

Impact of Gas Flaring On the Environment of Selected Oil Producing Areas of Delta State, Nigeria

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Abstract

Background: Gas flaring in Niger-Delta communities in Nigeria has been on since 1956 and the people around these areas have been raising alarm due to the air pollution caused by the gas flaring activities which are not well managed by the government. This study investigates the impact of gas flaring on the residents of some selected oil producing areas in Delta State, Nigeria.

Materials and Methods: The study adopted survey research design with literatures relevant to gas flaring and a questionnaire was developed for the study. Three hundred and ten questionnaires were administered to the respondents by the researcher and analysed using figures and percentages.

Results: The findings from the study revealed that gas flaring has impacted negatively on the environment, socio-economic lives and activities of the inhabitants.

Conclusion: The study led to the findings that gas flaring causes health problems for the people, a damaged and unsustainable environment, as well as socio-economic problems. The study recommended strict regulations of toxic chemical disposals coupled with enforcement of penalties for unsustainable economic practices that degrade the environment should be put in place. Public education and awareness on the social, economic and ecological effects of gas flaring should be increased. Interview with some of the residents revealed some level of ignorance among them.

Keywords: Gas Flaring, Impact, Environment, oil producing areas

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I. Introduction

The activities of gas flaring have been a regular practice within the oil and gas industry for decades, and this of huge concern. Gas flaring is mainly used to dispose of associated gases with crude oil to make it more economically useful.¹ Gas flares are a regionally and globally significant source of atmospheric pollutants.² There are more than 16,000 flare sites in 90 countries globally with many of them occurring in Nigeria. Records show that Nigeria accounts for about 40% of all gas flared in Africa. This shows that about 145-150 BCM gas is flared per year globally, and this quantity is enough to produce 750 billion kWh power more than the entire power consumption on the African continent annually.³ It is worrisome to note that most of the flare sites in Nigeria are found in the residential areas of Niger Delta region. For instance, in Rumola, a community in Port-Harcourt, Rivers State, Shell Company flares gas in the area and is about 300 meters from the nearest dwelling house.⁴ The widespread use of the 'open pipe flare' method in Nigeria, which is almost obsolete outside the country further compounds the problem.³

Extreme crude oil pollution still traverse Delta State. For instance, gas flaring still goes on in the area. Gas flares also impacts the environment on a wider scale through the emission of pollutants and greenhouse gases like carbon dioxide, carbon monoxide, black carbon, nitrogen oxides, polycyclic aromatic

hydrocarbons, volatile organic compounds and acid rain precursors. Other effects of gas flaring includes, increase in temperature, acid rain, low agricultural productivity and changes in the ecosystem⁵.

Gas flaring is considered an important component of atmospheric dispersion simulations and climate modelling as the impact of GF emissions extends beyond immediate environmental concerns.⁶ Poor environmental management practices also contribute towards environmental contamination with direct consequences on the surrounding socio-economic wellbeing, human health and the environment. Gas flares negatively impacts the immediate surrounding for example through noise, heat stress and visual pollution^{7, 8, 9}. This situation is alarming because of negative impacts associated with gas flaring. Gas flaring is a key driver of air pollution in oil producing communities. Approximately 600,000 people die in Africa every year as a result of air pollution.⁸ The pollutants resulting from gas flaring areas are associated with a variety of adverse health impacts including respiratory tract infections, diseases of the central nervous system and blood stream, cancers, deformities in children, lung damage and skin problems have also been reported.⁸ It also contributes to health problems such as irregular heartbeat, acute leukaemia, aplastic anaemia, chronic bronchitis, painful breathing, aggravated asthma and premature mortality.¹⁰

