Available on: https://jsshrs.ep-journals.org/ E-ISSN: 3051-3561, P-ISSN: 3051-3553

Journal of Social Science and Human Research Studies

Volume: 02 Issue: 06 June-2026

Bioethical Implications of Bad Waste Management and Pollution: A Study of Black Soot in River State Nigeria

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Published Date: June 06, 2026 **Article DOI: 10.65150/EP-jsshrs/V2E6/2026-07**

ABSTRACT: In our society today, materialism and consumerism abound. Our society lacks the attitude of responsible production and consumption. This has led to the disruption of environment through bad waste management and pollution. A case at hand is the prevalent pollution and consequent inhalation of black soot in many towns of River State of Nigeria and beyond. The soot is as a result of illegal refining of petroleum products, setting ablaze of illegally refined petroleum products by the military and other security agencies, tyre burning, gas flaring, meat roasting with used tyres, asphalt plants, refuse burning, fertilizer companies, etc. With these activities, the sky is often covered with thick dark clouds and the soot particles can literally be seen dropping on the environment. The sad reality is that this has not only limited outdoor life and businesses within the locale, but portends danger for the over five million people that constantly inhale the soot particles. Already, many are coming down with respiratory problems, and no one knows the extent of damages done to the other organs of the body. This paper therefore aims to expose the bioethical implications of bad waste management and pollution on the health of humans within the affected area and beyond. It uses the hermeneutic and analytic methods to expose the long term dangers of exposure to such pollution, as well as highlight the need for bioethical enforcement of the universal ethics of reverence for life and environment.

KEYWORDS: Bioethics, Life, Management, Pollution, Waste

INTRODUCTION

When Potter founded the science of Bioethics about 1970, he emphasized that his reason for this new science is for the survival of human species on the surface of the earth. In our society that is sated with materialism and consumerism, we lack the attitude of responsible production and consumption. This has led to the disruption of environment through bad waste management and pollution. Besides natural hazards, human pollution of the air we breathe, the water we drink and the environment in which we live is the highest threat to human survival in our planet. Many developed nations have started making sincere efforts to improve on healthy environment and the quality of the air they breathe. In 2018, United Kingdom, for instance, embarked on a recycling target of 50% by the year 2020 so as to ensure a healthy environment and clean air. Following the United Nations' Climate Change Conference of the Parties (COP26), held in Glasgow, UK, in 2021,[1] many world nations are brainstorming and finding sustainable solutions to the challenges of climate change and environmental pollution.[2] However, many governments of African nations and their citizens have not still embraced environmental consciousness. Pollution as a result of bad waste management is still the order of the day in the sub-Saharan Africa region.

A case at hand is the prevalent pollution and consequent inhalation of black soot in many towns of River State of Nigeria and beyond. With the black soot, the sky is often covered with thick dark clouds and the soot particles are seen dropping on human beings, cars, clothes, houses, markets, etc., covering all available surfaces. This black dust from hydrocarbon pollution has put a stop to most outdoor activities. Some traders who sell clothes and food stuff can only display their wares at the risk of soot pollution. Health conscious people can no longer stay outside to eat food anymore because of fear of food poisoning from soot particles. People find it difficult to dress on white clothes or other attractive colours for fear of black soot stains. When it rains the colour is dark. The water cannot be used for anything: wash clothes or take bath because it stains whatever it touches.

The most serious and perturbing concern of the black soot pollution is that over five million inhabitants of River State and beyond have been inhaling these particles for more than seven years now. In fact sickness is threatening as soot affects almost all the organs in the body. A report of a technical committee set up by the River State government, states that for over a period of three years, an estimated 500,000 persons have been exposed to the extreme of the prevalent viral infection because their immune system have been compromised as result of breathing black soot.

[1]United Nations Climate Change Conference, Delivering the Glasgow Climate Pact: (COP26), 31 October – 13 November, 2021. ebarchive, nationalarchives.gov.uk.

[2] V. Alikor, The disturbing impact of soot on public health and economy of Port Harcourt, in Business Day, January 6, 2022.

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Another unconfirmed number of persons are suffering from severe kidney, liver and mental problems.[3] There is rapid increase in cancer-related cases. At present, many residents in Port Harcourt, River State are finding it hard to breath and majority have already relocated from the State to other places on account of health challenges. Black soot affects the health and life of people and their environment. Its health implications are enormous. This raises serious bioethical concerns on the potential health/life effects. This work therefore, seeks to highlight the bioethical aspect of this scenario and its health implication especially for people residing in River State, Bayelsa State and other neighbouring towns and cities of Nigeria.

