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Online Advocacy and Social Media's Role in Communicating Effects of Environmental Pollution

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Abstract

Background: This study was motivated by the increasing rate environmental pollution in Nigeria, environmentally hazard behaviour, attitude and habit of citizens and the tendency for social media to help communicate the effect of pollution and facilitate environmental sustainability. Anchored on two-step flow theory, this study examines the roles of new media in communicating the effect of environmental pollution in Nigerian universities.

Methods: The study adopted survey research design and collected data using questionnaire. Students of University of Abuja and Nile University make up the study population while 398 of them were sampled. This study used the descriptive and regression analysis methods. SPSS version 27 was used for analysis.

Results: The results showed that social media platforms like Facebook, Twitter (X), and Instagram are the major channels for acquiring knowledge about environmental pollution among respondents. It revealed that students are more likely to view, like and comment on environmental related content coming from these platforms, but are less likely to share or participate in online events. The respondents displayed relatively low knowledge of the

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meaning, causes and effect of environmental pollution. Despite, regression results showed that students' exposure to EP-related content on social media strongly and significantly correlates with their knowledge, behaviour, and attitude toward environmental sustainability.
Conclusion: The study concludes that environmental advocates should adopt multimedia style of content creation. They should incorporate features that encourage users' interactivity, such as polls, quizzes, and FAQs.
Novelty: The study is the first to empirically examine how social media influences EP-knowledge and behaviour of university students, who are mostly active online.
Keywords: Social Media, Environmental Pollution, Environmental Sustainability; Online Advocacy.

1.1 Introduction

Environmental pollution (EP) is one of the most serious problems facing humanity. It is a global challenge responsible for about 9 million premature deaths in 2019 (Fuller et al., 2022; U.N.E.P., 2023) and 32.6 million internal displacements in 2022 (Internal Displacement Monitoring Centre [IDMC], 2023). World Bank estimated 216 million more people could become homeless by 2050 if sincerely focused sustainable action is not taken (Lupica, 2021). Ajibade et al.(2021) define EP as the introduction of harmful materials called pollutant into the natural environment (water, land and air). It includes trash and fossil fuels burning, open dumps, ocean garbaging, deforestation, industrial wastage (Boadi, 2020; Hill, 2020; Khasanova et al., 2023), among others.

Over the years, the need to address biodiversity loss, climate change, and pollution have triggered global reforms and mobilizations such as United Nations Stockholm Conference on the Human Environment (UNCHE), Global Environment Facility (GEF), and SDG 15. However, their impact remains blurry as degradation persists, especially in developing countries (Abu Dayyeh, 2024). This is evidence by how MEASEA countries dominated list of most polluted nations (IQAir, n.d; Tiseo, 2024). EP has multilevel adverse impact on general living condition of people. For instance, in 2022, flood killed over 300 people, displaced millions and destroyed properties worth $9 billion (Olurounbi, 2023). Arikenbi et al. (2023) claimed that flood and many diseases in Nigeria are symptom of the problems of environmental pollution. Before it becomes unredeemable, nations and actors have been called to solve the issue (Betsill & Bulkeley, 2021; Bodansky & Asselt, 2024). This includes deployment of communication infrastructure to sensitise and educate the populace on what EP is, its causes, effects and solutions.

1.2 Statement of the Problem

Despite the government efforts toward environmental pollution (Nwauzi & Amadi, 2019), Nigeria continues to battle air pollution from industrial and vehicular releases (Alumona & Onwuanabile, 2019), water pollution from plastic waste, oil spills and waste mismanagement (Adeniyi et al., 2021; Ukhurebor et al., 2021), and land pollution from open dumping unhealthy waste disposal. Report (Adeyinka et al., 2005) from Federal Ministry of Environment indicated

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that Nigeria also contends with global warming due to increasing concentrations of carbon dioxide (CO2) from 280 parts per million (PPM) in the 1800s to about 380 parts per million (PPM) now. The report maintained that health awareness through online advocacy is crucial to sustain Nigerian environment (Bugshan et al., 2022; Robbinson, 2024).

Given that the world has become digital and the growing adoption of social media for environmental advocacy (Chwialkowska, 2019; Confetto et al., 2023), it is imperative to assess social media roles in communicating effect of environmental pollution among students. This is because EPs are usually perpetuated through humans' activities. And since youths are arguably more active on social media than traditional channels, it could propagate environmental sustainability awareness in higher education and promote green university policies (Hamid et al., 2017). The advantage of social media in environmental communication lies in its two way approach, multimediality and ability to facilitate real-time communication at little or no cost (Pavelle & Wilkinson, 2020).

