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RESEARCH ARTICLE

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Assessment of sociological indices affecting environmental pollution in Iwo, Nigeria

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Abstract

Twelve sociological factors such as: gender, age, marital status, household size, religion, educational attainment, government influence, occupation, housing structure, culture, health issues, and period of residency at the survey location were assessed to evaluate their relative impacts on environmental pollution, in Iwo, Nigeria. Structured questionnaire was prepared and randomly administered to 257 households out of which 215 (83.65%) was completed and retrieved. Data obtained were subjected to descriptive and inferential (factor analysis) statistics. Kaiser–Meyer–Olkin (KMO) and Bartlett tests showed factorability of data at $p < 0.05$ significant level. Factor Analysis (FA) ultimately recognized six (6) indices among the sociological factors as having eigenvalues above 1. The indices explained 65% of the total variance and are weighted as follows: household size (12.5%), marital status (11.4%), government influence (10.7%), religion (10.5%), culture (9.8%), and health issues (9.8%). These are essential indices to be explored when measuring sociological impacts on environmental pollution. That means, cultures that discourage pollution are to be identified and supported by relevant government policies and legislations.

KEYWORDS
environment, impact rating, pollution, sociological indices

1 | INTRODUCTION

Sociological factors that influence the environment may be cultural and location specific. Demographic statistics like gender, age, marital status, household size, religion, educational attainment, government influence, occupation, culture, health issues, and so on determine the extent of pollution in any community. These make every society unique and the need to understand associated variability and differential impacts. The situation in Iwo community of Osun State, Nigeria, as far as we know is yet to be studied and forms the basis for this investigation.

The natural environment interacts with the social environment for sustainable development. Pollution associated with human factors are largely sociological (CWRU, 2022). Environmental sociology, in particular, is concerned with shared relationships between environment and the society (Lockie, 2015) that can influence viewpoints and understanding of the causes and consequences of pollution. Noll (2002) submitted that sociological factors could help to identify baseline causes and warnings against some identified symptoms. For example, sociological indices may be useful to measure quality of life (that is welfare), public policy as it affects acceptable values and goals, analysis of social change and so on.

Grover and Singh (2014) estimated kitchen wastes like plastics and metals and established positive correlation with family size. Liao et al. (2019) explored the use of a sociological application termed "environment info push" to examine anthropological threats and concluded that individual willingness to control and prevent air pollution is critical. Padula et al. (2018) also studied environmental pollution and social factors as contributors to premature birth in Fresno County

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in California and concluded that multiple pollution exposures with increased risk for untimely birth was higher among the most disadvantaged population. Roman et al. (2013) conducted a sociological study of environmental pollution and its effects on public health in Faisalabad city, India. They used age, family size, education, and income to assess the impact of pollution and the result gave positive link between the social indices and environmental pollution, except for education which confirmed that industries generally add to environmental pollution.

The Creative Commons Attribution-Non-Commercial-Share Alike (CCNCSA, 2010) posited that individuals, communities, corporate organizations, and government agencies when acting independently of each other, engage in practices that can harm the environment. For instance, indiscriminate dumping of solid waste may pollute soil, water, and air. Use of fossil fuel and overuse of toxic chemicals also cause air pollution and contribute to global warming (Rivers, 2014). Pollution is largely anthropogenic but the irony is that the resultant diseases are also detrimental and shortens human lives. Fuller et al. (2022) submitted that environmental pollution threatens the entire ecosystem with known and unknown diseases.

Environment encompasses all conditions including physical, moral, intellectual, cultural, economic, political, social, and emotional (Kumar, 2018) conditions that surround man. When polluted, the effects directly cause discomforts, biodiversity loss, and aesthetical value decline (Pathak, 2019).

If the factors causing pollution are defined, the level at which such factors contribute to pollution in the society is ascertained, these could be reasonably subdued through effective and working policies.

If the factors causing pollution are defined, the level at which such factors contribute to pollution in the society is ascertained, these could be reasonably subdued through effective and working policies. Landrigan et al. (2018) felt that good and functional environmental policies are key to pollution control and mitigation. The effects of sociological indices on environmental pollution is significant and this is what this study sets out to determine and rank by drawing attention to the principal factors in the study area. Specific objectives were (i) to identify the sociological factors influencing environmental pollution, and (ii) rank the factors in order of severity so as to set in motion efforts toward the mitigation of pollution for better environmental quality in the study area.