II. Materials and Methods

2.1. Study Area (location)

Kokori in Ethiope East L.G. A of Delta State is one of the gas flaring locations. It lies approximately between Longitudes 6°04'00 and Latitudes 5°40'00'. Its land area is 196sqkm. The entire kokori land is flat and situated in the evergreen tropical forest zone which is dominated by the oil palm tree. Afiesere in Ughelli north L.G.A, lies between Longitude 6° East and Latitude 5° 32'31' 'North. It's land area is 12m, 39.37ft, 472.44 in above sea level. Ewvreni also in Ughelli North L.G.A, lies between Longitude 6°04' 58' East and Latitude 5° 24'00' North. It's land area is 13m, 42.65ft, 511.81 in above sea level. Eriemu, also in Ughelli North L.G.A, lies between Longitude 6° 02' 00" East and Latitude 5° 35' 00" north. Otujeremi in Ughelli south L.G. A, where the Utorogu facility is located lies between Longitude 5° 52'41.8" East and Latitude 5° 26'17.4"N. Iwhreka is in Ughelli south L.G.A and harbours one of the facilities under study. It lies between Longitude 5° 52.3' 'East and Latitude 5° 27'22.1' 'north. Ekakpamre a town in Ughelli south L.G.A, also hosts one of the facilities under study. It lies between Longitude 5° 54' 00" East and 5° 31' 00" north. Olomoro-olehinisoko south L.G.A, lies between Longitude 6° 09' 00" East and Latitude 5° 25' 00" north, Uzere, also a town in Isoko south L.G.A where gas flaring activities is located, lies between Longitude 6°10' East and Latitude 5° 12' north, oweh is also a town in Isoko north L.G.A, an oil producing area of Delta state. These information were sourced from.⁵

The study area cut across five local government areas in Delta State. These local government areas are located in different axis of the state so for this reason, the geological setting of Delta State as a whole is presented in this study. The subsurface geology of Delta State which is part of the Niger Delta Basin is depicted in Figure 1.0. Information on the Geological setting of the Niger Delta has been well published.⁷ The basin fill is made up of three formations, namely from the oldest to the youngest, Akata, Agbada, and Benin Formations.

The Akata Formation is composed of continuous shale and about 10% sand stone. The shale is believed to be over pressured and under-compacted. It ranges from Eocene to Recent and was deposited under marine conditions. The Agbada Formation conformably overlies the Akata Formation in the subsurface. It is a paralic sequence of alternating shale and sandstone with a variable age ranging from Eocene in the north to Pliocene/Pleistocene in the south, and Recent in the delta surface. Its lateral equivalents at the surface are the Ogwashi- Asaba Formation and Ameki Formation of Eocene-Oligocene age. The Ogwashi-Asaba Formation constitutes the main rock outcrops in the Asaba Capital Territory.

The continental Miocene-Recent Benin Formation conformably overlies the Agbada Formation. It is composed of more than 90% sands and about 10% shale clays. The sands are large in size from gravelly, coarse to fine grained. They are also poorly-sorted, rounded, and bear ignite streaks and wood fragments. The Benin Formation occurs just west and northwest of Asaba town and this extends into Agbor town.⁸ Formation exist and just south of Abraka as well as Sapele, Warri and Ughelli the Benin Formation is meant to be the younger Holocene deposits of the Sombreiro-Warri, Deitaic plain, the Mangrove swamps and Freshwater Swamp wetlands. These deposits which have not been assigned geological names because they are universally considered to be recent expressions and continuation of the Benin Formation are only identified by the physiographic terrains in which they occur. The aerial distribution of these delta top deposits collides somewhat with the associated physiographic subdivisions.