A number of studies recognize the roles of social media in promoting and creating awareness about environmental issues (Abbas et al., 2019; Chung et al., 2020). This is based on the argument that social media platforms like Facebook, X and Instagram are effective tool to create awareness about effect of pollution (Bramwell-Lalor et al., 2020), and such understanding can stimulate healthier environmental behaviour and attitude. However, most of available literatures either adopted qualitative methodology or not Nigeria based (Bhanye & Mais, 2023; Luedecke & Boykoff, 2017; Tavares, 2021). This study tries to fill this gap by adopting inferential analysis to investigate social media roles in communicating the effect of EP. The current study is guided by the following research questions.

1.3 Research Questions

i. What major social media platforms do students use to acquire knowledge about environmental pollution in Nigeria?
ii. How do students engage with environmental pollution content on social media?
iii. How do social media influence students' knowledge of environmental pollution?
iv. How do students measure the roles of social media in solving environmental pollution?
v. How do social media influence students' behavior and attitudes toward environmental sustainability?

We argue that this paper is significant to a number of groups in groups in the society. Firstly, this paper will inform policy makers, environmental advocates, and general publics of the level of knowledge about EP among students and effect of social media. Such insight not only raises awareness about environmental sustainability but could empower policy formation for positive change. This study also contributes to the expanding body of literature on environmental communication and media studies. Lastly, professionals involved in environmental management and policymaking can utilize the research findings to develop evidence-based strategies for engaging university students and fostering a culture of environmental stewardship and sustainability. The rest of the paper is divided into four sections: literature, methodology, findings and conclusion.

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2. Literature Review

2.1 Environmental Pollution

The concept of EP is nothing new. It is safe to say the concept is as old as man's history. This is agreeable when we reason the fact that earliest men at some point burn bushes and disposed excesses into the environment. However, the concept became a global concern in 20th century, primarily due to a combination of industrial growth (Markham, 2019), constructions of electricity dams (Wu et al., 2019), deforestation, discovery and harvesting of oil (Olowoyeye, 2021), increased use of fossil fuels, and the recognition of pollution's widespread impacts on human health and ecosystems (Perera, 2018).

According to Sebastian et al. (2019), EP is the degradation of environmental factors (air, water, soil) due to human and animal activity, causing residues that disturb living well. It occur when pollutants contaminate the surroundings, affecting our normal lifestyles adversely and disturbing the ecosystem and balance in the environment (Yadav, 2018). Many definitions of EP across broad literature are based on three main points; that it occurs when air, water and soil pollutants are introduced to ecosystem; that the introduction is done by man; and that such introduction has negative implications (Appannagari, 2017). Putting these together, we define environment pollution as any introduction into human environment (water, air, and land) that which is unpleasant and capable of causing health issue.

2.1.1.1 Causes and Effects of EP

As established above, EP is caused by substances called pollutants or contaminants and they can exist in liquid, solid or gaseous form (Gyawali et al., 2023). A substance becomes a pollutant when its concentration above its natural occurrence. The increase can be caused by human activity or natural phenomena (Maximillian et al., 2019). Studies have indicated that EP is caused by human economic activities (Azare et al., 2020; Xu et al., 2022; Zahoor & Mushtaq, 2023). For example, the industrial release such as exhaust, fumes, lead, mercury, and arsenic can bio accumulate in the body, causing serious lung diseases, neurological damage, and other health issues. According to Sereda and Flores-Sahagun (2022) who observed that uncontrolled urbanization, and increased solid waste generation such plastic packages are main causes of environmental degradation. Appannagari (2017) emphasised that development in modern technology is accountable for the manufacture of synthetic and non-biodegradable substances, including plastics, chemical nitrogen fertilisers, synthetic detergents, synthetic fabrics, huge vehicles, petrochemical industries, and other environmentally harmful sectors, alongside a 'disposable culture. Adverse effect of EP can be seen from both natural and economic side. For example, Aju et al. (2015) and Okeke et al. (2020) note that as deforestation increases so do increased soil erosion rates, increased river sediment loads, siltation of reservoirs and river beds, increased frequency and size of hood and drought events, altered precipitation patterns, intensified greenhouse effects, increased damage from atmospheric storms, among others. Below are some of the effects of EP.

i. Indoor air pollution from cooking and heating fires resulted in 3.8 million fatalities. (WHO, 2018).

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ii. In 2015, outdoor exposure ranked as the sixth foremost risk factor for mortality globally, resulting in 4.2 million deaths and almost 103 million disability-adjusted life years lost (Schraufnagel et al., 2018).
iii. The continuous mining process degrades plant and soil systems, diminishing soil production and fertility(Feng et al., 2019).
iv. Environmental plastics harm ecosystems, inhibit biodiversity, and eventually threaten the lives of mostly birds, fish, crabs, turtles, and other marine organisms. (Barboza et al., 2019).
v. One million species face extinction, largely due to human activities like habitat destruction and pollution (I.P.B.E.S., 2019).
vi. 1.2 trillion tons of untreated sewage, industrial waste, and agricultural runoff are dumped into the world's waters each year (Bradford, 2023).

