

AN INVESTIGATION INTO THE FREQUENCY AND PATTERNS OF SCIENCE REPORTING IN THREE LEADING ONLINE NIGERIAN NEWSPAPERS FROM 2016-2022*

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Abstract. This study conducts a comprehensive seven-year analysis of science reporting in three prominent Nigerian online newspapers: Vanguard, Daily Sun, and Punch, spanning from 2016 to 2022. Research conducted before has shown that science journalists in Africa face difficulties. These challenges include editors who do not provide enough support and focus too much on politics, low salaries, and not having enough resources to do their work effectively. They also face criticism from scientists for perceived shortcomings in education, interview preparation, reporting accuracy, and ethical concerns regarding payment for information. In view of this, the problem of this study is the need to understand and analyze the frequency and patterns of science reporting in Nigerian newspapers, specifically in Vanguard, Daily Sun, and The Punch, from 2016 to 2022. Utilizing descriptive research methods, the research scrutinizes the frequency of science reports and their percentage relative to general reports in each newspaper. The findings reveal variations among the newspapers, with Vanguard consistently featuring the highest number of science reports. Noteworthy fluctuations are observed from year to year, indicating potential shifts in editorial priorities or public interest in science-related topics. The study underscores the importance of enhancing science reporting efforts in online newspapers to foster scientific literacy and awareness among readers. It emphasizes the necessity of adapting reporting trends to align with evolving public interests and scientific advancements.

Keywords: *Editorial Policies, Nigerian Online Newspapers, Science Communication, Science Journalism Challenges and Science Literacy*

ԳԻՏԱԿԱՆ ՀՐԱՊԱՐԱԿՈՒՄՆԵՐԻ ՀԱՃԱՆԽԱԿԱՆՈՒԹՅՈՒՆԸ ԵՎ ԲՆՈՒՅԹԸ ՆԻԳԵՐԻԱՅՈՒՄ ԵՐԵՔ ԱՌԱՋԱՏԱՐ ՕՆԼԱՅՆ ԹԵՐԹԵՐՈՒՄ (2016-2022 թթ.)

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* Journal of Sociology: Bulletin of Yerevan University, Vol. 14 2(38), 2023, pp. 81-106



Received: 09.08.2023, Revised: 03.12.2023, Accepted: 12.12.2023

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Ամփոփում: Հոդվածում ներկայացված է նիգերիական երեք առաջատար առցանց թերթերի՝ Vanguard, Daily Sun և Punch, 2016-2022 թթ. ուսումնասիրություն, որի նպատակն է պարզել գիտական հիմնախնդիրների վերաբերյալ հոդվածների քանակն ու բնույթը: Հեղինակները գտնում են, որ մամուլում գիտական բնույթի հրապարակումների սակավությունը, թերթերի բովանդակության և լեզվի պարզեցման/պարզունակացման արդի միտումը կարող է նպաստել բնակչության գրագիտության մակարդակի նվազմանը, և այն բացասաբար են գնահատում՝ կարևորելով մամուլում գիտական հիմնախնդիրների վերաբերյալ և գիտական մակարդակի քննարկումների հրապարակումների քանակի մեծացումը: Մինչդեռ նախորդ հետազոտությունները ցույց են տվել, որ Աֆրիկայում գիտական լրագրողները բախվում են դժվարությունների, այդ թվում՝ խմբագիրների կողմից գիտական հեղինակներին բավարար չափով չաջակցելը, ովքեր չափազանց շատ են կենտրոնանում քաղաքականության վրա, ինչպես նաև ցածր վարձատրության ու անբավարար ռեսուրսներ ունենալու՝ իրենց աշխատանքն արդյունավետ կատարելու համար: Այդպիսի հեղինակները նաև բախվում են գիտականների քննադատությանն իրենց կրթվածության մակարդակի, հարցազրույցների նախապատրաստման, հրատարակվող նյութի ճշգրտության և տեղեկատվության մատուցման կապակցությամբ, ինչպես նաև էթիկական խնդիրների: Օգտագործելով նկարագրական հետազոտության մեթոդները՝ սույն հոդվածի հեղինակները պարզել են գիտական զեկուցումների հաճախականությունը և մասնաբաժինն ընդհանուր հրապարակումների թվում ուսումնասիրվող յուրաքանչյուր թերթում: Արդյունքները ցույց են տալիս թերթերի միջև եղած տարբերությունները, որտեղ Vanguard-ը պարբերաբար հրապարակում է նաև զեկույցներ: Մինևս նաև ժամանակ, նկատելի են տատանումներ, որոնք վկայում են խմբագրական առաջնահերթությունների հնարավոր տեղաշարժերի կամ գիտությանն առնչվող թեմաների նկատմամբ հանրային հետաքրքրության փոփոխության մասին: Ուսումնասիրությունն ընդգծում է առցանց թերթերում գիտական հիմնախնդիրների լուսաբանմանն ուղղված ջանքերի ավելացման կարևորությունը՝ գիտական գրագիտության և ընթերցողների իրազեկվածության բարելավման տեսանկյունից: Այն ընդգծում է մամուլի հրատարակչական մոտեցումների փոփոխության անհրաժեշտությունը գիտական թեմաներին և գիտական մակարդակի քննարկումներին ավելի մեծ տեղ հատկացնելու առումով:

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**ЧАСТОТА И ХАРАКТЕР НАУЧНЫХ ПУБЛИКАЦИЙ В ТРЕХ
ВЕДУЩИХ ОНЛАЙН-ГАЗЕТАХ НИГЕРИИ ЗА 2016-2022 ГГ.**

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Аннотация. В данном исследовании проводится всесторонний анализ научных публикаций в трех известных нигерийских онлайн-газетах: Vanguard, Daily Sun и Punch, с 2016 по 2022 год. Проведенные ранее исследования показали, что научные журналисты в Африке сталкиваются с трудностями. К числу этих проблем относятся редакторы, которые не оказывают достаточной поддержки авторам, публикующим статьи по научной тематике, и слишком много внимания уделяют политике, низкие зарплаты и отсутствие достаточных ресурсов для эффективного выполнения своей работы. Они также сталкиваются с критикой со стороны ученых за предполагаемые недостатки в образовании, подготовке к интервью, точности отчетности и этические проблемы в отношении оплаты за информацию. Используя описательные методы исследования, авторы данной статьи изучили частоту научных сообщений и их процент по отношению к общим сообщениям в каждой газете. Результаты показывают различия между газетами: Vanguard постоянно публикует наибольшее количество научных отчетов. Из года в год наблюдаются заметные колебания, указывающие на потенциальные сдвиги в редакционных приоритетах или общественном интересе к темам, связанным с наукой. Исследование подчеркивает важность активизации усилий по освещению научных публикаций в онлайн-газетах для повышения научной грамотности и осведомленности читателей. В нем подчеркивается необходимость адаптации тенденций научных публикаций в соответствии с меняющимися общественными интересами и научными достижениями.

