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Comparative Analysis of Human-Perception and Empiricism of Gas Flaring Activities on Health Hazards of Residents in FCE(T) Omoku, Rivers State

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Abstract
The possibility that the results from scientific investigation could sometime align or conform with human's observation on the possible effects from social, economic and even spatial activities prompted the conduct of this comparatively study that analyzed human-perception and empiricism of gas flaring activities on health hazards of residents in FCE(T) Omoku, Rivers State. The study adopted the descriptive and expo-facto research designs. A sample of 137 members of the FCE(T) Omoku community were randomly selected and administered the structured questionnaire for the collection of data compared with the result in Oweisana et al. (2021) evaluation of ambient air quality in Obrikom and Omoku communities. The data collected was analyzed using mean and standard deviation. The result revealed that human perspectives and scientific analysis were somewhat closely related on human-induced activity (like gas flaring) to inundate or saturate the atmosphere with pollutants or impurities that could stir health effects on. The study recommended that air quality in the area should be regularly monitored and gas flaring by oil companies should be minimized. Health impact assessment should also be conducted regularly in the communities to determine the level of impacts of the pollutants.
Keywords: Human-perception, empiricism, gas flaring activities, health hazards, residents

INTRODUCTION

Perception relates to the identification, interpretation and discernment of sensory information in order to enable an individual to present or report his/her understanding of the information and issues in the environment (Okeke et al., 2019). All perception involves signals that go through the nervous system, which in turn result from physical or chemical stimulation of the sensory system (Anderson & Gordon, 2016). Additionally, perception is sometime based on intuition, sensation, knowledge gained from monitoring scientific events and predictions as well as based on tales, acumen, experience of similar events, convictions and in some instances, insights that are entirely distinct from empiricism or scientific assessment (Okedara & Ajiboye, 2018). Thus, human-perception could be conceptualized as the individual's acumens, insights, intuitions, understandings, visions, speculations or generalizations that leads to similar, diverse or subjective deductions, interpretations or inferences given to the effects or consequences from social, economic, political and spatial activities.

Human's religious affinity, cultural beliefs, traditional roles, socioeconomic status and intellectual sophistry stem as the experiences that could influence their active or passive views, perspectives or reasoning about events or activities in the society (Adeyemi & Adeyemi, 2017). Despite this, there is still active debate about the extent to which perception could be likened or equated as an active process of speculation, assumption or hypothesis testing of social and spatial activities that is analogous or

comparable to science (i.e. empiricism and scientific investigation). The multifaceted areas, issues and scenarios that humans perceive the same or different events and activities could trigger social inequalities, disparities or imbalances underscores the enactment and development of a robust policy framework in order to proactively tackle the influence of social inequalities to school access. Okedara and Ajiboye (2018) observed that social imbalance could be mostly be inferred on the absence of uniformity of results, conclusions or deductions of the insights, intuitions, understandings, visions or perceptions by the same or different category of individuals on the effects from social, economic, political and spatial activities in the environment.

Furthermore, the bush fires during hamattan effluents from welding and construction activities as well as gas flares from the varying oil fields constitute the spatial activities that significantly contribute to the saturation of toxic pollutants that poses great risks on residents (Ede & Edokpa, 2015; Ubong et al., 2015; Nwogbidi et al., 2019). Similarly, gas flaring involves the practice of burning off the natural gas generated during crude oil exploration directly into the atmosphere rather than deploying biologically, technological and environmentally friendly alternative and sustainable removal methods that are (Seiyaboh & Izah, 2017). Also, Osuoha (2017) reiterates that gas flaring is the primary source of anthropogenically-induced release of toxic pollutants that are responsible for poor air quality, serious public health issues, and ecological degradation, including what AAAS (2015) ascribe as the generation of greenhouse gases, chronic respiratory diseases, vegetative discoloration among others in an environment.