Waste Management and Pollution

Environmental and air pollution began with the first use of fire about 500,000 years ago and escalated with the industrial revolution of the 18th century. This implies that pollution began almost with the history of humanity on earth. Obviously, man's environment is being steadily and increasingly abused and degraded through pollution as a result of poor management of waste. Obi-Okogbuo defined pollution as "the unrestrained and uncontrolled degradation of our environment through the injection into it of pollutants in excess of what can naturally be recycled, broken down, dispersed or stored in harmless form."[4] Air, water and noise pollution are the key components of an environment that has been continually polluted as a result of mismanagement of waste and control measures. Air pollution can be a major problem with landfills and waste burning which produce large amounts of harmful chemicals in the atmosphere.[5] According to Opeyemi T., World Health Organization has confirmed that outdoor air pollution causes about 4.2 million deaths each year across the world. It is a fact that about 99% of the world population is exposed to a high level of air pollution which puts them at the risk for heart diseases, stroke, cancer and other heart threatening medical conditions.[6]

Particulate or atmospheric pollutants have many sources and are of different kinds. There are about 100 known atmospheric pollutants. These include aerosols, fly ashes, smokes from de-carbonate elements, fumes, dust, soot, mists, odors, etc. Today, the major and prevailing atmospheric pollutants are the combustion of fossil fuels: coal, oil and gasoline. These fuels are used by factories, home furnace, power plants and motor vehicles. Recent statistics reveal that about 163 million tones of unwanted gases and tiny particles are dumped into the atmosphere every year.[7] On a general note, the major environmental problems faced in Nigeria and Africa today, are air pollution, water pollution, deforestation, etc. At present, however, Nigeria is confronted with an urgent case scenario of soot pollution in most of her oil producing states.

Black Soot in River State Nigeria

River State and its environs have been struggling with water pollution for a long time now. They hardly drink water from their wells or streams because of its contamination with petrol-like-substance. Still on that, there emerges at present, persistent impure carbon particles known as black soot that is fouling the air, water and the environment.

The deadly black soot pollution started in 2016, in many cities of Port Harcourt (the capital city of River State) and environs. At first the dark particle matters were unknown to the residents. Many thought it was a mysterious or superstitious happenstance. It was later identified in 2017 as black soot emitting from both legal and illegal refining of petroleum products, setting ablaze of illegally refined petroleum products by the military and other security corps. In Nigeria at present, legal means of refining petroleum products produce fumes and soot which cause air and environmental pollution. However, the predicament is that illegal refining of fuel by oil bunkerers and gas flaring has aggravated the situation that soot pollution in River State and environs has become so agonizing.[8] These illegal refining locations are associated with incomplete combustion of the crude oil. The result is that they release carbon monoxide and sulphur in the atmosphere.[9]

The soot particle is so amorphous that its size is about 2.5 microns, which can only been seen with the aid of high-powered microscopic lens. Thus the black soot nuisance is not discriminatory. Unlike the sun and rain that affect those who do not shield themselves, soot filters in through locked doors, closed surfaces into rooms, cars, and offices. There are no safe places from soot in Rivers State and beyond.[10]

A report by the State Ministry of Environment and the Guardian report revealed that artisanal refining takes place in 14 of the 23 local government areas of River State. However, the areas with the highest rise in soot prevalence since the last three years are: Eleme, Oyigbo, Obio/Akpor, Ikwere, Port Harcourt, Ogoni, Ogba Egbema/Ndoni, Asari-Toru, local government areas of the State. Port Harcourt, the once clean and green Garden City of River State has become the metropolis of black soot, thus making River State the worst air-polluted State in Nigeria.[11] The black soot has caused a reduction in the air quality index in River State.

In April 2018, Port Harcourt was rated the worst polluted city in the world with air index of 188, followed by Beijing, China at 182, and Delhi, India at 181. Later, on December 23, 2020, in the Air Visual ranking of Port Harcourt City, the city was recorded as very unhealthy for sensitive groups with an air index of 207.817. This means that sensitive groups must compulsorily wear mask outdoors. The soot is a threat to air quality.

In many ways, the residents pay extra cost because of soot pollution. Many residents in the affected areas have stopped to work especially in the agriculture and fishery sectors. This means they have experienced diminished livelihood. Many parents are worried about their children going to school, playing outside, etc. Port Harcourt and the River State once hospitable garden city has been highly polluted, as such many residents have

[3] P., Ede, Report of Technical Committee of the River State Government, Nigeria, Vanguard News, Editorial, Soot pollution in Rivers, Bayelsa: All hands must be on deck. January 5, 2022.

