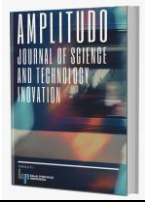
AMPLITUDO 4(2) (2025)

AMPLITUDO: Journal of Science & Technology Innovation

https://journals.balaipublikasi.id



Assessment of Environmental Pollution on Public Health Status of Communities in Bauchi Metropolis Bauchi State

Salisu Umar Muhammad[1], Ahmed Faruk Umar[2], John Gushit[3], Anas Babangida[4], Suleman Ahmed Wan[5]

[1] Department of Sustainable Environmental Studies, Abubakar Tafawa Balewa University, Bauchi, Bauchi State, Nigeria
[2] Department of Microbiology, Abubakar Tafawa Balewa University, Bauchi, Nigeria
[3] Department of Chemistry, University of Jos, Nigeria
[4] Department of Management and Information Technology, Faculty of Management Technology, Abubakar Tafawa Balewa University, Bauchi, Bauchi State, Nigeria
[5] Department of Sociology, Faculty of Management and Social Science, Sule Lamido University Kafin-Hausa, Jigawa State, Nigeria

Received: February 15, 2025
Revised: June 25, 2025
Accepted: August 22, 2025
Published: August 31, 2025

Corresponding Author:
Salisu Umar Muhammad
umsalisu.pg@atbu.edu.ng

DOI: 10.56566/amplitudo.v4i2.336

Abstract: The study was to assessing of environmental pollution on public health status of communities in Bauchi Metropolis Bauchi state, on environmental pollution, which includes the contamination of air, water, and soil, has become a critical global concern due to its profound impacts on public health. The study used systematic sampling technique to obtain data and relevant information from the respondents. The study used survey research design adopted a quantitative method because of its appropriateness to the topic under investigation. Its conscious effort to continuously learn about the poor health status and environment in order to improve the social intervention. In this regard health status can be said to be the meeting of the needs of peoples. The results showed a significant between the mean scores for Air pollution (70.997) and their biological factor that can satisfied peoples of Bauchi Metropolis on the element indicator of the biological factor scale [ANOVA (df = 3) =6.115 35.078, P<.0.00]. A majority of peoples about significant value on 001 of the respondents indicated that they were satisfied with the social intervention. This is followed by a percentage of about .723 who also indicated that they liked the friendliness of Air pollution towards them and the 207 of the respondents who are also pleased with the government ability to handle all enquiries. There were a total 306 respondents, making up with their view on environmental pollution and their mind set. All the areas indicated by respondents are areas that need to be looked at closely by environmental if they wish to satisfy their peoples and hence achieve people's health status.

Keywords: Assessment of Environmental; Bauchi Metropolis; Bauchi State; Pollution

Introduction

Environmental pollution has become one of the most pressing global challenges, significantly affecting public health, biodiversity, and ecosystems. The rapid increase in industrial activities, urbanization, and human-induced environmental degradation has led to severe air, water, and soil pollution. According to World Health Organization (2022), environmental pollution contributes to approximately 9 million premature deaths annually, with air pollution alone responsible for around 7 million deaths. The adverse health impacts include respiratory diseases, cardiovascular conditions, neurological disorders, and various forms of cancer (Landrigan et al., 2018; Lelieveld et al., 2023). Moreover, United Nations Environment Programme Kiprugut (2025) warns that if pollution control measures are not intensified, environmental degradation will continue to threaten global health, food security, and economic stability.

How to Cite:
Muhammad, S. U., Ahmed Faruk Umar, John Gushit, Anas Babangida, & Suleman Ahmed Wan. (2025). Assessment of Environmental Pollution on Public Health Status of Communities in Bauchi Metropolis Bauchi State. *AMPLITUDO: Journal of Science and Technology Innovation,* 4(2), 110–117. https://doi.org/10.56566/amplitudo.v4i2.336

In Africa, environmental pollution is an escalating crisis due to rapid population growth, weak environmental policies, and inadequate waste management systems. Air pollution, largely caused by industrial emissions, vehicle exhaust, and biomass fuel usage, has been linked to increased cases of chronic respiratory diseases and cardiovascular illnesses (Atuyambe et al., 2024; Mlambo et al., 2023). Additionally, water pollution from poor sanitation, industrial waste, and oil spills continues to contribute to high morbidity and mortality rates from waterborne diseases such as cholera and typhoid (Abera et al., 2021; Ogolla, 1989). In sub-Saharan Africa, over 60% of urban dwellers are exposed to unsafe drinking water due to pollution. Despite global commitments to sustainable environmental management, many African countries continue to struggle with enforcing pollution control policies (Lema, 2025).

