6 per cent of the residents in Kwara State had pipe-borne water connected to their homes. In 2022, about 643 cases of road traffic fatalities were recorded, and about 2,873 persons were affected by floods in 2015 (NBS, various issues). In addition, just about 10 per cent of the population in Kwara State had basic hygiene services (NBS/UNICEF/WB, 2019). In 2022, Offa also had its share of the flood, of which 1,770 and 1,130 people were affected and displaced, respectively (NEMA, 2022).

Several studies have it that some of these situations were caused by high population density, corruption, poor communication from regulatory agencies, cultural and traditional beliefs, lack of effective deterrents, lack of community and public involvement, poor governance, overlapping functions of agencies, lack of political will and commitment, political interference, inadequate funding,

lack of professionalism, economic barriers created by a high level of poverty and inequality and the difficulties in accessing the Courts given the size of the country (see, Ambituuni, Amezaga, &Emeseh, 2014; Amuyou, et al, 2016; Ijaiya, et.al, 2016; Ijaiya&Ijaiya, 2022; Olayemi, et al, 2017; Otusanya, Lauwo& Adeyeye, 2012; Umukoro, 2023). Moreover, if the laws as enacted and enforced by the government had been implemented and violators of the laws appropriately sanctioned for disrupting the environment, that would have erased the doubts that the targets of SDG 11 would not be met by the year 2030.

It is against this backdrop that the study examines the extent to which compliance with the laws on the environment would achieve SDG 11 in Offa town, Kwara State, before 2030.

LITERATURE REVIEW

Conceptual Issues: Sustainable Development, Sustainable Development Goals, Sustainable Development Goals 11, Environment Law, Enforcement and Compliance Main Headings

Sustainable development is a situation where current needs are satisfied while ensuring the needs of future generations. Since 2015, it has guided the seventeen Sustainable Development Goals (SDGs) and their associated targets (see, UN, 2023ab; UNEP, 2023; UNSD, 2023).

Sustainable Development Goals aim to tackle global issues such as poverty, inequality, and climate change (IISD 2024). SDG 11 focuses on building safe, inclusive, resilient, and sustainable cities and communities (see, UNSD, 2023).

The environment, or the natural world, encompasses a complex array of physical, chemical, and biological elements. It includes the atmosphere, water bodies, soils, sediments, and living organisms, creating a diverse ecological system (Merriam-Webster, 2025a).

The law is a binding custom or practice recognised by a community, enforced by authority, and serves as a rule of conduct or action, enforceable through penalties (Merriam-Webster,2025). Environmental laws are therefore the tools that help manage the conservation of natural resources across the country. In other words, environmental laws are regulations and agreements aimed at protecting the environment. They govern human interactions with nature, covering areas like natural resource management, including forests and fisheries, and procedures like environmental impact assessments to evaluate potential ecological effects (Sands, 2003).

Law enforcement and compliance are intertwined. Law enforcement involves government officials and organisations enforcing laws through structured actions, such as investigating, preventing, rehabilitating, or punishing individuals who violate community regulations and standards, while Compliance involves following laws, regulations, and internal directives from both regulatory authorities and the company (Merriam-Webster, 2025b).

For law enforcement to work, the courts, law enforcement agencies, law enforcement officers and the citizens are required and for compliance to work, fines, arrest and imprisonment, inspection and searches, enlightenment and advocacy, sealing of premises, and demolition of illegal structures are also needed (Kwara State Government, 2006h; Okonkwo, 2020).

The Link Between Environmental Laws Enforcement, Compliance and Sustainable Development Goal 11

Theoretical studies highlight the importance of the environmental rule of law for sustainable development, which integrates environmental needs with legal governance. It underscores the link between environmental sustainability and fundamental human rights, grounded in universal values. This framework fosters predictable governance, establishing environmental rights and responsibilities essential for effective environmental management. Enforcement of environmental laws is vital for achieving sustainable development and protecting the environment (UNEP, 2025).