2.1.1.3 Issues of EP in Nigeria

Most industrialised cultures worldwide struggle with environmental degradation; in recent years, African and Nigerian communities in particular have also had to deal with this threat. A study by Donuma et al. (2024) found that indiscriminate disposal of plastic bottles and sachet water bags are common form of pollution in Nigeria and it has led to the accumulation of plastic waste in open spaces, drainage systems, and water bodies. Akin to the above, Ogunbode et al. (2021) found that the use or misuse of fire to clear land can sometimes help improve soil quality in arid areas by adding fresh organic matter, but can lead to a reduction in natural vegetation. It also threatens wildlife, human life, and property through erosion, flooding, etc. (Anwadike, 2020). Livestock farming, or animal domestication, in northern and north-central Nigeria has notably impacted surface pollution. Intensive cattle grazing results in soil trampling and compaction, consequently diminishing its water retention capacity and altering its structural integrity. This results in soil erosion caused by wind and water. Grazing can positively impact land by providing faeces that act as natural fertiliser; however, during rainy seasons, this waste can wash into streams and rivers, which serve as drinking water sources for many rural farmers, thereby posing health risks such as cholera outbreaks. This may explain why cholera affects more rural inhabitants than their urban counterparts in Nigeria(Dan-Nwafor et al., 2019).

Similarly, Aju et al. (2015) argued that the deliberate removal of forest to create new agricultural land and/or for other purposes deprive Nigeria of the wealth of diversity and the potential use of many of their unique biological compounds often of great medical value. This is not withstanding how rural farmers sometimes out of ignorance over fertilize their farms because they are not aware of the nutrient content of the soil upon which they farm (Evelyn & Tyav, 2019). This practice damages the soil tops and result to poor yields. In Nigeria major urban cities like Lagos, Enugu, Ibadan, Kano, Port Harcourt, Benin, Warri, Kaduna, YandevGboko, industries inject into the air pollutants that deplete the ozone layer. In the Niger Delta area to be specific, most oil spills come from vessels or involves pipelines, oil terminal and bulk storage facilities which are sometimes caused by accidental or deliberate sabotage (Evelyn & Tyav, 2019). Offshore oil and gas well blowouts, the disposal of drilling muds and

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oil-contaminated waste, and the destruction of drilling rigs constitute significant sources of water pollution in these regions (Sakib, 2021). Water pollution adversely affects fish and other aquatic organisms. Different water borne diseases like epidemic, dysentery, typhoid etc., also occur. Obebe et al. (2021) indicate that corporate emissions, including carbon dioxide, sulphur oxide, hydrocarbons, and nitrogen oxide, result from the incomplete combustion of fuel and other carbon-containing substances in exhaust pipes and plants.

Social Media and Environmental Awareness

According to Bhavana and Vijayalakshmi (2021), social media are communication and information sharing platforms that cover computerized media, online media, programming, and web-based assets. Vorasiha (2022) defined social media as a communication channel presenting information such as news, entertainment information, or advertisements to consumers through various forms, such as internet media. It is a form of media that facilitate social activities on mobile phones and users share pictures and emoticons with text (Lihong, 2021; Stocchetti, 2020).

It had become an essential responsibility of media institutions to fully inform the public about impact of certain industrial facilities and eco-behaviour on their health. This claim is supported by the growing global clamouring for media support to limit or help provide solution to climate change. Scholars (e.g., Bhanye & Mais, 2023) have opined that social media offers chances to improve environmental communication. Bhanye and Mais identify several key components, including raising awareness of environmental issues, facilitating collaborations and participatory environmental communication, enabling two-way communication and dialogue on environmental matters, promoting environmental activism, and advancing environmental education.

Social media enhance connectivity and enable rapid communication. This can be achieved through social media platforms such as Facebook, Twitter, Instagram, WhatsApp, and YouTube (Pavelle & Wilkinson, 2020). Through social media, citizen journalism has increased the circulation of breaking news in Africa and accelerated the spread of environmental issues across the continent (Bhanye & Mais, 2023). With more than 4.26 billion social media users worldwide (Dixon, 2022), the lines between local and global "content" are blurring, which is increasingly seen as a key co-production factor for environmental and climate protection in Africa (Howarth et al., 2022).

A greater understanding of environmental problems is also made possible by social media. Building awareness involves sharing information about the impacts of pollution, sharing solutions and strategies for addressing diverse environmental issues, as well as organising and promoting events and campaigns related to environmental action (Meng et al., 2023).

The platform uniquely also allows participatory, which means citizens are allowed to participate in the discussion of environmental issues. Similar to other parts of the world, a lot of African organisations and people utilise social media to start campaigns and spread awareness about climate change. Utilising hashtags related to climate change has helped spread knowledge and awareness of the problem on social media sites like Instagram and Twitter

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(Bhanye & Mais, 2023). For instance, activities have been promoted and information about climate change in Africa has been shared using the hashtags #ClimateStrikeAfrica, #ClimateAction, and #ClimateCrisis.