[4] J. Okogbuo, Modern Science: Threshold and Philosophical problems. (Owerri: Hallmark Digital Image Services), 2015, p. 254ff, in A.C Ibe, The Benefits and Threats of Modern Technicization and Science. *Philosophy and Praxis, Journal of the Association of Philosophy Professionals of Nigeria (APPON)*, Vol. 11. No. 2. 2021. ISSN: 2006, p. 81.

[5] C. Hill, The Consequences of Poor Waste Management. Posted January 16, 2019, Visited May 22, 2023.

[6] T. Opeyemi, Black Soot in Rivers State: 'Government has failed to Protect Citizens' December 22, 2021, NewsNigeria, collected 21/02/2022.

[7] A.C., Ibe, The Benefits and Threats of Modern Technicization and Science…, p. 81.

[8] A. Godwin, Again, Soot spike in River State raises fresh health concerns. Vanguard News, Port Harcourt, 14 January 2021, 4:22 am.

[9] Twitter/govwike, Guardian Report, 2019.

[10] Technical Study Team, the scientific report on hospitalization related to soot. River State, Nigeria, the Guardian Report, April, 2019.

[11]Vanguard News Nigeria, Editorial, Tackling Port Harcourt Air Pollution, January 20, 2022.

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left the area in search of better environment while the remnants are planning to relocate from the entire city if the government fails to resolve the soot issue soonest.

Health Implications of Black Soot in River State Nigeria

Today, like George Floyd of the United States of America, the people of River State, neighbouring Bayelsa State and environs "cannot breathe" due to environmental pollution. A hazardous black amorphous carbon known as soot has completely polluted the entire areas. Soot is a cancerinogenuous chemical, capable of causing a full-blown health crisis and reduction of life expectancy rate of the victims. In fact, inhaling it has resulted to the death of many.[12]

As a result of the soot pollution, health experts have identified respiratory infections, chronic obstructive pulmonary disease, lungs cancer, ischemic heart disease, etc. Analysis of the World Health Organization's (WHO) 24 hrs mean standards shows that citizens within Port Harcourt and other cities of that area are exposed to potential respiratory and cardiovascular health risk due to poor air quality. The Guardian Newspaper carried out a survey in some Primary Healthcare Centres in River State: Okija Street, Mile One Diobu, Port Harcourt, Rumuodumanya and Rumuosi Health Centres, and at the River State Teaching Hospital; citing of files of many patients confirmed that large number of the patients hospitalized in these areas were diagnosed of the respiratory problems mentioned above.[13] Experts believe that air pollution contributes more to disease burden than many other risk factors except malnutrition.[14] This fact is corroborated by the scientific report of a technical study team released in April 2019, which revealed that victims who were hospitalized in River State on account of black soot related problems rose to 22,077 persons.[15] These people received care for soot related conditions at Health Facilities in River State. Other health cases recorded are adverse respiratory conditions to skin and reproductive cases due to black soot. According to the reports, persons who received health care include women, men and children[16]. Some of those children also appeared to have as well cough, catarrh, sore throat, asthma, heart disease. These complications are for the fact that black soot affects almost all organs in the body. The respiratory organ is the highly affected because human beings breathe in soot on the air daily.[17]

Analysis of the pollutant found in the black soot shows heavy concentrated metals in the soot which is capable of causing cancerous and non cancerous diseases, lung diseases, intermittent cough, itching throat and nose, etc. This means that thousands of people in River State of Nigeria and environs are prone to varied types of sicknesses as a result of soot in the atmosphere. On account of these findings, health professionals have predicted that if nothing is done as a matter of emergency to curb soot, many residents of River State might experience chronic respiratory diseases, heart problems and of course increased mortality rate.[18] Further findings revealed that soot contains carcinogenic substances capable of causing problems of reproductive development and infertility and loss of memory after inhalation. Many health experts have also stated that soot could trigger respiratory tract infections like bronchitis and asthma. Soot is capable of causing stroke and heart failure.[19] A baseline quality study conducted between April 18 and 22, 2020 by Prof. Nenibarini et. al., on behalf of some stakeholders and organizations revealed that residents of Port Harcourt were more vulnerable to COVID-19. Although people were already dying from complications of soot infection before the outbreak of the COVID 19 pandemic, however, COVID-19 complicated the situation, such that people with already weak and fragile immunity for the inhalation of soot had the highest hit. This is because their resistance to the pandemic was minimally very low because of earlier exposed respiratory risks. Bonny and Onne areas are typical instances of this prevalence.[20]