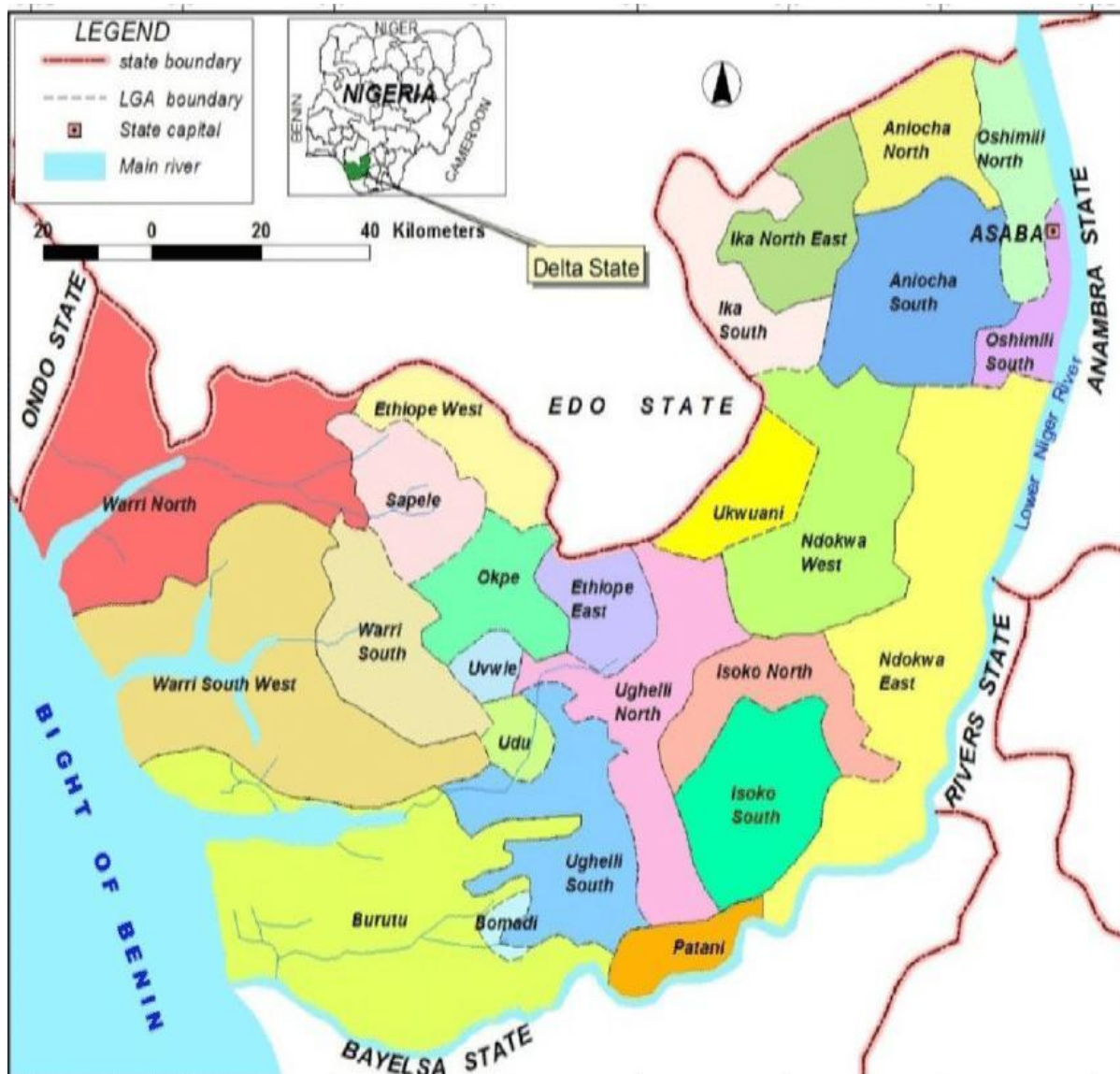
Study Design: The study was designed to be observational

Study Duration: January 2019 to November 2019.

Sample size:

Subjects & selection method: The study population was drawn from five local government areas of Delta State.

Inclusion criteria: Fasting triglycerides ≥ 150.56 mg/dl, obtained within 1 week before the first use of statins which was then compared at first- and second-year intervals.



(Source: Akpoborie *et al.*,⁸)

2.2.1. Methodology

Questionnaires were distributed to selected residents near oil producing companies and some staff working for Nigerian Petroleum Development Company (NPDC). The questionnaires were distributed to three hundred and ninety-nine (399) members of the 10 communities sampled as indicated on the sample size frame with inclusion of 20 members of staff present in the field at the time of field work. Information on respondents' demographical details on the inhabitants of oil producing areas of Delta State were collected. These included their sex, age, highest level of education, marital status and occupation. Others included their specific roles, responsibilities and their perception of their environments. This helped to determine the driving factors towards gas flaring and its impacts, as well as the socio-economic and environmental impact of gas flaring in the areas. The residents of Delta State of Nigeria were the target of the study conducted due to its association with the activities of gas flaring from oil producing companies. Among the five local government areas in Delta State of Nigeria, where the communities, oil and gas facilities reside, 10 communities are situated in the region referred to as oil producing areas.

III. Results

Figure 1 shows respondents on environmental pollution due to gas flaring activities in oil producing communities using questionnaire. 46.0% of the respondents indicated always that environmental pollution due to gas flaring activities affect the communities. 23.0% of the respondents indicated sometimes that environmental pollution from gas flaring affect the communities. 19.0% of the respondents indicated often, 9.0% indicated never, while 3.0% of the respondents indicated rarely on the effects of environmental pollution due to gas flaring.