Nigeria, as the most populous country in Africa, faces severe environmental pollution challenges, particularly in its urban centers and industrial zones. According to Abaje et al. (2020), Lagos, Kano, and Port Harcourt experience some of the highest levels of air pollution in Africa due to industrial emissions, traffic congestion, and improper waste disposal. Gas flaring in the Niger Delta has further exacerbated air and water pollution, leading to respiratory illnesses, birth defects, and increased cancer cases among residents (Abulude et al., 2024; Ordinioha & Brisibe, 2013). Water pollution caused by oil spills, agricultural runoff, and improper waste disposal has also been identified as a leading cause of health complications such as gastrointestinal infections and heavy metal poisoning (Nnaemeka, 2020; Pona et al., 2021). Nigeria's inability to fully implement environmental protection laws has worsened the pollution crisis, leading to significant public health concerns (Ogundele et al., 2020).

In Bauchi State, environmental pollution is a growing concern, particularly in urban centers like Bauchi city and surrounding communities. The rapid urban expansion has led to increased air and water pollution, affecting public health. Poor waste management, open defecation, and industrial emissions have contributed to the contamination of surface and groundwater sources, leading to recurrent outbreaks of cholera, typhoid, and diarrhea (Bala et al., 2025; Umar et al., 2024). A study by Gin et al. (2018) revealed that over 70% of rural households in Bauchi rely on polluted water sources for drinking and domestic use. Furthermore, indoor air pollution from the widespread use of firewood and charcoal for cooking has increased cases of respiratory diseases, particularly among women and children (Glenn et al., 2022; Sadiq, 2022). The combined effects of poor sanitation, industrial activities, and weak environmental policies have left many communities vulnerable to serious health conditions (Akagbue et al., 2023; Macaulay, 2014).

This study aims to assess the impact of environmental pollution on public health status of communities in Bauchi State, identifying key sources of pollution, their health implications, and potential mitigation strategies. By understanding the relationship between pollution and health outcomes, policymakers and stakeholders can develop more effective interventions to improve environmental quality and safeguard public health. Environmental pollution remains a critical public health issue in many urban areas around the world, including Bauchi Metropolis in Nigeria. The rapid urbanization and industrialization in Bauchi Metropolis have led to increased levels of pollution, which significantly impact the health of its residents. This study aims to assess the extent of environmental pollution and its effects on the public health status of communities. Air pollution rapidly growing cities, faces significant Air pollution challenges. Sources of Air pollution include vehicle emissions, industrial activities, and the burning of waste.

Method

Research Design

The research used survey research design adopted a quantitative method because of its appropriateness to the topic under investigation. Survey design is a scientific method which involves observing and describing the behavior of the subjects without influencing of data for the purpose of answering research question under study (Kyamru et al., 2021). The study is based on assessing environmental pollution on public health status of communities in Bauchi metropolis Bauchi state. It is based on an in-depth investigation of individual group, or even to explore causation in order to find the underlying principles.

Data Collection

The researcher was administered the instrument to the entire households Bauchi metropolis Dan Iya and Majiddadi wards of the Bauchi metropolis Bauchi state some explanations on how to respond to the questions but allow independent responses. However, the questionnaires administer each, face to face method of administration, each respondent ware given a considerate time to answer the questions, after which the researcher collect the questionnaire from the households Bauchi metropolis of Bauchi state.

Sampling Technique

The researcher made used of the systematic sampling technique to obtain data and relevant information for the study.