2.1.2.2 Online EP Campaigns in Nigeria

The importance of information dissemination on environmental management cannot be over emphasized. The undesirable effects of an abused environment have led to the call for sustainable environmental protection practice in our nation (Olowoyeye, 2021). Nigeria, like many other countries, grapples with plastic pollution. Lagos, its megacity, produces between 13,000 and 15,000 tonnes of waste daily, including 2,250 tonnes of plastic (Ushie, 2023). The government's efforts to conserve the environment throughout the years have not produced any significant results. The Federal Environmental Protection Agency (FEPA) was founded in 1988 and then elevated to the current Federal Ministry of Environment in 1992. Degree 50 demanded the protection of natural resources and biological diversity. In 1984, the government instituted the monthly Environmental Sanitation Day. Conversely, Non-Governmental Organisations such as Friends of the Environment (FOE) and the National Conservation Fund (NCF) have also made contributions in various capacities towards environmental improvement.

Extensive campaign strategies via social media will significantly impact Nigerians. Numerous studies have highlighted the influence of online media on public perception regarding significant issues (Childers & Boatwright, 2021). Evidence supporting this assertion can be found in table 2.1, which illustrates the significant impact of digital media on public discourse and attitudes regarding environmental sustainability. The purpose of platforms is to facilitate broader reach, enhance engagement, and enable real-time communication.

Table 1: Some of Nigeria Social Media Channels

Name of Channel	Platform	Area of Focus
Environmental Rights Action (ERA)	Facebook	A Nigerian NGO that advocates for environmental justice and campaigns against pollution and environmental degradation.
Green Alliance Nigeria	Facebook	A group that promotes environmental education, advocacy, and community engagement to address environmental issues in Nigeria.
Nigerian Environmental Study Team (NEST)	Facebook	A team of environmental professionals and researchers working together to promote environmental sustainability in Nigeria.
Environmental Health Council of Nigeria	X (Twitter)	Established by Act 11 of 2002 as amended, It regulates the practice of Environmental Health Profession in Nigeria
Jewel Environmental Initiative	X	Jewel Environmental Initiative is an NGO based in Nigeria. #ClimateChange advocates #Biodiversity #NatResCons

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NESREANigeria	X	Responsible for regulating and enforcing national environmental standards.
Lekan Bakare Foundation	X	NGO that builds knowledge and capacity for the protection, improvement and growth of #OceanMarineLife in rural and urban coastal areas of Nigeria. #BlueEconomy #Sdg14

Source: Collected from the internet (Author, 2024).

2.2 Review of Related Studies

Keinonen et al. (2016) explored higher education students' perceptions of environmental issues and how these perceptions relate to media coverage. The sample comprised 429 students from Finland (307), Lithuania (59), and Sweden (63). Data were collected using an Internet-based or paper questionnaire with 21 multiple-choice and open-ended questions. The findings indicated that students viewed the lack of clean water as the most serious global environmental problem. The study revealed that media coverage influences students' perceptions; students who considered an issue serious also found the media's coverage of it appropriate. However, students felt that media often underestimated and obscured issues like biological diversity and global warming. Nwankwo (2017) assessed residents' views on the role of media in environmental health education in Onitsha, Nigeria. The study sampled 195 respondents and collected data using questionnaires and in-depth interviews. The findings revealed that refuse accumulation was perceived as the primary environmental health issue in the area, and residents rated the level of environmental health education as very low, attributing this to minimal media involvement. A Chi-square test indicated that less educated people are less concerned and less likely to take proactive measures. Also, logistic regression analysis showed that older respondents were more likely to engage positively with environmental health responsibilities compared to younger respondents.

Hamid et al. (2017) evaluated the role of social media, specifically Facebook, in promoting environmental sustainability awareness among higher education students and staff. Using a systematic literature review methodology, the authors searched three online databases for relevant papers, extracting specific data for analysis. The findings show that higher education institutions should leverage social media to enhance students' and staff's engagement with sustainability practices such as recycling, reducing electricity and water consumption, and minimizing paper use. Han and Xu (2020) investigated how different types of information exposure—interpersonal communication, traditional media, and social media—affect pro-environmental behaviour. Using a sample of 550 respondents in China, the study findings indicated that traditional media had negligible effects on pro-environmental behaviour, while interpersonal communication significantly influenced it by affecting environmental risk perception. Vogelaar and Priante (2021) explored the factors influencing the effectiveness of social media interventions in promoting pro-environmental behaviours. Their findings revealed that while environmental awareness was positively associated with people's sustainability

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habits, exposure to social norms through social media content did not significantly predict this intention.

