

Review paper

Black soot and public health of Rumuolumeni residents in Port Harcourt, Nigeria

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ABSTRACT: This work investigates how black soot, a recently discovered form of air pollution in Rumuolumeni, can lead to an increase in public health problems among Rumuolumeni residents. Because the study is qualitative, an extensive review of related works of literature was conducted. According to the literature, artisanal refineries scattered throughout the community marine environment, as well as government regular burning down of artisanal refinery infrastructure, are the primary causes of the phenomenal incidence of black soot. That black soot can exacerbate the area's already-existing public health issues. Based on this, the work recommends that government should license, fund, and turn artisanal refineries into modular refineries which of course should be owned by the people in that community, that residents in the community should take hygiene very seriously and that they should eat fruits that are rich in vitamin C and E among others.

Keywords: Black soot and Public Health

INTRODUCTION

Nations and economies are deeply concerned about public health. First, public health is a metric for determining whether or not an economy is productive. As a result, it is widely assumed that good health is essential for a country's growth and development. It is believed that a healthy labour force contributes significantly to national development. This also supports the assertion that a healthy population rarely misses work due to illness in themselves or family members. As a result, a healthy population is a driving force behind economic growth (World Health Organization) (2000). This prima facie suggest that the economy has a problem when individuals, especially the reproductive elements, are poor in health (Elem, 2015). It is on this basis that public health is taken seriously.

Apart from this, WHO Working Group Report (2002), Nigeria 2009 National Strategic Health, Lucas and Giles (2003), Health Development Plan Framework Development (2010) in Elem (2015) equally observed that good health plays a central role in nations economic

development and it is also a fundamental human right. For health to achieve this in any economy, the environment must play a significant role as the relationship between both cannot be denied. According to Resnik and Portier (2015), both have an impact on each other. The environment is home to a wide range of resources that man uses to sustain his existence. In this sense, clean air, potable water, and nutritious food, and so on are environmental products that can help people live longer lives. Similarly, advances in agriculture, sanitation, and mineral exploitation for human sustenance have devalued the environment over time. Such devaluation has resulted in a social issue. In this scene, unsafe drinking water can cause a variety of infectious diseases like cholera, gastritis, diarrhoea, meningitis, and schistosomiasis. Diarrhoea diseases, according to Peter and Umar (2018), are the leading cause of child mortality in developing countries, and that about 1.8 million children die per annum from this disease. This report confirms or linked the incidence to

the consumption of contaminated water and unhygienic practices in food preparation and disposal of excreta. It is on this basis that environmental issues and public health is taken seriously. In this work, the primary interest here is to establish if 2007 in Rumuolumeni like other environmental problems has generated causing public health problems in the residence.

The Problem

The influence of a polluted environment on public health has been established by different scholars. Munguti (1988) in a study of environmental degradation and disease in Kenya observed that the leading causes of morbidity in Kenya are environmentally based. Kelishadi (2012) in his study of environmental pollution, health effects, and operational implications for pollutants removal equally observed that environmental pollutants have various adverse health effects on man. Marchwinska-Wyrwal, Oziubanek, Hajok, Rusin, M, Oleksiuk, and Kubasiak, (2011) also affirm that such relationship exists. For these scholars, air pollution exist and air pollution is a major cause of environmental health problem and that it caused about two million premature death globally.

In Port Harcourt and the Niger Delta where Rumuolumeni is, environmental degradation is evident as the city and the region host all the oil activities, which often time degrade the environment. Such degradation takes inform of oil spill and gas flaring. Over the years, a new dimension to this emerged due to (air pollution) which is a product of rising cases of artisanal refineries which over time produced black soot. The operators of these artisanal refineries rely on oil theft (Goodnews and Wordu, 2019). To curb this, the government set up Joint Military Taskforce (JTF) to monitor the activities of these operators. As it stands, illegal refineries are virtually in all coastal communities. The taskforce operation technique is to set these refineries on fire because the business is scattered everywhere, everyday, artisanal refineries are set on fire.

According to the Vanguard Newspaper of July 11, 2014 claims that JTF destroyed 110 illegal refineries. This, according to JTF, excludes 3,872 surface tanks used by operators of artisanal refineries, 191 barges, 13,129 drums 785 wooden Cargo boats, 13,343 Jerry cans belonging to illegal oil business operators. Of great interest here is that as soon as the disruptions are made, the operators re-erect new ones (Sweet crude report, 2018). So the scenario is that of erect, destroy and re-erect. As this circle is maintained, so black smoke is emitted.