2 | METHODOLOGY

2.1 | Study area

The study location is Iwo which is the headquarters of Iwo local government area of Osun State, in the western region of Nigeria.

The study location is Iwo which is the headquarters of Iwo local government area of Osun State, in the western region of Nigeria. It is a university city with expanding population which definitely has sociological implications. At the same time, the city is within reach of the researchers to collect and evaluate the selected factors at a reasonable cost. Iwo is located between latitudes 7° 38′N and 7° 40′N of the Equator and longitudes 4° 09′ and 4° 13′E of Greenwich Meridian. The town covers an area of 244.7 km^2 and inhabits 263,500 people by 2022 based on the National Population Commission of Nigeria (NPC, 2022) projection. Iwo is an agrarian community with many agricultural processing industries such as palm oil mills and gari processing industries. From 2000 to date, Iwo has witnessed growth of educational institutions such as the establishment of Bowen University and Westland University. These institutions attract significant human flock into the town as workers, students, business men and women and the likes. The just approved Federal College Education (FCE) to be sited in Iwo will still add to the population when fully operational. Apart from these, the Odo-Ori periodic market continues to attract people from far and near into the town, some of those who could have settled in the town to carry out their legitimate businesses.

UN-HABITAT (2014) reported that Iwo city is poorly planned and that the people live in slum, high density residential building with lack of adequate ventilation which could be detrimental to human health. The slums described the poor quality of housing, inadequate access to safe water and sanitation, overcrowding, and poor infrastructure. The major environmental issues confronting Iwo residents include pollution emanating from poor waste management especially from the slum areas and flooding which is a yearly environmental problem during the raining season particularly along the flood plains, resulting from waste dump in water channels. Dumping of waste in drainage and designated open waste dumping is common which causes air, water, and land pollution. Pollution from transport vehicles exhaust pipe and loud horn are common especially market days. Noise pollution is also experience from mounted loud speaker by mosques and churches and also by trader like music vendors and advertisers of products. Poor or non-existence of solid waste management in Iwo. The local government which have the responsibility of collection, transportation, and disposal of solid wastes are incapacitated due to poor financing and general maladministration. Undesignated

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dumps have become breeding sites for rodents and other disease vectors.

2.2 | Data collection and analyses

Two hundred and fifty seven (257) households were randomly selected in the study area for the purpose of administration of structured questionnaire out of which two hundred and fifteen (215) copies were completed and retrieved.

Two hundred and fifty seven (257) households were randomly selected in the study area for the purpose of administration of structured questionnaire out of which two hundred and fifteen (215) copies were completed and retrieved. The questionnaire covered the following sections namely: Personal information, household size, literacy level, occupation, income, gender, religion, culture, housing structure, government influence, and health issues. Data obtained were subjected to descriptive statistics such as frequency and percentage. Inferential statistics (factor analysis). Factor analysis (FA) is a tool used in extracting complex and diverse relationship existing among a set of observed variables that link together the apparently unrelated variables and provides significance structure of data which could be interpreted into meaningful scientific conclusion (Balasundaram, 2009). Factorability was determined by KMO and Bartlett test, while the Eigen value was set at 1.00 maximum after Shrestha (2021); also, Ogunbode et al. (2023). Thus, any variable with value less than 1 is discarded as insignificant to be considered to have contributed to environmental pollution challenges in the study area.

3 | RESULTS AND DISCUSSION

3.1 | Sociological characteristics of respondents

The sociological variables of the respondents, that were evaluated, and their relative response quotients are presented in **Exhibit** 1.