Enforcement of the law is also crucial at all levels as postulated by Polinsky and Shavell (2005) in their theory of public law enforcement. In their view, government agents, including regulators and law enforcement agents, have to identify and punish legal rule violators. Key theoretical questions that come with this theory include the appropriate form of sanctions (fines, imprisonment, or both) and whether liability should be strict or fault-based. Additionally, considerations arise regarding the necessary adjustments to sanction levels if violations occur with only a certain probability and how many resources society should allocate to capturing these violators.

European & Nel, (2011), European Commission (2025), He, Qi, Wang, & Zhang, (2022), Stretesky & Lynch, (2011), and the USEPA (2009) recognizes several theories of environmental law compliance. Key among them are facilitative compliance that promotes cooperation, provides capacity-building, technical assistance, and financial support to help states overcome compliance challenges; compulsory compliance that supports penalties and legal actions against non-compliance; voluntary compliance that leverage on voluntary action, public participation, corporate social responsibility, and self-regulation mostly driven by moral imperatives; incentive-based compliance that focuses on financial incentives, such as subsidies and tax breaks, to motivate compliance by aligning economic interests with environmental goals; dispute resolution mechanisms found in international agreements, that facilitate mediation, arbitration, and judicial review for resolving disputes; sanctions and countermeasures that involves punitive actions, including trade restrictions and diplomatic sanctions, to address non-compliance (see also Kwara State Government (2006h).

An empirical study by Agrawal (2023) highlights that India's environmental legislation is influenced by legal and cultural factors. Key laws include the Wildlife Protection Act, 1972, Water (Prevention and Control of Pollution) Act of 1974, the Environment Protection Act of 1986, National Forest Policy, 1988, Forest Rights Act 2006, Wetlands (Conservation and Management) Rules, 2010 and 2017, Ozone Depleting Substances Rules, 2000, and the Biological Diversity Act of

2002, aimed at environmental protection and sustainable resource management.

In 2017, the Sri Lankan government enacted the Sustainable Development Act, No. 19 of 2017, aimed at promoting sustainable development following the Constitution. The Act establishes a legal framework for developing and implementing a National Policy and Strategy on Sustainable Development, ensuring the efficient use of natural, social, and economic resources. It calls for the integration of environmental, economic, and social factors in government decision-making and outlines strategies to achieve these goals. Additionally, the Act creates the Sustainable Development Council, which is tasked with facilitating national and international commitments related to sustainability. Its functions include formulating the National Policy in consultation with relevant stakeholders, periodically reviewing and updating this policy, and providing guidelines for sustainable development to various governmental bodies involved in new projects (PDSRS, 2017).

The Nigerian government has also enacted several environmental laws to foster sustainable development and environmental protection. Key legislation includes the Environmental Impact Assessment (EIA) Act of 2004, which requires assessments for development projects to address potential environmental and social impacts. The Nigerian Oil and Gas Industry Content Development Act of 2010 promotes local participation in the oil and gas sector while addressing associated environmental concerns. The Water Resources Act of 2004 oversees the sustainable management of water resources. The National Parks Service Act of 2004 provides a framework for managing national parks and wildlife reserves. Additionally, Section 20 of Nigeria's constitution emphasises the state's responsibility to protect natural resources and implement ratified international environmental treaties (Atoyebi, 2024).

Despite the challenges of enforcement of environmental laws, the laws often conflict with local beliefs regarding natural resource use. Nevertheless, judiciaries in several countries have significantly advanced environmental sustainability through these laws. Notably, the Supreme Court of India has addressed pivotal cases, such as Rural Litigation Entitlement Kendra vs. State of UP (A.I.R. 1985), which highlighted the importance of conserving natural resources for future generations. Additionally, in Vellore Citizens Welfare Forum vs. Union of India (A.I.R. 1996), the court affirmed that sustainable development is essential for poverty alleviation and improving living standards, emphasising that ecosystems must not be overstrained (Agrawal, 2023).