The health hazards of soot pollution have become a crisis situation that the Industry Regulator, National Oil Spill Detection and Response (NOSDRA) confirmed the danger of the fast-spreading soot. Thus Peter Idabor, the National Director General of NOSDRA confesses that the soot is an emergency. Our lives are really at risk, children are the most vulnerable as it sits in the lungs.[21]

Consequently, experts have warned that anyone who lives in River State is endangered species. The health hazards of black soot reduce one's lifespan. The lifespan of such people will be almost cut short because of the health hazards in the State. This is worst still because, all the effects do not manifest immediately. According to experts, its long time effects can be after ten years and more before victims of soot will begin to experience respiratory challenges. Black soot is inimical to human health. What smoking does to the lungs is exactly what soot does to the body.[22]

Illegal oil bunkering and refining is blamed for the black soot which is responsible for the rampart cases of cancer. Besides, it is also capable of leading to kidney and liver damages. It could also damage the human eyes, throat and nostrils.[23]

The soot pollution effects are so enormous. It does not only affect human life. The acidic nature of soot depletes the environment and the earth, which in turn affects farming activities as the acid rainfall could potentially impact on crop yield and harvest. Furthermore, the rivers and streams which are sources of water supply for most households within these areas of the State have been polluted. This situation has brought about unclean water, poor sanitation and hygiene for the users. The soot poses a great threat to aquatic lives. This has affected fishing which is a major occupation

[12] M. Eze, The Damage caused by soot in River state, Nigeria, in Democracy Moves. https://www.democracymoves.org/democracy-in-action/the-damage-caused-by-soot-in-river-state-nigeria Visited 12/12/2023 at 10.50pm.
[13] Technical Study Team, the scientific report on hospitalization related to soot…, op. cit.
[14] J.D.V. Sambath, Power, pollution and ethics, in Journal of Healthcare Ethics & Humanities, Vol. 4 (NS), Issue 3, august 28, 2019. DOI:https//doi.org/10.20529/IJME.209.045.
[15] A. Godwin, Again, soot spike in Rivers raises fresh health concern, Guardian, Port Harcourt, 14 January, 2022, 4:22am
[16] Technical Study Team, the scientific report on hospitalization related to soot…, op. cit.
[17] D. Altraide, Expert Committee Report on Black Soot, in The Guardian Report, 2019.
[18] Technical Study Team, the scientific report on hospitalization related to soot…, op. cit.
[19] S. Itode, Heavy air pollution heightens fear of lung disease in Rivers, Feb., 7, 2021, Punch Newspapers, https:/punching.com, visited on 20/07/2023.
[20] A. Godwin, Again, soot spike in Rivers raises fresh health concern…, op. cit. .
[21] P. Idabor, (National Director General of NOSDRA) in Vanguard News Nigeria, Editorial, Tackling Port Harcourt Air Pollution….
[22] A. Godwin, Again, soot spike in Rivers raises fresh health concern…, op. cit.
[23] A. Godwin, Again, soot spike in Rivers raises fresh health concern…, op. cit.

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of most people resident in River State. Soot also damages rooftops of houses of people because of its acidic nature. In addition, carbon dioxide that is released into the atmosphere contributes greatly to climate changes.[24]

Efforts to bring Soot to an End

With the emergence of soot in River State about six years ago, the first immediate action was to draw the government attention on the menace through the State Government of River State. Then on its own, the State government set up expert committee to investigate the composition and recommend solutions. It also shutdown some companies which were noted to be sources of the soot.[25]

During the Coronavirus pandemic all industrial activities of both legal and illegal refining of petroleum products were shutdown. Experience showed that there was reduction of soot particles. On this account, the former River State Governor, Nyesom Wike ordered the immediate shutdown of all illegal oil refining sites in the State. Other moves were the seizure of tyres as well as shutdown of power plants in Ikwere and Obio/Akpor councils for causing air pollution. The State government in turn beckoned on the Federal Government to bring to book all those behind illegal oil bunkering and artisanal crude oil refiners in the State.[26] As a major solution to the soot pollution, the Federal Government and the Government of River State promised to create modular refineries which will integrate the artisanal refiners into cooperatives for formal refining of petroleum products.[27]