According to Kalagbor, Orji and Ekpete (2019), in their study of exposure to heavy metals in soot sample, and carrier risk assessment in Port Harcourt, Nigeria reveal that soot problem does exist in Rumuolumeni and that

the community is one of the communities in Port Harcourt with soot. These scholars' finding, like other scholars findings, reveals that exposure to soot can cause leukaemia, cancer of the liver, oesophagus, lungs and skin cancer. In this work, the scholar informed that the rising incidence of skin and lung cancer is connected to soot air pollution. On this, Akindejoye (2018) Yakubu (2017) and Cho (2016) also established that soot can cause public health problem

Literature Review and Theoretical Framework

Black soot is a type of air pollutant. Its diameter is about 2.5mm. As a pollutant, it comprises a variety of other pollutants like chemical acids, metals, and dust particles. By its nature, it can take the form of a solid, liquid, or gaseous state. Ordinarily, soot is a type of product of burning fossil fuels like oil refining and smokes from vehicles. Given its small particle nature, soot particles are emitted into the air while some others form gas particles that can travel thousands of miles from their source. Over the years, soot has been classified as a threat to public health as public health generally, is concerned with promoting and protecting the health of people and the community where they live, learn, work and play (American Public Health Association, 2020). By this, an incidence that is capable of affecting negatively the safety and well-being or improvement in the health of the people is considered a public health problem.

Niranjan and Thakur (2017), in a study titled "The toxicological mechanisms of environmental soot (black carbon) and carbon black: Focus on oxidation stressed and inflammatory pathways" established that soot and carbon black can constitute public health problem. In their study, it was revealed that soot and carbon black can cause many diseases. That soot, apart from that it is carcinogenic, can also lead to multiple diseases to man. In another study by Parent, Siemiatyck and Renaud (1996) a positive relationship between exposure to TB and lung cancer was established in their risk assessment of population-based soot study in Montreal, Canada. A similar study in Kuwait by Niranjan and Thakur (2017) also revealed that soot particles from the 1991 oil fields of Kuwait induced genetic mutation which is capable of damaging DNA. A recent study by Kalagbor, Orji and Ekpete (2019) titled "exposure to heavy metals in soot samples and cancer risk assessment in Port Harcourt, Nigeria" reaffirms other studies in this. These scholars confirmed that soot causes leukemia, cancer of the liver oesophagus, and skin. The research equally asserts that there is a high incidence of cancer in the area of this study and that its prevalence is related to the presents of soot in the area of their study.

A separate study by Akutu (2018) titled "Health issues to know about soot, preventive measures" revealed that long-time exposure to soot can cause pneumonias.

That this pneumonia makes patients prone to other respiratory diseases like asthma. Like other scholars, the proceedings of the National Academy of Science study in 2019 reaffirm other scholars' findings on the part of soot in public health. The findings from the study revealed that soot caused an estimated 131,000 premature deaths in Latino city of America in 2015. Nwachukwu, Chukwuocha and Igbudu (2012) in their study titled "the effects of air pollution on diseases of people of Rivers State, Nigeria" discovered that the pollution level in Rivers State is high. That it is higher than the World Health Organization standard and that is the cause of high morbidities and mortalities in Rivers State. The research reveals that cerebrospinal meningitis (CSM), chronic bronchitis, measles, pertussis, pulmonary tuberculosis, pneumonia, and hyper respiratory tract infection were the most prevalent in the years the study took. Nwachukwu et al. (2012) concluded that pneumonia accounts for the highest number of deaths in 2015.

Weli and Adekunle (2014) in a study of environmental risk factors and hospital-based cancers in two Nigerian cities established a close relationship between air pollution including soot with morbidities like respiratory diseases, traumatic skin, outgrowth and respiratory health condition, child deformities, stillbirth, miscarriage. Observing further Yakubu (2017), claim that findings from different studies relate adverse health problems like eye and skin disorders with people who are frequently exposed to polluted air. Yakubu even Humanist Eco-Marxists like Clark have also established a similar relationship between man and nature. This theory specifically claims that man and nature are in an interdependence relationship. This sentiment of the close affinity between nature and man is further emphasized by Riff theory which sees the relationship as dynamic and that the dynamics are between humans and non-humans in the natural world which for them are distinct entities, but are united within one metabolic system.

claimed that lung cancer and skin cancers are not only prevalent but higher in Port Harcourt than Ibadan. To establish the seriousness of the problem, Yakubu explains that inhaled soot penetrates deep into human lungs, thus affects health chances including acute bronchitis, aggravated asthma among children, heart attack, strokes and consequently premature death, developmental challenges, and reproductive disorders. This research finding corroborates Peel, Tolbert, Klein, Metzger, Flanders, Knox (2015) and Riboli, Bai, and Merisi (1983) findings on ambient air pollution and respiratory emergency department visit. In this work, these scholars discovered that patients with existing hypertension cases and are exposed to soot do experience a high risk of visiting the emergency department for dysrhythmias and congestive heart failure.

Theoretically, several theories exist in this regard. Gibson's ecological psychology theory, a derivation of general ecological theory views organism and

environment as inseparable pair. The critical feature of Gibson's conception of the pair between organism and environment is that the environment and the individual interacts and influence each other. That is, the action of an individual influences the environment and is influenced in return by the other, the environment, so both are in an inseparable relationship and a part of a greater whole.