Ключевые слова: *редакционная политика, нигерийские онлайн-газеты, научная коммуникация, проблемы научной журналистики и научная грамотность*

INTRODUCTION

Science-based reporting, as emphasized by Marn-González et al (2016), is essential for societal progress, highlighting that disseminating research enhances visibility, engages the public, and builds trust, ensuring research's meaningful impact on society.

The relationship between science and society is significant, with science impacting daily life through technological advancements and influencing human thought processes, as outlined by UNESCO (2013). Utilizing scientific knowledge and innovation is crucial for a high standard of living, and addressing global issues often requires the application of scientific solutions. Ventura (2019) suggests that societies neglecting investments in science and technology may face chronic poverty, especially during economic and environmental crises, highlighting the importance of science and technology engagement for development.

Nigeria's journey from a developing to a developed country hinges on various indices, including science, which is essential for improving life and driving societal progress. The Nigerian mass media comprises traditional and online outlets, with many traditional platforms adopting online channels to reach the broader Internet audience, leveraging advantages such as content permanence, global reach, multimedia capabilities, and instantaneous audience feedback. Many Nigerian newspapers web-publish their journalistic publications via online channels on news blogs and social media. News blogs are basically online newspapers, and journalism content published in hardcopy is web-published on news blogs. Three prominent newspapers in Nigeria are the *Vanguard* (vanguardngr.com), *Daily Sun* (<https://sunnewsonline.com/>), and *The Punch* (<https://punchng.com/>) newspapers. They are general-interest newspapers, initially print-based with 365 editions annually, now utilize media convergence by expanding to web publishing through news blogs and social media, covering various topics, including science. According to *Statistica*, there are 84 million Internet users in Nigeria (Johnson, 2023) and most of them read online news. As per a study conducted by the Reuters Institute for the Study of Journalism, a significant 95% of the English-speaking sample in Nigeria with access to education obtain their news on a weekly basis through digital and social media platforms, surpassing the percentages for television (61%) and print media (33%) (Adeyemo & Roper, 2022).

Online newspapers offer more science-related content than broadcast stations as not all the broadcast houses have science desks and science correspondents, although prominent broadcast media houses cover science, technology and innovation matters (Obot, Batta, Nda, & Ekeanyanwu, 2022). Nigerians exhibit a preference for online news sources over traditional media, with established offline brands like *Channels TV* and *The Punch* leading in preferred news sources, while international online platforms like CNN and BBC are popular among respondents, contributing to increased traffic and revenue for platforms like *The Punch*, the *Guardian*, and *Vanguard*. Notably, the majority of Nigeria's population below the age of 30 relies on mobile devices (84%) for news consumption, with the country offering relatively affordable mobile data charges (Isaac & Roper, 2021).

Researching the frequency and patterns of science reporting in Nigerian newspapers, is essential to understanding how the digital landscape has influenced the dissemination and accessibility of science-related information to a broader and more global audience, potentially affecting public engagement with science.

RATIONALE OF THE STUDY

African science journalists confront numerous challenges, including unsupportive editors who prioritize politics over science, low wages, insufficient training, limited resources like transportation, and a lack of respect from some

scientists. Scientists often criticize them for inadequate education in both science and journalism, unprepared interviews, inaccurate reporting, and occasional ethical concerns, such as requesting payment from scientists before publishing information (Nakkazi, 2012).

However, despite the highlighted challenges, studies have shown that science is reported in the Nigerian mass media, especially newspapers. Adeniran and Adenle (2012) studied science news reportage in *The Nation* and *Thisday* newspapers. Akpan et al. (2012) studied climate change reporting in *The Guardian*, *Thisday*, *Vanguard*, and *Daily Sun* newspapers. Batta et al. (2013) investigated climate change reporting in *The Guardian*, *Daily Trust*, *ThisDay*, and *The Punch* newspapers. Also, Batta et al. (2014) studied techno-science reports in *The Guardian*, *Leadership*, and *Daily Trust* newspapers. The contents of the above studies showed science reporting from diverse fields that have made significant contributions and insights to the reporting of science in Nigeria.

However, this study investigates the frequency and patterns of science reporting in *Vanguard*, *Daily Sun*, and *The Punch* newspapers from 2016 to 2022 to help establish a chronological sequence and provide a clear timeline that allows researchers and audiences to comprehend the frequency of science reporting in Nigerian newspapers.

THE IMPORTANCE OF SCIENCE AND SCIENCE REPORTING

Science is a systematic and logical method for discovering how the universe operates, building knowledge and new ideas that illuminate our surroundings. It leads to technological innovations, benefits society, and helps us understand and improve our lives, providing a deeper appreciation of our place in the universe. Science is crucial for making informed decisions about health, the environment, and other significant issues, serving as a tool that has led to transformative discoveries and innovations throughout human history and remains essential for the future (UNESCO, 2013).

Science holds value in society as it addresses fundamental human needs and enhances living standards, exemplified by efforts such as finding a cure for cancer and sustainable energy sources. It is justified to the public by contributing to economic growth, seen as a return on public funding. In recent decades, an additional goal of science has emerged: ensuring the rational use of natural resources to secure their continuity and humanity's sustainability (Rull, 2014).

Science reporting, as a form of journalism, involves translating complex scientific concepts into accessible information for the public through mass media, with a focus on enhancing understanding and awareness of scientific phenomena.

Science journalism, as outlined by Guenther (2019) and the Texas A&M School of Veterinary Medicine & Biomedical Sciences (2023), is a specialized field

focusing on science, medicine, and technology, where journalists play a vital role in translating complex scientific information for the general public through various media platforms and institutions. The responsibilities of science journalists encompass reporting, editing, and serving as public information officers, bridging the gap between scientists and the broader audience.

Condit (2004) justifies science reporting by emphasizing the public's reliance on media for health information, noting challenges in direct communication by medical professionals.

Science journalists covering diverse scientific fields aim to increase science literacy by informing the public about a wide range of scientific projects, fostering awareness, education, and understanding of the positive impacts and potential risks of science on society. Slater et al. (2021) explain that the endeavors to promote scientific literacy among the public primarily seek to empower individuals to make well-informed choices, both in their personal lives (such as health and sustainability decisions) and in the broader public arena.