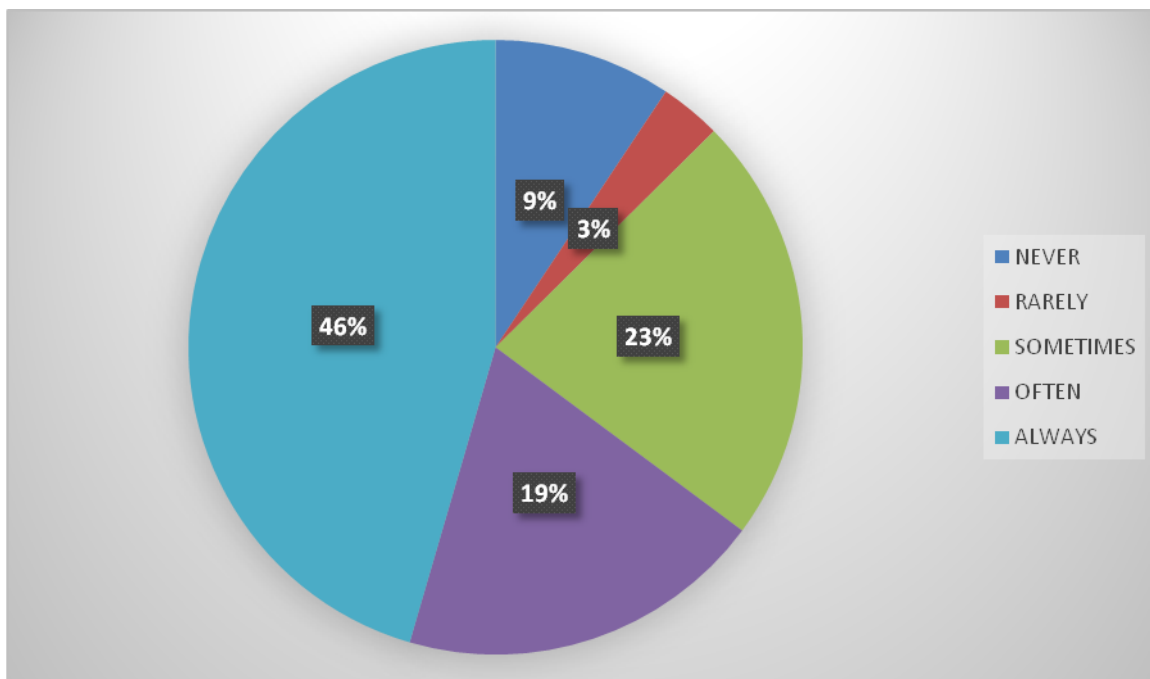


Fig. 1: Results of respondents on environmental pollution from gas flaring activities in oil producing communities.

Figure 2 shows community experience on air pollution due to gas flaring from oil producing companies using questionnaire. 49.0% of the respondents indicated always that gas flaring lead to air pollution. 18.0% of the respondents indicated sometimes that it has high effect on air quality, 14.0% indicated often, 16.0% indicated never while 3.0% of the respondents indicated rarely that the effect is low or not much.