Arising from this, an applied ecological theory strengthened the affinity between organisms and the environment further. Among its core assumptions is that human being like other organisms is parts of the web of life which induce both to interrelated and interdependent contacts. Human being depends on the environment and its resources. That is, both enjoy mutual influences. The striking thing in this ecological theory is that one thing (whether negative or positive) which occurs in this mutual influence between organism and the environment, produces an equivalent event on the other. When the individual in the environment, for example, abuses the environment when he exploits the resources endowed in the environment, such abuse produces negative consequences on man.

Similarly, Marxian ecological theorist like O'Connor provides an understanding of this relationship but anchor more on the capitalist quest for materialism which has resulted in providing adverse ecological consequences that threaten the stability of nature. Meaning that, capitalism curious desire to provide and gain private materials did not only create ecological in-balance but that this in-balance can cause several problems, including health problems for man.

Eco-socialists like Kovel and Lowy on their part believe that capitalist expansion has resulted in an environmental crisis in its quest or drive to industrialize. Through this, capitalism created ecological in-balance which on its own is causing several problems, health problem inclusive. Demonstrating how capitalism created this, Carter-Roberts (2019) in his study captioned Eco-Marxism: A Ghana case study, revealed that a higher human cost of illegal gold mining in Ghana. Those abandoned mining pits pose risks of collapse and flooding to communities which threaten the life of community members. This scholar further claims that there is also contamination of the environment by mercury and other toxic chemicals of pristine rivers thereby killing aquatic life and causing health problems for those who use the water.

Establishing the direct effects of the environment, precisely air in Niger Delta, Ana (2011) observes that the exposure of populations to a barrage of pollutants and pollution episodes in the Niger Delta area is a valid causal problem of several health problems experienced by the people in Niger Delta. Among the health problems he identified are cancer, skin outgrowths, respiratory disorders, irritation, miscarriages, and deformation of children among others. Deepening this, Ana, Sridhar, and Bamgboye (2009) in their study on environmental risk factors and health outcomes in selected communities of the Niger Delta area Nigeria reveal that there is an increase in lung cancers in Port Harcourt residence and that this is due to the residents' exposure to atmospheric

contamination.

Whyte, Tamuno-Wari, and Kabari (2020) in a survey of the resident perception of the effects of pollution in Rivers State Nigeria, equally confirmed that residents are not just aware of the soot problem, but they claim that soot is the main cause of chronic cough; eye, nose, throat and skin irritation. Feng, Gao, Liao, Zhou, and Wang (2016) in a related study highlight that the absorption of the pollutant into target cells in the human body could harm cellular physiological/biochemical developments. This according to these scholars can result in adverse birth outcomes plus the growth of diabetes mellitus, cardiopulmonary diseases among others.

Experimenting to establish the relationship between air pollution and public health, Yang and Liu (2018) in their study on this in china also establish related or similar negative outcomes of air pollution and public health problem. In this study, the researchers reveal that air pollution poses significant health risks and that the damage to public health further deepens health inequality among the populace of different income levels. The research also adds that air pollution increases the impact of income inequality on health. Based on these, the work concludes that the overall outcome of this, to a reasonable extent, validates the concept of an environment- health- poverty trap.

Conclusion and Recommendation

Black soot exists and it has become a complex environmental problem. The prime source is the artisanal refineries scatter all over Port Harcourt and the area of this study. This act is occasioned by Rumuolumeni marine eco-environment which provides the impetus for illegal oil business due to government failure to meet public demand for petroleum product; a situation that facilitated the relevance of artisanal refinery. Equally important is the frequent sustained burning down of artisanal refineries infrastructure by the government task force on the illegal oil business. The prevalence of soot has degenerated into a real and potential public health problem. However, given its current nature, the government must turn artisanal refineries into modular refineries since they have filled the obvious demand deficit in refining crude oil demand. Where this is done employment issues and income generation which is the driving force for the emergence of the artisanal refinery will be addressed significantly. In the same manner, oil companies should introduce modern best practices like the use of diversity that will dictate vandalism from their office. Through this, crude oil theft which is the main source of supply of operators of artisanal refineries will be reduced. Beyond these, the residence should take hygiene seriously. In this, residence should constantly wash their foods before eating, regularly wash their hands, and regularly dust their homes to remove

accumulated soot deposits. Similarly, their foods should always be covered. Their doors and windows should be closed to cut-off soot that will enter their house. Finally, it is expedient for residence to always eat fruits and vegetable like Avocado, Tomatoes, and Spinach broccoli, Flaxseed, etc. that are rich in vitamin C and E. These foods, it is believed, are not only rich in antioxidants but have anti-inflammatory qualities and can help to clean the body system and counteract the effects of soot in the body.

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