Science literacy is a concept in which the public is educated about the scientific engagements of scientists and technologists in society with the adequate knowledge and expertise to analyze, interpret, use, and query scientific data that impacts day-to-day or future engagements. Garbacz (2023) says that science literacy encompasses not only a comprehension of scientific facts but also an understanding of the scientific methodology, allowing individuals to make decisions grounded in facts, research, and knowledge rather than relying on opinions or hearsay. Reporting science sets the agenda for improved science literacy that can prompt the public to ask more from scientists and for the government to make robust science policies that can have an impact on improving the wellbeing of citizens.

SPECIFIC EXAMPLES OF SCIENCE REPORTS IN NIGERIAN ONLINE NEWSPAPERS

Science reporting in Nigeria is an underdeveloped field, lacking attention and specific training in science communication skills in Sub-Saharan Africa. This deficiency affects the quality of science journalism, hindering the effective communication of scholars' high-quality research findings to the public and policymakers, thereby limiting their potential impact on important issues (Tumeo, 2023). This implies that a lot of science reporting in Nigeria is based on policy pronouncements by Nigerian government officials without the requisite political will to address scientific and technological challenges affecting Nigeria. Science reporting in Nigeria are mostly the “political promises” to improve science which is a major feature of science reporting in Nigeria. According to Tomori (2023), the Nigerian government's failure to adequately fund and support scientific endeavors has become apparent, revealing a deep-seated neglect of science and technology in national

development, as outlined in a 2023 article from The Conversation. Despite political promises to invest more in science, the country's scientific progress remains hampered, emphasizing the need for concrete actions rather than mere rhetoric. The article underscores the necessity for the new president to prioritize retaining scientific talent, augmenting funding for research, and implementing measures to foster innovation, science education, and public awareness.

Some specific examples of the above are: FG promises N36m as four scientists present solutions to COVID-19³⁸; Nigerian scientists fail to win FG's N36m prize for COVID-19, Lassa Fever cure³⁹; Nigeria Will Land Own Astronaut In Space By 2030 – Minister⁴⁰; 24yrs after, Nigeria's space programme loses traction despite yearly allocations⁴¹; COVID-19: FG releases N10bn for domestic vaccines production⁴²; Risks of investing in vaccine production in Nigeria dangerously high, govt uninterested in local initiative –Awoyemi, Regulatory officer, Bio-vaccines firm⁴³

Recently, the controversy surrounding Nigeria's delegation to the United Nations Climate Summit COP 28 in Dubai involves conflicting reports on the delegation's size that overshadowed the few scientific gains of the science reporting of the benefits and prospects of COP 28. The Federal Government clarifies that only 422 delegates were sponsored, with the rest considered "overflow" participants. Despite Nigeria's relatively low global carbon dioxide emissions, the delegation of 1,411 participants is criticized for being among the largest, sparking outrage and demands for transparency and cost accountability from political parties and citizens alike. Prominent headlines were: Uproar over Nigeria's 1,411-man delegation to COP-28⁴⁴; COP28: Seyi Tinubu, Stewards, Chefs, Cooks Among Nigerian Delegation⁴⁵.

These and more overshadowed genuine science reports on COP 28 like COP28: Nigeria's green economy initiative 'll inspire the world — Tinubu⁴⁶ and Nigeria Inaugurates Long Term Low Emission Development Strategy At COP28⁴⁷.

³⁸ [FG promises N36m as four scientists present solutions to COVID-19 \(vanguardngr.com\)](https://www.vanguardngr.com/2021/01/covid-19-fg-promises-n36m-as-four-scientists-present-solutions-to-covid-19/)

³⁹ [Nigerian scientists fail to win FG's N36m prize for COVID-19, Lassa Fever cure - Daily Post Nigeria](https://www.vanguardngr.com/2021/01/covid-19-fg-releases-n10bn-for-domestic-vaccines-production/)

⁴⁰ [Nigeria Will Land Own Astronaut In Space By 2030 - Minister • Channels Television \(channelstv.com\)](https://www.channelsstv.com/news/nigeria/nigeria-will-land-own-astronaut-in-space-by-2030-minister)

⁴¹ [24yrs after, Nigeria's space programme loses traction despite yearly allocations | The Guardian Nigeria News - Nigeria and World News — Nigeria — The Guardian Nigeria News – Nigeria and World News](https://www.theguardian.com/world/2023/01/24/nigeria-space-programme-loses-traction-despite-yearly-allocations)

⁴² https://www.vanguardngr.com/2021/01/covid-19-fg-releases-n10bn-for-domestic-vaccines-production

⁴³ [Risks of investing in vaccine production in Nigeria dangerously high, govt uninterested in local initiative –Awoyemi, Regulatory officer, Bio-vaccines firm - Punch Newspapers \(punchng.com\)](https://www.punchng.com/news/risks-of-investing-in-vaccine-production-in-nigeria-dangerously-high-govt-uninterested-in-local-initiative-awoyemi-regulatory-officer-bio-vaccines-firm/)

⁴⁴ [Uproar over Nigeria's 1,411-man delegation to COP-28 - Vanguard News \(vanguardngr.com\)](https://www.vanguardngr.com/2023/12/cop28-nigerias-green-economy-initiative-ll-inspire-the-world-tinubu)

⁴⁵ <https://dailytrust.com/cop28-seyi-tinubu-stewards-chefs-cooks-among-nigerian-delegation>

⁴⁶ <https://www.vanguardngr.com/2023/12/cop28-nigerias-green-economy-initiative-ll-inspire-the-world-tinubu>

⁴⁷ [Nigeria inaugurates Long Term Low Emission Development Strategy at COP28 – Voice of Nigeria \(von.gov.ng\)](https://www.von.gov.ng/news/nigeria-inaugurates-long-term-low-emission-development-strategy-at-cop28)

Foreign media (African, European, Asian, American) presented the real issues and action points of COP 28 like: BBC's COP28: UN climate talks go big on ending fossil fuels⁴⁸; *Africa News's* Kenya's President Urges Global Action at COP28 Amid Climate Crisis in Eastern Africa⁴⁹; and *Aljazeera's* Oil companies pledge to lower methane emissions at COP28⁵⁰.