Li and Noor (2022) examined the impact of social media on the pro-environmental behaviour of university students in China. Their findings revealed that social media usage positively influenced pro-environmental behaviour, with pro-environmental attitudes partially mediating this relationship. The correlation between social media use and pro-environmental behaviour was stronger among students with higher environmental consciousness. Similarly, Meng et al. (2023) explored the effects of exposure to environmental information on the intentions of 291 Chinese young adults (ages 18-25) to engage in pro-environmental actions such as recycling, and participating in environmental groups and events. The findings revealed that environmental information on social media platforms like WeChat positively influenced intentions to engage in pro-environmental behaviour and attitudes.

In Nigeria, Arikenbi et al. (2023) examined the effectiveness of mass media campaigns in promoting environmental sustainability in Nigeria. They grounded their work in the Two-Step Flow Theory. The findings indicated that these campaigns significantly raised public awareness about environmental issues and effectively communicated the urgency of adopting sustainable practices. The campaigns spurred behavioural changes among the populace, such as waste reduction, energy conservation, and support for environmental initiatives. Akin to Arikenbi et al., Banjo and Obun-Andy (2023) examined the role of media in creating awareness about environmental education among a sample of 200 residents from three senatorial districts in Ogun State, Nigeria. Their findings indicated that a lack of education on environmental issues and weak government policies were major challenges for the media in raising environmental awareness. It also revealed a positive significant correlation between environmental education and media awareness. The study is supported by Ambe et al. (2024) who evaluated the use of electronic media learning tools for environmental education in Nigerian tertiary institutions. However, the studies fail to access the level of knowledge of Nigerians on EP, major social media platforms used in communicating EP and the relationship between these media and people's knowledge, behaviour and attitude.

2.3 Theoretical Framework

Two-Step Flow Theory

Two-Step Flow Theory was propounded by Paul Lazarsfeld, Bernard Berelson, and Hazel Gaudet in 1948. The theory is based on the assumption that media influence occurs in two stages (Arikenbi et al., 2023). It assumes that media content initially reaches 'opinion leaders,' who process this information before passing it on to their followers or 'opinion followers.' The theory emphasises the importance of interpersonal relations in mediating media influence, proposing that individuals are more likely to be influenced by opinion leaders within their social circles than by mass media directly (Arikenbi et al., 2023). It implies that the effectiveness of EP campaigns often depends on the influence of opinion leaders (Arikenbi et al., 2023). These leaders can include community figures, influential bloggers, celebrities, or individuals with the capacity to shape public opinion within their spheres. When these opinion

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leaders endorse or advocate for sustainable practices, their followers are more inclined to adopt similar behaviors, leading to broader societal change. Arikenbi et al. (2023) used the theory examined the effectiveness of mass media campaigns in promoting environmental sustainability in Nigeria. The study indicated that these campaigns significantly raised public awareness about environmental issues and effectively communicated the urgency of adopting sustainable practices. However, the theory has faced criticism for oversimplifying the process of media influence (Nwankwo, 2017). It neglects the impact of other factors such as media content and individual characteristics.

3. Methodology

The study employed a survey research design. A survey is a method used in social science research to measure knowledge, attitudes, behaviours, practices, and perceptions on subject matters through the gathering of quantitative data from a representative sample (Mohajan, 2020; Nardi, 2018). We administered Likert scale questionnaire through Google Form, to collect primary data from the study participants. The 27-itemed questionnaire with close-ended responses was administered and retrieved between October and November, 2024. All data collected were analysed using the Statistical Package for Social Sciences (SPSS) version 27. We adopted a mixed-methods approach combining descriptive and regression analyses.

Population of the Study

45,810 and 33,552 students of the Bayero University, Kano and University of Abuja make up the population of this study. Therefore the total population of the study is 79,362 students from the two schools. The schools were chosen having satisfied the condition of having enrolled students from diverse social, cultural and economic background in Nigeria. As such, the results generated from study can be generalised to other varsities.

Sampling

We adopted purposive sampling technique, a non-probability sampling technique where the researcher selects sample based on his judgement. The sampling size was based on Yamane Taro formula below:

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

Where:
n = Sample size.
N = Population size.
1 = Constant.
e = margin of error.

The researcher used 5% level of significance to determine the sample size. 5% is used because it is constant. The sample size is therefore calculated thus:

$$n = \frac{79{,}362}{1 + 79{,}362\ (0.05^2)}$$

$$n = \frac{79{,}362}{1 + 79{,}362\ (0.0025)}$$

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$$n = \frac{79{,}362}{1 + 198.405}$$
$$n = \frac{79{,}362}{199.405}$$
$$n = 400$$

Approximately, the sample size is 398. However, the copies of the questionnaire were administered based on the population strength of each of the universities selected. Thus:

- $University\ of\ Abuja = \frac{33{,}552}{79{,}362} \times \frac{400}{1} = 169$
- Bayero University $= \frac{45{,}810}{79{,}362} \times \frac{400}{1} = 230$

Based on this, 169 (42.3%) copies of the questionnaire were administered in University of Abuja while Bayero University, Kano had 230 (57.5%).