As a follow up, many residents of the State and especially the towns affected have organized peaceful demonstrations and match to alert the government and other relevant stakeholders on the menace of soot. There have also been Radio and Television notifications as well as on the social media and newspapers. Also, with operation 'StopTheSoot' Campaign launched in the State, about 300 pages of petitions by the residents of the State have been compiled and sent to the United Nations Environmental Programme, to the World Health Organization, etc. Other efforts made to curb the pandemic include the 2018 Campaign with the common refrain: "Save Rivers from this soot of death".[28]

There are also many law suits against the River State government, the Federal government and other agencies who should have acted to stop the soot but have grossly remained indifferent. Some Civil Organizations have also sued the Federal Government and other government operations in the State for continuous pollution of the environment in the State. One of the organizations that have sued the government is the 'StopTheSoot' Campaign.

Remarking on the lasting solution for the stop of black soot, Altraide stressed that:

> The best solution is to stop all the sources of soot because you cannot stop people from breathing, so prevention from the source is best because soot is associated with heart problems, skin diseases, cough, asthma, catarrh, in fact, it affects all the respiratory organs, it does not spare anyone because all of us breathe the same air, so, there is urgent need to stop the menace from the source, masks cannot stop it from filtering in, the only mask that can help is M95.[29]

The M95 mask is a type of nose mask that filters the air. Many rich politicians have started using it. This type of protection cannot be for all because it is very expensive and still, it has a short lifespan of 30 days only.[30]

This air plague is ravaging human health and life. It as well constitutes a grave threat to other biotic organisms and environment. Governments at all levels and all stakeholders must make sincere efforts to bring it to an end. However laudable their plans, government must factor in the creation of some sort of economic reliance that can guarantee livelihood to the artisanal refiners and at the same time respect environment. Otherwise, all her efforts will be futile and counterproductive.

Furthermore, inscribed in the African Charter is the "Right to clean environment and Nigeria as a signatory to this charter has domesticated the Charter. Nigerian government should therefore rise up to its responsibility. The Nigerian government will be doing a disservice to the nation, if she fails to protect more than five million Nigerians in River State who have been inhaling black soot for more than six years.[31]

Factors Militating Against the Stopping of the Soot

The challenge of soot has lingered so long. Many people believe that Nigeria government could end the source of soot if she could implement the reports of various panels of inquiry she set up herself. Yet this has not been done. Thus people doubt if government has the political will to stop the soot since she has not initiated until now policies, regulations and orders to curb the air pollution.

Another grave obstruction to curb the soot is that some of the government officials involved in eradication of the soot have been identified as owners of illegal refineries. Majority of the staff of federal institutions, military, police and security agencies own and/or have shares in many private and illegal refineries. It is obvious that some of the security agencies and senior staff of Federal government are involved in aiding oil theft.[32] Still at present, people in Nigeria bribe their way with the people who are supposed to maintain law and order in petroleum and maritime sectors.[33] In fact, the unabated and complicated soot menace is as a result of the fact that some security agencies, top government and civil personalities are deeply involved in the illegal deals of petroleum products. These groups of people have often been accused of exacerbating the ugly situation which they were established to eradicate.

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[24] M.L. Bell, J.M., Samet, Air Pollution, in H., Frumkin, editor, Environmental health: from global to local, 2nd ed., (San Francisco CA, by John Wiley & Sons publishers, 2010), pp. 387-415.
[25] Technical Study Team, the scientific report on hospitalization related to soot…, op. cit.
[26] Vanguard News Nigeria, Soot pollution in Rivers, Bayelsa: All hands must be on deck…, op. cit.
[27] Twitter/govwike, the Guardian Report..., 2019.
[28] Vanguard News Nigeria, Soot pollution in Rivers, Bayelsa: All hands must be on deck, Editorial, January 5, 2022.
[29] D. Altraide, Expert Committee Report on Black Soot, in the Guardian Report, 2019.
[30] A. Godwin, Again, soot spike in Rivers raises fresh health concern…, op. cit.
[31] T. Opeyemi, Black Soot in River State: 'Government have failed to Protect Citizens' December 22, 2021, NewsNigeria, collected 21/02/2022.
[32] V. Alikor, The disturbing impact of soot on public health and economy of Port Harcourt…, op. cit.
[33] Vanguard News Nigeria, Editorial, Tackling Port Harcourt Air Pollution, January 20, 2022.

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Furthermore, there is this mindset and an old-age concept that the federal oil sector is an opportunity for self-enrichment. People therefore are known to bribe their way to get posted in this sector. With this mentality, officials posted to help maintain law and order in the petroleum and maritime sectors turn around to join the lawlessness and/or even protect law breakers for selfish gains.