Data Collection Instrument

The researcher developed the instrument used in this thesis in order to obtain the required information. The four (4) points Likert's scale was scored as follows: Strongly agree, 1 points; Agree, 2 points; Disagree, 3 points; and Strongly Disagree, 4 point. From the questionnaire consisted of four sections A to E. Section A, demographic information of the respondents; section B contains information on the 1. To determine the effect of Air pollution on environmental factor affecting public health status of Bauchi metropolis Bauchi state; section C, concern with the 2. To determine the effect of water pollution on environmental factor affecting public health status of Bauchi metropolis Bauchi state concern with D, contains information on the 3. To determine the biological pollution on environmental factor affecting public health status of Bauchi metropolis Bauchi state, while, section E. contains information on the 4. To examine the social interventions on environmental factor affecting public health status of Bauchi metropolis Bauchi state.

Data Analysis

The data will be collected and analyzed using descriptive statistics of frequency in data analysis. This entails the used of frequency curves and percentages to and presented into table. Descriptive statistics of frequencies, percentages, means and standard deviations. Inferential statistics of Pearson Product Moment Correlation Coefficient analysis was used to test the hypotheses. All tests were carried out at 0.05 alpha level of significance. This statistic is suitable for this study, this is because, and the study is on assessment of environmental pollution on public health status of communities in Bauchi metropolis Bauchi state. The purpose of correlation analysis to establish the association between the dependent and independent variables. Regression analysis will also be conducted to determine the relationship between independents variable and independent variable. The process of determining which independent variable are Air pollution, water pollution, Biological factors, Social factors and dependent variable ware environmental pollution on the community public health status however the statistics intuitive consist of graphs basics, questions testing using regression ANOVA probability time series model.

Sample Size

The sample size which to be used for the purpose of this research Yamane Formula (1967) for sample size, in which the sample size is (306) represented through the total population of (1285) as at 1st February 2023.

Result and Discussion

The chapter presents the results of the study based on the data collected using the methodology espoused in the previous chapter. The data was analyzed using the Statistical Package for Solutions and Services (SPSS). This chapter is organized into two main sections. The first sections consist of the demographic information of respondents and environmental factor in the study. In the second section, the main findings on the environmental pollution on public health status and environmental factor affecting in Bauchi communities are presented. This is followed by the measurement of the gap between air pollution, water pollution, biological and social intervention of the using the regression analysis for measure. The final section entails the discussion of the results on environmental pollution on public health status and environmental factor affecting to overcoming the quality of good health status, good sewerage, faster and instant social intervention responses on water pollution and biological factor /health stability for environmental factor.

Demographic Information

The questionnaire was designed to firstly seek information about the respondents' age, gender, education, and their occupation. This is to give a brief idea of the kind of respondents that were available for the research.

Table 1. Distribution of respondent based on gender during the study

Parameters		Frequency	Percent	Valid Percent	Cumulative Percent
	Male	192	62.7	62.7	62.7
Valid	Female	114	37.3	37.3	100.0
	Total	306	100.0	100.0	

Gender

The analysis shows that 62.7 % of the respondents are males and 37.3 % are females. As shown in table 1, the gender distribution gives a brief information about the environmental pollution on public health status, respondent's males as against females. Most researches conducted, have proved the same about the gender distribution of respondents.

Table 2. Distribution of respondent based on Age during the study

Parameters		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	18-30	69	22.5	22.5	22.5
	31-40	116	37.9	37.9	60.5
	41-50	80	26.1	26.1	86.6
	51-60	41	13.4	13.4	100.0
	Total	306	100.0	100.0	

The age distribution of our respondents also showed the majority of respondents being within the age group of 31 to 40 years representing about 37.9 % of the respondents. This was followed by respondents within the age group of 41 to 50 years which also constitute about 26.1 % of the respondents. The remaining 22.5 % is made up of respondents within the ages of 41 to 50 years. Forming 51 and 60 years and above making up 13.0%. A quick and clear statement on the age distribution can be seen in table 3 below labeled age of respondents.

