

DETERMINANTS OF ILLEGAL CRUDE OIL REFINING AND PERCEIVED HEALTH CONSEQUENCES ON THE RESIDENTS OF RIVERS EAST SENATORIAL DISTRICT, RIVERS STATE

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ABSTRACT

RESEARCH ARTICLE

This study investigated the determinants and perceived health consequences of illegal crude oil refining in Rivers East Senatorial District, Nigeria. The study adopted a descriptive cross-sectional design. Eleven objectives, eleven research questions and four hypotheses guided the study. A sample of 393 respondents were drawn using a multistage sampling procedure. Data collection was done using a validated self-structured questionnaire with a Cronbach Alpha reliability coefficient of 0.792. Data analysis was done in SPSS using descriptive statistics (percentage, mean and standard deviation) and inferential statistics (z-test and ANOVA, and Post Hoc Bonferroni). It was found that poverty emerged as the most powerful driver (aggregate $\bar{x} = 3.05 \pm 0.45$), followed by corruption ($\bar{x} = 2.95 \pm 0.50$, high) and lack of knowledge (mean = 2.84 ± 0.49), with easy access to oil pipelines also rated as an important determinant ($\bar{x} = 2.74 \pm 0.51$), while non-implementation of MOUs was perceived as a relatively weak determinant ($\bar{x} = 2.57 \pm 0.53$). Perceived health consequences of ICOR were widely accepted, with an aggregate mean of 3.10 ± 0.40 , especially for risks linked to harmful air pollutants, soot-related immune weakening, respiratory problems, eye symptoms, waterborne diseases and long-term conditions such as cancer and reduced life expectancy. Gender and income had a significant influence on perceived health consequences of illegal crude oil refining ($p < 0.05$) while education and age had not significant effect on perceived health consequences of ICOR ($p > 0.05$). It was recommended among others that security agencies should co-create community patrols and anonymous reporting with youth associations using mapped hotspots, and body worn cameras, to deter sabotage, cut fire risk, and build trust.

KEYWORDS: Determinants of illegal crude oil refining, perceived Health consequences on the residents of Rivers East Senatorial District, Rivers State.

INTRODUCTION

1.1 Background to the Study

The process of breaking down crude oil into its component parts and turning those parts into useful products is called petroleum refining or crude oil refining. This process is necessary to

produce a variety of petroleum products that are used as raw materials in the chemical industry to power automobiles and produce electricity. Producing high-quality petroleum products that satisfy consumer demand and regulatory requirements in an economical and efficient manner is the main objective of crude oil refining. In the US Canada North America and Africa oil production is a significant source of energy jobs and government income. According to (EIA 2024) the development of unconventional crude sources such as the Alberta oil sands and various geologic shale plays has led to a boom in North American crude oil production. mainly the Eagle Ford and Permian fields in Texas and the Bakken fields in North Dakota and Montana. Crude oil production has grown dramatically in recent years both domestically and abroad and this trend is expected to continue. The current estimated total production is 84. daily 31 million barrels (IEA 2024). According to some estimates crude oil production in 2023 will be around 81. 8 million barrels per day but it is anticipated that global petroleum liquid production will increase to 103 million barrels per day by 2024. The biggest oil producer in the world is the United States followed by Saudi Arabia and Russia. IEA for 2024. The industry's need for transportation to transport crude oil from extraction sites to refineries across multiple countries has increased due to the increase in crude production. In addition to offering a variety of transportation options crude oil is a vital source of income for the US. Federal provincial state and tribal governments in Canada. Direct and indirect employment have been significantly impacted by the rise in domestic production of unconventional crude. In contrast to the total employment in the oil and gas industry which represents an absolute change of 164685 million jobs the average annual employment across all industries in the US and other foreign industries increased by four. seventeen out of 128. 6 million to 134 million jobs despite job losses brought on by the recession. Energy Information Agency 2024. Despite the benefits of this industry some people illegally refine crude oil both domestically and internationally. The process of refining stolen crude oil into different petroleum products using rudimentary equipment is known as illegal crude oil refining. Due to the explosive sound produced when oil is used as fuel this simple unconventional method of fractional distillation is known locally in Nigeria as kpo fire. Officials in charge of environmental regulation claim that the soot is the result of years of illicit crude oil refining which has been occurring for many years in many countries. The World Bank (2021) defines air pollution as the quantity of one or more pollutants including dust gas mist odor smoke and vapor. Nigeria's Niger Delta Region is well known for its extensive oil and gas operations. While multinational corporations continue to operate there some local actors have also turned to illicit bunkering and oil theft. In the area oil exploration and refining that is not formally authorized by the government is referred to as bunkering. . Adegbate . 2013. The current laws are being broken by these operators. The majority of people and cooperative organizations take part in the act because it is profitable and a significant source of income for the nation. Despite being illegal and having detrimental effects on peoples health finances and environment it has continued to exist. The underlying causes of motivating factors that lead to the practice of stealing crude oil (also known as oil theft or bunkering) and processing it into usable petroleum products using crude unauthorized methods are known as determinants of illegal crude oil refining. Rivers States ongoing illegal activity is endangered by a number of factors. Adisihi E. says as much. dot. and (2013) Adegbite. (2017) et al. The illegal refining of crude oil also known as oil bunkering is believed to be caused by a variety of factors. The explanations range from plausible to ludicrous. These include a lack of gainful employment poverty ignorance greed contempt for ones own financial survival and the get rich syndrome. Exploding the criminal justice systems loopholes to get around the law in terms of education levels poor governance or institutional structure to checkmate criminals malice bad governance (corruption incompetence) social economic statutes low income accessibility of crude oil pipes resources

for local refining knowledge and skills unemployment/jobless population and poor M. O implementation. Ineffective environmental regulation policies between host communities and oil companies the existence of black markets (both domestically and internationally) for products of illegal crude oil refining corruption (connivance between or among employees of oil companies government officials security agencies and local or community authorities) the get-rich mentality among residents of oil-producing areas frequent oil spills caused by either natural or man-made causes ignorance of the negative health effects of illegal crude oil refining etc. Igbuku (2014) also noted that poverty a mismatch between community and industry expectations corruption unemployment inadequate law enforcement and poor governance are some of the root causes of this evil. He continues by saying that for example high unemployment has produced a large number of idle youth who are easily lured to oil-related crimes. Because the accused is not prosecuted these crimes are perpetuated when there are no effective deterrent measures in place. In a similar vein Mernyi (2014) claimed that despite government efforts oil bunkering and pipeline vandalism continue in Nigeria due to the nations high youth unemployment rate ethnic militias incompetent and dishonest law enforcement and other state actors who are frequently connected to an international syndicate. They also claimed that the lack of political will to address these issues and the vested interests of powerful individuals in the industry are the reasons for this. They felt that because they profit from illicit oil refining Nigerian leaders particularly the political class lacked the political will to stop it. They went on to say that if the leaders are not making money off of this illicit activity either directly or indirectly they must have enacted laws or policies to put an end to it. According to Brock (2012) years of neglect marginalization and underdevelopment of the state by the federal government and the Mountain National Oil Companies (MNCs) that operate there have led to the development of criminal organizations known locally as oil bunkers/illegal refiners in the creeks and along our territorial waters. These groups are skilled at stealing Nigerian crude oil refining it illegally and selling it on the black market across the globe. In a similar vein Vidal (2013) claimed that while some communities in the state freely acknowledge their involvement in oil theft they attribute their behavior to ongoing poverty and pollution. Since we don't have jobs or money we must gather and refine our own oil since the government and oil companies do. . Says a man in the village of Bolo near where and illegal finding was set up. American youth appear to view illicit oil refining as a legitimate industry due to unemployment and poverty. Due to their low income and inability to sustain the high standard of living in the country peoples socioeconomic status has actually forced them into illegal refining. The government did not fully fulfill its domestic debt and obligations. is rapidly expanding. By encouraging oil theft facilitating the transportation of stolen oil and weakening accountability corruption plays a major role in the illegal crude oil industry. Corruption makes it more difficult for the government to deal with these issues by fostering an atmosphere that encourages criminal activity. Because corruption makes poverty and unemployment worse more people are looking for other ways to make money like working in the illicit oil industry. This leads to a vicious cycle in which corruption encourages criminal activity which further hinders economic expansion. Corruption has weakened laws and regulations designed to safeguard the oil industry and deter illegal activity. Examples of this include the governments insurance of licenses and permits to unfit parties its inability to enforce current laws and its incapacity to deal with illegal activity occurring outside of its borders. By establishing a system where the rules of engagement are manipulated and those who profit from illegal activities are protected from accountability corruption essentially serves as a catalyst for the production of illicit crude oil. Act now in 2020. In Nigerian society unemployment has grown to be a serious problem and one of the governments most potent tools for wreaking havoc on the nations youth. Because the government is not doing enough to stop it is a purposeful strategy