4. Research Analysis and Findings

In this section, data generated in the field is presented, analysed and interpreted using a variety of statistical approaches. The reliability and validity of the instrument were tested at the research level through the calculation of Cronbach Alpha and Explorative Factor Analysis as shown in Tables 2 and 3. The overall Cronbach Alpha is .85, which indicates there is an acceptable range of reliability result. This is in consonance with the general rule of thumb that result between .70 and .90 shows a good internal consistency (Adeniran, 2019).

Table 2: Results of Reliability Studies

Variables		**Reliability Test Results**	
	No of Items	**N**	**Alpha**
Opinion on major social media sources for EP.	4	400	.832
Audience engagement with social media EP contents.	6	400	.884
Perception on social media effect on EP knowledge.	5	400	.873
Students' measures of social media roles	3	400	.835
Behaviour and attitude towards EP	4	400	.850
Overall	**22**	**400**	**0.85**

Also, using the Kaiser-Meyer-Okin and Bartlett's test, the results revealed the questionnaire to be valid as the Chi-Square value of 6367.698 with a significance level of 0.000, indicating that the correlations between the variables are significant. The Kaiser-Meyer-Okin Measure of Sampling Adequacy revealed .964, which means the factor analysis, is appropriate.

Table 3: Factor Analysis (Validity Test)

KMO and Bartlett's Test	**Results**
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.	.964
Approx. Chi-Square	6367.698
Bartlett's Test of Sphericity df	.231
Sig.	.000

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4.1 Analysis of Research Questions

Five (5) research questions guided this study. These questions are rephrased and analysed below.

Research Question One: What are the major social media platforms students use to acquire knowledge about environmental pollution (EP) in Nigeria?

Four items were identified regarding respondents' perception of major social media sources used for learning about EP. 59% of the respondents generally agreed that "Social media platforms like Facebook, Twitter (X), and Instagram are essential channels to learn about EP," while 21.5% disagreed. 55.1% agreed they "learn about EP issues through blogs and websites," while 36.3% disagreed. 54.3% generally agreed to using "mobile apps to stay updated on EP news," while 33.1% disagreed. Lastly, 54.6% agreed that online news portals are their primary source of information about EP, 34.6% disagreed.

Table 4: *Responses on major social media platforms used for learning about EP*

Items	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean	Std (σ)
Social media platforms; Facebook, Twitter (X), and Instagram are essential channels to learn about EP.	34	25	9.5	18	13.5	3.48	1.451
I learn about EP issues through blogs and websites.	29.3	25.8	8.8	19.5	16.8	3.31	1.483
I use mobile apps to stay updated on EP news.	30.5	23.8	12.8	23.3	9.8	3.42	1.381
Online news portals are my primary source of information about EP.	30.3	24.3	11	16.8	17.8	3.32	1.493

Note: ***N***= 398. **SA= Strongly Agree; A= Agree; N= Neutral; D= Disagree; SD= Strongly Disagree.** *Weighted Average =3.38.*

Research Question Two: How do students engage with EP content on social media?

On respondents' engagement with EP-related content on social media, 54.3% of the respondents agreed that they clicked on the "like" of such content when they come across it, while 40.8% disagreed. 53.8% agreed they follow blogs or websites that discuss EP issues, while 31.3% disagreed. .43.5% reported to have "participated in online events or activities related to EP awareness," while 28.5% disagreed. Similarly, 46.5% agreed they share/repost contents on effects of EP they come across, while 44.1 disagreed. Lastly, 50% agreed they participated "in online forums or communities that discuss environmental health issues," while 36.% disagreed.

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Table 5: *Distribution of Respondents according to engagement on EP related contents on social media*

Items	SA (%)	A (%)	UN (%)	D (%)	SD (%)	Mean	Std (σ)
When I come across contents on effect of EP, I like them.	36.5	17.8	12.5	23	10.3	3.47	1.44
When I come across contents on effect of EP, I make comment on them.	27.8	21.0	10.5	16	24.8	3.11	1.57
I participate in online events or activities related to EP awareness	24.5	19	18	27	11.5	3.18	1.37
When I come across contents on effects of EP, I share/repost.	26	20.5	9.5	26.8	17.3	3.11	1.48
I participate in online forums or communities that discuss environmental health issues.	29.5	20.5	13.5	22	14.5	3.29	1.45
I follow blogs or websites that discuss EP issues.	28.5	25.3	15	17.8	13.5	3.37	1.41

Note: ***N***= 398. **SA= Strongly Agree; A= Agree; UN= Undecided; D= Disagree; SD= Strongly Disagree.** *Weighted Average = 3.26.*

Research Question Three: How do social media influence students' knowledge of EP?