Humans are prone to perceive without any form of empiricism that areas where they are high concentration of oil exploration activities accompanied by gas flaring could be a replica of an arena that is inundated with atmospheric pollutants that would predispose humans to health risks such as catarrh, cough, respiratory disorders or ailments (Ideriah et al., 2020). Empiricism is conceptualized as the scientific inquiry, systematic analysis, practical assessment and methodic investigation of natural and observable facts, features and phenomena in order to determine the specificity of their influence and concentration, which could lead to inference on possible effects or impacts. Thus, the unscientific view or analysis on the possible health effects from as flaring was corroborated in the study by Amaechi-Onyerimma (2021) that gas flaring at the Agbada flow station led to the emission of pollutants like CO_2, NO_2, So_2, H_2S, CH_4, CO, NH_3, Pm 2.5, Pm 10 among others that significantly contributed to poor air quality that increases the occurrence of skin diseases, cancer and respiratory ailments (especially cough, cold and catarrh, etc.).

The presence of air pollutants on human health and skin include; skin aging, atopic dermatitis and psoriasis (Drakaki et al., 2014), eye and skin irritation (Ideal-response, 2021), skin cancer (Kohanka & Kudasz, 2022), eczema, urticaria, rashes and skin infection (Puri et al., 2017), respiratory diseases such as asthma, skin disorders and reproductive problems from exposure to polluted air that can lead to presence of black carbon (i.e. black patches and droppings) on roof surfaces, cars, floors, windows, etc. (Owhor et al., 2023). Similarly, humans-perception could be related to the trans-boundary nature of air pollution that could make certain pollutants released in the air, makes pollutants to permeate and severely impact a very long distance beyond the community hosting the flow station. This was correlated in the study by Monday (2018) that the release and presence of Pm 2.5, Pm 10, CO_2, H_2S, NH_3 and NO_2 among other particulate matter pollutant in a particular environment where gas flaring activities are going on.

In a nutshell, human's perspectives and convictions can either sustain or moderate the common disparities and imbalances that may occur from the way they view or understand the changing social, economic and spatial activities (Reimers & McGinn, 2017). The understanding that humans' view, impression, speculation and reasoning can lead to social imbalances is without a doubt extremely crucial in arousing humans' concerns and anxieties (Okedara & Ajiboye, 2018). Accordingly, the supposedly aroused imbalances could elicit the formation and institutionalization of process and framework for the conduct of empirical studies or scientific analysis to determine the specific effects from spatial activities (Agirdag et al., 2021). In view of this, it becomes pertinent to surmise or infer that human insights, concerns and views has the tendency to raise concerns that can elicit the consciousness for probing and conducting

scientific analysis on spatial activities in the environment. This standpoint aptly makes the residents within the Federal College of Education (Technical) Omoku community to rightly preempt the possible health threats from their exposure to gas flaring activities occurring several meters outside the institution environment.

Statement of the Problem

Humans and science have the tendency to speculate and precisely reveal respectively the similarity of findings and inferences from anthropogenic or human-induced activities (like gas flaring). This human-induced activity has the prospect for the release of noxious pollutants that would in the short and long run impact on the health of the exposed humans. Also, there is no doubt that human activities like crude oil exploration could lead to the generation of certain wastes and particulate matter pollutants that could overtime heighten the toxicity and pollution of the air. In specificity, the continuous generation of pollutants around oilfields could be traced to regulatory inefficiency and conflict that is responsible for the adoption of unsustainable exploration method like gas flaring. Thus, gas flares are perceived by humans as well as scientifically proven to contain noxious substances with detrimental effect on the health of humans and the environment. Against this background, this study attempts to comparatively analyze human-perception and empiricism of gas flaring activities on health hazards of residents in FCE(T) Omoku, Rivers State, with a view at attempting to close this yawning gap.

Aim and Objectives of the Study

The aim of this study is to comparatively analyze human-perception and empiricism of gas flaring activities on health hazards of residents in FCE(T) Omoku, Rivers State. The specific objectives include to:

1. ascertain the perceived conditions and experiences arise from gas flaring in Omoku community by the residents of FCE(T) Omoku, Rivers State.
2. find out perceived effects of gas flaring in Omoku community on the residents health in FCE(T) Omoku, Rivers State.
3. Determine the level of association on the mean scores of the perceived experiences and health effects of gas flaring on the scientific assessment of the air quality around Omoku community.