to monopolize power which has caused many young people to commit crimes destroyed homes and relationships impeded social and economic development and resulted in socioeconomic and political strangulation (Ojo O. About the S. et al. (2022) Nigerian politicians are certainly aware that no young people would want to be used as sacred cows by them in order to further their self-serving political objectives when jobs are created. Abdurashheed (2018) claims that the unemployment rate among educated people has increased to an unacceptable degree. Eight out of ten recent graduates are unemployed so investing in education is an investment in frustration. Favoritism tribalism social connections and Imummadu are the means by which the extremely few who find employment do so. As a result merit is diminished and mediocrity takes its place. Because of corruption people are hired while they are at home without applying or going to an interview. Sadly those who pass the recruitment and selection process and are eligible for an appointment are turned down because they lack sponsors or godfathers. Unfortunately unfavorable government policies that are in line with high banking interest rates make it harder to find people with the spirit and zeal of entrepreneurship widening the gap between the country's unemployed population and potential social and environmental disaster agents. They claim that a blank mind is perfect for malicious schemes. Man must act to fulfill his immediate needs desires aspirations and ambitions since he must unite his body and soul. To achieve this he must empower himself in the most economical and efficient way possible which means illegally refining crude oil to produce finished meat. The numerous serious illnesses and early deaths brought on by exposure to the hazardous pollutants released during these unregulated operations are among the health effects of illicit crude oil refining. By contaminating the air water and food chain these repercussions impact not only the people engaged in the refining process but also the surrounding communities. Eli and co. (2025). One important though often ignored component of the environmental and socioeconomic problems in the Niger Delta is the detrimental health effects of illicit crude oil refining in Rivers East Senatorial District. Long-term exposure to hazardous chemicals can cause chronic diseases like cancer and cardiovascular disorders and toxic emissions from uncontrolled refining processes can cause serious respiratory issues like asthma and bronchitis. Adelekan and associates 2019. Members of the community experience increased stress anxiety and depression as a result of the environmental degradation that follows. Reproductive and developmental issues are more common in communities near artisanal refineries according to Nwankwo and Ijeoma (2022). Children's developmental delays low birth weights and hormonal disruption have all been connected to prolonged chemical exposure. Due to increased medical expenses and decreased productivity as a result of illness these health problems put a burden on families finances. Additionally as regional ecosystems deteriorate food sources may become contaminated raising the risk of long-term health issues and malnutrition. When taken as a whole these results show how urgently public health programs and legislation are needed to lower chemical exposure and promote safe environmental practices in these communities. The majority of people in Nigeria's Niger Delta Region especially in Rivers State are aware of the detrimental effects illegal crude oil refining has on ones health. The resulting soot and air pollution are often linked to a variety of acute and chronic health issues. Studies carried out in Rivers Mina et al. impacted communities. and Bayelsa State. (2020). found that most locals believe artisanal refining operations pose serious health risks. Despite widespread general awareness specific studies provide in-depth insights into how these perceptions manifest in different demographic groups. Mina as well as others. (2020) found that residents often report specific health issues that are directly linked to the pollution. Common self-reported symptoms include a persistent cough irritation of the eyes nose and throat breathing issues tightness in the chest skin irritation rashes and anxiety about ones own and ones family's health. According to research there is typically no statistically significant difference

between educational attainment and gender in terms of awareness of the effects on human health and the environment. Benson et al. s study. (2022) Despite widespread awareness some people who actively participate in the refining process may be unaware of or undervalue the risks. Perhaps due to a lack of formal risk education specific to the process or economic factors. The researcher chose to use the Rivers East Senatorial District as a case study to look into the causes of illicit crude oil refining and the alleged health effects based on the previously mentioned findings. The majority of people in the various communities participate in this activity as the researcher was fully aware. These will enable the researcher to identify the main reason behind the behavior as well as whether or not community members are aware of the risks associated with their activities and the different health outcomes that could result from them.

Statement of the Problem

In addition to lung cancer cardiovascular diseases and possible systemic toxicity affecting organs like the liver and kidneys residents of the various host communities surrounding the Rivers East Senatorial District have complained about increased risks of headaches dizziness and even death due to exposure to toxic pollutants contaminating the air water and soil. These health issues have been linked to illicit crude oil refining. Because their lungs are still developing children are especially vulnerable. Some host communities in the state are currently experiencing the loss of arable farmland plant cover household and drinking water supplies and human food sources due to exposure to soot and other pollutants that may have caused inflammation in the airways leading to chronic obstructive pulmonary disease (COPD) and bronchial asthma among the various age groups of residents in Rivers East Senatorial District. The health risks connected to the Senatorial districts are of interest to researchers because they want to know what drove them to engage in such illicit activities and whether those risks are connected to the negative health effects of the illicit refining.

Aim and Objectives

The aim of this study is to investigate the determinants and perceived health consequence of illegal crude oil refining in Rivers East Senatorial District. To achieve this aim, the study was guided by the following objectives:

1. to determine if corruption is a determinant of illegal crude oil refining (ICOR) among residents of Rivers East Senatorial District, Nigeria.
2. to ascertain whether easy access to oil pipelines is a determinant of ICOR in Rivers East Senatorial District, Nigeria.
3. to determine if non-implementation of Memoranda of Understanding (MOUs) with host communities is a determinant of ICOR.
4. to determine the perception of the residents on the health consequences of illegal crude oil refining.
5. to determine the perception of the residents on the health consequences of illegal crude oil refining based on gender.
6. to determine the perception of the residents on the health consequences of illegal crude oil refining based on age.

Research Questions

The following seven research questions were answered in the study

1. to what extent is corruption a determinant of illegal crude oil refining (ICOR) among residents of Rivers East Senatorial District, Nigeria?

2. to what extent is easy access to oil pipelines a determinant of ICOR in Rivers East Senatorial District, Nigeria?
3. to what extent is non-implementation of Memoranda of Understanding (MOUs) with host communities a determinant of ICOR?
4. what is the perception of the residents on the health consequences of illegal crude oil refining based on income?
5. what is the perception of the residents on the health consequences of illegal crude oil refining based on gender?
6. what is the perception of the residents on the health consequences of illegal crude oil refining based on age?

Hypotheses

Four hypotheses were tested at 0.05 alpha level

H₀₁: there is no statistically significant difference in the perceived health consequences of illegal crude oil refining among residents of Rivers East Senatorial District based on gender.

H₀₂: there is no statistically significant difference in the perceived health consequences of illegal crude oil refining among residents of Rivers East Senatorial District based on age.

H₀₃: there is no statistically significant difference in the perceived health consequences of illegal crude oil refining among residents of Rivers East Senatorial District based on income.

Literature Review

Concept of Health

Health includes not only the absence of illness or disability but also social mental and physical well-being. The World Health Organization (WHO) defines health as a condition of total physical mental and social well-being rather than just the absence of disease or disability (WHO 2013). Physical health is the body's capacity to operate normally including the absence of disease or injury. It entails maintaining a healthy weight getting enough sleep exercising regularly and quitting harmful behaviors like binge drinking and smoking. Mental health includes both emotional and social psychological well-being. It entails managing life's stressors creating wholesome relationships and discovering life's meaning and purpose. Environmental social and biological factors can affect mental health. Social health is the capacity to establish and preserve deep connections with others. The dynamic multidimensional concept of health includes mental social and physical well-being. To feel like you belong you require opportunities for social interaction and a support system. Social determinants of health lifestyle choices and genetics are some of the factors that affect it. According to WHO in Adam (2017) health is a positive concept that emphasizes social and personal resources in addition to physical abilities. In addition to the actual social and economic context it takes into account a person's traits and actions. The group Huber, rather than, (2011) in Lina (2017) described health as the capacity for self-management and adaptation with situational adaptation being a key element of health. Furthermore a state of total emotional and physical well-being is what Adam (2017) described as health. One historical definition of health is the mental and physical stability that allows a person to adjust to a specific situation at a given time. Two aspects of health are the absence of disease

and the capacity to recover from illness and other health issues. Additionally it should be desired and pursued since good health is necessary for stress management and leading an active long life. In addition to genetics nutrition lifestyle and medical care Bhushan and Tillu (2015) list relationship education a healthy diet physical activity disease screening and coping mechanisms as additional factors that can influence and improve health. Health is another term for a persons total well-being which includes all facets of life. Every person or group has a right to it so it should be given top priority. It is a means of maintaining ones physical mental and social health as well as leading a fulfilling life (Christian 2017). When assessing someones health factors such as employment genetics income behavior health services social environment and physical surroundings can all be taken into account. The degree of exposure to workplace hazards and workplace health-promoting practices determines an individuals health in a particular occupation.

The Concept of Oil Refinery

A variety of useful petroleum products including gasoline diesel and heating oils like kerosene are produced from crude oil in an oil refinery. Refineries are basically the second stage of crude oil production after extraction according to Adam (2022). In the oil and gas industry refinery services are considered downstream. Crude oil is heated to a high temperature in the first stage of the refinery process to separate its various hydrocarbons. According to Adam (2022) an oil refinery is a facility that transforms crude oil into a variety of useful petroleum products including kerosene gasoline and jet fuel. Although many integrated oil companies provide both extraction and refining services refining is categorized as a downstream activity in the oil and gas industry. Transportation fuel production depends heavily on oil refineries. Once separated the crude oil component can be sold to various industries for a variety of purposes. After distillation lubricants can be sent straight to industrial facilities as solids but other products need further refinement before being used. Hundreds of thousands of barrels of crude oil can be processed daily in large refineries. These refineries transform the crude oil into petroleum products that can be used for a variety of commercial purposes including transportation and the production of electricity. They are costly and difficult to operate lawfully because of their high energy consumption and need to adhere to regulations. Legal refineries are situated in carefully planned industrial areas that protect workers and the environment. The industry refers to the production of raw crude as the upstream sector and the refinery process as the downstream sector. The term downstream describes the process of transporting oil to a refinery where it is converted into fuel via the production valve chain. The actual sale of petroleum products to other companies governments or private citizens is another facet of the downstream stage. according to the U. A U-dot. Department of Energy Information (EIA 2017). From a 42-gallon barrel of crude oil S refineries can produce 19–20 gallons of motor gasoline 11–12 gallons of distillate fuel (which is primarily sold as diesel) and 4 gallons of jet fuel. More than twelve other petroleum products are also produced by refineries. The petrochemical sector uses petroleum refinery liquids to make a range of chemicals and polymers. Despite the fact that many of the companies that operate oil refineries have midstream and even upstream production refineries are only downstream operations. Businesses like Exxom (XOM) Shell (RDSA) and Chevron (CVX) can produce oil from exploration to sale thanks to this integrated approach. Because the demand for many petroleum products including gas is price sensitive high prices actually hurt the refining industry. However it becomes more profitable to sell value-added products when oil prices drop. Gasoline diesel heating oil kerosene and liquefied petroleum gas are all made from crude oil a naturally occurring substance (Gideon 2022). Despite being extremely flammable crude oil can be found in large quantities deep within the earth in many different parts of the world. The raw material however has no value. large costly facilities that