Schukoske (1996) identifies the inherent tension between environmental protection and economic development in Sri Lanka as a significant factor complicating the enforcement of environmental laws. These laws often conflict with traditional resource use by indigenous populations and income generation for owners and investors. Recently, local police, magistrates, and lower court judges have placed greater emphasis on enforcing these laws, particularly through fundamental rights litigation under Article 126 of the 1978 Constitution. This Article enables direct appeals to the Supreme Court, serving as a strategy for litigants to encourage the enforcement of existing environmental regulations. Four primary approaches are employed outside of government to protect the environmental land in Sri Lanka: (i) public nuisance complaints addressed to magistrates under various legal provisions; (ii) private nuisance suits from neighbouring residents against local businesses, such as brick kilns; (iii) involvement in the public commentary process for environmental impact assessments under the National Environmental Act; and (iv) fundamental rights petitions under Article 126. Two principal methods of challenging environmental fundamental rights violations have emerged in litigation. The first involves public interest litigation where residents claim government negligence in allowing nuisances, threatening their health and property. The second involves rangers who enforce environmental laws and contend with local officials' interference and even violence in their enforcement efforts.

The Nigerian courts first seriously referenced sustainable development in the case of the Attorney-General of Lagos State vs. Attorney-General of the Federation & 35 Ors. Lagos State contested the Federal Government's use of the Nigerian Urban and Regional Planning Act (NURPA) 1992, which encroached upon its town and country planning laws. A key issue debated was whether the Federal Government could use NURPA, under Section 20 of the 1999 Constitution, to legislate urban and regional planning for states. This Section mandates that states protect and enhance the environment, which the Supreme Court ultimately supported, emphasising sustainable development principles (Okon, 2016).

In Nigeria, courts enforce strict liability principles for environmental damage, holding polluters accountable for compensation. This is evident in the Harmful Wastes Act. A notable case, Shell Petroleum Development Company (Nigeria) Ltd v Abel Isaiah, highlighted jurisdictional issues regarding oil spills. The Supreme Court noted that only the Federal High Court had jurisdiction over such complaints, allowing the defendant to invoke fundamental rights under the constitution and the African Charter (Fawehinmi, 2001).

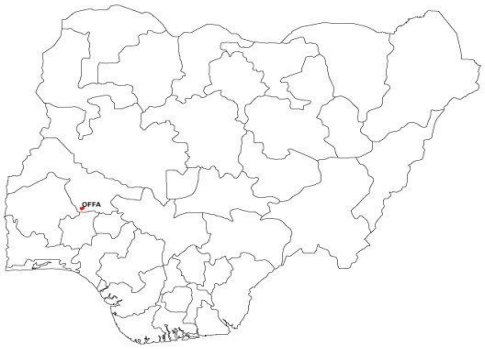
MATERIALS AND METHODS

Study Area

Kwara State has a landmass of 35,705 km2, and the population of the state is over 3.1 million. (National Bureau of Statistics, 2018; Ojuolape & Mohd, 2024). Kwara State is located in the Middle-Belt or North-Central geopolitical zone. Kwara State is fortunate to have a diverse population. The majority, known as Yorubas, are concentrated in areas of Kwara south and central.

The research is focused on Offa town, situated in Kwara South, Kwara State, Nigeria. Offa is positioned approximately 250 kilometres from Lagos and 500 kilometres from Abuja, the Federal Capital Territory of Nigeria. It is located at Latitude $8^{0}25^{1}$ north of the equator and Longitude $4^{0}30^{1}$. The town is found in the transitional area between the forest and savanna regions of Nigeria. Currently, Offa is the second-largest town in Kwara State, serving as the headquarters of Offa Local Government Area. As of the 2006 census, it is estimated to have a population of around 166,112 inhabitants. (Ijaiya, 2002; NPC, 2006).

