

PUBLIC PERCEPTION OF ARTESANAL REFINERY IMPACT ON AIR QUALITY IN PORT HARCOURT, NIGERIA.

HYGINUS B. OKU

**Department of Geography and Environmental Studies
Ignatius Ajuru University of Education
Port Harcourt**

And

NUMOIPRE INAINFE

**Department of Geography and Environmental Studies
Ignatius Ajuru University of Education
Port Harcourt**

Abstract

The paper public perception of artisanal refinery impact on air quality in Port Harcourt has the objective of eliciting vital information on the public perception of observed black soot on air quality index in the municipality. Hence structured questionnaire was administered to the respondents. Over 90% of the respondents are of the view that the high prevalence of black soot in the Port Harcourt municipal area was the product of artisanal refineries located offshore and this has impact on air quality and health of residents. The authors thus include that air quality index could be enhanced through the total stoppage of the economic sabotage occasioned by artisanal refining of crude petroleum. Hence recommend the active involvement of enforcement agencies to tame this ugly development. Similarly, advocate the reorganization of all stakeholders with the intent of implementing modular refineries to tame as well as to ensure that the raw material for this illicit business is not available.

Keywords: black soot crude oil, artisanal, refineries.

Introduction

Ecology is a critical component of all human activities and the sophistication of energy development explain the complex nature of the art of technology that has been brought into the energy mix of nation states (Oku, 2016). In essence, technological issues in energy generation and distribution including use reflect the socio-economic transformation which such society has been exposed to or has taken place. Societies right from the prehistoric to the modern pursue one form of energy development or the other for its sustenance. For instance, the primitive man sustain himself around the discovery of fire, the 18th century industrial revolution was sustained around coal fields. Today, the energy mix of fossil, coal, nuclear, solar, biofuels and hydro among others have combined to provide as well as drive societal needs and aspirations.

However, most of the above form or means of generating power to meet societal needs have its environmental consequences. These range from water, soil and air quality implications which advertently or inadvertently affect the ambient environment of its operations and could be transported several tens of hundreds of kilometers especially air borne or discharges into streams or water bodies (Oku, 2016). This was also echoed in the work of Omorogbe (2001) who noted that spills from bunkering and illegal refineries contributed to ecological devastation. This means that ecological quality is being impacted by the diverse activities in the

energy chain process. Akue (2017) acknowledging the writings of Wiwa (1993) observed that the struggle for economic survival in the midst of growing product scarcity and unreliable national grid provoke traditional skills in the establishment of the artisanal refineries whose ecological mandate of a stricken environment is with us today.

The United Nations Environment Programme (UNEP, 2011) report noted that in the ground tank where crude is tipped into fire also result to seeps into the soil which have vital impact on ground water. This means that the processes of artisanal refinery of crude oil have in its wake enormous column of black smoke emanating from the process. Hence, UNEP (2011) noted the emergence of arc-plumes of smoke during the illicit artisanal crude oil refining. The evolving plume of smoke is released into the earth lower atmosphere or ambient environment which culminate into serious air quality problems.

It should be noted however that depending on the wind direction as well as the proximity to the nearest settlement the toxic air quality index could vary widely from one location to the other as well as the time of the observation. This means that niche variations exist across various locations and the particular time of the day. Discussions on air quality index in the literature shows the high degree of variability of parameters of measurements temporally and spatially.

Ubong (2010) noted the poor ambient air quality in the Ogoni land area. This was attributed to the diverse offshore artisanal refineries around the area. The effort was transported by the prevailing onshore tropical maritime land wind which was also known as the south west trade wind (Oku, 2016). This means that any prevailing wind system becomes to distributor of arc plumes of smoke emanating from any source factor. The role of the wind system in the extent of poor air quality index has been observed by Akpoan (2009), Nelson (2010), UNEP (2011) and Oku (2016) in their separate observations of wind direction and distribution of particulate matter in that air. In essence, the role of prevail in wind in the extent of pollutant impact were well documented after due diligence on the source and transporting scenarios.

Nelson (2010) and World Health Organization (WHO, 2009) differently reported the impact of black soot on health. They noted that it could be disastrous to human living and resulting to death as well as severity of various air borne infections. We are daily exposed to the dangers of black soot because we inadvertently breathe in the air whether its quality is bad or not. Humans are not in control and could not screen what is being breathe in or not. Oku (2016) observed that there is no environmental supermarkets to choose which air quality you prefer. In essence, what the environmental activities produce and remit to the air is only what is available for intake. Hence, Chio (2016) noted that black soot has a significant damaging effect as it affect several cells of the human body causing its devastating impact of poor air quality on respiratory diseases.