manufacture products like diesel and gasoline. are called refineries of oil. Theyve been established. The Niger Delta one of the worlds most biodiverse ecosystems is a major hub for crude oil activity and Nigeria is the sixth-largest exporter of crude oil worldwide. The Niger Delta is home to a vast array of plant and animal species as well as the third-largest mangrove forest in the world. Because of the negative effects of the crude oil industry on the communities surrounding these oil drilling operations and refineries people who depend on farming and fishing have been unemployed for many years due to pollution. When crude oil is extracted from the earth spills may occur that are very detrimental to the environment. Refineries emit dangerous greenhouse gases into the atmosphere in addition to using a lot of water and energy. Even the refining of crude oil can result in solid waste that is challenging to get rid of and clean up. However due to lax regulations and the operation of illicit oil refineries the Niger Delta region is among the most environmentally harmed in the world due to crude oil according to research published by EIA (2020).

Illegal Crude Oil Refining

Crude oil is heated in metal containers to create petroleum products in the illegal refinery process. It disregards all environmental health and safety regulations and can have disastrous outcomes. According to Gideon (2022) illegal oil refining basically involves siphoning off crude oil from pipelines and rerouting it into tanks which are typically located in bushes and forests where it is boiled at high temperatures to produce a variety of petroleum products. Boiling crude residue from illegal oil refining is dumped into rivers disrupting the water cycle and contaminating wildlife habitats. Underneath the cauldron a burner heats the crude oil causing it to evaporate. Petroleum products like diesel and kerosene are formed when the vapor cools. After that the liquid products are packaged for sale and transportation. The distillation process is very risky since the boiler or distillation unit receives constant heat from the burner without temperature or pressure control because hydrocarbons are highly flammable during illicit refining. The unit may overheat due to the continuous heat source which could result in thermal stress and material deformation from temperature fluctuations. A fire could spread quickly if the thermally stressed boiler under pressure bursts and releases its highly flammable contents into the surrounding area. Even though these units should be built to function at a certain temperature the condensation units of illicit refineries are usually water baths with submerged tubes covered in cement blocks. Basic engineering design principles are largely ignored by the artisans who construct the illegal refineries. Its possible that this water cooling baths vapor wont cool down quickly enough to produce the required liquid products. Consequently there would be an increase in both temperature and pressure. If the pressure increases above what the materials can sustain the cooling tube may burst. The highly flammable petroleum vapor products that are released during these explosions are what cause fires. Gideon in 2022. The condensation units must collect the refined liquid products. Vapor may consequently seep into the surrounding areas. Furthermore the collected liquid products may evaporate into the environment due to their volatility if they are not sufficiently contained. A catastrophic explosion could result from worker actions like smoking and sparks from metal moving parts that ignite escaped uncondensed products and vaporized condensed liquid products that saturate the surrounding area. Artisanal refineries are not designed to avoid fire hazards and do not have safety procedures to handle leaks along the process line.

Historical Background of Illegal Refining of Crude Oil

The illegal bunkering practice in Nigeria seems to have begun in the late 1970s. Theft of refined petroleum products accounted for the majority of bunkering cases at first but by the

early 1980s there was a rise in illegal crude oil bunkering. Illegal refining has increased in the last few years. The techniques are based on the centuries-old Niger Delta swamp distillation process which ferments palm wine to create regional gin according to Naanan and Tolani (2014). In order to supply the now-defunct state of Biafra with energy the process was employed in late 1960 to convert crude oil into low-quality fuels (Naanan and Tolani 2014). The industry was temporarily put on hold following Biafras collapse due to the low cost of fuel. Due to Nigerias growing deregulation which raised fuel prices and caused shortages in the Niger Deltas hand-to-reach communities artisanal refining was revived in 2004 (Naanan and Tolani 2014). Recent research indicates that the new wave of artisanal refining began in the Tuomo community in the Delta States Burutu Local Government Area. According to Naanan and Tolani (2014) it later spread to other areas of the Niger Delta including the Port Harcourt study area. It may not be accurate to attribute the revival and commercialization to a specific community because most Niger Delta communities are familiar with the artisanal Niger Delta distilling technique. However the market opportunity created by rising fuel prices and scarcity in hand-to-reach Delta communities may have encouraged artisanal refining in a number of places (Naanan and Tolani 2014). Despite the fact that the board and distant socioeconomic roots of artisanal refining are inextricably linked to the countrys overall economic social and political conditions two groups of people who steal and refine oil for the domestic market experience varying degrees of unemployment and poverty. Large corporations that sell stolen oil on international markets are by no means poor. Capital accumulation according to Naanan and Tolani (2014) is their primary motivator. They are able to secure the financial and political resources required to protect the business in a risky global illegal trade. Making money is their goal in the industry. Over 26000 people were thought to be directly or indirectly involved in the regions illegal refining and bunkering economy as of 2014 making local actors far more numerous than foreign ones. Yakubu (2017) and Naanan and Tolani (2014) claim that in 2022 the number of local companies operating in the Niger Delta and senior military officers engaged in the illegal refining industry doubled. In order to prevent theft and illicit refining bunkering senior military officers are assigned to guard crude oil pipelines in the Niger Delta. Additionally they are crucial to the artisanal refining sector. Due to the aforementioned issues illegal bunkering artisanal refining and oil theft were common among the residents of the oil-bearing communities. According to Naanan and Tolani (2014) people who feel they have been totally left out of the advantages or earnings from crude oil have filed lawsuits to make sure they get a fair portion of the profits.

Adduced Determinant of Illegal Refinery.

The primary drivers of illegal refining and oil theft are unemployment and poverty. About one-third of Nigerians do not have a job. Some of these factors include the practice of illicit crude oil refining and the long-standing dissatisfaction of local communities with foreign oil companies that profit from the exploitation of natural resources without investing in the communities that bear the consequences. first. corruption as well as poor leadership. The illegal oil industry in Nigeria is well-known. The state-owned oil company (NNPC) is thought to be among the most politicized and traded-off businesses in the country's oil industry according to Katsouris and Sayne (2013). Although Nigeria's oil-producing states of Bayelsa Rivers Akwa Ibom and Delta may have higher planned livelihoods per capita than the smaller West African nations a significant amount of the nations oil revenue—typically 13 percent—is embezzled or transferred to far-off foreign countries. Over the past 60 years the well-known Trans Niger pipeline in Nigeria's Niger Delta region has carried more than 150000 barrels of crude oil every day from wells in the various smaller terminals to the massive oil terminal in Bonny via creeks and the impoverished villages of Ogoniland and

Ogu-Bolo (Albert Amaratunga and Haigh 2019). This old pipeline which is reportedly rusting and has some spring leaks is among the most damaged pipelines in the world today. According to reports when contractors from oil companies repair particular pipeline sections illegal taps are usually removed from the Trans-Niger pipeline (Albert Amaratunga and Haigh 2019). In the meantime another group is seen setting up machinery that enables enormous volumes of oil to be siphoned directly into big barges where it will be transported to tankers that are ready to sail to the US and Europe. Oil theft in the Niger Delta especially in Rivers State is believed to have been made possible by military and government cooperation. It is impossible to steal crude oil without the governments protection because illegal oil refinery (bunkering) in Nigeria has been regarded as organized crime in a number of literary works (Katsouris and Sayne 2013). Once, poverty and joblessness. Because of the governments and oil companies total disregard the people of Rivers State have been living in extreme poverty and want for years despite the abundance of resources on their land. These conditions have given rise to opportunities for willful misconduct and general discontent. In the 2000s activists from Rivers State and the governors of the oil-producing states called for a bigger portion of the countrys oil wealth. The main agricultural activities of the residents of Rivers State were crop cultivation fishing and animal husbandry. The pre-colonial population was extremely wealthy due to the regions frequent exports of agricultural products like cassava and palm oil. Sixty years after petroleum was discovered in 1958 numerous oil spills gas flaring and forest fires have destroyed the rivers for fishing the natural forest for hunting wild animals and the farmlands that could be used for crop cultivation. Aimeh and Bodo (2019) claim that this has led to dead rivers and arid areas. Due to the lack of rivers and land for agriculture which was the peoples main source of income they now need alternative means of subsistence which has led to unemployment and a scarcity of agricultural products. In the fight for survival the only practical and sustainable solution is to tap or destroy the oil pipeline. #3. marginalization and ignorance. Despite the lack of basic social amenities in the area residents of the Niger Delta especially those in Rivers State have claimed that the regions income has allowed Lagos and Abuja to develop from rural settlements to megacities (Bodo 2019). Some of the worlds poorest people live in the villages in the Rivers State where oil exploration is occurring because of the widespread destruction of the farmlands and rivers (Bodo and David 2018). Over time the Rivers State has unexpectedly become incredibly and irreversibly biologically pulverized due to uncontrolled underground gas and crude oil exploration and misuse. Contaminated water deforestation and the displacement of human habitats due to pipeline construction and oil installation are just a few of the many ecological problems associated with oil that have rendered life in Rivers State intolerable (Paki & Ebiefa 2014). Bodo and David (2018) state that most local communities that are already extremely impoverished are typically traversed by gas and petroleum pipelines. Oil has caused a state of destitution savagery and a dying biological system as evidenced by the destruction of mangroves and salt swamps the loss of wildlife and greenery air pollution corrosive waste from oil and gas handling flaring industrial waste disposal and a few other issues (Bodo 2019). Young people in Rivers State are reportedly more anxious than they have ever been because they are unhappy with their living conditions. However rather than providing a solution youth anxiety has led to the states brutality concealment and savagery (Bodo 2019). In addition to the invasion and destruction of innocent lives and property in the Odi Odima Ayekoroma abaramatu realm minority rights activist Ken Saro-Wiwa and eight other Ogoni were executed as a result of the terrible suffering that the entire Ogoni ethnic nationality went through in the 1990s. (Paki and Ebiefa 2014) Oporoza and several Ogoni villages. It is not surprising that the Niger Delta and the state of Rivers have become a district of deeply rooted disappointment given the knowledge of abuse undervaluation and debilitation. Consequently there are currently more oil disturbances in the region affected by