The results indicate a moderate understanding of the meaning, types, causes, effect and remedy to EP (M=3.46, SD=1.43). Specifically, 59.3% of the respondents generally agreed that they are aware of the different types of EP, while 30.8% disagreed. 58.8% agreed "EP occurs when humans introduce pollutants such as fossils, waste, oil spillage, and deforestation into the natural environment," while 29.6% disagreed. 59.3% acknowledged the harmful effects of pollution on plants, animals, and humans, while 30.3% did not. 54.8% agreed "death, diseases and food scarcity are some of the effect of EP," while 36.3% disagreed. Lastly, 57.8% believed that EP can be mitigated through cleaner energy sources, sustainable practices, and public awareness, while 30.5% disagreed.

Table 6: *Responses on students' levels of knowledge about EP*

Items	SA (%)	A (%)	UN (%)	D (%)	SD (%)	Mean	σ
I am aware of the different types of EP (air, water, soil and nuclear).	34.3	25	10	20.5	10.3	3.52	1.40
EP occurs when humans introduce pollutants such as fossils, waste, oil spillage, and deforestation into the natural environment.	29.8	29	11.8	13.8	15.8	3.43	1.44
EP has harmful effects on plants, animals and humans.	33.5	25.8	10.5	19.8	10.5	3.52	1.40
Death, diseases and food scarcity are some of the effect of EP.	30.8	24	9	20.3	16	3.33	1.49

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EP can be solved by adopting cleaner energy sources, sustainable practices, technological innovations, and public awareness campaigns.	35	22.8	11.8	18	12.5	3.50	1.44

Note: ***N*= 398. SA= Strongly Agree; A= Agree; UN= Undecided; D= Disagree; SD= Strongly Disagree.** *Weighted Average* = 3.46.

We further tested the hypothesis that social media usage would relate to students' knowledge level about EP. Results of the simple linear regression are presented in Table 7 and 8. Findings showed a statistically significant model summary: $F(1, 398) = 746.08$, $R^2 = 0.65$, $\Delta R^2 = 0.65$, $AdjR^2 = 0.65$, $P < .000$. Also, it indicate that social media ($\beta = 0.808$, CI = [0.738, 0.852], $P < .000$) was statistically and positively related to students' knowledge of EP. Hence, the hypothesis was accepted.

Table 7: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics				
					R Square Change	F Change	df1	df2	Sig. F Change
1	.808[a]	.652	.651	.68893	.652	746.079	1	398	.000
a. Predictors: (Constant), Social Media Usage									

Table 8: Coefficients

Model	B	Std.Error	Beta	T	Sig	Lower	Upper
1(Constant)	0.770	0.104		7.382	0.00	0.565	0.976
Social media usage	0.795	0.29	0.808	27.314	0.00	0.738	0.852

a. Dependent Variable: Environmental Pollution Knowledge

Research Question Four: How do students measure the roles of social media in solving environmental pollution?

Results of the data analysis show that 56.5% of the respondents generally agreed that social media facilitates collaborations and participatory environmental communication, while 36% disagreed. 55.5% agreed social media serves as essential channels for social networking for sustainability cause, while 29.8% disagreed. Meanwhile, 56.5% agreed social media serves a avenue for promoting environmental activism and education, while 30.1% disagreed.

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Table 9: *Respondents' perceptions of social media roles in solving environmental pollution*

Items	SA (%)	A (%)	UN (%)	D (%)	SD (%)	Mean	Σ
Social media facilitates collaborations and participatory environmental communication.	37.5	19	7.5	22	14	3.44	1.51
Social media serves as avenue for environmental activism, and for promoting environmental education.	30	25.5	14.8	12.8	17	3.39	1.46
Social media platforms are essential channels to learn about EP.	33.5	23	13.5	18.8	11.3	3.49	1.41

Note: ***N***= 398. **SA= Strongly Agree; A= Agree; UN= Undecided; D= Disagree; SD= Strongly Disagree.** *Weighted Average =3.44*

Research Question Five: How do social media influence students' behavior and attitudes toward environmental sustainability?

Findings show that respondents generally agree that their attitudes and behaviours towards environmental sustainability have been influenced by content on social media (M=*3.4*, SD=1.45). Specifically, 54.3% of them agreed they adopted eco-conscious habits, while 33.3% disagreed. 58.3%, 56.5% and 51.1% agreed they "support green policies like fight against deforestation" and "advocate against any activities that lead to automobile exhaust and bush burning" and "industrial smoke" because of social media content they are exposed to, while 32.3%, 31.6% and 35.8% disagreed, respectively.