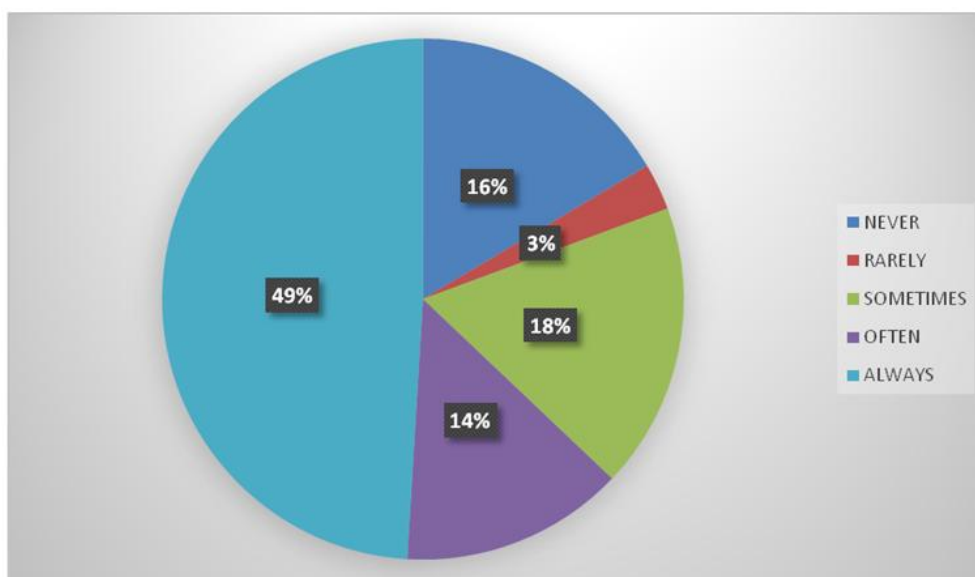


Fig. 2: Results of community experience on air pollution from gas Flaring communities

Figure 3 shows how the activities of gas flaring affect the environment in the course of their operations using questionnaire. 64.0% of the respondents extremely attested to the fact that gas flaring negatively affects the environment in the course of their operations. 17.0% of the respondents moderately attested the negative impact of gas flaring, 10.0% attested neutral, 5.0% attested slightly, while 4.0% of the respondents attested not at all on the fact above.

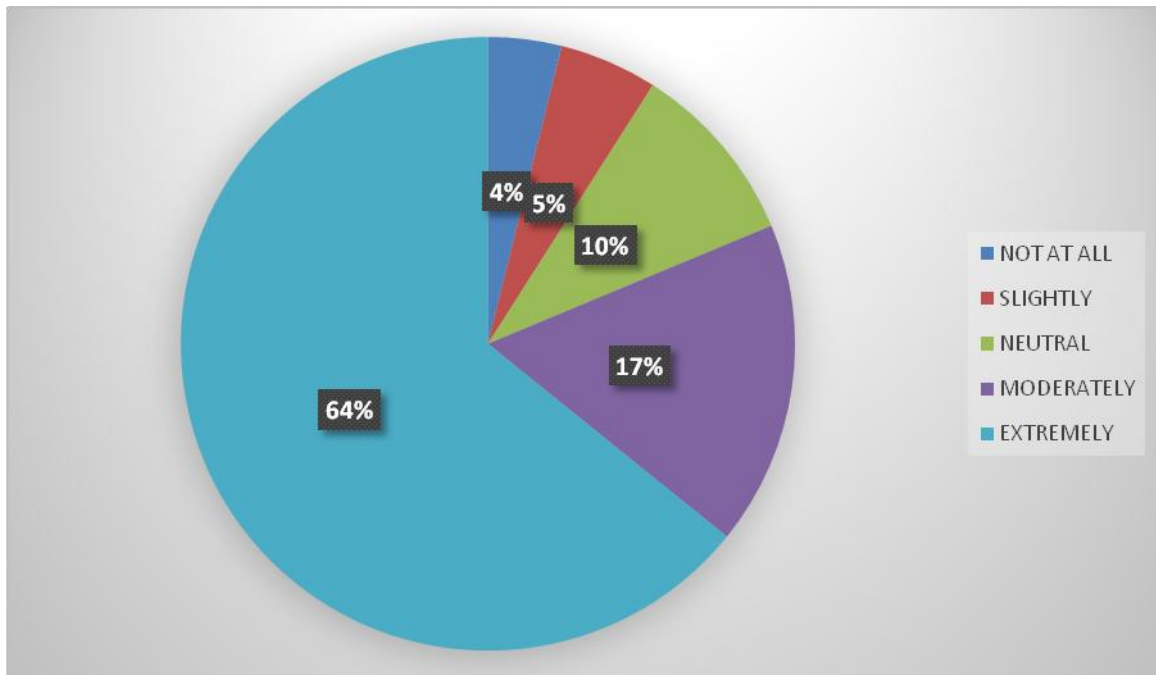


Fig. 3: Results of respondents on whether the activities of gas flaring affect the communities in any way.

Figure 4 shows whether the oil producing companies are making efforts on improving air quality by reducing gas flaring in the environment using questionnaire. Sixty five percent (65.0%) of the respondents indicated never that oil producing companies are not proffering solution to pollution due to gas flaring after monitoring the environment, 17.0% indicated sometimes that the companies are proffering solution, 12.0% indicated rarely, 4.0% indicated often, while 2.0% indicated always that the companies are proffering solution to pollution after monitoring.