It is alleged that at present in Okrika, Borokiri, Marine base, Nembe waterfronts, etc., there is still bunkering and illegal mining and refining of crude oil going on. Further reports show that men, women and youths are often seen in the cities carrying cans and nylon bags filled with adulterated kerosene for sale. The same situation is recorded with trucks which are steadily packed, waiting to be loaded with adulterated products under the watchful protection of security operatives. This type of activities goes on in the presence of government officials and security corps and no legal actions are taken to stop the imbroglio.

Further reasons for the continued soot menace in Nigeria include the fact that Nigeria still does not have the best practices in the handling of refineries. Nigerian regulatory agencies are still ignorant of the best practices in handling refining facilities (whether legal or not). Nigeria still uses the primitive methods of burning confiscated crude oil and destroying illegal facilities.

Despite the blames heaved on the government and her agencies, there is unrepentant obstinacy on the part of the perpetrators of illegal refineries. Today, there is still the upsurge of many illegal refineries in several parts of the River State. Although many practitioners in this illicit business indicated hunger and hardship as the cause of oil bunkering and illegal refineries, many others see it as a quick source of income and vowed never to desist from it even if the government should empower them in other ways[34]. If the soot menace in Nigeria must stop, the Federal government and her agencies must regulate, enforce and maintain laws and order in this domain.

Bioethical Concern about the Soot Pollution in Nigeria

One major concern of bioethics is the human person and his survival on earth.[35] According to Boethius, a "human person is an individual substance of a rational nature."[36] The implication of this definition points to the ontological nature of the human person, which confers on him an intrinsic dignity that is his right. Consequently, a human person is a moral and rational being who deserves to be respected with dignity. Furthermore, the fact of the individuality of the human person, his uniqueness and irepeatability in nature, corroborates the fact that human life is a fundamental value. Without life man cannot achieve any other good on earth. This implies that great respect, tutelage and responsibility should be accorded to human life at every stage of existence from conception to natural death. Bioethics enforces this universal ethics of reverence for health and life of the human person and his environment. It is on this basis that bioethics calls for the immediate and prompt actions to curb the prevalence of soot in Nigeria. It is perilous to life and health of the human person, to other biotic beings and the environment. Soot pollution as a bioethical issue affects the individual's autonomy, his wellbeing and rights. These core bioethical principles constitute the framework on which issues affecting human person should be considered.

As a social justice responsibility, the curbing of soot pollution in Nigeria calls for a collective collaboration of the citizens and government. Here, therefore, we shall apply the bioethical principles of solidarity and subsidiarity which succinctly capture the required efforts.

Solidarity is a feeling of unity between people who have the same interest, goals, etc. [37] It is "Firm union in sentiment and action". Solidarity entails pulling efforts and resources together for excellence, while at the same time preserving the unique identity of individual members[38]. The human society is a community of free citizens striving for the common welfare of all.[39] Solidarity is a virtue that instills a united humanity in a continuous interaction with one another. Man cannot escape from this real situation. We live in a society and so we are interdependent. Solidarity emphasizes the mutual/common involvement of individuals in the common destiny of each member of the society. This reflects the real meaning of solidarity as "*obligatio in solidium"*. This means that each individual in a given community has juridical and ethical obligation and common responsibility for the welfare of every member of the community

What this requires in practice can succinctly be described as doing unto others as we would wish done unto ourselves, otherwise known as "The Golden Rule" (Cf. Matthew 7:12). Solidarity is exhibited in any shared situation or experience by an in-group, who are practically in the same situation. The members are together in the same situation: good or bad. This could be expressed in the "we" consciousness, which demands, responsible commitment to a common goal by all concerned.

Thus, in the effort to curb soot pollution, the principle of solidarity requires all the residents of the areas affected as in-group to participate actively in any move to curb soot pollution. The in-group here includes all those who propagate this soot pollution through oil bunkering and illegal refineries, because they too expose their lives to danger and harm. They are the first in frontline to show charity and solidarity to the residents around these areas by desisting from actions that cause soot pollution.