Table 3. Respondent knowledge on environmental pollutions in the study area

Parameters		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	192	62.7	62.7	62.7
	No	135	44.1	44.1	100.0
	Total	306	100.0	100.0	

Source: Data gathered from the field

The analysis shows that 55.9 % of the respondents on knowledge on environmental pollution and 44.1 % were have knowledge on environmental pollution. As shown in table 5, that are not have knowledge on environmental pollution distribution gives a brief information about the environmental pollution distribution. Most researches conducted, have proved the same about the gender distribution of respondents. This section of the analysis and discussions is to the measure relationship between Air pollution and Water pollution in environmental pollution on public health status in Bauchi Metropolis between peoples and user satisfaction Air pollution and were used to compere the variable between the dependent variable and independents find the R Squire is 508 scores because Air pollution depends on a policy in delivering value relative to Air pollution on environmental on public health status and expectations and scores for each item are given. Thus, based on the Air pollution has significant effects to environmental factors affect the peoples in Bauchi Metropolis the peoples are not satisfied, proposed (Delucchi et al., 2014). The questionnaire mainly included the scale designed to measure the Air pollution in the environmental on public health status. The result which was the case with environmental justice theory used by Holand et al. (2024), but rather were collected simultaneously for each item. This was the strategy used by Nortvig et al. (2024) in their research. Clearly, the researcher was interested in finding out whether there was any relationship between environmental health status factors on air pollution, water pollution, biological factors and social intervention environmental services. Clearly, the researcher was interested in finding out whether there were any effects of Air pollution, water pollution on environmental health status. The repeated measure was by R is 258 at a confidence interval of result was used for analyzing respondents' scores on the Air pollution and health status. The items measured are all inquiries regarding Air pollution, water pollution are answered promptly by peoples' service personnel.

Table 4. ANOVA Respondent on Air Pollution, Water Pollution and Biological factor

Model	Sum of Squares		DF	Mean Square	F	Sig.
1	Regression	18.346	3	6.115	35.078	000b
	Residual	52.650	302	0.174		
	Total	70.997	305			

To ascertain whether clients on significant relationship between biological factor and social intervention on peoples in Bauchi Metropolis expectations are met the reliability element dimension of Air pollution, the repeated measure was used. The results showed a significant between the mean scores for Air pollution (70.997) and their biological factor that can satisfied peoples of Bauchi Metropolis on the element indicator of the biological factor scale [ANOVA (df = 3) =6.115 35.078, P<.0.00]. This means that when it comes

to Air pollution effects on environmental health status, far exceed what exists in the environmental health in social intervention sector. The between what exists in the social intervention sector and what clients expect is statistically significant. Thus the government can do better than what exists now. The measure indicated that there is a significant difference in the mean scores of respondents of environmental pollution through Air population and water pollution perceptions on the empathy measure indicated statistically as shown in the table. The mean score on water pollution and good environmental factors which peoples perceive to be receiving from the government. Peoples expect that Bauchi metropolis will improve environment to be duty of every citizen to the best suit their needs.

That is Bauchi metropolis will provide tailored made on Air population and social intervention to environment. Peoples wish to see the environment becoming more concerned about their interest and being ready to give them individual attention and supports. This area was aimed at finding out from peoples anticipate their environment to give them in this modern era. As Bromberg et al. (2015) propounded, the achievement of good environment peoples service entails conformance to the people's health status. They further opined that it is a conscious effort to continuously learn about the poor health status and environment in order to improve the social intervention. In this regard health status can be said to be the meeting of the needs of peoples. From the proposed question peoples came up with the various options of the significant relationship between Air pollution and public health sector in peoples.

Table 5. Respondent Coefficients[a]

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	.723	.207		3.499	.001
Air Pollution	.319	.056	298	5.659	.000
1 Water Pollution	.354	.061	.324	5.830	.000
Social Intervention	.004	.064	.003	.058	.954

Source: Data gathered from the field

A majority of peoples about significant value on 001 of the respondents indicated that they were satisfied with the social intervention. This is followed by a percentage of about .723 who also indicated that they liked the friendliness of Air pollution towards them and the 207 of the respondents who are also pleased with the government ability to handle all enquiries. The least frequency score went to listening environmental effects of Bauchi Metropolis which received about 319 of responses from peoples who liked the social intervention. Apart from indicating their likes about the water pollution of Bauchi Metropolis, respondents also gave their preferences about new things that they wish their environment could adopt and add to their services. This represents the second highest responses or suggestions from peoples and hence must be taken seriously. As reported in the introduction and corroborated by researchers in the literature review, most peoples are not satisfied with the social intervention from there on satisfactory and this could be a factor of environmental effects to peoples. There were a total 306 respondents, making up with their view on environmental pollution and their mind set. All the areas indicated by respondents are areas that need to be looked at closely by environmental if they wish to satisfy their peoples and hence achieve people's health status.