militants (Paki & Ebiefa 2014). Previous research (Ikporokpo 2006 Okoko and Nna 2007 Ibaba 2005 Bodo & David 2018) indicates that the Nigerian government prioritizes the distribution of oil profits over human rights abuses and the development of the local populace. Multinational oil companies disregard for corporate social responsibility is a clear indication of their administrative carelessness. Every oil-producing community in the Niger Delta/River state is currently under the control of the Nigerian military depriving its citizens of their human rights to life and freedom of movement (Bodo 2019). It is common knowledge that the Rivers State region is currently going through a crisis marked by widespread weakness innocent deaths and property destruction (Bodo 2019). Forty. inadequate organizational framework. The simple and unrestricted operation of illicit oil refining is unrestricted by law. No foreign police or investigators have tried to look into or identify the oil bunkering cartel or their networks and no illegal oil refining (bunkering) kingpin or lord has been arrested locally. Furthermore there are no active international multilateral organizations there. For instance Interpol has confirmed that there have been no criminal complaints of oil theft outside of Nigeria. Nigeria has numerous laws and rules pertaining to the environment and the general welfare of the people but these laws are dormant and incredibly ineffectual especially when the military which is meant to enforce them commits crimes. People believe that the government is helpless and incompetent and that no structure or system can force people to act morally. Because the organizations and laws meant to prevent it are either nonexistent or ineffectual illegal oil bunkering is flourishing as a profitable enterprise in Rivers State. In line with Vector et al. in addition to Adegbite (2013). (2016) The continuous increase in criminal activity in Rivers State is a result of several other factors. These include poverty ignorance greed disdain for the countrys economic survival the get rich syndrome a lack of gainful employment among young people in the area a culture of impunity stemming from the false belief that some people are above the law a weak institutional framework to check corruption incompetence and criminal impurity in the country and cooperation between the government and multinational corporations. Igbuku (2014) states that some of the root causes of this issue include poverty corruption unemployment poor governance ineffective law enforcement and a mismatch between community and industry expectations. He continued by saying that many young people for instance are unemployed and more likely to commit crimes. In the absence of effective deterrents these crimes are further encouraged because the accused is not prosecuted. According to Mernyi (2014) some experts in the oil industry agree that high rates of youth unemployment armed ethnic militias ineffective and corrupt law enforcement agencies and other state actors who are regularly involved in an international syndicate are the reasons behind the ongoing expansion of these illicit oil operations in the Niger Delta. He stated that despite government efforts oil theft and pipeline vandalism continued in Nigeria due to strong corporate interests and a lack of political will. They felt that because Nigerian leaders particularly those in the oil industry and political class profit from illicit oil refining they lacked the political will to stop it. Additionally they argued that if the leaders were not directly or indirectly benefiting from the threat they should have passed laws or policies to end it. According to Brock (2014) the federal government and multinational oil companies (MNCs) that operate in the region have long neglected and underdeveloped the Niger Delta. As a result rings of organized crime groups have emerged in the creeks and along our territorial waters specializing in the illicit refining and transportation of Nigerian crude oil to the black market abroad. These groups are called oil bunkers in the area. In a similar vein Vidal (2013) noted that while some Niger Delta communities freely admit their role in oil theft they blame it on persistent poverty and pollution. Since the government and oil companies are gathering the oil and we don't have any money or jobs we must gather and refine it ourselves. This assertion is made by a man who lives near an illegal refinery in the

village of Bolo. Because of unemployment and poverty young people in the Niger Delta appear to consider illegal oil refining and bunkering as legitimate businesses. that latter. To begin with. Illegal crude oil refining results in seven physical health problems. There are negative health effects from illegal oil refining. This illegal oil refining process involves handling and heating crude oil which contaminates the air. We inhaled. Its unclear how the workers health is impacted by the toxic environment that the camps create. People who live in the areas where these illegal businesses operate are constantly in danger of breathing in harmful gases that can lead to respiratory problems and coughing (UNEP 2021). Many villages were uprooted from their farmlands to make room for pipeline ground support during decades of crude oil extraction and exploitation. In the Niger-Delta Shell reported 1010 spills in 2011 totaling 110535 barrels of crude oil while Agip reported 802 spills in 2014 totaling 26286 barrels (Lawel 2020). Because there are no operational refineries in the Niger Delta local crude oil refining significantly contributes to climate change. In addition to the local refining even though the gas is being flared a significant amount of carbon is released into the atmosphere. They flare the gas rather than converting it for household use. Local refining eventually resulted from this ([https://tribuneonline . com/niger-delta-inside-world-of-crude-oil-theft-artisanal-refiners-2/](https://tribuneonline.com/niger-delta-inside-world-of-crude-oil-theft-artisanal-refiners-2/)). Members of the community are at risk for several health problems due to the illegal refiners operations. Port Harcourt and the surrounding areas have been impacted by the current black soot issues. Black soot a tiny particle that can penetrate the lungs deeply has been connected to several harmful health outcomes in children including acute bronchitis that aggravates asthma heart attacks and potentially fatal strokes.

Physical Health Problems of Illegal Refining of Crude Oil

Pollution that is five micrometers or smaller is referred to as soot. These tiny particles are even smaller than dust and mold measuring about 1/30 the width of a womans hair. It is made up of various airborne pollutants such as dust chemicals acids metals and soils. It can therefore exist in three distinct states: solid liquid and gaseous (aerosols). Our rivers water is now unfit for human consumption due to the horrible local crude oil refining process. Many people developed respiratory tract infections as a result of the toxic gas that was released into the atmosphere. An inflammatory reaction in the lungs is just one of the numerous signs of soot poisoning. Lung epithelial cells react to suit or CB by releasing inflammatory mediators (cytokines and chemokines) that strengthen the immune response. Is black dust harmful? According to Lawal (2020) inhaling carbon black particles can irritate the lungs eyes nose and throat in addition to causing coughing. Women may develop lung blockages from prolonged exposure to high carbon black concentrations. Carcinogenic soots are produced when organic materials like wool fuel oil plastic and household waste are partially burned according to the National Cancer Institute of America. Arsenic cadmium and chromium are among the carcinogens found in soot a fine black or brown powder. Pneumoconiosis a general term for bronchitis brought on by inhaling non-organic dust is the outcome of ongoing carbon exposure. The alveoli that divide these air spaces become lined with objects after extended exposure to grit preventing normal vaporous exchange strength. Patients with pneumoconiosis are susceptible to two respiratory conditions: pneumonia and asthma. Akutu Geraldine May 27 2018 The Guardian. The two most serious health risks associated with carbon black and soots are cancer which is primarily brought on by DNA adducts DNA strand breaking or gene mutation and respiratory toxicity which is caused by an immune response gone wrong that activates mast cells and eosinophils. Heart disease is a component of cardiovascular toxicity. Soot also has a major negative impact on population health. Particulate matter can easily enter your bloodstream and alveoli due to its small size which can have a number of negative effects. Acid rain is associated with particle pollution. When atmospheric moisture mixes with sulfur dioxide and nitrogen oxides two compounds from