Despite the setbacks in science reporting in Nigeria, there are still public interest science reports that enures that Nigerians are health and safe. Examples are *Daily Sun's* Benzoic acid level in Nigerian soft drinks safe – The controversy over benzoic acid in Fanta and Sprite prompts the Nigerian Institute of Food Science and Technology (NIFST) to support the Federal Ministry of Health's statement. NIFST asserts the global safety of benzoic acid, aligning with international standards. The institute addresses health concerns, emphasizing the unlikely conditions for benzene formation in Nigeria and advocates for increased awareness to avoid unnecessary controversies (Chikwe, 2017). *Vanguard's* Misdiagnosis in individuals with haemoglobinopathy can ruin lives — Professor Sulaimon Akanmu stresses the importance of accurate diagnosis in haemoglobinopathy cases to avoid negative impacts. He advocates for comprehensive training of lab practitioners, emphasizing adherence to standard procedures and cost-effective screening methods (Obinna, 2023). *Punch's* Scientists advocate natural health remedies: Stakeholders at the Nigerian Society of Pharmacognosy's conference emphasized the crucial role of natural remedies in healthcare, citing their multifaceted benefits and the importance of collaboration between researchers, pharmacists, and indigenous communities for sustainable utilization (Ogundepo, 2023).

THE ROLE OF THE MEDIA IN SCIENCE COMMUNICATION

Communication stands as a vital pillar of human existence, and conveying meaningful scientific information presents a particularly formidable task. Globally, significant progress has undeniably been made in this endeavor over the years. However, the fruits of these advancements will remain unrealized without an efficient and accessible means of disseminating this crucial information to the relevant individuals (Abhijit, 2012). The above emphasizes the critical role of communication in disseminating meaningful scientific information, highlighting the importance of examining the seven-year timeline of science reporting in Nigerian online newspapers. Science communication is a multifaceted process that goes beyond simplifying scientific jargon for the public; it involves diverse elements such as communication goals, content, format, and the influence of

⁴⁸ COP28: UN climate talks go big on ending fossil fuels - BBC News

⁴⁹ Kenya's President Urges Global Action at COP28 Amid Climate Crisis in Eastern Africa | Africanews

⁵⁰ Oil companies pledge to lower methane emissions at COP28 | Climate Crisis News | Al Jazeera

individuals, organisations, and broader societal factors. To excel in science communication, it is essential to understand and navigate this complexity while adapting to the evolving communication landscape (National Academies of Sciences, Engineering, and Medicine, 2017). Understanding the complexities and dynamics of science communication, as highlighted above, is crucial for comprehending how science reporting has evolved over seven years in Nigerian online newspapers and how it adapts to the changing communication landscape.

Currently, a substantial volume of scientific content is readily available in the mass media and serves as the primary source of scientific information for many individuals. Consequently, the social scientific community has extensively scrutinized the connection between science and the media. However, it can be challenging to stay abreast of this research due to the prolific number of studies addressing this matter (Schäfer, 2011). This underscores the significance of examining how scientific content in the mass media has evolved and its impact on public understanding of science.

In the realm of science communication, the combination of the words 'science' and 'communication' denotes the act of conveying scientific knowledge from the known to the unfamiliar. The central goal of science communication is to familiarize the public with scientific information, fostering a scientific mindset that encompasses the capacity for discussion, debate, and analysis among ordinary individuals at a foundational level (Goswami, 2018). This emphasizes the essential role of science communication in making scientific knowledge accessible to the public, highlighting the goal of fostering scientific literacy and enabling informed discussion and analysis among ordinary individuals. In line with the above, science communication is complemented by science literacy, and Fischhoff and Scheufele (2013) posit that effective science communication to the public is influenced by prior education in science, as individuals who have received science education are better equipped to comprehend and engage with relevant scientific information. Additionally, the authors add that scientists' efforts in building connections with society and fostering networks with stakeholders enhance the likelihood of their research receiving attention and addressing societal implications effectively. The above highlights the importance of science literacy and the role of science education in enabling effective science communication, while also highlighting how scientists' engagement with society and stakeholders can contribute to the dissemination and impact of their research findings in the media.

It is recognized that not all people have some basic knowledge of science education or science literacy, even in the most advanced science nations. In a Pew Research Centre survey in 2019, Americans answered an average of 6.7 out of 11 questions correctly on a quiz of basic science facts (Kennedy & Hefferon, 2019). Consequently, the media serves as a potent platform for disseminating information

to the public regarding scientific advancements, accomplishments, and the invaluable contributions of scientists to the progression of society. As per the findings of researchers, the communication of scientific knowledge can occur through two primary channels: direct communication by the scientists themselves or indirect communication facilitated by journalists who bridge the gap between academic research and public awareness, ensuring that the knowledge generated in academic domains reaches a wider audience (Harmatiy, 2021). The above underscores the critical role of the media in disseminating scientific information to the general public, especially in cases where basic science literacy may be lacking, highlighting the dual channels through which scientific knowledge can be communicated—directly by scientists and indirectly through skilled science journalists who bridge the gap between academic research and public awareness.

The media have important roles to play as regards science communication. The study by Ferreira et al. (2021) explains that the media's role in science communication is to ensure a focused voice that determines when, how, and where to communicate science by choosing the appropriate format, platform, and audience. Understanding the media's role in science communication, as articulated by Ferreira et al. (2021), is essential for evaluating how Nigerian online newspapers have strategically conveyed scientific information over seven years.

Brodsky's (2014) research shows that the mass media acts as a mediator between scientists and the public by translating technical jargon, explaining complex concepts, and highlighting the relevance and impact of scientific research. Brodsky's (2014) research highlights the essential role of the mass media as a mediator in science communication, underscoring its function in translating scientific complexities and emphasizing relevance, which is highly pertinent to understanding how science reporting evolved over a seven-year period in three online Nigerian newspapers.

For Kitzinger (2006), the mass media serve as a primary source of science exposure for most adults and are often presumed to have a significant influence on science communication and public perceptions. While mass media can reach broad audiences, it also has limitations in conveying scientific intricacies. Therefore, those involved in science communication and public engagement must carefully consider their goals and strategies when collaborating with the media. The above perspective underscores the mass media's role as a primary source of science exposure for adults, highlighting its potential influence on science communication and public perceptions while also emphasizing the need for thoughtful consideration of goals and strategies when engaging with the media, given its limitations in conveying scientific complexities.

The media plays a crucial role in science communication, with proficient science journalists specializing in translating intricate scientific concepts into easily

understandable content for the public while maintaining scientific accuracy (Brownell et al., 2013). This perspective underscores the indispensable role of skilled science journalists in bridging the gap between complex scientific concepts and public understanding while also upholding scientific accuracy, which is crucial for assessing the effectiveness of science reporting in the media.