Discussion

The study revealed that air pollution in Bauchi metropolis has a significant effect on public health. Airborne pollutants such as particulate matter (PM2.5), carbon monoxide (CO), nitrogen oxides (NOx), and sulfur dioxide (SO_2) are prevalent in the city due to vehicle emissions, industrial activities, and the use of biomass for cooking (Abaje et al., 2020). These pollutants contribute to respiratory diseases such as asthma, bronchitis, and lung cancer. The poor air quality in certain parts of the city was found to be a leading cause of increased hospital admissions related to respiratory conditions (Abdulkadir et al., 2019). The harmful effects of air pollution also disproportionately affect vulnerable groups, such as children and the elderly, who are more susceptible to respiratory problems. Water pollution emerged as another critical environmental factor affecting public health in Bauchi metropolis. Contamination of water sources through improper waste disposal, agricultural runoff, and industrial discharges leads to the spread of waterborne diseases such as cholera, typhoid, and dysentery.

The study found that many residents rely on untreated or inadequately treated water sources, exacerbating the public health risk. Inadequate sanitation facilities also contribute to water pollution, as human waste contaminates water bodies, increasing the

likelihood of disease outbreaks. Poor water quality directly correlates with the prevalence of gastrointestinal diseases in the metropolis. Biological pollution, primarily in the form of waste and pathogens from human and animal sources, was found to have a direct effect on public health. The study identified that poor waste management systems in Bauchi metropolis lead to the accumulation of biological waste in public areas, water bodies, and residential zones. The presence of pathogens such as bacteria, viruses, and parasites in these areas significantly contributes to the spread of infectious diseases like malaria, diarrhea, and hepatitis (Igbinosa et al., 2016). Stagnant water and open sewage systems provide breeding grounds for mosquitoes, increasing the incidence of malaria, which is one of the leading causes of morbidity and mortality in the region. The study also examined the role of social interventions in mitigating the effects of environmental pollution on public health.

Various government and non-governmental organizations have initiated programs aimed at improving environmental health in Bauchi metropolis, such as public health campaigns, waste management projects, and the promotion of cleaner energy sources. However, these interventions have had limited success due to inadequate funding, poor public participation, and a lack of enforcement of environmental regulations. The research highlighted that despite these efforts, public awareness about the dangers of pollution remains low, leading to poor environmental practices that continue to degrade public health

Conclusion

The study concludes that environmental pollution, in its various forms, has a profound impact on the public health status of Bauchi metropolis. Air, water, and biological pollution are major contributors to the high incidence of respiratory, gastrointestinal, and infectious diseases in the area. Despite some social interventions, the lack of effective enforcement and community participation hampers efforts to reduce pollution and improve public health outcomes. Urgent actions are required to mitigate environmental pollution and protect public health in Bauchi metropolis.

Acknowledgments
Thanks to all parties who have supported the implementation of this research. I hope this research can be useful.

Author Contributions
Conceptualization,; S. U. M., methodology, A. F. U validation, J. G.; formal analysis, A. B.; investigation,S. A. W.; resources, S. U. M.; data curation, A. F. U.: writing—original draft preparation, J. G.; writing—review and editing, A. B.: visualization, S. A. W. All authors have read and agreed to the published version of the manuscript.

Funding
Researchers independently funded this research.

Conflicts of Interest
The authors declare no conflict of interest.

References

Abaje, I. B., Bello, Y., & Ahmad, S. A. (2020). A review of air quality and concentrations of air pollutants in Nigeria. *Journal of Applied Sciences and Environmental Management*, *24*(2), 373–379. https://doi.org/10.4314/jasem.v24i2.25

Abdulkadir, T. S., Muhammad, R. U. M., Wan Yusof, K., Ahmad, M. H., Aremu, S. A., Gohari, A., & Abdurrasheed, A. S. (2019). Quantitative analysis of soil erosion causative factors for susceptibility assessment in a complex watershed. *Cogent Engineering*, *6*(1), 1594506. https://doi.org/10.1080/23311916.2019.1594506