soot that react in the air to form haze precipitation carried by the wind or in the water may turn acidic. This acidified pollution deteriorates water quality by raising the acidity of lakes and rivers reducing soil nutrients harming delicate crops and altering the nutrient balance in river basins close to forests and coastlines. Marshall & Weidman (2022). Later on, to start. Eight biological health risks are associated with illegal crude oil refining. In a particular community in the Rivers States Ikwerre Local Government Area approximately 112 illicit refineries were discovered along the OML 17 trunk lines. As a result illegal refineries were economically sabotaged and black soot pollution had negative health effects. (Channel: 2022). Loss of biodiversity and habitat destruction primarily due to topsoil degradation are two of the primary adverse effects of illegal oil production and refining. One of the most prevalent environmental problems in the Niger Delta is soil pollution from crude oil and its byproducts from local refining which is destroying the traditional local economic support systems of farming and fishing grounds. Illegal refining operations eliminate soil-improving organisms fungi and microbes. By forming a layer on top of the topsoil they also deprive the soil of aeration (Douglas 2018). Some of these wastes contain PAHs which are the most common primary hydrocarbons in the crude oil mixture and have been found to be the true oil contaminants, as well as others. In 2020 Ndudi. The biological social and economic facets of human existence as well as the ecosystem are profoundly and widely impacted by illegal oil refining in the Niger Delta (e. g. (g). In the g. Within g. food scarcity nutritional deficiencies environmental refugee migration and loss of customary revenue streams (Efenakpo et al. 2018 was the year. Illegal refineries damage the ecosystem by contaminating the air water soil fish and animals. This could be harmful to human health after consumption. The World Health Organizations (WHO) recommended upper limits for soil heavy metal concentrations have been shown to be exceeded by petroleum and its refined products. According to Akpomrere and Uguru (2020) heavy metals are those that have a high relative density (more than 5g/cm³) in relation to water. Heavy metals continue to accumulate in ecosystems because they are persistent and do not biodegrade. Espin and so forth. (2014) shows that throughout their life cycles plants and animals are constantly exposed to them which can increase toxicity if high dosages are accumulated. Heavy metal pollution is a worldwide environmental concern since soil concentrations of heavy metals have recently increased as a result of human activity. Osuagwu and Olaifa (2018) looked into the impact of oil spills on fish production in the Niger Delta. They claimed that the crude oil leak contaminates commercially valuable fish flesh and jeopardizes fish hatcheries in coastal waters. Additionally they examined how the oil spill affected fish production in Nigerias Niger Delta between 1981 and 2015 using an estimable model based on the Cobb Douglas production function. They emphasized that long-term fish production is negatively impacted by the harmful environmental effects of crude oil exploration. Fishermens means of subsistence are destroyed aquatic life is distorted and a shortage of seafood results from oil production from illicit crude oil ventures (Albert et al. the year 2018. The group Nwankwoala. claim that. Fertile soil is destroyed as are crop yields. 2017 Douglas 2018) making farmers ability to make a living challenging. The quick spread of black soot contributes to air pollution. Onakpohor and additional individuals. 2020 will be the year. Residents of the Niger Deltas are deeply worried about the impact of illicit refineries on the regions aquatic ecosystem due to their experiences with high temperatures contaminated air degraded forests biodiversity loss and contaminated environments. The environment and ecosystem are harmed by these illicit refining operations that burn stolen crude because they seriously contaminate soil water and mangroves. Air quality is impacted by air pollution caused by illegal refining technology. (And additional Onakpohor). in 2020. It is also in charge of releasing liquid and gaseous waste into the environment. Because of pollutants like ammonia (NH₃) nitrogen dioxide (NO₂) and volatile organic compounds (VOCs) which are usually higher than the World

Health Organizations recommended limits the air quality in illegal refining areas and the nearby communities is poor. (2020) Simbi Ideriah Willington. Asthma lung cancer chronic bronchitis chronic obstructive pulmonary disease (COPD) and a number of other chronic lung conditions are made worse in Nigeria by illegal refining pollution. Additionally it causes allergies skin irritation eye irritation and respiratory tract irritation (cough catarrh tearing) (Oyedongha 2021). Inhaling contaminated air drinking contaminated water and eating food contaminated with oil are common causes of this. According to Oyedongha (2021) diseases associated with hydrocarbon and black soot air pollution have the potential to spread to epidemic proportions overwhelming medical staff and facilities and precipitously collapsing the health sector. Shelled and fin fish are frequently found in surface water depending on the habitat. In surface water resources where human interference is frequent fish diversity and abundance are currently declining. Izah and friends, by 2018. The Niger Deltas biodiversity including its wild plants and animals is rapidly declining due to the large illegal oil refinery. Because they contaminate the air water soil and ecosystem these refineries have a negative impact on the local flora and fauna. Animals from contaminated ecosystems suffer from the heavy metals they eat. Gaseous pollution (black soot) from illicit refineries may also have an indirect effect on animals such as birds that depend on attractive plumage coloring for courtship. One of the hazardous compounds that plants absorb is polynuclear aromatic hydrocarbons (PAHs). This effect on plant growth results in a decrease in plant species diversity and abundance. High soil concentrations of heavy metals have a detrimental effect on plants and other living organisms. Because they impede photosynthesis illegal oil refineries have the potential to cause significant harm to the ecosystem. The fragmentation of wildlife habitat may have an impact on the regions beautiful forest landscape and the existence of fauna species that promote ecotourism. Air purification water recycling climate change mitigation and other vital ecosystem services could be disrupted. Additionally impacted are crop production and fishing operations. Oil spills in rivers can have an impact on aquatic organisms ability to survive because they obstruct the flow of oxygen required for crop production. A food shortage could result from this which would affect society. On farmlands crops either die or grow slowly. One of the most important consequences of the illegal waste discharge from refineries is the loss of vegetation which gives both vertebrates and invertebrates food and shelter. Consequences of trees importance to the local water cycle include the fragmentation of wildlife habitat changes to the water cycle and disruption of trees ability to purify the air due to decreased carbon sequestration and worsening climate change. Umechuruba in 2015. Because of the serious damage that artisanal refining has done to the aquatic ecosystem mangrove plants have completely disappeared. Mangroves are home to a wide variety of aquatic and terrestrial flora and fauna including fish reptiles birds mollusks (bivalve oysters) crustaceans and mammals (monkeys antelopes and mantees) (Onyana and Sam 2020).

Biological Health Problems of Illegal Refining of Crude Oil

Illegal crude oil refining has contaminated many intertidal creeks stripping mangroves of their leaves stems and living roots and covering them with a bitumen-like substance that can be up to 1 cm thick. As Ikezam et al. uttered. Waste from illegal refineries that were dumped into rivers in 2021 spread along the upstream and dance stream river courses as a result of tidal effects. A high mortality rate of merchantable trees is indicated by the death of mangrove plants particularly those near the site. Fish breathing grounds and coastal erosion result from mangrove plants inability to stabilize the soil through decomposition. Fish from shallow waters are being forced into the deep sea by the pollution in the area which has seriously hindered the regeneration of species in the mangrove forest because contaminated

seeds and saplings on the forest floor. According to Albert et al. Oil coats aquatic organisms respiratory systems and reduces the amount of oxygen in the water column (2018).

Mental and Social Health Problems of Illegal Refining of Crude Oil

Illegal crude oil refining produces more psychological stress than natural disasters. Recovery jobs are linked to high rates of alcohol and drug use and domestic violence and crime rates are higher when there is a threat to ones livelihood and new recovery fund inflows into the community (Chang et al). 2014 was the year. which all have an adverse effect on mental health. However depending on specific social-demographic context searches such as location age and gender these issues may differ. The location of these illicit refining operations may affect people and the environment in different ways. For instance when such illicit refining operations are carried out close to residential areas the local population and soil may suffer more. Ordinioha and Sawyer (2020) claim that illegal refining operations on land cause oil spills that reduce soil fertility suffocating food crops and commercial trees and either killing or reducing their yield. Even those done offshore are detrimental to mangroves and aquatic life which are vital to many peoples livelihoods both young and old. The illegal refining process results in a significant amount of waste being dumped on land or in rivers and streams according to Obenade and Amangabara (2014). In addition to increasing the possibility of explosions and self-harm fires illegal refining has a number of negative environmental effects. In any given scenario the health effects of illicit refining operations may either worsen or improve with age. It is common knowledge that health issues tend to get worse as people get older because aging itself can lead to certain illnesses. Therefore illicit refining may exacerbate health issues in older adults both male and female. However because men and women have different genes the severity of health issues related to illegal crude oil refining may differ based on a persons gender. Nevertheless there is currently a lack of research elucidating these variations. Aboriginal communities and ethnic or rural enclaves that depend on the environment for social-cultural and subsistence needs are affected by the social health issues caused by illicit refining. Cheong (2021) claims that illicit crude oil refining can have a detrimental effect on a community's social cohesiveness through direct costs like hospital bills and burn-related expenses as well as more general social costs like a lower life expectancy.