Another form of solidarity is the empathetic level, which is rooted in some form of inferred commonality, shared fate or interest. These will include all those who are not in reality directly affected now, but feel the plight of their fellow citizens. In this case one does not necessarily be in the same situation/area but he/she imagines the same for oneself. It is a kind of applying the "Golden Rule" to oneself. In certain cases and as applicable in the soot pollution which respects no boundaries, the problem to be resolved in a particular community may have repercussion on a larger group of people if not attended to. This demonstrates the urgent need of solidarity, openness and mutual cooperation of all and sundry. In this group includes all who sponsor and patronize the activities that create soot. We also enlist here all citizens both far and near, all those who know the perpetrators of the soot pollution, all those who have official responsibility to check abuses with regard to oil bunkering, illegal refining of petroleum products. This is because many who may not be affected today may fall into the same condition themselves, sooner or later. This solidarity is of paramount

[34] A. Godwin, Again, soot spike in Rivers raises fresh health concern…, op. cit. .
[35] V.R. Potter, Bioethics. The Science of survival in "Perspectives in Biology and Medicine", 14 (1), 1970, pp. 127-153.
[36] Boethius, *Liber De Persona et Duabus Naturis, seu contra Eutychen et Nestrorium*, III.
[37] New Webster's Dictionary and Thesaurus, Visited, 08/06/2021
[38] H. Pesch, Solidarism in AKU E., Solidarity, Subsidiarity and Common Good.
[39] R.E Mulcahy, Solidarism, in New Catholic Encyclopedia vol. 13, 1967.

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importance today to curb soot pollution. It is a concern for our neighbour which transcends the confines of national communities and increasingly broadened its horizon to the whole world."[40] Solidarity is extended brotherhood.

The second principle for intervention to curb soot pollution would be subsidiarity which deals with the permissibility of a higher authority (government etc.), to intervene in the affairs of lower authorities or powers. There are basically three forms of such interventions: when the community/individual desires help; when an individual or community's desire is unattainable if left on their own; and when the government foresees a need for common good. This last sphere, even permits governments to intervene in areas that promote common justice and peace whether requested by the individuals or not, but judged by the authority/government as exigent for the common good. A typical example here would be a government policy that will abolish all illegal bunkering and illegal refining of petroleum products, all crude ways of burning down illegal refineries, and install modern means of controlling soot (fumes) from refineries, etc. Here the State can even impose penalty on defaulters. Here again, as subsidy, the government and stakeholders can enunciate programmes to engage the jobless people in a sustainable means of livelihood. This will prevent them from engaging in illegal bunkering and refining. Other examples of this form of subsidiarity would be developmental projects: infrastructures, social amenities, etc., for the common good. The legitimate object of government is to do for a community of people whatever they need to have done but cannot do at all or cannot so well do for themselves in their separate and individual capacities.[41]. Hence, subsidiarity is not just a principle but a "*subsidiarium officium*", that is a legal obligation on the part of the government to be helpful to individuals or associations so that they can have the possibility of survival as persons.[42] As *subsidiarium officium,* individuals and communities have legal right to demand it especially from the government of the people. This is what the residents of River State and environs are demanding from the government of River State and Nigeria in this soot menace. The help demanded here is due to the persons in need for continued survival as humans. The human person is the centre of all collective activities.

Thus in line with these principles, bioethics, and anthropology oblige all, as first need to set up certain principles that safeguard human life based on the richer and deeper vision of the human person as a unique and irepeatable being. This is the request of the people of River State and environs.

CONCLUSION

When we take care of the Earth, the Earth will feed us and when we don't take care of nature, nature cannot take care of us.

One of the most obvious means of environmental degradation is pollution. A thing is right when it tends to preserve the integrity, stability and beauty of humans and other biotic community. It is wrong when it tends otherwise. Actions and products that disrupt lives or the processes that compose life are wrong. Human beings, biotic beings and the environment should not be harmed or destroyed with industrial or technological pollutions.

Bioethics demands that we pay attention to the short and long term environmental consequences as it affects human beings and biotic organisms. It emphasizes the astute use of our technologies for the promotion of the survival of human species and also better the quality of life of future generations[43].

Black soot pollutes the air, water and environment. Pollution by black soot affects mortality, morbidity and people's quality of life so fatally. It must therefore be given serious attention. This means that government should enact policies that address this issue for life and health reasons.

Here therefore, we recall the agreement that after about 60 years of oil exploration in Nigerian River State and environs, there should be the need to re-evaluate the environment and the health status of the residents. While this is yet to be done, the modular refinery (the main solution to curb soot pollution) expected to come on stream in 2021 has also not been realized. Nigeria is expected to implement this plan as it will reduce artisanal and illegal mining and refining of crude oil. This will in turn reduce environmental pollution and degradation. We must learn to avoid harming or injuring (*ahimsa*) the ecosystem when such harm can otherwise be avoided. To do otherwise is not only to harm ourselves but also to degrade and impoverish the Earth in which we all live. Bioethics sets a caveat that in all human actions, our means and ends should not violate the principle of *ahimsa*.