Yasa, Amer, Rosen, Hensen and Novakor (2009) observed that about 4% of global death could be attributed to poor air quality is a major source for global death rate. This position was also corroborated by the report of the world health organization (WHO, 2009) that about 640,000 to 4,900,000 human deaths are preventable if the air quality globally is enhanced. The figure is alarming though a conservative estimate when compared to the place of human industrial and domestic sources of emissions which contributes to poor air quality. Studies have shown that black soot particulate matter is carcinogenous which have capacity to destroy cells and cause death (UNEP, 2011; WHO, 2009 and Bhatia. 2001). In essence, the impact of black

soot and other types of effluent into the ambient environment on man have been a thing of great concern

Nevertheless, despite the global or regional understanding that human activities affect air quality and the recent emergence of significant documentation of the public perception of artisanal refinery on the impact on air quality in the area. Arising from the above the researchers have put forward the following questions.

- Does artisanal refinery of crude oil contribute to black soot in the city of Port Harcourt?
- Will the unfolding air quality impact on public health index of the inhabitants of the city?

Methodology

The paper relied heavily on survey research method through the administration of structured questionnaire as the research instrument. Similarly, the main source of data was primary source elicited by the research instrument. The population of the study area is about 1,837,532 (NPC, 2006) as projected to 2018. However, using the Taro Yameni formula to establish the sample size, a sample size of 400 was taken. This was achieved through the use of the table of random numbers to ensure that all elements of the population have an equal and non-zero chance of being selected.

In other words, the sample random technique was adopted. This technique enable the researchers to eliminate bias in the sample collection procedure.

Table 1: Data Analysis Public Perception of Sources of poor air index in Port Harcourt

Sources	Number	%
Domestic	30	7.5
Burning of tyres/Asphalt plant	70	17.5
Industrial	100	25.0
Artisanal refinery	180	45.0
Others	20	5.0
Total	400	100

It is evident from table 1 above that 7.5% of respondents perceived that the major source of poor air quality index in the area is from domestic sources, 17.5% see the incessant burning of tyres in abattoir and asphalt plant as major sources of poor air quality and black soot. However, 25% of the respondents perceived that the problem is come from the industrial activities in the area, while 45% are of the view that the incessant offshore artisanal refining and oil bunkery activities is the main source of poor air quality. Nevertheless, 5% of the respondents still lay hold to the view that sundry sources contributes to the poor air quality index daily experience in the city of Port Harcourt.

Table 2: Respondents perception of artisanal refining contributing to black soot in Port Harcourt.

Questions used	Yes	No
Does artisanal refining of crude oil contributes to black soot in Port Harcourt.	370 (92.5%)	30 (7.5%)

In putting forward the first research questions to respondents, it is obvious from table 2 that 92.5% of the respondents are of the view that artisanal refining of crude oil contributes to

of black soot experience in the Port Harcourt city. Nevertheless, Paltry 7.5% answer to the contrary.

Table 3: Respondents Perception of Impact of black soot on Health of inhabitant

Questions used	Yes	No
Will the unfolding air quality from black soot impact on public health index in the city of Port Harcourt?	381 (92.25%)	19 (4.75%)

In evaluating the second research question, 95.25% of the respondents are concerned that the black soot in the city will impact on the health index on the residents while an insignificant 4.75% answered to the negative. This means that there exist a greater awareness of the possible impact of the black soot on the health status of the residents of the city of Port Harcourt.

Discussion of findings

From the evaluation of the research questions pose by the study it is evident that 95.25% of the respondents have concerned or are of the view that black soot prevalence in the city will affect human health in the area. This corroborates the UNEP (2011) reports that poor air quality index could be dangerous to health. Similarly, Nelson (2010) and WHO (2009) also reported separately, the impact of particulate matter on air borne disease. This means that poor air quality impact on health status of individuals who breathe in such air. Worthy of note is the fact that we can do little or no thinking individually improve air quality or at various niche before breathing in such air, hence, case should be taken to stop or check the source of air pollution.

However, the first research question shows that 92.5% are of the view that the black soot in the city is coming from our artisanal refinery. UNEP (2011) have earlier warn about the implications of artisanal refineries on air quality of the affected area. Hence the offshore activities with the onshore wind system almost all the year have greatly impacted or become the source of air quality problems in the city.

Conclusion and Recommendations

The paper therefore concluded that air which indispensable in our daily living could be better improved when the sources on affluent affecting air quality are properly checked or monitored with the necessary legislation. This will help check the menace of black soot in the city.

However, the paper made the following recommendations:

- All stakeholders should come with a plan of action to stop all forms of bunkery related activities.
- Government should identify those involved and possible organize them into cooperatives or mergers a view to transform them into legitimate modular refinery models to check air pollution.
- Security agencies saddled with the responsibility of pipeline surveillance should live up to expectation to check the activities of artisanal refinery.