Consequence and Environmental Impacts of Illegal Oil Refining/Bunkering

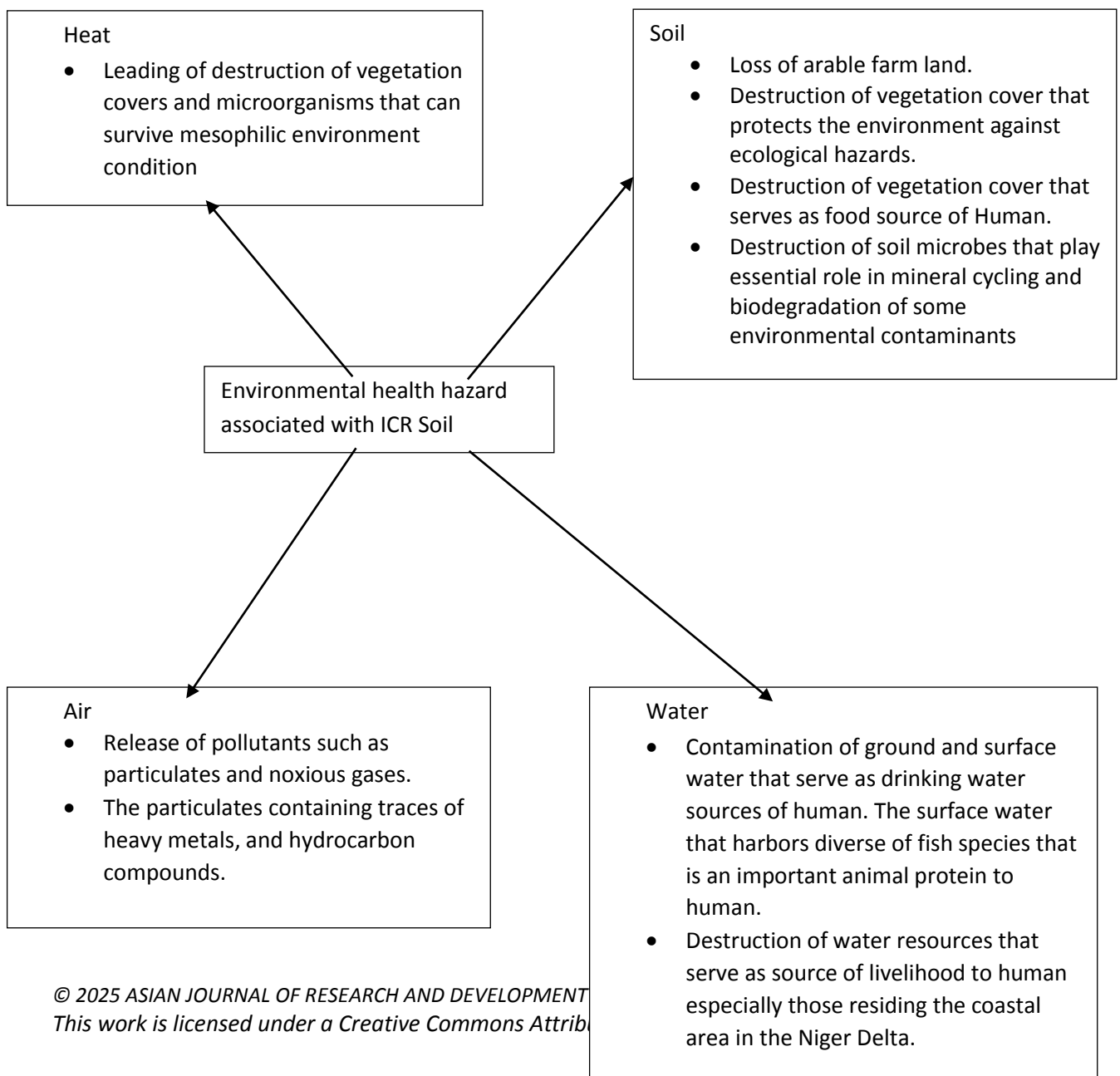
According to Boris (2015) the countries most affected by oil thieves are Mexico Nigeria Indonesia Russia and Iraq. Nigeria might be losing as much as \$1. 7 billion on a monthly basis (Boris 2015 Daly 2014). According to Delby (2014) and Boris (2015) oil theft in Mexico is between 5000 and 10000 barrels per day whereas in Indonesia it is only between 2000 and 3000 barrels. The Niger Deltas entire pipeline vandalism and illegal oil refining (bunkering) system is a clear example of the governments numerous concessions and exposes the illegality of the oil industrys establishment (Garuba 2012 Boris 2015). One of the biggest problems in Nigerias Niger Delta is illegal refining. Due to pipeline vandalism oil theft and other crimes involving the nations oil supply Nigeria directly loses more than 300000 barrels of unrefined petroleum each day (Boris 2015). Nigerias economy is currently dealing with a unique problem—a financial crisis unprecedented among oil-producing nations worldwide—that must be fixed immediately to prevent further economic collapse or complete loss. • Socio-Economic Losses To The Nigerian State: These illegal activities have seriously hurt Nigerias economy. Some of its socio-economic effects according to Duru (2014) and Okere (2014) include environmental degradation a decline in local economic activity a loss of government revenue that prevents sufficient funding for development an increase in criminal

activity in the Niger Delta region a lack of security as a result of illegal activity and the infiltration of foreign collaborators and a bad image of the nation. By vandalizing oil terminals and claiming force majeure the militants essentially destroyed the oil industry and as a result the nations economy which is heavily dependent on oil revenue (Njoku 2015). The nations potential revenue from the sale of crude oil on the international market is being lost more and more as a result of pipeline vandalism illegal bunkering and oil theft. Nigeria may lose N1 according to a recent report by Yusuf (2016). The amount is \$458 billion. 29 million) in daily earnings from its oil exports during the conflict. Majeure on the daily export of 162000 barrels of Bonney Light Crude (force majeure is a legal declaration that a party uses to indicate that it might not be able to fulfill its obligations under a contract) (Yusuf 2016). based on the NNPC N24. Operational deficits of N18 and 23 billion in February 2016. In March of that year 89 billion was lost. The shutdown of roughly 300000 barrels of crude oil at the Forcados terminal on February 15 2016 due to Shells declaration of force majeure is reportedly the primary cause of NNPCs significant decline in export sales. According to the report vandalism at the Forcados export line caused sporadic production shutdowns which negatively impacted NNPCs performance (Daily Sun News 2016). Given the massive financial losses Nigeria suffered as a result of pipeline vandalism and oil theft President Muhammadu Buhari may have urged the international community to classify oil theft as an international crime similar to the trade in blood diamonds. (2016) Guardian News. Nigeria reportedly suffered an overall loss of N12. because of theft of petroleum products (566 billion in March 2016) and damage to NNPC facilities (Eboh 2016). The Organization of Petroleum Exporting Countries (OPE) reports that Nigerias oil production has fallen to 1. 64 million barrels per day in April before declining even further to 1. In May 2016 a million bpd was recorded (Sulan 2016). Nigeria is no longer selling enough crude oil to cover her financial needs as a result of the loss of income from illegal bunkering. The government is not meeting some of its responsibilities and the amount of domestic debt is rising quickly. The destruction of aquaretic and farmland economic sabotage which explains Nigerias budget deficit and divestitures by some international oil companies (IOCs) which result in job losses are among the detrimental effects of vandalism and crude oil theft that exacerbate the countrys current economic recession and unemployment situation (Gaskia 2013). • Environmental Pollution and Degradation in the Niger Delta Region: Pipeline damage can result from breaking vandalizing and tapping oil from oil installations. Odalonu (2015) asserts that it is the source of multiple leaks that cause significant environmental damage. Pipeline breaches and the siphoning of crude oil products are two instances of crude oil theft. This action will unavoidably cause oil spills and harm to oil facilities. Oil theft and vandalism exacerbate environmental degradation and waterway pollution in the Niger Delta compounding oil spills from various sources (Ogbuefin 2017). Vandalism is responsible for a significant portion of oil spills that result in groundwater poisoning the destruction of agricultural land fisheries and livestock and the rapid disappearance of mangrove forests. These are complaints about oil contamination in boreholes which renders the water unfit for human consumption even after treatment. There is ample evidence of the detrimental consequences of some indigenous people drinking or using contaminated water out of frustration (Ufford 2013 Alawode and Ogunleye 2013). There are in fact rivers fishponds farms etc. are no longer suitable for use in aquaculture and agriculture due to their destruction. Due to the extent of environmental degradation thousands of Niger Delt households and families have either fallen into poverty or become firmly trapped in it (Gaskia 2013). Since frequent spills and leaks have severely damaged the farming and fishing livelihoods of many Niger Delta communities this issue has further reduced their standard of living. • Economic Losses To International Oil Companies: Attacks on oil production facilities have caused multiple shutdowns and the declaration of force majeure by international oil companies (IOCs). As a result both the government and the

oil companies have suffered financial losses (Alohan 2013). The Niger Delta has seen numerous shutdowns of foreign oil companies operations due to vandalism which has reduced production capacity and cost the government and businesses money. International oil companies (IOCs) operating in Nigeria are losing a lot of money as a result of supply disruptions and an increase in illegal bunkering (Asu 2013). However cleaning up oil spills in the environment and fixing the pipeline will be an urgent task for the federal government and oil companies. Both the government and the oil companies that need to make large capital expenditures will undoubtedly suffer financial losses as a result. Additionally the attack on the Nigeria Gas Company pipeline connecting to the Chevron Nigeria Limited facility at Escravos is costing the country an incredible N470 million every day according to Babatude Raji Fashola Minister of Power Works and Housing (Adedoyin 2016). The attack has caused damage to other power plants including the 60 megawatt Nigerian National Integrated Power Project (NIPP) plant in Olorunsogo. The sabotaged gas pipeline which cost \$2 and was a part of the Escravos Lagos Pipelines System (ELPs) has resulted in a daily loss of 160 million standard cubic feet of gas (MMSFED). There are fifty standard cubic feet for each thousand. This loss will cause the nation to lose roughly \$400000 in gas volume every day. This is in addition to the \$1988228 in daily losses brought on by the impacted power generation. The nation is expected to lose N470479931 per day. Between December 2014 and February 2015 there were six incidents of vandalism at the Trans Forcados pipeline (at Oben Sapele Oredo) and Escravos Lagos pipeline system (CNL) which caused a loss of 1100 mmscfd according to Raji Fasholu (Adedoyin 2016). The estimated cost to repair the damaged pipeline is \$607137. Industry experts estimate that a 700 MW power reduction is equivalent to a 200 mmscfd loss. stated that even though the industry is currently producing an average of 4120 mwh/h (as of January 17 2016) performance would have surely been better without the extra setback brought on by the vandals. Spill cleanup and pipeline maintenance are now costing money that could have been allocated to other aspects of oil production and exploration. Lawode and Ogunlege (2013). • Losses to the Niger Delta Communities: Numerous dangerous releases that negatively impact the environment are caused by illegal oil refining and pipeline vandalism. Because they destroy farmlands and habitat oil spills have a major negative impact on the environment and reduce the amount of arable land that can be farmed. Gimah and Bodo (2019) claim that spills into conducts contaminate drinkable water and kill marine and oceanic life vegetation and wildlife. Even worse the illegal petroleum processing facilities scattered throughout the Niger Deltas creeks have destroyed the rivers and streams that supply the locals with drinking water resulting in a variety of waterborne illnesses and diseases (Bodo & Gimah 2019). Aquaculture fisheries and farms in fact (Boris 2015). Unfortunately many locals are unemployed and without hope because their main sources of income farming and fishing are no longer viable due to environmental degradation. Multinational oil companies frequently halt operations in regions where pipeline vandalism and oil theft are prevalent due to the damage caused by oil criminals. These actions cause immediate hardship for the country especially for the communities operating in the Niger Delta where illegal refineries have burned down properties and claimed many lives in addition to the more common effects of lowering the nations revenue which in turn reduces expenditures and developments. • Insecurity in the Area: Because illegal bunkering and refining cause so much damage oil companies are often forced to shut down pipelines. Nigeria produces just one. Consequently 5 million barrels of oil are produced every day. This situation presents a serious risk to national security because of Nigerias monoeconomic reliance on oil exports for survival. Illegal oil bunkering has caused financial losses increased drug abuse and the spread of weapons all of which have made the Rivers State region unstable. It also poses security risks damages equipment and undercuts investments in onshore exploration and production. According to Katsouris and Sayne (2013) oil theft has