Abera, A., Friberg, J., Isaxon, C., Jerrett, M., Malmqvist, E., Sjöström, C., Taj, T., & Vargas, A. M. (2021). Air quality in Africa: Public health implications. *Annual Review of Public Health*, *42*(1), 193–210. https://doi.org/10.1146/annurev-publhealth-100119-113802

Abulude, F. O., Oyetunde, J. G., & Feyisetan, A. O. (2024). Air Pollution in Nigeria: A Review of Causes, Effects, and Mitigation Strategies. *Continental Journal of Applied Sciences*, *19*, 1–23. Retrieved from https://shorturl.asia/AkLVT

Akagbue, B. O., Ibrahim, M. N., Ofure, O. F., Ekugbe, O. U., Kyrian, O., Amaobichukwu, C. T., Aminu, M. B., Dung, P. D., Babale, S. I., & Salisu, S. M. (2023). Comprehensive Assessment and Remediation Strategies for Air Pollution: Current Trends and Future Prospects; A Case Study in Bompai Industrial Area, Kano State, Nigeria. *Communication in Physical Sciences*, *10*(1), 1–13. Retrieved from https://journalcps.com/index.php/volumes/article/view/130

Atuyambe, L. M., Arku, R. E., Naidoo, N., Kapwata, T., Asante, K. P., Cissé, G., Simane, B., Wright, C. Y., & Berhane, K. (2024). The Health Impacts of Air Pollution in the Context of Changing Climate in Africa: A Narrative Review with Recommendations for Action. *Annals of Global Health*, *90*(1), 76. https://doi.org/10.5334/aogh.4527

Bala, S., Ulfat, T. J., Hossain, H., Al Absy, M. S. M., Ridwan, M., Ridzuan, A. R., & KP, J. M. (2025).

From Energy Diversity to Environmental Resilience: The Role of Government Efficiency in Shaping Ecological Footprint in Bangladesh. *International Journal of Energy Economics and Policy*, *15*(4), 189–203. Retrieved from https://shorturl.asia/aOsbm

Bromberg, U., Wiehler, A., & Peters, J. (2015). Episodic future thinking is related to impulsive decision making in healthy adolescents. *Child Development*, *86*(5), 1458–1468. https://doi.org/10.1111/cdev.12390

Delucchi, M. A., Yang, C., Burke, A. F., Ogden, J. M., Kurani, K., Kessler, J., & Sperling, D. (2014). An assessment of electric vehicles: technology, infrastructure requirements, greenhouse-gas emissions, petroleum use, material use, lifetime cost, consumer acceptance and policy initiatives. *Philosophical Transactions of the Royal Society A: Mathematical, Physical and Engineering Sciences*, *372*(2006), 20120325. https://doi.org/10.1098/rsta.2012.0325

Gin, N. S., Buteh, D. S., Daniel, S., Noma, A. S., Akanang, H., & Ranga, Y. G. (2018). Assessment of the quality of water from hand dug wells at Dutsin Tanshi Bauchi, Bauchi State, Nigeria. *Assessment*, *3*(5). Retrieved from https://shorturl.asia/1vDCp

Glenn, B. E., Espira, L. M., Larson, M. C., & Larson, P. S. (2022). Ambient air pollution and non-communicable respiratory illness in sub-Saharan Africa: a systematic review of the literature. *Environmental Health*, *21*(1), 40. https://doi.org/10.1186/s12940-022-00852-0

Holand, Ø., Contiero, B., Næss, M. W., & Cozzi, G. (2024). The Times They Are A-Changin-research trends and perspectives of reindeer pastoralism--A review using text mining and topic modelling. *Land Use Policy*, *136*, 106976. https://doi.org/10.1016/j.landusepol.2023.106976

Igbinosa, I. H., Igbinosa, E. O., & Okoh, A. I. (2016). Antibiogram characterization and putative virulence genes in Aeromonas species isolated from pig fecal samples. *Environmental Science and Pollution Research*, *23*(12), 12199–12205. https://doi.org/10.1007/s11356-016-6421-y

Kiprugut, C. J. (2025). *United Nations Environment Programme Interventions In Safeguarding Urban Environment In Nairobi City County, Kenya (1992-2022)*. Retrieved from https://shorturl.asia/fhECv