References

- Abua, M.A. (2004). *Comparative Studies of Soil and Casual Degradation of Nigeria Niger Delta Area and Benue Trough*. A Ph.D thesis, University of Ibadan. Unpublished.
- Akpan, L. A. (2009). The Chemistry of Black Carbon: A Synoptic Analysis of Air Pollution in Niger Delta Region. *Nigerian Journal of Oil and Gas Technology*. 2(1), 63-64.
- Alias, M., Hamzah, Z., & Kenn, I. S. (2007). PM₁₀ and Total suspended particulates (TSP) Measurement in various Power Stations. *Malaysian Journal of Analytical Sciences* 11(1); 225-261.
- Ambient Air Quality Guideline (2002). *New Zealand Ministry the Environment report*.
- Bhatia, S.C. (2001). *Environmental Pollution and Control in Chemical Process Industries*. New Delhi, Khana publishers.
- Bond, C., Ramahathan, A. C. & Gilbert, L. (2013). Bonding the Role of Black soot in the Climate System: A Scientific Assessment *Journal of Atmospheric Resources*.
- Butter, S. Ed (2010). *Macquirc Concise Dictionary* (5th edition), Sidney, Australia: Macquirc Dictionary Publisher Ltd,
- Chio, R. (2016). *The Damaging Effect of black Carbon*. Columbia. Earth institute.
- Cwardin, L.M., Carter, V., Golet, F.C. & Ialoe, E.T. (1979). "Classification of wetlands and eep water habitats of the united states". *U.S. Fish and Widelife Serivce Repoprt FWS/OBS-79/31,131P*.
- Davidson. N. D., Cruz. R., Finlayson, C.M. (2003). *Ecosystems and human wellbeing, wetlands and water synthesis: a report of the millennium ecosystem assessment* Washington D.C. World Resources Institute.
- Deekor, D. N. (2004). A Comparative Assessment of Oil Pollution in Gokana and Khana LGAs. *African Journal of Pure and Applied Chemistry*. 3(3), 33-34.
- Enger, M. & Smith D. (2015). *Introduction to Environmental Science: the Study of interrelationship*. New York. Mc Graw Hill.
- Francise, B.S., Shanka, U. (1995). "The Regional Particulate Matter model". *Journal of Geophysical Research*. 100(12) 26291-26209.
- Glaser, B. (2012) Prehistorically Modified soils of Central Arizone Affected by black soot Contamination, *International Journal of National Science* 3(2), PP187-189.
- Johnson, K. (2009). How Carbon Dioxide became a Pollutant. *Journal of Environment Protection and Conservation*. 2(3), pp 62-64.
- Keddy, P. A. (2010). *Wetland Ecology: Principles and Conservation*. New Delhi(2nd Edition). New York. Cambridge University Press.
- Kelley, C.B., James, F.P. (2004). "Thermodynamics of the Formation of Atmospheric Orgnaic Particulate Matter by Accretion Reaction- Part 1. *Atmospheric Environment* 38(26),4371 – 4382.

- Narayanan, P. (2014). *Environmental Pollution Principles, Analysis and Control*. New delhi. CBS Publisher.
- National Ambient Air Quality Standard Report (2005). on *Air Pollutants. Global Up Date*.
- National Population Commission (NPC) (2003). *Rivers State data Sheets*.
- National Population Commission (NPC) (2006). *Nigeria's National Population Census Result*.
- Nelson, G. B. (2010). Black soot Dispersion and its Hearing Effect on Different Albedo Surfaces. *International Journal of Atmospheric Radiation* 3(1). 64-66.
- Oku, H. B.(2016). *The Niger delta environment*, Port Harcourt, Kanissi Books.
- Omorogbe, Y. (2001). *Oil and Gas Law in Nigeria*, Lagos. Malthouse Press Limited.
- Tamuno, N.T. (2006). *Oil Wars in the Niger Delta*. Stiring – Horden Publishers Ltd. Ibadan.
- Ubong, I. (2010). *Ogoniland Environmental Assessment Air Quality Review*. Prepared for UNEP Environmental assessment of Ogoniland.
- UNEP (2011).*Environmental Assessment of Ogoniland*. Nairobi: Kenya.
- WHO Regional Office for Europe (2007). *Health Relevance Particulate matter from various Sources*. Report on a WHO Workshop. Copenhagen.
- World Health Organization Global Health Observation (2012). *Recent Data on Air Quality*.
- World Health Organization Report (2013). *Air pollution Across the World*.
- World Health Organization Report (2014). *Death Related Cases of Air Pollution*. March 25th.
- Yasa, Z., Amer, N.M., Rosen, H., Hensen, A.D. & Novakore, T. (2009). Photo Acoustic Investigations of Urban Aerosol Particles. *International Journal of Atmospheric Physics*. 2(2), pp 6-8.