been the main cause of violent conflict in the Rivers region. The majority of those involved in oil bunkering trade heavy weapons for crude oil at sea but some use the proceeds to import weapons into the area with the primary goal of using them to protect their illicit operations. Because each gang group needs to have enough weapons and be ready for combat in order to continue operating the weapons are used for both attacks and counterattacks by different gang groups and security personnel. There are currently many attacks and counterattacks by various factions as well as a lack of security for peoples lives and property due to the spread of small heavy and light weapons in the area. Wilson 2014. Similarly Onwuemenyi (2014) asserted that a range of sophisticated weapons used in the Niger Delta were purchased with funds derived either directly or indirectly from illicit refining. He went on to say that violent crimes in Nigeria including kidnapping armed robbery and piracy are significantly influenced by the availability of weapons acquired through illicit oil theft and refining. According to Wilson (2014) the violence and crisis associated with illegal bunkering and vandalism in the Niger Delta region are rapidly spreading to other parts of Nigeria and beyond. The illegal activity creates a global link between drug and weapon traffickers and bunker pirates by facilitating the growth of other transitional criminal networks throughout the Gulf of Guinea. The youths heavy weaponry and their persistent attacks on oil and non-oil facilities for the actors political and financial gain attract young people from other geopolitical regions to engage in illegal activity as a way to achieve economic empowerment. Regardless of their geopolitical origins these young people use their weapons to commit violent crimes all over the country. Additionally politicians occasionally use them to rig elections or target political rivals which exacerbates the nations security issues (Odalonu 2015). Illegal bunkering oil theft at high seas and oil export terminals all contribute to an increase in sea pirate activity in the subregion (Wilson 2014). There has been constant violence and attacks in the Gulf of Guinea as a result of pirates attacking oil investors and their investments and state security agents retaliating. The peace and security of West African states especially those along the coast where oil vessels sail to Europe America and Asia are threatened by the violence committed by these actors and sea pirates (Wilson 2014). Nigerias economy is primarily driven by crude oil which also subtly affects the countrys entire sociopolitical structure. Therefore anything that secretly or excessively interferes with oil production poses a direct threat to Nigerias national economy political stability territorial integrity and national security (Odalonu 2015). • Health Concern and Air Pollution: Illegal oil refinery operations cause air pollution. The burners that heat the distillation units emit significant amounts of carbon black or soot. This has an effect on health. Furthermore even though carbon black is not a greenhouse gas its release into the atmosphere warms the planet by absorbing solar heat. The main gas that is released into the environment when crude is siphoned from a pipeline is methane. Methane gas is more potent than carbon dioxide when it comes to climate change and global warming which have disastrous effects for African countries like Nigeria. The Emodi team. Declare that. Dot Dot (2022) The water cycle and wildlife habitats are harmed by the untreated waste released by these illegal refineries. Additionally it stops trees from growing which is crucial for storing carbon. Loss of natural wildlife habitats disruption of water cycles extinction of medicinal plant species and plant regeneration are just a few of the detrimental environmental effects of illegal refinery operations. Regardless of whether oil refining is done legally or illegally it is still a very dangerous process because the extracts are highly flammable and have the potential to cause unprecedented environmental damage within minutes of a trigger. both property and casualties. In addition to endangering the environment this practice affects the welfare and health of the local populace. Two air pollutants that can raise the risk of lung cancer heart disease stroke respiratory disorders skin discoloration and eye irritation are smog and soot (Gideon 2022). Oil refining chemical exposure at work and in the environment has been linked to a number of health problems

including skin eye and mucous membrane irritation reproductive issues hepatorenal damage and more. (Nriagu and others) in individuals. as of 2016. According to Ordinioha and Brisibe (2013) there is worry in the rivers region that some cancers like leukemia especially in children are directly related to DNA damage brought on by oil exposure which results in primary enzyme genetic instability. Raimi Inc. Declare that. Dot Dot (2021): Human activity is the main factor contributing to the loss of biodiversity globally. Inatimi and associates. Ogwu and associates (2022). As of 2022. Emissions from the petroleum industry are especially harmful to the ecosystem and all forms of biodiversity including humans. Emissions from the petroleum industry can be classified as solid liquid gaseous or thermal. For example pollutants like gases are released into the environment when crude oil is converted into various final products. When processed solid waste is burned and crude oil is refined harmful gases are released. These gases could be the result of pollution. Gaseous pollutants include sulfur and carbon oxides nitrogen dioxide ammonia volatile organic compounds and hydrocarbons like polycyclic aromatic hydrocarbons. Sulfuric and carbonic oxides can be combined with water to produce a mild acid. Seiyaboth and Izah (2017) state that weak acids eventually condense into acid rain which damages nearby infrastructure and vegetation. Aquatic life particularly that found in surface waters is threatened when water turns acidic. In addition, toxicants may collect in adipose tissues of living organisms and travel up the food chain to reach humans.



Inappropriate waste disposal particularly of municipal and industrial waste into the surrounding environment including the land and water is the main cause of pollution in the Niger Delta. Raimi and associates. affirm that. the dot. Hazardous waste disposal has no effect on the soils chemical or physical characteristics (2022). Additionally by damaging organisms that are vital to the biogeochemical cycles it diminishes the ecosystems most important flora and fauna functions (Raimi et al. 2021 is here. Furthermore its presence renders the water unfit for human consumption raising serious questions regarding the security of the areas potable water supplies (Izah et al. Ogamba and others in 2022. (2015). Furthermore it is possible that the waste will seep into the groundwater and contaminate it. Millions of liters of ground and surface water can become contaminated by even trace amounts of petroleum compounds such as gasoline or diesel kerosene. Igben (2021) claims that the regions illicit crude oil refining (ICR) operations are reducing the amount of land available for farming fishing animal husbandry rubber tapping Raphia palms and other related activities. A concerted effort is required to lessen the threat that ICR poses in the Niger Delta because soil and water resources are critical to the economic development of coastal cities and communities. Aquatic life is impacted by water pollution. As Uzoekwe and others have said. Izal and others (2021). (2022) Trace metals can be found in a range of environmental conditions. aquatic environments (Uzoekwe et al. Izah as well. 2021. soil (Raimi et al.). By 2022. Izah (2017) and Seiyaboth. as of 2021. Both fish water and sediment have been found to contain trace metals (Ogamba et al. [2017]. Heavy metal poisoning has been connected to rivers that are contaminated. Aquatic vegetation and other natural food sources in aquatic ecosystems may sustain harm. Ikezam et al. conducted an investigation. Soil erosion according to residents of an ICR is an indication that there isn't much arable land available for farming. up to 2021. Consequently fewer people decide to work in agriculture. There are effects when food crops are grown in contaminated soil. ICR has destroyed 73 according to a 2013 study by Asimiea and Omokhuas on the floristic composition of a freshwater wetland in the Niger Delta with an ICR site. 82 and 91 percent of the flora of the Deltas. That percentage is 61% in the Bayelsa States. The authors claim that ICR operations in the area significantly affect a variety of factors including biodiversity forest appearance plant growth habitat destruction the water cycle and species of medicinal plants. It is anticipated that production will be modest. The Nwankwoala Company. conducted studies in the rivers of Ogu-Bolo and Okirika. demonstrates the impact of illicit refining on soil and water quality. in 2017. The water in the area is unfit for human consumption due to its low quality and high iron and zinc content. According to the authors the level of soil contamination decreases with increasing depth. roughly twenty-three. 59 kilometers. 85 percent or 71%. 20 kilometers (65). 140 of the 71. 37 kilometers or 33 miles. 112 or nine percent. 56 miles (27. Fifty-one percent and two percent. 12 miles. In 40% of the cases the land mass was rated as very good good moderate or very bad. The Niger Deltas mangrove fish habitats have been devastated by ICRs (Bebeteidoh et al. [2020]. as well as a noticeable rise in pollution in rivers and marshes. Surface water and sediment in the Niger Delta have been found to contain polycyclic aromatic hydrocarbons a component of crude oil. Petroleum hydrocarbons also float on river surfaces decreasing the amount of oxygen available to aquatic ecosystems and ultimately causing aquatic life to perish. The burning of fossil fuels produces these hydrocarbons. Therefore fish productivity survival reproduction and diversity are associated with contaminants that contain hydrocarbons. Agricultural productivity is impacted by crude oil pollutants such as polycyclic aromatic hydrocarbons due to erosion and deteriorating soil quality. Additionally this main contaminant is near the ICR. The Wokoma group. (2020) found that the Sombrero Rivers had a higher perceived ICR and a higher total hydrocarbon content. The authors claim that ICR operations have an effect on water quality

sediments and local zooplankton structure. Howard and his group. Declare that. circles. Pollutants that have built up in the sediment of river beds resuspend in the water column due to the hydrodynamics of river systems. by 2021. Therefore aquatic resources and the people who depend on them may be harmed by ICR operations. The Ineyougha group. (2015) Fish including their shells and fins provide the majority of the animal protein that Niger Delta residents eat. Climate landforms and most significantly human activity have an impact on the amount chemical makeup and physical characteristics of soil. The fundamental components of a soil are its physical chemical and biological characteristics. How it functions is determined by the physicochemical and biological properties of the soil. In an area of the Niger Delta where ICR is common hydrocarbons from petroleum can adversely affect the soils characteristics making it unsuitable for the growth of particular plant species and making it harder for farmers to turn a profit. Microbes are commonplace and have developed a variety of survival mechanisms. Regrettably certain carcinogenic hydrocarbons cause microbial mutations that can impair the environments ability to collaborate with various microorganisms with both predictable and unpredictable outcomes.