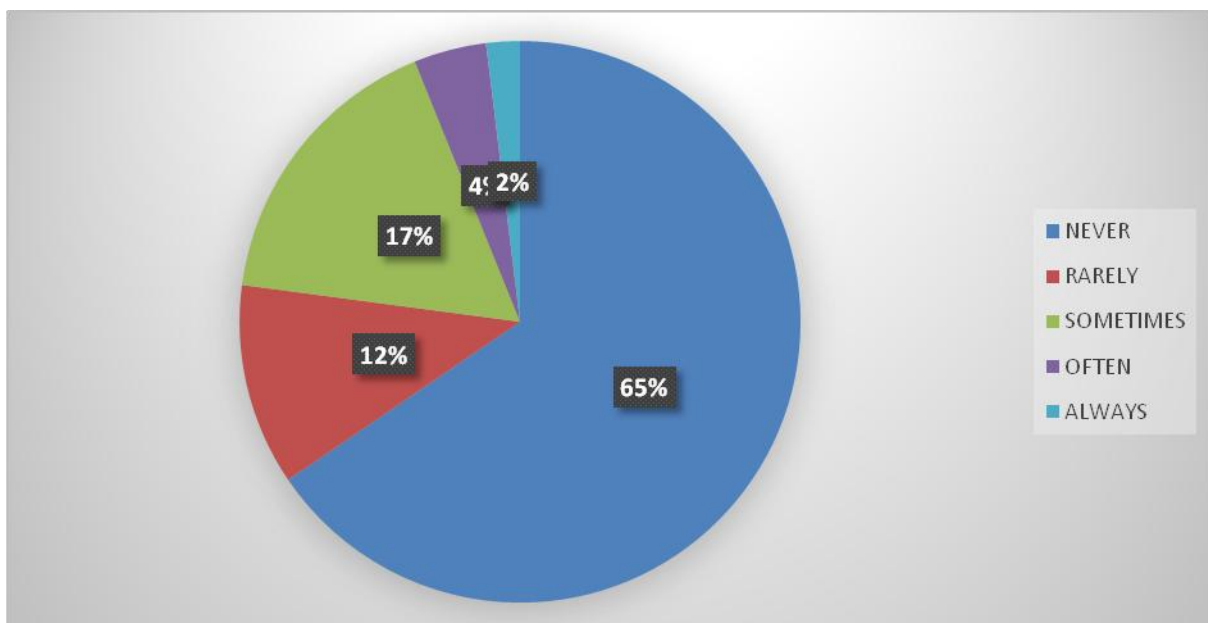


Fig. 4: Results of whether the oil producing companies are making efforts on improving air quality by reducing gas flaring.

IV. Discussion

This study so far investigated the effect of gas flaring on the environment of oil producing areas of delta state, Nigeria. The findings from the study revealed that gas flaring has impacted negatively on the environment, air quality and improper management of gas flaring by oil producing companies with high percentage of respondents attesting to this. This agrees with similar work of Nwaichi and Uzazobona,¹¹. These impacts are felt much on environmental pollution, air quality and improper management etc. Some of the general effects of the gas flaring as observed within Niger Delta include poor air quality as it is linked to premature death, cancer, and long-term damage to respiratory and cardiovascular systems.

Deterioration in air quality have been linked to emissions from oil and natural gas production and other industrial activities.¹² Emissions from oil and gas extraction are sources of air pollutants and showed that aerosols are significant sources of pollutants. The devastating effect on the environment and stakeholders has been recognized and identified in other research such as Aigbedion and Iyayi,¹³. The health and safety implications of gas flaring in Nigeria have been revealed.¹⁴

V. Conclusion

Gas flaring activity in oil producing areas in Delta State of Nigeria with all its economic benefits in terms of financial enumeration to residents of gas flaring communities and source of revenue to the government has resulted to environmental degradation, air pollution and water pollution in the areas. Gas flaring therefore impacted negatively on the communities and environment around the oil producing areas.

VI. Recommendations

Finally, Environmental Law Enforcement Agencies, especially Department of Petroleum Resources (DPR) should be more involved in enforcing all existing environmental laws on gas flaring so as to ensure the well-being of the host communities. Hazards associated with environmental pollution can be controlled by having information about the concentration with management practice taken into consideration.

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