Figure 1: Map of Nigeria showing the location of Offa Town in Kwara State



Source: Ijaiya (2002); Kwara State Planning Commission (2004); Ojuolape and Mohd (2024)

Materials: Variables and Data Sources

This study examines various indicators related to Sustainable Development Goal 11, which aims to make cities inclusive and sustainable. It evaluates factors such as slum presence, public transport access, flood incidents, crime rates, traffic fatalities, sanitation facilities, and safe water availability. Additionally, it considers laws on environmental protection, town planning, road traffic, public health, and water supply. The research assesses compliance levels among residents of Offa town in Kwara State, using specific measurement items outlined in Table 1.

A survey was conducted to gather primary household data on residents' views in Offa town regarding the impact of environmental law compliance on achieving Sustainable Development Goal 11 by 2030. Utilising structured interviews and questionnaires based on the World Bank Living Standards Measurement Study and the UNDP/UNCHS/World Bank's Urban Management Programme methods, the survey aimed to analyse public perceptions (see, Grootaert 1986; Leitmann 1994ab).

Principal Component Analysis (PCA) was utilised to create an index for Sustainable Development Goal 11 (SDG 11), which includes factors such as the presence of slums, access to public transport, flood incidence, crime rates, traffic fatalities, sanitation facilities, and safe water access. Respondents rated their awareness, experiences and access to these indicators using a binary 2-point scale: "1 for Yes" and "0 for No". The resulting values formed the PCA index. Additionally, compliance with existing environmental laws in Kwara State, Nigeria, was assessed using a 4-point scale ranging from "very much compliance" to "no compliance". Multiple linear regression analysis was performed to evaluate how compliance with these environmental laws could support the achievement of SDG 11 by 2030.

Sample Selection Method

The respondents were selected using a multi-stage stratified random sampling method in Offa town, which was divided into 13 areas. A structured questionnaire was administered to around 400 participants, with an average of 30 respondents per area. This approach ensured an impartial sampling process while adhering to a normal distribution model in the selection.

The sample size was determined using the formula developed by Yamane (1967). The formula is expressed as:

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

Where:

n = the sample size

N = the finite population

e = the level of significance (limit of the tolerable error), e.g. 0.05 per cent

1 = unity which is a constant.

$$n = \frac{75{,}383}{1 + 75{,}383\ (0.05)^2}$$

$$n = \frac{75{,}383}{1 + 75{,}383\ (0.0025)}$$

$$n = \frac{75{,}383}{1 + 188.45}$$

$$n = 398$$

As of 2004, Offa Local Government Area comprises 3 urban towns and over 30 rural settlements, had a population of 107,690, with Offa town accounting for approximately 70 per cent of this figure, leading to an estimated population of 75,383 (Kwara State Planning Commission, 2004). Using the Yamane formula, a sample size of 398 was determined for the study, and 400 questionnaires were distributed. However, only 260 were returned, and just 140 were valid for analysis, as the others were incomplete or improperly filled. The data collection for this study occurred between October 27 and November 20, 2023.

The interview and questionnaire explored socio-demographic and community characteristics, such as location, gender, age, and education, along with infrastructure issues like road conditions, power supply, and healthcare. It assessed how compliance with environmental laws in Offa town could contribute to achieving Sustainable Development Goal 11 before the 2030 deadline.