Kyamru, J. I., Da'am, E. H., & Gemson, G. S. (2021). Assessment of Socio-Cultural Factors Hindering Health Promotion among Community Members in Plateau Central Senatorial Zone, Plateau State, Nigeria. *NIGERIAN JOURNAL OF HEALTH PROMOTION*, *14*(1). Retrieved from https://journals.aphriapub.com/index.php/NJHP/article/view/2136

Landrigan, P. J., Fuller, R., Hu, H., Caravanos, J., Cropper, M. L., Hanrahan, D., Sandilya, K., Chiles, T. C., Kumar, P., & Suk, W. A. (2018). Pollution and global health--an agenda for prevention. *Environmental Health Perspectives*, *126*(8), 84501. https://doi.org/10.1289/EHP3141

Lelieveld, J., Haines, A., Burnett, R., Tonne, C., Klingmüller, K., Münzel, T., & Pozzer, A. (2023). Air pollution deaths attributable to fossil fuels: observational and modelling study. *Bmj*, *383*. https://doi.org/10.1136/bmj-2023-077784

Lema, M. W. (2025). Environmental regulatory frameworks in East Africa: A comparative mini-review. *Environmental Development*, 101314. https://doi.org/10.1016/j.envdev.2025.101314

Macaulay, B. M. (2014). Land degradation in Northern Nigeria: The impacts and implications of human-related and climatic factors. *African Journal of Environmental Science and Technology*, *8*(5), 267–273. Retrieved from https://www.ajol.info/index.php/ajest/article/view/110422/100160

Mlambo, C., Ngonisa, P., Ntshangase, B., Ndlovu, N., & Mvuyana, B. (2023). Air pollution and health in Africa: The burden falls on children. *Economies*, *11*(7), 196. https://doi.org/10.3390/economies11070196

Nnaemeka, A. N. (2020). Environmental pollution and associated health hazards to host communities (Case study: Niger delta region of Nigeria). *Central Asian Journal of Environmental Science and Technology Innovation*, *1*(1), 30–42. Retrieved from https://shorturl.asia/H70Ej

Nortvig, M. J., Andersen, M. C. S., Eriksen, N. L., Aunan-Diop, J. S., Pedersen, C. B., & Poulsen, F. R. (2024). Utilizing retinal arteriole/venule ratio to estimate intracranial pressure. *Acta Neurochirurgica*, *166*(1), 445. https://doi.org/10.1007/s00701-024-06343-0

Ogolla, B. D. (1989). Water Pollution Control in Africa: A Comparative Legal Survey. *Journal of African Law*, *33*(2), 149–156. https://doi.org/10.1017/S0021855300008093

Ogundele, L. T., Ayeku, P. O., Adebayo, A. S., Olufemi, A. P., & Adejoro, I. A. (2020). Pollution indices and potential ecological risks of heavy metals in the soil: a case study of municipal wastes site in Ondo State, Southwestern, Nigeria. *Polytechnica*, *3*(1), 78–86. https://doi.org/10.1007/s41050-020-00022-6

Ordinioha, B., & Brisibe, S. (2013). The human health implications of crude oil spills in the Niger delta, Nigeria: An interpretation of published studies. *Nigerian Medical Journal*, *54*(1). Retrieved from https://www.ajol.info/index.php/nmj/article/view/105307

Pona, H. T., Xiaoli, D., Ayantobo, O. O., & Tetteh, N. D. (2021). Environmental health situation in Nigeria: current status and future needs. *Heliyon*, *7*(3). Retrieved from https://www.cell.com/heliyon/fulltext/S2405-8440(21)00435-7

Sadiq, A. A. (2022). *Effect of particulate emissions from road transportation vehicles on health of communities in urban and rural areas, Kano State, Nigeria* [Université Claude Bernard-Lyon I]. Retrieved from https://theses.hal.science/tel-03963351/

Umar, Y., Yakubu, R. O., Abdulazeez, A. A., & Ijeoma, M. W. (2024). Exploring Nigeria's waste-to-energy potential: a sustainable solution for electricity generation. *Clean Energy*, *8*(6), 82–95. Retrieved from https://academic.oup.com/ce/article-abstract/8/6/82/7826453

World Health Organization, W. (2022). *Ambient (outdoor) air pollution*. World Health Organization,. Retrieved from https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health