Respondents' attributes are discussed in the following sequence:

1. **Gender**: Gender has become significant in all sectors of life. **Exhibit** 1 shows that 52% of the respondents are female, while 48% are male. This result indicates almost equal representation amongst gender, which make the survey gender unbiased. Regarding gender and environmental pollution, there is difference between men and women in observing local environmental quality. Akinwumi (2015) and Organization for Economic Co-operation and Development (OECD) (2020) supported that women are more likely to be environmentally motivated, less skeptical about environmental issues, and commute using public transport. In view of this, roles female gender play in the family make them to interact closely with environment and consequently contribute or otherwise to various challenges.
2. **Age**: The respondents were fairly distributed among the various age groups except those within the ages of 54–65 and above 65 that were few (5% and 1%) respectively (**Exhibit** 1). Age plays a vital role in determining the level of maturity, sensitivity, and commitment toward environmental issues in the society (Madrigal & Oracion, 2018).
3. **Marital status**: With respect to marital status, 60% were married, 32% were single and 8% are widowed and widower (see **Exhibit** 1). This shows that majority of the respondents are married and married people are more likely to be responsible and care more about their environment. Kim et al. (2020) confirmed that, unmarried people are more likely to expressed depressional syndromes that are associated with air pollution than married.
4. **Household size**: **Exhibit** 1 shows that, 55% of the respondent's household size range between 1%–5% and 45% range between 6 and 20 above (see **Exhibit** 1). From the above records, larger family sizes exist in the study area, this could be one of the determinants of environmental quality that consequently affects the level of consumption and waste generated in the society (Biddlecom et al., 2005).
5. **Religion**: The survey results shows that 68% of the respondents are Christians, while 32% are Muslims (see **Exhibit** 1). Religions plays an important role in determining the quality of environment, this could be seen through their advocacy for cleanliness among members. Although there is an assertion that noise pollution is likely to be highly generated from worship centers (Adebayo, 2013).
6. **Educational attainment**: With respect to education, 83% of respondents attended tertiary school, 13%, secondary, 3%, primary, and 1% did not attend any formal education (see **Exhibit** 1). This is an indication that respondents were able to understand the survey questions and provide appropriate answers. Zsóka et al. (2013) in corroborating this observation revealed that educational attainment is salient to the understanding of pollution generation in among households.
7. **Occupation**: With respect to occupation, 48% of the respondents were civil/public servants, 23% operate personal business, 4% were farmers and artisans, while others (people that did not specify their occupation) resulted to 21% (see **Exhibit** 1). Occupation also determined the income of an individual and could consequently influence pollution. The significance of occupational distribution and its influence on environmental pollution (Okechukwu & Chinenye, 2014).

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EXHIBIT 1 Sociological characteristics of respondents.

S/N	Factors	Variables	Response frequency	Response ratio (%)
1	Gender	Female	112	52
		Male	103	48
2	Age	18–29 years (Mean = 37)	51	24
		30–41 years (Mean = 37)	101	47
		42–53 years (Mean = 37)	49	23
		54–65 years (Mean = 37)	11	5
		Above 65 years (Mean = 37)	3	1
3	Marital status	Married	128	60
		Single	69	32
		Widowed/widower	18	8
4	Household size range	1–5	118	55
		6–10	88	41
		11–15	2	1
		16–20	–	–
		Above 20	7	3
5	Methods of handling waste (Culture)	Nearby dump site	52	24
		Dump in gutter	28	13
		Open burning of waste	71	33
		Use of pit latrine	22	10
		Patronized bush for convenience	4	2
6	Health issues	Access to primary healthcare	142	66
		Non-access to primary healthcare	69	34
7a	Religious	Christianity	146	68
		Islam	69	32
		No religion	–	–
8	Educational attainment	Tertiary	178	83
		Secondary School	28	13
		Primary/Quranic School	7	3
		No formal education	2	1
9	Occupation	Farmer	9	4
		Artisan	9	4
		Businessmen	49	23
		Civil/public servant	103	48
		Others	45	21
10	Government influence	Access to government waste collection points	45	21
		Available regulations	108	50
		Available Sanctions	19	9
		Available supervision	73	34
	Duration of residency in the study area (Range in years).	1–5 (mean = 8)	112	52
		6–10 (mean = 8)	43	20
		11–15 (mean = 8)	26	12

(Continues)

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EXHIBIT 1 (Continued)

S/N	Factors	Variables	Response frequency	Response ratio (%)
		16–20 (mean = 8)	9	4
		Above 20 (mean = 8)	25	1
12	Housing structure	Type of house occupancy		
		Personal	103	48
		Rent	101	47
		Government/corporate	11	5