Methods: The Model and Estimation Techniques

Preceding the multiple linear regression analysis is a mathematical model specification derived from the literature. The model is thus specified as:

$$SDG11_i = (ELS_{it}, VHHC_{it}, VC_{Cit}) \quad (1)$$

Where:

$$ELs_{it} = (EPL_{it}, TPDL_{it}, RTL_{it}, PHL_{it}, RML_{it}, WSUL_{it}, SL_{it}) \quad (2)$$

$$VHHc_{it} = (LocaRR_{it}, Age_{it}, HHsize_{it}, Sex_{it}, MariSta_{it}, EduSta_{it}, OccpSta_{it}, MotRoads_{it}, Power_{it}, TeleInter_{it}, HealthFa_{it}, LocaGov_{it}) \quad (3)$$

$$VCc_{it} = MotRoads_{it}, Power_{it}, TeleInter_{it}, HealthFa_{it}, LocaGov_{it} \quad (4)$$

When equations (3, 4 and 5) are substituted into equation (2), it then becomes,

$$\mathrm{SDG11}_{it} = (\mathrm{EPL}_{it}, \mathrm{TPDL}_{it}, \mathrm{RTL}_{it}, \mathrm{PHL}_{it}, \mathrm{RML}_{it}, \mathrm{WSUL}_{it}, SL_{it}, \mathrm{LocaRR}_{it}, \mathrm{Age}_{it}, \mathrm{HHsize}_{it}, \mathrm{Sex}_{it}, \mathrm{MariSta}_{it}, \mathrm{EduSta}_{it}, \mathrm{OccpSta}_{it}, \mathrm{MotRoads}_{it}, \mathrm{Power}_{it}, \mathrm{TeleInter}_{it}, \mathrm{HealthFa}_{it}, \mathrm{LocaGov}_{it}) \quad (5)$$

When equation (5) is transformed into a multiple linear regression equation, it thus becomes;

$$SDG11_{it} = \beta_0 + \beta_1 EPL_{it} + \beta_2 TPDL_{it} + \beta_3 RTL_{it} + \beta_4 PHL_{it} + \beta_5 RML_{it} + \beta_6 WSUL_{it} + \beta_7 SL_{it} + \beta_8 LocaRR_{it} + \beta_9 Age_{it} + \beta_{10} HHsize_{it} + \beta_{11} Sex_{it} + \beta_{12} MariSta_{it} + \beta_{13} EduSta_{it} + \beta_{14} OccpSta_{it} + \beta_{15} MotRoads_{it} + \beta_{16} Power_{it} + \beta_{17} TeleInter_{it} + \beta_{18} HealthFa_{it} + \beta_{19} LocaGovit + Z_{it} \quad (6)$$

The description of the variables, measurement of the variables and a-priori expectations of the variables as stated in equation (6) are shown in Table 1.

Table 1: Variable Description and Measurement: Sustainable Development Goal 11 and Environmental Laws in Offa Town, Kwara State, Nigeria

S/ No	Variable name	Symbol	Variable type	Categorization	Variable measurement	*a-Priori* expectation (expected sign)
1	Index of the indicators of SDG 11 that comprises the presence of slums/informal settlements, access to public transport, incidence of flood, insecurity (crimes), traffic fatalities, access to sanitation facilities and access to safe water	$SDG11_{it}$	Binary/ Dummy	0, 1	0 if no, 1 if yes. Using the responses accordingly the index was generated using the Principal Component Analysis (PCA)	The dependent variable
2	Existing laws on the environment in Kwara State that comprise environment protection laws, town planning and development laws, road traffic laws, public health laws, road maintenance laws, water supply and usage laws, and sanitation laws	ELS_{it}		See all the Laws	See all the Laws	See all the Laws
3	Environmental protection law	EPL_{it}	Ordered	0 – 3	0 for no compliance, 1 for less compliance, 2 for much compliance and 3 for very much compliance with the laws on the environment	(+) Indicates positive impact
4	Town planning and development laws	$TPDL_{it}$	Ordered	0 – 3	0 for no compliance, 1 for less compliance, 2 for much compliance and 3 for very much compliance with the laws on town planning and development	(+) Indicates positive impact
5	Road traffic laws	RTL_{it}	Ordered	0 – 3	0 for no compliance, 1 for less compliance, 2 for much compliance and 3 for very much compliance with the laws on road traffic	(+) Indicates positive impact
6	Public health laws	PHL_{it}	Ordered	0 – 3	0 for no compliance, 1 for less compliance, 2 for much compliance and 3 for very much compliance with the laws on public health	(+) Indicates positive impact
7	Road maintenance laws	RML_{it}	Ordered	0 – 3	0 for no compliance, 1 for less compliance, 2 for much compliance and 3 for very much compliance with the laws on road maintenance	(+) Indicates positive impact
8	Water supply and usage laws	$WSUL_{it}$	Ordered	0 – 3	0 for no compliance, 1 for less compliance, 2 for much compliance and 3 for very much compliance with the laws on the water supply and usage	(+) Indicates positive impact