Research Questions

The following questions were stated to guide this study.

1 What perceived conditions and experiences arise from gas flaring in Omoku community by the residents of FCE(T) Omoku, Rivers State?
2. What perceived effects of gas flaring in Omoku community on the residents health in FCE(T) Omoku, Rivers State?
3. What is the level of association on the mean scores of the perceived experiences and health effects of gas flaring on the scientific assessment of the air quality around Omoku community?

Significance of the Study

1. The study would enhance the awareness that human's view as stakeholders and beneficiaries of spatial activities in the environment could elicit the consciousness and concern that would result in scientific assessment of the social, economic and health effects of developments.
2. The study would provide information that would enhance the sustainable and improved environment in oil bearing communities.
3. This study would serve as a reference material for researchers and future studies.
4. The study would be beneficial as it would help to advocate the zero flaring of gases whose effluences impacts negatively on both the air quality and inherent residents.

Scope of the Study

This study centered on comparatively analyzing human-perception and empiricism of gas flaring activities on health hazards of residents in FCE(T) Omoku, Rivers State. Furthermore, the study intends to elicit information from the category of respondents in FCE(T) Omoku that would be compared with the result from the scientific evaluation of ambient air quality in Obrikom and Omoku communities by Oweisana et al. (2021).

METHODOLOGY

The study was conducted at Obrikom and Omoku communities in Ogba/Egbema/Ndoni Local Government Area, Rivers State. Geographically, Omoku and Obrikom towns are located approximately on latitude 4° 51' 29.16" N longitude 6° 55' (NDDC, 2004). Also, the meteorological conditions of the study area display climatic characteristics that could be classified as semi-hot equatorial zone. The equatorial maritime air mass characterizes the climate with high humidity and heavy rainfalls (annual mean ranges between 72% -81% and 3,000mm-4,000mm while average monthly temperatures vary from 28^{o}C to 33^{o}C and 21^{o}C to 23^{o}C, respectively (Oweisana et al., 2021). Also, the study area play host to many public and private primary and secondary schools as well as a tertiary institution like Federal College of Education Technical (FCET) Omoku. While oil installations like flow stations that are operated by the Agip and Elf Petroleum are located in the study area. The population of the study will comprise all the lecturers, students, artisans (like drivers, traders, and pharmacists/chemists), and medical staff (like doctors, nurses and laboratory technicians) in the Federal College of Education Technical (FCET) Omoku.

A sample size of 137 respondent's members of the FCE(T) Omoku community comprising 15 lecturers, 60 students, 50 artisans (15 drivers, 25 traders, and 10 pharmacists/chemists), and 12 medical staff (3 doctors, 5 nurses and 4 laboratory technicians) were randomly selected and administered the structured questionnaire for the collection of data. A self-structured 20-item instrument titled "Comparative Analysis of Human Perception and Empiricism of Gas Flaring Activities on Health Hazards of Residents Questionnaire" (CAHPEGFAHHRQ). The CAHPEGFAHHRQ instrument were patterned after a four-point rating scale of "Strongly Agree" (SA= 4 Points), "Agree" (A = 3 Points0, "Disagree" (D = 2 Points), and "Strongly Disagree" (SD = 1 Point), and comprised three (3) Sections A< B and C.

The face and content validity of the CAHPEGFAHHRQ instrument was determined by two (2) experts in the Department of Measurement and Evaluation, Rivers State University Port Harcourt, Rivers State**.** The reliability or internal consistency of the CAHPEGFAHHRQ instrument was determined using Cronbach Alpha (r_a) method with a reliability coefficient of 0.87 obtained making the instrument reliable. The face-to-face direct delivery technique was adopted as method of data collection in this study. Thus, the face-to-face direct delivery technique enabled the researcher to personally administer and effectively explain or make clarifications (where necessary) during the process of administering the CAHPEGFAHHRQ instrument to the category of respondents (lecturers, students, artisans and medical staff).