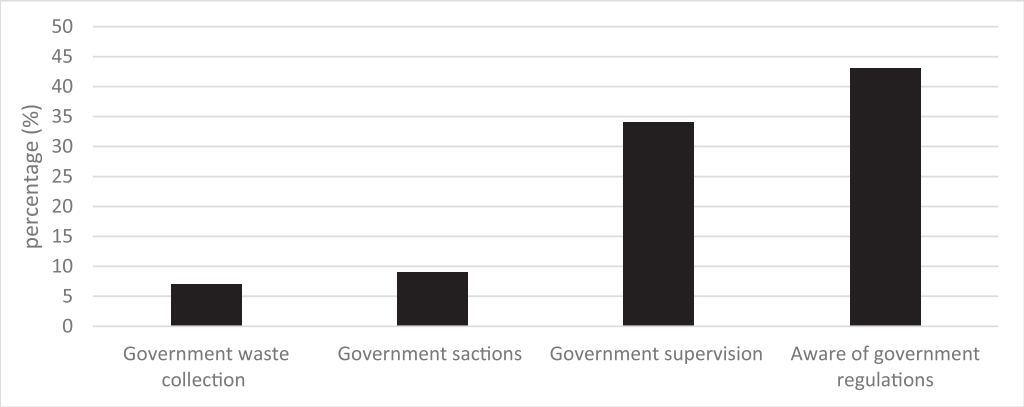


EXHIBIT 2 Perceptions of respondents on government influence.

8. **Period of residency**: result shows that, 52% of the respondents have lived in their houses for between 5 and below, 20% have lived between 6 and 10 years and (28%) have lived between 11 and 20 above years (see **Exhibit** 1). The implication is that the respondents are likely to be much aware of the changes in their environment over the years. This finding was corroborated by Ezeh et al. (2017) when it was emphasized that the longer one stays in an area, the more is likely to be the extent of awareness about environmental quality maintenance or otherwise.
9. **Health issues**: Health is a pressing issue that the whole world is fighting holistically. Instance, COVID-19 that led to the death of millions of people on earth, the incident of diseases and other healthcare needs that led to the patronization of healthcare and their accessibility to the healthcare were access. **Exhibit** 1 shows that 66% of the respondents have access to primary healthcare, while 70% patronized the healthcare. Most health issues resulting from diseases associated with pollution could likely increased patronage to healthcare (Akmal & Jamil, 2021; Manisalidis et al., 2020).
10. **Culture**: The culture of people could the level of pollution. The parameters observed culture are: Patronization of nearby dump site by respondents 10%, dumping of waste in gutter 23%, open burning of waste 47% while using of pit and patronization of bush for convenience 12% (see **Exhibit** 2) (Jazat et al., 2023).
11. **Government influence**: Parameters observed in **Exhibit** 2 were: Respondent's access to government waste collection points 7%, government sanctioned on defualter 9%, government supervision 34% and respondent's awareness of government regulations 43% (Ashford & Caldart, 2010).
12. **Housing structure**: The number of bedrooms occupied by a household could influence pollution. For instance, when 6 or more people live in a bedroom, the propensity to be affected by any unhealthy air pollution conditions will be high. More than 60% of the respondent's uses 3–4 and above bedrooms apartment and 34% of the respondent's apartment do not have plumbing fixtures (Olukanni & Mnenga, 2015).

3.2 | Weighting of the sociological indices

Inferential results obtained after subjecting to factor analysis are in **Exhibit** 3. Suffice to report that the data were factorable and significant at $p < 0.05$ with KMO of 0.523. Outcome of the analysis were six (6) extracted sociological indices that were major pollution components and influencers for the study area. They cumulatively constituted 65% of the explanation bordering on environmental pollution. The component indices are presented in descending order in (**Exhibit** 3) influence as (1) Household size, (2) Marital status, (3) Government influence, (4) Religion. (5) Culture, and (6) Health issues.

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EXHIBIT 3 Factor analysis of extracted sociological indices.

s/n	Indices	Extracted component	Total eigenvalue	Component variance (%)	Cumulative variance (%)
1.	Household size	0.702	1.499	12.492	12.492
2.	Marital status	0.726	1.365	11.376	23.868
3.	Government influence	0.861	1.284	10.703	34.572
4.	Religion	0.842	1.262	10.518	45.089
5	Culture	0.904	1.170	9.754	54.843
6.	Health issues	0.797	1.170	9.752	64.595

Exhibit 3 showed that household size is the main influencer of environmental pollution in the study area. This is expected because as the number of people increases in a family so also the waste generated increases. This is in agreement with Biddlecom et al. (2005) who observed that poorer environmental quality is associated with larger household size.