9	Sanitation laws	SL_{it} =	Ordered	0 – 3	0 for no compliance, 1 for less compliance, 2 for much compliance and 3 for very much compliance with the laws on sanitation	(+) Indicates positive impact

$VHHc_{it}$: Vectors of household characteristics of the individual respondent (e.g. location, gender, age, marital, household size, educational status, main occupation, secondary occupation).

S/No.	**Variable name**	**Symbol**	**Variable type**	**Categorisation**	**Variable measurement**	***a-priori* expectation (expected sign)**
	Location	Loc_{it}	Nominal	1 - 2	1 for traditional settlements and 2 for modern settlements	(+) Indicates positive impact
1	Sex	Sex_{it}	Nominal	1 – 2	1 for female and 2 for male	(+-) Indicates positive impact
2	Age	Age_{it}	Continuum	Age, as stated by the respondent	Age of respondent in years	(+) Indicates positive impact
3	Marital Status	$MarSt_{it}$	Nominal	1 – 2	1 for singles, 2 for married	(+-) Indicates positive impact
4	Household Size	HHs_{it}	Continuum	Household size as stated by the respondent	Number of people in the household	(+-) Indicates positive impact
5	Education Status	$EduS_{it}$	Dummy	0 – 1	0 for no school, 1 for educated	(+) Indicates positive impact
6	Occupational Status	OcS_{it}	Dummy	0 – 1	0 for unemployed, 1 for employed	(+) Indicates positive impact

VCc_{it}: Vectors of community characteristics of the individual respondent (e.g. state of motorable roads, power supply, telecom/internet facilities, health facilities, and local governance)

S/No.	**Variable name**	**Symbol**	**Variable type**	**Categorisation**	**Variable measurement**	***a-priori* expectation (expected sign)**
1	State of motorable roads	$SMro_{it}$	Ordered	0 – 3	0 for bad, dusty and not motorable, 1 for fair, dusty and motorable, 2 for fair tarred with few potholes and 3 for good tarred with no potholes	(+) Indicates positive impact
2	Power supply	$PowS_{it}$	Ordered	0 – 4	0 for none, 1 for poor, 2 for fair, 3 for good and 4 for very good	(+) Indicates positive impact
3	Telecom/Internet facilities	$TelIn_{it}$	Ordered	0 – 4	0 for none, 1 for poor, 2 for fair, 3 for good and 4 for very good	(+) Indicates positive impact
4	Health facilities	$HeaF_{it}$	Ordered	0 – 4	0 for none, 1 for poor, 2 for fair, 3 for good and 4 for very good	(+) Indicates positive impact
5	Local governance	$LoGo_{it}$	Ordered	0 – 4	0 for none, 1 for poor, 2 for fair, 3 for good and 4 for very good	(+) Indicates positive impact
		β_0	the intercept			
		$\beta_{1\ldots\ldots} \beta_{20}$	the parameters			
		Z_{it}	error term			
		I	Denoted as individual respondent 1…..140			
		t	The time data was collected			

Source: Developed by author, 2024

Methods of Data Estimation

To estimate the model, a Principal Component Analysis (PCA) was employed to generate the index for Sustainable Development Goal (SDG) 11, alongside multiple linear regression analysis utilising robust standard errors to capture variable relationships. Model validity was assessed using two main criteria: (i) a-priori expectation criteria based on the signs and magnitudes of variable coefficients, and (ii) statistical criteria, including R-square (R^2), F-statistic, and t-values. R^2 assessed the model's overall explanatory power, the F-statistic tested its overall significance, and the t-test evaluated the contribution of individual independent variables to the dependent variable (SDG 11) (see, Gujarati & Porter, 2009).