Table 10: *Respondents' attitude and behaviour towards environmental sustainability*

Items	SA (%)	A (%)	UN (%)	D (%)	SD (%)	Mean	σ
I have adopted eco-conscious habits like using proper waste disposal, reusable products, and reducing plastic usage because of content I was exposed to on social media.	30.8	23.5	12.5	18.8	14.5	3.37	1.45
Because of content I was exposed to on social media, I now support green policies like fight against deforestation.	29.8	28.5	9.5	17.8	14.5	3.41	1.44
I desist from and advocate against any activities that lead to automobile exhaust and bush burning.	34	22.5	12	18.3	13.3	3.46	1.45
I desist from and advocate against any form of industrial smoke.	30.8	23	10.5	23	12.8	3.36	1.44

Note: ***N***= 398. **SA= Strongly Agree; A= Agree; UN= Undecided; D= Disagree; SD= Strongly Disagree.** *Weighted Average =3.4*

We also tested hypothesis that social media relate to students' attitude and behaviour towards environmental pollution. The regression results are presented in the table 11 and 12. Results

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showed a statistically significant model summary: $F(1, 398) = 739.971$, $R^2 = 0.65$, $\Delta R^2 = 0.65$, $AdjR^2 = 0.649$, $P < .000$. This indicates that social media usage ($\beta = 0.806$, CI = [0.757, 0.875], $P < .000$) was statistically and positively related to students' behaviour and attitude towards EP. Hence, the hypothesis was accepted.

Table 11: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.806[a]	.650	.649	.71021	.650	739.971	1	398	.000	1.816
a. Predictors: (Constant), Social Media Usage										
b. Dependent Variable: Behaviour and Attitude towards EP										

Table 12: Coefficients

Model	B	Std.Error	Beta	T	Sig	Lower	Upper
1(Constant)	0.638	0.108		5.929	0.00	0.426	0.849
Social media usage	0.816	0.030	0.806	27.202	0.00	0.757	0.875

a. Dependent variables: Behaviour and Attitude towards EP

5. Discussion

The findings of this study reveal several underlying roles of social media in communicating the effect of environmental pollution and advocating for sustainability to university students in Nigeria. It was observed that Facebook, Twitter (X), and Instagram are the most common social media platforms respondents used to acquire knowledge about environmental pollution and students are more likely to view, like and comment on environmental related content coming from these platforms, but are less likely to share or participate in online events. This suggests that while new media can spark interest and awareness, deeper levels of engagement, such as active participation in discussions or online communities, may require further encouragement. Similarly, results identified four key measurement respondents used to determine usefulness of social media in solving EP: collaborations, participatory environmental communication, environmental education and environmental activism. The findings support those Hamid et al. (2017) and Nathania et al. (2021) who observed that social media as gain popularity among environmental advocates. It however challenges the study of Abdulazeez et al. (2024), who placed more emphasis on traditional media as suitable channels of environmental communication.

Although results of descriptive analysis indicate that on average, sampled students only possess moderate knowledge of the meaning, types, causes, and effects of EP, regression results demonstrated that students' exposure to EP-related content on social media strongly and significantly correlates with their knowledge, behaviour, and attitude toward environmental

sustainability. The significance level ($p < 0.01$) of both test results confirms that the relationship is not due to chance, and the more students view, post, repost, comment, like and share EP contents on social media, the more they are likely to know about it and adopt eco-conscious habits, support green policies, desist from hazard waste dumping, automobile exhaust and bush burning, and industrial smoke. The findings align with those of Li and Noor (2022), Meng et al. (2023) and Vogelaar and Priante (2021), who both found that social media use influences pro-environmental behaviour among students and young adults.

6. Conclusion and Recommendation

In conclusion, results of this study underline the multifaceted benefits of social media in online advocacy for environmental pollution and sustainability causes. As postulated in two-step flow theory, participatory and democratisation features of social media channels make them crucial in environmental campaign. Insight from this study highlight the need for advocates to produce engaging multimedia content that invites students to share their views, participate in discussions, and advocate for sustainable practices and increase their knowledge base of the issue. However, despite the observed variance in EP knowledge and social media engagement among students, this study could not ascertain whether students' engagement with environmental content stems from genuine interest or is merely incidental (e.g., driven by entertainment or trending content). Also, propagation of fake environmental information on social media may limit deeper understanding. To explore these nuances, future studies should adopt qualitative methods such as focus group discussions (FGDs) or interviews to uncover the motivations, perceptions, and barriers influencing students' engagement with environmental issues on social media.

Author Contributions Statement

Saheed Oyelakin is a graduate of Kano State University from the Department of Mass Communication. His field of interest is journalism, media, and communication. He formulated the research concept, constructed the theoretical framework, and conducted analytical calculations under the supervision of Joseph Adekunle. He also developed the study instrument, conducted its administration, and gathered data for analysis.

Joseph Adekunle provided guidance and supervision for the analytic computations. Also, he supervised the findings of the work so that they were reliable and valid. Bilyaminu Abubakar and Matthew Oyeniran contributed to the analytical calculations and ensured the work was accurately attributed and referenced. They also contributed essential comments, which played a crucial role in influencing the research, analysis, and article.

Haruna Sule, Oluseyi Folorunso, Adebayo Alagbe, Temitope Anifowoshe, Okechukwu Robbert, Benedine Ebonyem, Ideh Glory, Chukwuebuka Ogu and Dasarath Neupane contributed to the analytical computations and offered valuable input and assistance in developing the research and analysis of the article. They also proofread the manuscript.

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