The collected data was analyzed using mean and standard error to answer research questions 1 and 2, while the research question 3 were analyzed by the average of the mean scores for research evaluation of ambient air quality in Obrikom and Omoku communities.

PRESENTATION OF RESULTS

Research Question 1. *What are the perceived conditions and experiences that arise from gas flaring in Omoku community by the residents of FCE(T) Omoku, Rivers State?*

Table 1: `Data from respondents on perceived conditions and experiences arise from gas flaring in Omoku community by the residents of FCE(T) Omoku, Rivers State.

S/N	ITEMS	SA	A	D	SD	MEAN	SD	REMARK
1	Do you agree gas flaring in Omoku community has negatively impacted air quality?	80	45	7	5	3.45	0.76	Accept
2	Do you agree gas flaring in Omoku community has negatively impacted water quality?	90	30	8	4	3.58	0.78	Accept
3	Does gas flaring in Omoku community often impacted on respiratory problems (e.g., coughing, difficulty breathing).	88	41	2	6	3.54	0.74	Accept
4	Do you agree that gas flaring in Omoku community has negatively impacted your overall health?	86	39	3	9	3.47	0.83	Accept
5	Gas flaring in Omoku community affected your livelihood or income negatively	100	25	10	2	3.63	0.68	Accept
6	Do you agree that gas flaring in Omoku community has increased economic opportunities for residents?	96	29	5	7	3.56	0.79	Accept
7	Do you feel anxious or stressed due to gas flaring in Omoku community?	52	78	3	4	3.30	0.66	Accept
	AVERAGE MEAN					3.50	0.74	

Table 1 above shows the descriptive statistical outcome for the perceived conditions and experiences arise from gas flaring in Omoku community by the residents of FCE (T) Omoku, Rivers State. All items 1-7 were all accepted by the respondents with the criterion mean of 2.5 and grand mean of 3.50, which is above the criterion mean. The result indicates that gas flaring in Omoku and its environment negatively impacted on air, water quality and other health hazards in the community and its environment

Research Question 2: *What perceived effects of gas flaring in Omoku community on the residents health of FCE(T) Omoku, Rivers State?*

Table 2: `Data from respondents on perceived effects of gas flaring in Omoku community on the residents health of FCE (T) Omoku, Rivers State.

S/n	Items	SA	A	D	SD	Mean	SD	Remark
8	Do you agree that gas flaring in Omoku community has negatively impacted your mental health?	56	69	7	5	3.28	0.73	Accept7
	Do you feel satisfied with the overall condition of Omoku community due to gas flaring?	7	9	55	66	1.69	0.81	Reject
10	Do you agree that gas flaring in Omoku community has improved your overall quality of life?	70	13	9	45	2.79	0.36	Accept
11	Do you agree that gas flaring in Omoku community has negatively impacted your mental health?	86	34	9	8	3.45	0.86	Accept
12	Do you agree that there is negative impact of gas flaring on your willingness to engage in outdoor physical activities?	70	49	10	8	3.32	0.85	Accept

13	Do you agree that gas flaring in Omoku community has negatively impacted on your overall health?	80	40	9	8	3.40	0.85	Accept
14	Do you experience respiratory problems (e.g., coughing, difficulty breathing) that you attribute to gas flaring in Omoku community?s	90	29	11	7	3.47	0.85	Accept
	AVERAGE MEAN					3,06	0.76	

Table 2 above shows the descriptive statistical outcome for the perceived effects of gas flaring in Omoku community by the residents' health in FCE (T) Omoku, Rivers State. Items 8, 10,11,12,13 and 14 were all accepted by the respondents having means of above 2.5 the criterion mean, while Item 9 which has a mean of 1.69 was rejected because it is less than the criterion mean. The grand mean is 3.06, which is above the criterion mean. This indicates that there are the perceived effects of gas flaring in Omoku community by the residents' health in FCE (T) Omoku, Rivers State, which means that gas flaring impacted negatively on the people's mental, physical health and other activities in the environment.