The independent variables, including various laws related to environment protection, town planning and development, road traffic, public health, road maintenance, water supply and usage and sanitation are generally expected to have a positive relationship with Sustainable Development Goal 11, except for certain household and community characteristics that depend on individual respondent traits.

RESULTS AND DISCUSSION

Regression Results of the Extent of Compliance of the Laws on the Environment and SDG 11 in Offa Town, Kwara State, Nigeria

Table 2: Regression Results of the Extent of Compliance of the Laws on the Environment and the Index of SDG 11 in Offa Town, Kwara State, Nigeria

Explanatory variable	Co-efficient	Robust standard errors	t-value	P > (t)
Intercept	0.6451268	0.7057802	0.91	0.363
EPL_{it}	-0.2568976*	0.1486151	-1.73	0.086
$TPDL_{it}$	-0.16337	0.1733057	-0.94	0.348
RTL_{it}	-0.4401954**	0.177143	-2.48	0.014
PHL_{it}	-0.062204	0.1106032	-0.56	0.575
$RML_{it,}$	0.1214403	0.1596897	0.76	0.448
$WSUL_{it}$	0.2098839	0.1347026	1.56	0.122
SL_{it}	-0.2460619**	0.1130184	-2.18	0.031
$LocaRR_{it}$	-0.2441884	0.2490927	-0.98	0.329
Age_{it}	-0.0145845	0.0120679	-1.21	0.229
$HHsize_{it}$	0.1179814**	0.0585104	2.02	0.046
$Gender_{i}$	-0.0464924	0.1885502	-0.25	0.806
$MariSta_{it}$	0.5477915	0.3538236	1.55	0.124
$EduSta_{it}$	0.8955311**	0.3443081	2.60	0.010
$OccpSta_{it}$	-0.4259704	0.2972366	-1.43	0.154
$MotRoads_{it}$	-0.3562235***	0.1190028	-2.99	0.003
$Power_{it}$	-0.5339153	0.1677212	-3.18	0.002
$TeleInter_{it}$	0.3265882**	0.1442364	2.26	0.025
$HealthFa_{it}$	-0.2232734	0.2033438	-1.10	0.274
$LocaGov_{it}$	0.6071571***	0.1891715	3.21	0.002
R^2	0.5146			
F-Statistic	0.0000			
Mean value of vif	2.06			
No. of cases	140			

*** p<0.01, ** p<0.05, * p<0.1

Robust standard errors in parentheses

Source: Developed by author, 2024

The model analysed reveals an R-square value of 0. 51, indicating that 51 per cent of the variation in the dependent variable [Sustainable Development Goal 11 (SDG 11)], was explained by various factors. These factors include environmental protection laws, town planning and development laws, and other regulations related to public health, road maintenance, water supply, and sanitation, as well as household and community characteristics in Offa town, Kwara State. The remaining 49 per cent of the variation is attributed to unmeasured variables, such as a lack of awareness of these laws. At a 5 per cent significance level, the model demonstrates its utility in assessing the relationship between legal compliance and SDG 11, as indicated by an F-statistic of 0.000, which indicates that the model as a whole is statistically significant. The value of the variance inflation factor (vif) was the average of 2.06 (below the 10-point threshold), which indicates the absence of multicollinearity in the variables.