REFERENCES

1) Akinwotu E., Sooty hands and damaged lungs: the toll of Nigeria's illegal refineries in ort Harcourt, the Sun, 29 May 2022 12.43 BST. Last modified on Mon 30 May 2022 05.10 BST
2) Aku, E., Solidarity, Subsidiarity and Common Good: Fundamental Principles for Community and Social Cohesion. Xlibris Corporation, USA, 2011.
3) Alikor, V., The disturbing impact of soot on public health and economy of Port Harcourt, in Business Day, January 6, 2022.
4) Altraide, D., Expert Committee Report on Black Soot, in *The Guardian Report*, 2019.
5) Benedict XVI, *Deus Caritas Est*, no. 30.
6) Boethius, *Liber De Persona et Duabus Naturis, seu contra Eutychen et Nestrorium*, III.
7) Dwyer, J.V.S., Power, pollution and ethics, in Journal of Healthcare Ethics & Humanities, Vol. 4 (NS), Issue 3, August 28, 2019. DOI:https//doi.org/10.20529/IJME.209.045.
8) Ede, P., Report of Technical Committee of the River State Government, Nigeria, Vanguard News, Editorial, Soot pollution in Rivers, Bayelsa: All hands must be on deck. January 5, 2022.

[40] Benedict XVI, *Deus Caritas Est*, no. 30.
[41] O. Von Nell – Breuning, subsidiarity, in AKU E., Solidarity, Subsidiarity and Common Good, op. cit. p. 115.
[42] J., Verstraeten in AKU E., Solidarity, Subsidiarity and Common Good, op. cit.
[43] E. Sgreccia, Manuale di bioetica, Vol. 1, Fondamenti ed etica biomedical, 4th edizione. (Gemelli, Vita e Pensiero, 2007), p. 4.

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9) Eze, M., The Damage caused by soot in River state, Nigeria, in Democracy Moves. https://www.democracymoves.org/democracy-in-action/the-damage-caused-by-soot-in-river-state-nigeria. Visited 12/12/2023 at 10.50pm.
10) Frumkin, H., (editor), Environmental health: from global to local, 2nd ed., (San Francisco CA, by John Wiley & Sons publishers, 2010)
11) Godwin, A., Again, Soot spike in River State raises fresh health concerns. Vanguard News, Port Harcourt, 14 January 2021, 4:22 am.
12) Hill, C., The Consequences of Poor Waste Management. Posted January 16, 2019, Visited May 22, 2023.
13) Ibe, A.C., The Benefits and Threats of Modern Technicization and Science. Philosophy and Praxis, 9235 Journal of the Association of Philosophy Professionals of Nigeria (APPON), Vol. 11. No. 2. 2021. ISSN: 2006.
14) Idabor, P., (National Director General of NOSDRA) in Vanguard News Nigeria, Editorial, Tackling Port Harcourt Air Pollution.
15) Itode, S., Heavy air pollution heightens fear of lung disease in Rivers, Feb., 7, 2021, Punch Newspapers, https:/punching.com, visited on 20/07/2023.
16) Mulcahy, R.E., Solidarism, in New Catholic Encyclopedia vol. 13, 1967.
17) Okogbuo, J., Modern Science: Threshold and Philosophical problems. (Owerri: Hallmark Digital Image Services), 2015.
18) Potter, V.R., Bioethics. The Science of survival in "Perspectives in Biology and Medicine", 14 (1), 1970, pp. 127-153.
19) Sgreccia, E., Manuale di bioetica, Vol. 1, Fondamenti ed etica biomedical, 4th edizione. Gemelli, Vita e Pensiero, 2007.
20) Technical Study Team, the scientific report on hospitalization related to soot. River State, Nigeria, the Guardian Report, April, 2019.
21) Twitter/govwike, Guardian Report, 2019.
22) United Nations Climate Change Conference, Delivering the Glasgow Climate Pact: (COP26), 31 October – 13 November, 2021. ebarchive,nationalarchives.gov.uk.
23) Vanguard News Nigeria, Editorial, Tackling Port Harcourt Air Pollution, January 20, 2022. .
24) Vanguard News Nigeria, Soot pollution in Rivers, Bayelsa: All hands must be on deck, Editorial, January 5, 2022.

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