The media plays a vital role in science communication by enhancing public comprehension of scientific topics. They achieve this by translating and simplifying scientific information, making it more accessible to a general audience. Additionally, the media utilise various visual aids such as pictures, films, tables, and figures to make scientific content more understandable and facilitate effective communication with the public (Maher et al., 2015). This underscores the pivotal role of the media in enhancing public understanding of scientific topics by simplifying complex information, employing visual aids, and making scientific content accessible to a broad audience, highlighting the significance of effective science communication through the media.

The media can contribute to ensuring the ethical conduct of scientific research and the honest communication of findings, thereby safeguarding public trust in science. Ethical lapses or dishonesty in science can have severe consequences not only within scientific communities but also, when reported in the media, for society at large (Moore, 2006). This highlights the media's potential role in upholding the ethical standards of scientific research and promoting honest communication of findings, underscoring its significance in maintaining public trust in science and emphasising the broader societal consequences of ethical lapses or dishonesty when reported in the media.

CHALLENGES AND OPPORTUNITIES IN SCIENCE REPORTING IN DEVELOPING NATIONS

The role of science journalism in advancing human societies is of utmost significance, though it is occasionally underappreciated and undervalued (Tran & Nguyen, 2023). The global expansion of science communication is evident, but within Africa, progress, although marked by some positive instances, is still trailing behind (Walker et al., 2020). One of such positive instances was the first heart transplant in the world. The insufficient focus on discussing science and the absence of government support for science communication took a turn after the significant media coverage following Dr. Chris Barnard's pioneering heart transplant at Cape Town's Groote Schuur Hospital on December 3, 1967. South Africa emerged as a prominent figure in the global medical science community, and the medical profession gained a high-profile status akin to rock stars in the realm of scientific achievements (du Plessis, 2017). The literature above highlights the global expansion of science communication but underscores the lag in progress within

Africa.

Platforms like *The Conversation*, which serve as amplifiers for scientific content, have become increasingly popular in response to the changing landscape of media, where traditional journalism roles are diminishing and scientists are encouraged to engage with the public. *The Conversation* represents a unique fusion of scientific communication, public science engagement, and science journalism, bridging the realms of science and journalism. This study delved into the characteristics and impact of *The Conversation Africa*, a regionally focused edition of this platform, by examining five years' worth of articles published since its inception in 2015 (totaling 5392 articles). Although content from South Africa predominates on the platform, contributions from other African countries are on the rise (Guenther & Joubert, 2021). The above highlights the growing importance of platforms like *The Conversation* in the evolving media landscape, where they serve as bridges between scientific communication, public engagement, and journalism, emphasising the need to consider the characteristics and impact of such platforms, particularly in regional contexts like Africa, which may provide insights into the changing dynamics of science reporting and communication.

In spite of the growth of science journalism in developing countries, there is a lack of insight into the perspectives of Sub-Saharan African reporters on the future of science journalism. A survey conducted by Appiah et al. (2012), involving 151 Ghanaian journalists, sheds light on the ambitions of these journalists for the future of science journalism in Ghana and suggests using the Internet to achieve these goals. The survey revealed that many journalists are concerned about the limited access to contact information for scientists, which they see as a barrier to science reporting. Additionally, a significant majority (80.8%) expressed a desire to expand the presence of science journalism in Ghana in the coming decade, with some emphasizing the role of information and communication technology in making this aspiration a reality.

Lublinski et al's (2014) study shows that journalists who frequently report on science, health, environment, and technology in Africa and the Arab world encounter several challenges, including a lack of essential resources for research, unsupportive newsroom settings for specialized reporting, and a need for enhanced capacity in science coverage. Additionally, difficulties often arise in the interactions between journalists and scientists. An assessment of the SjCOOP mentoring programme, the world's largest support initiative for science journalism in developing nations, reveals that some of these issues can be alleviated through a range of support initiatives, with particular mention of the effectiveness of "distance mentoring" programmes.

A study that examined the perception of science communication culture among communication scholars in a periphery nation like Nigeria by Batta and Iwok (2019) revealed that a significant majority of respondents (76.2%) believed

that in Nigeria, both the quantity and quality of science journalists, as well as the infrastructure for organising journalism, were insufficient.

Due to the above challenges, among others, newsrooms in developing countries have relied on news agency reports. Basu and Datta's (2017) research investigated the growing interest in specialised science communication within newspapers in Asian and African countries, with a particular focus on their reliance on news agencies as the primary source of science news. The study involved surveying 14 highly circulated English newspapers from 14 selected Asian countries, each with its own designated news agency, to analyze their dependency on these agencies for science news. Similarly, 14 other widely circulated English newspapers from 14 chosen African countries, each with a different news agency, were examined to assess their dependency on these agencies for science news in comparison to their sourcing of other types of news. The findings indicate that while newspapers invest significant resources in gathering their own sources and correspondents for various news categories, they predominantly rely on news agencies for science news. This trend results in uniform content across newspapers, depriving readers of diverse and more comprehensive science reporting.

RESEARCH METHODOLOGY

The research design was descriptive research. Descriptive research is a research method that aims to provide a detailed description of a population, situation, or phenomenon. It can be used to answer questions about what, where, when, and how, but not why. Descriptive research can use a variety of methods, such as surveys, interviews, observations, and archival research. Unlike experimental research, descriptive research does not involve controlling or manipulating the variables. The researcher simply observes and measures the variables as they exist naturally (McCombes, 2019).

The population of the study was three purposively selected Nigerian newspapers that both publish hardcopy and online (*Vanguard*, *Daily Sun*, and *The Punch*) using the XML sitemaps of *Vanguard*⁵¹, *Daily Sun*⁵², and *The Punch*⁵³ newspapers from 2016 to 2022.

Vanguard, *Daily Sun*, and *The Punch* are three prominent Nigerian newspapers, each with its own characteristics and focus. *Vanguard* is one of Nigeria's oldest newspapers, founded in 1983. It is known for its comprehensive coverage of news, politics, business, and sports. *Vanguard* is considered one of the leading newspapers in Nigeria and has a wide readership. It provides in-depth analysis and editorials on current events and issues.

Daily Sun is a relatively new newspaper in Nigeria, established in 2001. It is

⁵¹ https://www.vanguardngr.com/sitemap_index.xml

⁵² <https://sunnewsonline.com/sitemap.xml>

⁵³ <https://punchng.com/sitemap.xml>

known for its bold and eye-catching headlines, targeting a broad readership. *Daily Sun* often focuses on human interest stories and sensational news. It provides a mix of news, entertainment, sports, and politics.