The study found that, while controlling for household and community characteristics, several legal factors had unexpected coefficient values. Environmental protection laws (-0. 256), town planning laws (-0.163), road terrific laws (-0.440), public health laws (-0.062), and sanitation laws (-0.246) did not meet the anticipated signs. In contrast, road maintenance (0.121) and water supply laws (0.209) performed as expected. Statistically, road traffic and sanitation laws were significant at the 5 per cent level, with environmental protection laws significant at the 10 per cent level.

Discussion of the Results

Non-compliance with laws on environmental protection, town planning, road traffic, public health, and sanitation in Offa, Kwara State, poses challenges for achieving Sustainable Development Goal 11 by 2030.

The observed results stem from cultural norms and traditional beliefs regarding natural resource ownership and use, which are often seen as immutable despite legal frameworks. Additionally, the lack of sanitation facilities, misuse of open spaces for defecation and other activities, and domestic animal rearing contribute to these issues. These findings align with Schukoske's (1996) study, which notes that environmental law enforcement in Sri Lanka encounters similar obstacles, highlighting the persistence of these systemic challenges.

The misuse of road traffic regulations is a significant issue, highlighted by speeding among commercial motorcyclists, bus, and taxi drivers. Additional concerns include the lack of vehicle and driving licenses, illegal parking, and unauthorised construction of shops. The indiscriminate posting of advertisements, improper waste disposal, and theft of road manhole covers further exacerbate the situation. Furthermore, non-compliance with health protocols, such as using masks and sanitisers, has been troubling, especially during the Ebola and COVID-19 outbreaks, aligning with views from Ijaiya et al. (2016) and Ijaiya and Ijaiya (2022).

Corruption among personnel and authorities hampers effective law enforcement and compliance, manifesting through bribery, nepotism, and biased treatment of sanitation offenders. Individuals with connections to those in power often evade penalties, highlighting systemic issues

within the enforcement of laws related to sanitation offences (see also Ijaiya et al., 2016; Ijaiya & Ijaiya, 2022).

Some respondents believe that the failure to comply with environmental laws is not intentional. They argue that the government has not provided adequate sanitation facilities, such as refuse dump sites, leading to public confusion regarding expectations. Citizens are penalised for open defecation, yet the absence of public toilets makes compliance challenging. Additionally, high poverty and hunger levels in certain areas have eroded trust in the government, fostering apathy towards its policies. A notable example of this is the public's disregard for COVID-19 lockdown orders, highlighting widespread scepticism about government directives. These views align with prior research conducted by Ijaiya et al. (2016), (2020), and (2022), emphasising the disconnect between governmental expectations and the realities faced by the populace.

CONCLUSION

The study found that many laws in Offa town, Kwara State, were not being complied with, particularly those related to environmental protection, town planning, road traffic, public health, and sanitation. This non-compliance raises concerns about achieving Sustainable Development Goal 11 by 2030.

To address the challenges in Offa town, the government must establish essential facilities such as refuse dump sites, public toilets, and safe water sources. Additionally, constructing more access roads will alleviate congestion on Olofa Way, Ibrahim Taiwo, and Popo roads. It is crucial to repair damaged drainage systems, fill potholes on major roads, and renovate the primary health centres and the General Hospital in the area.

To combat non-compliance with environmental laws, the government must strictly enforce regulations through police, courts, traditional institutions, community organisations, and individuals, ensuring a safer, cleaner town for all residents.

To ensure Offa is safe, resilient, and sustainable by 2030, inclusive and participatory policies are essential. Enlightenment campaigns should educate residents on the importance of maintaining a green and clean environment. A positive, development-driven mindset among law custodians and citizens is crucial. Governance must prioritise accountability, transparency, and the control of corruption. Additionally, stabilising political and economic conditions (focusing on human and food security, reducing inflation, and mitigating foreign exchange volatility) is vital to addressing poverty and hunger challenges.

Within the context of our local societies in Nigeria and most especially in Offa town with a long historical background, this study opens a vista in understanding the challenges faced by most laws in our society, especially the laws on the environment.

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