Marital status is another index that may influence pollution in the study area, perhaps for a fact that many of the respondents' spouses had positive influence on hygienic status of their partners. Patrick et al. (2017) assumed that married people are likely to be more responsible and thus keep the environment cleaner. They are also more willing to pay for improvements of their environment. Berkson (1962) also found that the incidence of lung cancer from cigarette smoking is correlated to the degree of pollution between married and unmarried people.

Government influence account for 10.7% of the total weight explained. Government plays a vital role to ensure that the society is kept unpolluted. This could be through the policies which includes regulations, monitoring, sanctioning, awareness on the dangers of pollution and ensuring that solid wastes are evacuated to appropriate landfills. In a situation where those functions of government are not observed, this could lead to an increased in pollution in the society. Therefore, the rising volume of waste in Iwo community may therefore be related to the inability of government to perform it roles (Sridhar et al., 2017).

Religious influence accounted for 10.5% of the explained variables. Two major religions practiced in the study are Christianity and Islam. Most of the religion advocate that human should handle nature with care, that cleanliness is next to godliness and to avoid wastage (John 6:12) and (Qur'an 30:30). These are measures made by the Holy books to ensure that pollution is minimized. Nevertheless, noise pollution generated by worship centers in Iwo is significant which account to 10.5% of environmental pollution in the study area.

Culture contributed 9.8% of the explained variables. Agreed community culture affects the attitude of respondents toward waste disposal. All these waste disposal practices are of great harm to the environment. Indiscriminate waste disposal could result in soil, water and air pollution which are causative agents of many diseases to humans (Chadar & Keerti, 2017). The type of convenience used by people in a society also influence pollution. For instance, use of pit toilet and the patronization of bush for convenience are some of these cultures that led to water pollution. Ndoziya et al. (2019) supported that, pit latrine in the proximity of drinking water source affects negatively the quality of the water.

Health issues account for 9.8% of the explained variables. The high incidence of pollution related diseases is a signed that indicates that the society is highly polluted. This could be accompanied by high patronage to healthcare. Over 50% of the respondents reported that 1–2 members of the family were infected with either cough/catarrh or typhoid in the last 2 years. The work of OECD (2001) is also in support of this finding. Also, Egaga and Aderibigbe (2015) added that, women and children indeed patronize healthcare delivery because they are much in touch with nature and environment from their daily activities.

4 | CONCLUSIONS AND RECOMMENDATIONS

Six sociological indices were established to be critical to environmental pollution in the city of Iwo that was studied here. The indices were household size, marital status, governmental influence, religion, and culture and health issues in order of significance. Their proportional contributions are respectively 12.5%. 11.4%, 10.7%, 10.5%, 9.8%, and 9.8%. Factorial contributions to environmental pollution were weighted and explained. A compelling sociological index is household size that determines whether the stakeholders would be willing to pay for waste management or do the cleaning themselves on volunteering basis. Next is marital status which guides morals among the family members and help to influence culture and health. Third in rank was government influence which touches on management concerns in form of regulations and education given to community dwellers to cope with hygienic requirements. Fourth was religion associated noise pollution which, respondents rated to be about 22% generated using public address systems at worships centers; 20% by ringing bells and 18% through singing. In other words, a cumulative 60% noise pollution is expected from worship centers based on the respondents' perception in the study area. Fifth, are culture and attitude of people to open burning of wastes; dumping of wastes in gutters or patronage of nearby dumped sites. Sixth was health issues and peoples' response to epidemic diseases and threats related to their actions and resultant effects on their environments. Some people use pit latrines and take advantage of the nearest bush for their convenience.

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The following recommendations were therefore pertinent:

1. That government should intensify efforts at providing available waste collection centers and evacuate the waste on time, create awareness on the danger of pollution, supervise, and sanction defaulters.
2. Women should be enlightened on the implications of having a bloated family size and family planning should be made available and attractive.
3. Religious leaders should be enlightened of dangers associated with noise pollution generated from their worship centers and government should re-enact related and appropriate sanctions.
4. Cultures that promote environmental pollution in the society should be worked on for improvement, or eliminated if possible, and the society will be better for it.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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