The Punch is one of Nigeria's most widely circulated newspapers, founded in 1971. It is known for its editorial independence and investigative journalism. *The Punch* covers a wide range of topics, including politics, business, entertainment, and sports. It has a reputation for providing in-depth analysis and critical viewpoints on political and social issues.

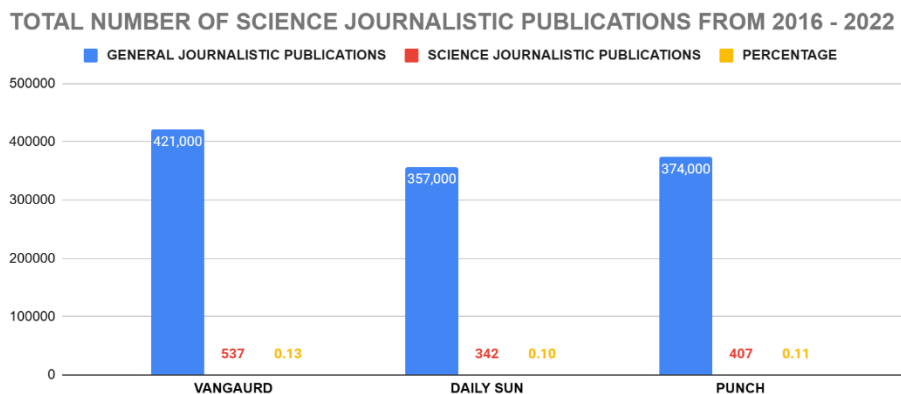
While all three newspapers cover a range of topics and have a significant readership in Nigeria, they differ in terms of their history, editorial style, and areas of focus. *Vanguard* is known for comprehensive coverage, the *Daily Sun* for its bold headlines and human interest stories, and *The Punch* for its editorial independence and investigative journalism. Readers often choose these newspapers based on their preferences for news style and content.

A population is the complete set under study, while a sample is a subset used for data collection, typically smaller than the population. In research, the term "population" can encompass various subjects of study beyond just people, including objects, events, organizations, countries, species, organisms, and more (Bhandari, 2020). An XML sitemap is a file that lists the URLs of a website and helps search engines crawl and index your pages. It can also provide additional information such as the last modified date, the frequency of changes, and the priority of each URL (Google, 2023). *The Punch* online newspaper's XML sitemap indexed 374,000 webpages from 2016 to 2022; the *Daily Sun* online newspaper's XML sitemap indexed 357,000 webpages from 2016 to 2022; and the *Vanguard* online newspaper's XML sitemap indexed 421,000 webpages from 2016 to 2022. This gives a total population of 1,152,000 journalistic publications in the three Nigerian online newspapers. The purposive sampling technique was adopted for this study. Purposive sampling, also referred to as judgement, selective, or subjective sampling, is a method of selecting individuals from a population for a research study based on the researcher's own judgement and criteria (Dudovskiy, 2022). Only indexed web pages that had the keywords "science" and "scientists" were selected purposefully. This gave a sample size of 1,286 (*Vanguard* online: 537 webpages; *Daily Sun* online: 342 webpages; and *The Punch* online: 407 webpages).

RESEARCH RESULTS

The provided data presents a descriptive analysis of science reporting within three prominent Nigerian newspapers—*Vanguard*, *Daily Sun*, and *Punch*—over a seven-year period, spanning from 2016 to 2022 (Fig. 1).

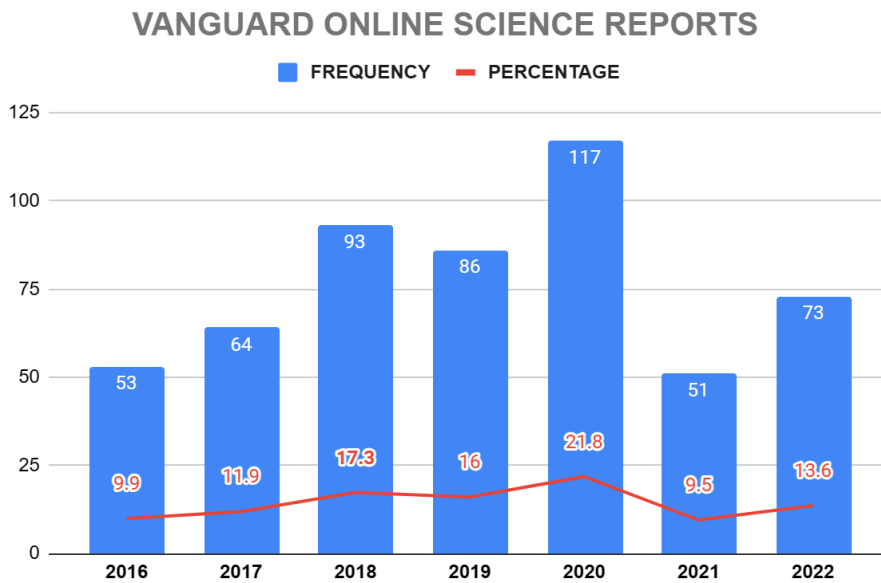
Figure 1: The total number of journalistic reports by *Vanguard*, *Daily Sun* and *The Punch* online newspapers (2016-2022, %)



The data includes the total number of general reports, the quantity of science reports, and the corresponding percentage of science reports concerning the overall content. Among the newspapers, *Vanguard* published the highest number of general reports, totaling 421,000, and featured 537 science reports, constituting approximately 0.13% of its total reports. The *Daily Sun*, while having the lowest number of general reports at 357,000, showcased a substantial presence in science reporting, with 342 science reports accounting for approximately 0.10% of its total reports. *The Punch* newspaper fell in between, with 374,000 general reports and 407 science reports, making up about 0.11% of its total reports. This analysis reveals that science reporting was a consistent feature in these newspapers, although it represented a relatively small percentage of their overall content, ranging from 0.10% to 0.13%. *Vanguard* emerged as the newspaper with the most substantial presence in science journalism, while the *Daily Sun* exhibited a notable focus on science reporting despite a lower volume of general reports. *Punch* newspaper occupied an intermediary position in terms of both general and scientific reporting. These findings highlight the newspapers' commitment to covering scientific topics over the seven-year period.