Research Question 3: *What is the level of association on the perceived experiences and health effects of gas flaring on the scientific assessment of the air quality around Omoku community by the residents of FCE(T) Omoku, Rivers State?*

Table 3: `Data from respondents on the level of association on the perceived experiences and health effects of gas flaring on the scientific assessment of the air quality around Omoku community by the residents of FCE(T) Omoku, Rivers State?

S/N	**ITEMS**	**SA**	**A**	**D**	**SD**	**MEAN**	**SD**	**REMARK**
15	Do you agree that gas flaring in Omoku community has increased your risk of developing chronic diseases (e.g., cancer, heart disease).	80	30	20	7	3.34	0.91	Accept
16	What is your level of agreement with the statement: "The air quality in Omoku community is hazardous to human health"?	105	20	6	6	3.64	0.77	Accept
17	Do you think the concentration of particulate matter (PM2.5) in the air around Omoku community exceeds safe limits?	8	11	25	93	1.52	0.88	Accept
18	How would you rate the overall air quality index (AQI) in Omoku community?	103	18	11	5	3,60	0.79	Accept
19	Do you agree that the perceived health effects of gas flaring in Omoku community are consistent with the scientific assessment of air quality?	81	39	7	10	3.39	0.89	Accept
20	The strength of association between the perceived experiences of gas flaring and the scientific assessment of air quality in Omoku community are consistent.	59	55	13	10	3.19	0.89	Accept
	AVERAGE MEAN					3.11	0.86	

Table 3 shows the descriptive statistical outcome on the level of association on the perceived experiences and health effects of gas flaring on the scientific assessment of the air quality around Omoku community by the residents of FCE (T) Omoku, Rivers State. Items 15, 16, 18, 19, and 20 were all accepted because their mean is above the criterion mean of 2.50 while item 17 with a mean of 1.52 is rejected. The grand mean of 3.11 indicates acceptance of the the level of association on the perceived experiences and health effects of gas flaring on the scientific assessment of the air quality around Omoku community by the residents of FCE(T) Omoku, Rivers State

DISCUSSION

Gas flaring releases toxic pollutants, including particulate matter (PM), nitrogen oxides (NOx), and sulfur dioxide (SO2), which can cause respiratory problems, such as asthma and bronchitis (EPA, 2019). Exposure to gas flaring emissions has been linked to an increased risk of cancer, particularly lung cancer (IARC, 2010). Gas flaring emissions contain neurotoxins, such as benzene and toluene, which can cause neurological problems, including headaches, dizziness, and nausea (ATSDR, 2019).

Gas flaring releases large quantities of greenhouse gases, including carbon dioxide (CO2) and methane (CH4), contributing to climate change (IPCC, 2013). Gas flaring can contaminate surface and groundwater sources, posing a risk to aquatic life and human consumption (WHO, 2017). Gas flaring emissions can lead to soil acidification and nutrient depletion, affecting agricultural productivity and ecosystem health (UNEP, 2013).

CONCLUSION

Gas flaring in Omoku, Nigeria, has severe perceived effects on human health and the environment. The emissions from gas flaring release toxic pollutants, contributing to respiratory problems, cancer risk, and neurological effects. Additionally, gas flaring leads to air pollution, water pollution, and soil degradation, posing significant environmental risks.

RECOMMENDATIONS

1. Implement Alternative Energy Solutions such as Transition from gas flaring to alternative energy sources, such as solar, wind, or hydroelectric power, to reduce greenhouse gas emissions and mitigate environmental impacts (IRENA, 2020).
2. Regulations and enforcement mechanisms to minimize gas flaring, ensuring compliance with international best practices and standards must be strengthened (NNPC, 2020).
3. There should be the conduct of Regular Environmental and Health Impact Assessments: Perform periodic assessments to monitor the effects of gas flaring on human health and the environment, informing evidence-based decision-making and policy development (WHO, 2018).
4. Provide Compensation and Support to Affected Communities: Offer fair compensation and support to communities impacted by gas flaring, including access to healthcare services, education, and economic empowerment programs (UNDP, 2019).

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