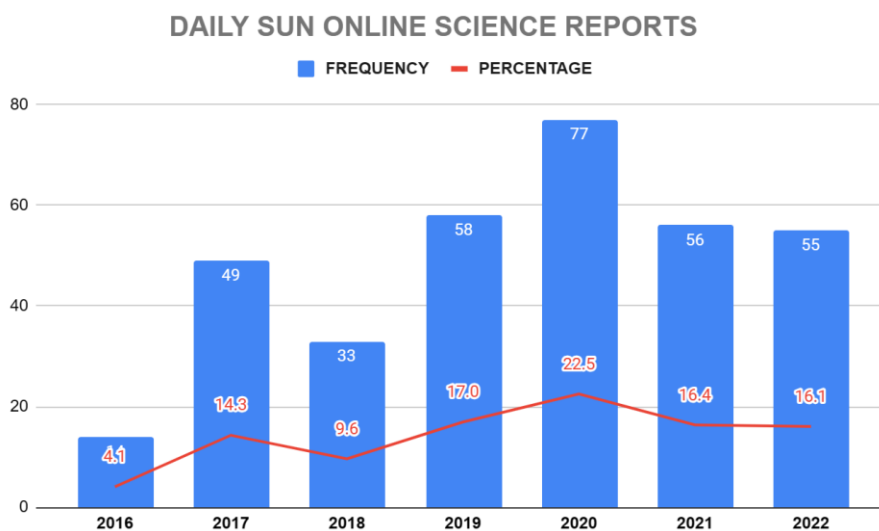
The data on the Fig. 2 provides a comprehensive overview of science reporting trends in the *Vanguard* newspaper over a seven-year period, spanning from 2016 to 2022. This dataset consists of the number of science reports published annually as well as the percentage representation of these reports within the total newspaper content for each year.

Figure 2: The total number of science reports by *Vanguard* online newspaper, (2016-2022, %)



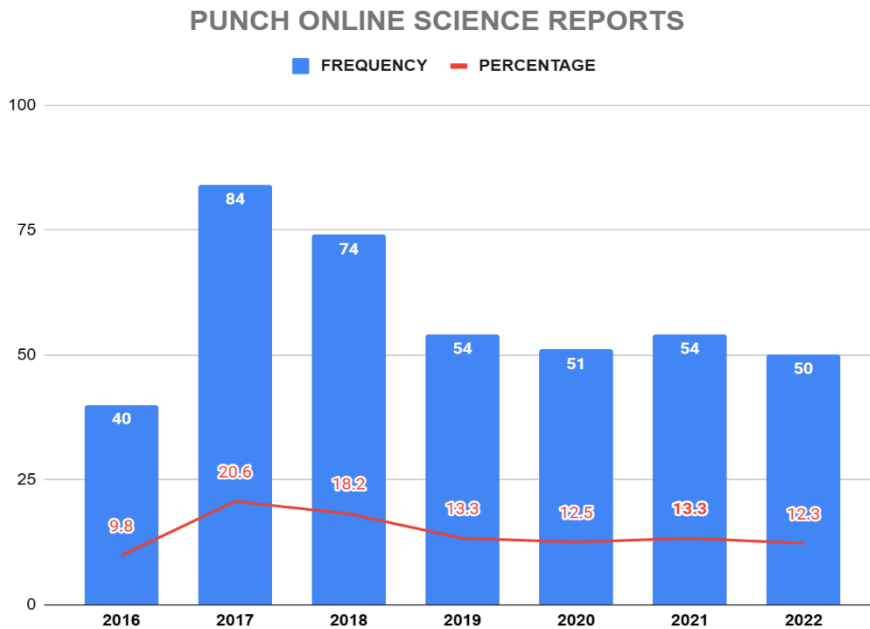
A few key observations emerge from this analysis: Science reporting in the *Vanguard* newspaper exhibited fluctuations throughout the observed years. Notably, there was a substantial increase in 2018 and a peak in 2020, reflecting a heightened focus on science-related topics during these years. Despite the yearly variations, science reports consistently maintained a presence in the newspaper's content. Even in the years with fewer science reports, the percentage never dropped below 9%, signifying a sustained commitment to science coverage. The years 2018 and 2020 stand out as particularly significant for science reporting, with higher percentages indicating a more pronounced emphasis on scientific subjects in these periods. The data reveals a dynamic pattern of science reporting in the *Vanguard* newspaper, characterized by fluctuations but also demonstrating a consistent commitment to covering science-related topics. The newspaper's editorial choices, as reflected in these percentages, highlight the importance of science communication and the varying levels of attention given to it over the analyzed seven-year span.

Figure 3: The total number of science reports by *Daily Sun* online newspaper, (2016-2022, %)



The provided data offers a comprehensive overview of science reporting in the *Daily Sun* newspaper spanning the years 2016 to 2022. It presents the number of science reports for each year along with the percentage of these reports relative to the total. Several noteworthy patterns emerge from this dataset. Firstly, there is a clear upward trajectory in science reporting over the analyzed period. In 2016, a modest 14 science reports, constituting 4.1% of the total, were featured. However, the following year, 2017, marked a substantial leap with 49 science reports, representing a notable 14.3% of the total reports. This significant increase signaled a growing commitment to science coverage, a trend that continued in subsequent years. From 2018 onward, science reporting remained consistently prominent, exceeding 9% of the total reports each year. The peak was reached in 2020, with 77 science reports accounting for a remarkable 22.5% of the total—a substantial surge in science communication within the newspaper. The *Daily Sun* newspaper showcased a clear and continuous commitment to science reporting, with a noteworthy expansion in the number of reports and their percentage relative to the total over the years. This data underscores the newspaper's dedication to disseminating scientific knowledge and engaging with science-related topics within its content.

Figure 4: The total number of science reports by *The Punch* online newspaper, (2016-2022, %)



The data represents a seven-year overview of science reporting in *The Punch* newspaper from 2016 to 2022, detailing the number of science reports and their percentage relative to the total reports each year. Several key trends and observations emerge from this data. First, the number of science reports exhibits variations over the years. Notably, there was a significant surge in 2017, with 84 science reports accounting for 20.6% of the total reports. The subsequent years, 2018 and 2019, continued to feature relatively high numbers of science reports, maintaining a significant presence at 18.2% and 13.3%, respectively. Although 2020 saw a minor decline in numbers, with 51 reports at 12.5%, the percentage remained consistent. Similarly, 2021 recorded 54 science reports at 13.3%, reflecting a steady commitment to science coverage. In 2022, there were 50 science reports, constituting 12.3% of the total. *The Punch* newspaper demonstrates a consistent focus on science reporting, with science reports consistently comprising around 12% to 20% of the total reports each year. This suggests a sustained commitment to covering scientific topics, despite some fluctuations. The data underscores the newspaper's dedication to disseminating scientific information and highlights its role in promoting science communication over the analyzed period.

DISCUSSION OF FINDINGS

Vanguard stands out as the newspaper with the highest number of both general and science reports, indicating a substantial presence in the domain of science

journalism. The percentage of science reports in *Vanguard's* content was the highest among the three newspapers, at approximately 0.13%.

The *Daily Sun*, while having the fewest general reports, demonstrated a noteworthy focus on science reporting, with 342 science reports. The percentage of science reports in the *Daily Sun's* content was approximately 0.10%, reflecting a consistent commitment to scientific topics.

The Punch newspaper occupied an intermediary position with 374,000 general reports and 407 science reports. The percentage of science reports in *Punch's* content was around 0.11%. *Punch* maintained a balanced approach between general and scientific reporting.

The findings regarding science reporting in the *Vanguard*, *Daily Sun*, and *Punch* newspapers from 2016 to 2022 contribute valuable insights to our knowledge in several ways. The data provides a quantitative assessment of science reporting in prominent Nigerian newspapers over a seven-year period. This empirical analysis quantifies the extent of science coverage, offering a clear picture of the newspapers' commitment to science journalism. This aligns with the position by Schäfer (2008) that "empirical comparison of media coverage on different fields of scientific research, conducted within the same context in terms of time and space, employing the same methods, and using the same basic data for all cases would serve to keep major confounding variables constant" (p. 481). The comparative analysis allows for a meaningful comparison between the three newspapers. It highlights variations in science reporting practices and demonstrates that different newspapers prioritize science reporting to varying degrees.

The findings contribute to our understanding of the media landscape in Nigeria, particularly in relation to science communication. They reveal that science reporting, while present, constitutes a relatively small portion of the newspapers' content. This agrees with the empirical data of Adeniran and Adenle (2012), who studied *The Nation* and *Thisday* in September 2008 and got 450 science reports, while Batta et al.'s (2014) content analysis of 156 issues of *The Guardian*, *Leadership*, and *Daily Trust* newspapers for the year 2012 shows that 329 technology stories were captured in the study. This is a far cry in relation to the total yearly journalistic publication of Nigerian newspapers as politics and sport are the major subjects of interest among Nigerian newspaper readers (Apuke & Omar, 2020).

The data also underscores the influence of these newspapers in shaping public discourse, public behavior and knowledge dissemination. Even with a small percentage of science reports, these newspapers can have a significant impact on public awareness of scientific issues. An example of this phenomenon is a study published in the journal *Science Communication* that investigated the public's reaction to the first human trial of a Zika vaccine in August 2016. The study found

that, following widespread media coverage of the trial, people paid more attention to news about the Zika virus and expressed greater trust in science (Rozansky, 2017). Also, Mach et al. (2021) show that in a pandemic, the news media are essential for disseminating public health and policy information. During the COVID-19 pandemic, media portrayals of complex and rapidly changing epidemiological science have shaped public understanding of the risks, measures to contain the spread of the disease, and associated political and policy discussions. Science reporting during the pandemic was critical to dispel the growing 'infodemic' and misrepresentations especially on social media. In a study done in Armenia, when asked about the nature of the pandemic, 35% of respondents asserted that the virus was developed in laboratories, and among them, 33% claimed that this was to reduce the global population. A smaller proportion, 3%, acknowledged the reality of COVID-19 but believed it was less dangerous than portrayed by the media, while 2% of respondents rejected the existence of the pandemic altogether (Atanesyan, Hakobyan, & Reynolds, 2021). This establishes the connection between scientific publications in the mass media and peoples behavior.

Researchers and practitioners in journalism can benefit from this data by gaining insights into the practices and priorities of these newspapers. It sheds light on how news media outlets balance general news with specialized topics like science. This agrees with the position of Adeniran and Adenle (2012), who concluded that Nigerian media practitioners should make significant efforts to improve their coverage of science issues, especially the pure sciences, which are often neglected. They add that there is a need for more interpretative analysis of science reports. This is particularly important if science journalists want to get more members of the public interested in science issues. Providing adequate interpretation and analysis of science issues will help to further enlighten the public and make them more interested in the issue being reported.

Policymakers and science communicators can use these findings to assess the current state of science reporting and consider strategies for enhancing the visibility of science in the Nigerian news media. The study by Hetherington and Phillips (2020) emphasizes the link between science and policymaking. They explain that scientists are becoming more and more motivated to participate in science policy, either by communicating scientific findings to policymakers or by advocating for science-based policies. Many scientists believe that they should engage with policymakers and play a role in shaping public policy, especially when policy issues or legislation directly relate to science (for example, stem cell research). Policymakers and media outlets frequently rely on the expertise of scientists for interviews, congressional testimony, or public speaking on policy issues related to their research.

These findings contribute to our knowledge of science reporting practices in Nigerian newspapers, providing a basis for further exploration of the role of media in science communication and its implications for public understanding of science.

CONCLUSION

This comprehensive seven-year timeline study of science reporting in three prominent Nigerian newspapers, *Vanguard*, *Daily Sun*, and *The Punch*, has illuminated several key findings and implications for science journalism and communication in the country.

Over the study period from 2016 to 2022, it was evident that these newspapers consistently featured science reports, albeit with variations in the number of reports each year. *Vanguard* displayed the highest number of science reports, followed by the *Daily Sun* and *Punch*. While science reporting comprises a relatively small percentage of the total news content in each newspaper, it nonetheless signifies a consistent effort to inform the public about scientific developments.

These findings underscore the importance of science journalism in Nigeria as a means to bridge the gap between the scientific community and the general public. Science reporters play a vital role in translating complex scientific concepts into accessible language, fostering science literacy, and promoting informed decision-making in society. However, there remains room for improvement in terms of the quantity of scientific reporting. The limitations of this study include the reliance on XML sitemap data and the absence of content analysis.

RECOMMENDATIONS

The study recommends that *Vanguard*, *Daily Sun*, and *The Punch* newspapers should consider increasing the frequency of science reports, as they play a crucial role in promoting scientific literacy and awareness among the public. Also, continuous monitoring of science reporting trends by online newspapers in Nigeria should be maintained to adapt to evolving public interests and scientific developments. Future research can delve into the qualitative aspects of science reporting by *Vanguard*, *Daily Sun*, and *The Punch*, assessing the depth and accuracy of content to enhance public understanding of complex scientific topics.

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Conflicts of Interest

The authors declare no ethical issues or conflicts of interest in this research.

Ethical Standards

The authors affirm this research did not involve human subjects.