Health Problem of Black Soot Resulting from Illegal Refining of Crude Oil

According to Yakubu because soot deeply penetrates the human lungs it can cause acute bronchitis strokes which can result in early death developmental problems and reproductive disorders. Pollutants can cause a range of birth outcomes as well as an increase in diseases like diabetes mellitus and cardiopulmonary disorders when they are absorbed into target cells in the human body. Zhou and Wang Gao Liao Feng (2016). Serious health risks are associated with air pollution and the harm it causes to the general publics health exacerbates health disparities between people from different socioeconomic backgrounds. Air pollution increases the impact of income inequality on health.

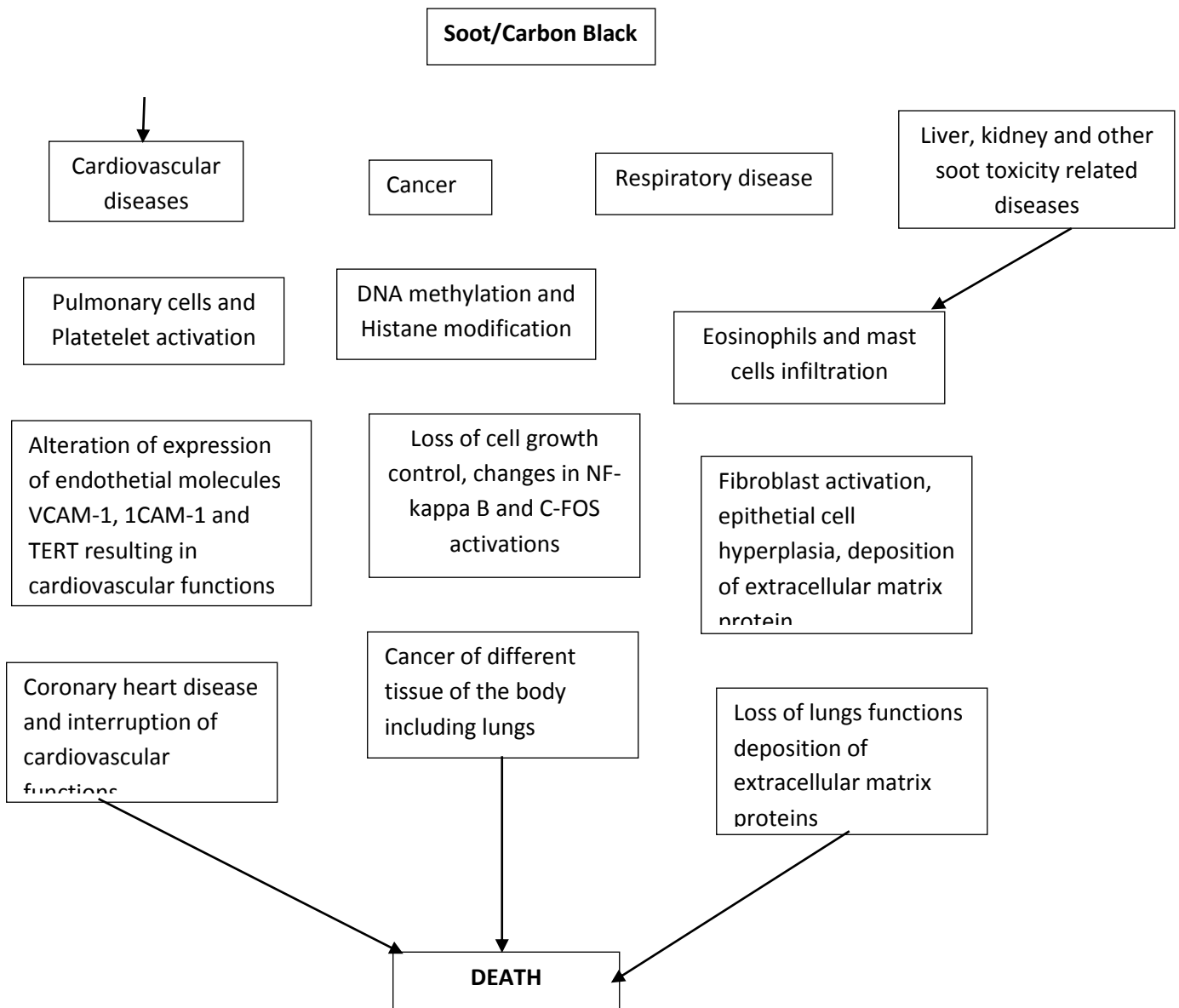


Fig 2.5 Health Problems due to soot and carbon black (CB)

Source: Rituraj and Ashwani (2017).

The primary health problem caused by soot and carbon black (CB) in the above figure is cancer which is caused by breaks in DNA strands or gene mutations. The second is respiratory toxicity caused by a malfunctioning immune response that triggers mast cells and eosinophils and the third is cardiovascular toxicology which includes coronary heart disease. Moreover soot damages the body's organs in ways that are unknown. Soot a type of pollution associated with deep lung penetration has a particle size of roughly two according to Yakabu (2017). A micrometre. The fine particulate fraction in the upper respiratory tract often absorbs particles 10 microns or larger (PM10) preventing them from penetrating deeply into the respiratory system.

Residents Responds to Pollution in Rivers State

Particles smaller than five microns have the ability to enter the lower lungs alveoli which are where gas exchange occurs. Many people in Rivers State have health problems as a result of

soot pollution from illicit crude oil refining. It has exacerbated and triggered birth defects asthma bronchitis pneumonia heart disease and even Port Harcourt Yakubu residents (2017). Inhaling soot can cause problems with development and reproduction in addition to cancer according to the American Lung Association. Eating contaminated food breathing contaminated air indoors and outdoors and coming into contact with contaminated skin are all ways that it can enter the human body. There is sufficient evidence from studies on human carcinogenicity to conclude that soot pollution causes cancer in people. Percival Pott a British surgeon found a link between exposed chimney sweeps and scrotal cancer in 2005 (Evanoff et al. 2013). Chimney sweepers were found to be more susceptible to scrotal and other skin cancers in a number of subsequent epidemiological studies. According to Yakubu (2017) and the International Agency for Research on Cancer (IARC 1987) Swedish chimney sweepers had a higher risk of esophageal hematopoietic prostate bladder and total lymphatic cancer in follow-up studies. Point 1 . 2. People in Rivers State 21 react to pollution. the response from the government. Because of the air pollution in Port Harcourt and the surrounding areas the Federal Ministry of Environment declared an emergency in February 2017 (Ovuakporie 2017 Global Patriot 2017). In order to control the situation while an investigation into the cause of the air pollution was conducted a notice to temporarily close an asphalt processing plant in Port Harcourt that was producing thick smoke from its operation was subsequently issued (Yakubu 2017). To address the soot pollution in Rivers State special duty representatives and the state commissioner for the environment established a task force. As part of the task forces solution businesses were shut down. AUC Asphalt Company Chinese Government Company (CGC) and HandH Engineering Company. Due to their high emissions it was soon found that all three members of the Aluu community had broken environmental regulations. However the pollution continued to affect the people living in Port Harcourt and the surrounding areas (Ojoye 2017 Yakubu 2017). A technical team appointed by the Rivers State government and led by the state commissioner for environment examined a 2019 report that estimated 22077 people had experienced respiratory-related illnesses in the preceding five years due to the recent increase in illegal refining and bunkering operations (Godwin 2021). According to the report gas flaring and illicit bunkering are the states two main sources of soot. Twenty experts from various interdisciplinary and relevant fields including a dermatologist and consultant physician at the University of Port Harcourt Teaching Hospital investigated the airborne particulate matter (soot) in Port Harcourt (Godwin 2021). However the public feels that the soot problem has gotten worse due to the state administrations lack of political will and the federal governments relevant agencies international health organizations and environmental organizations incapacity to implement the report. They think that the government should take immediate action to combat air plaque or implement laws that will lessen it (Peterside 2021). the response of the public. These nonviolent protests against soot pollution were held in the city and throughout the state in April 2018 (Yakubu 2017). The demonstrators called on the government to reduce pollution in a more forceful and open manner. When the soot pollution became unbearable individuals and nongovernmental organizations like Social Action started to spread the word and demand that the government and international oil companies (IOCs) stop it (Social Development Integrated Center 2018). As the campaign progressed hashtags like stopthesoot and stopthesootnow gained popularity on social media sites like Facebook and Twitter (Social Development Integrated Center 2018). The state governments argued that the people should take their protests to the federal government because the federal government lacks the authority to close the refinery which would be regarded as economic sabotage. The response of civil society. The Port Harcourt Rotary Clubs hosted the Stop the Soot Conference in December 2019. In order to raise awareness teach residents how to take personal safety precautions provide solutions to the pollution and hopefully convince the government to take action the organizers looked for a multi-stakeholder approach (Ajala

2022). There were representatives from the government traditional institutions media foreign oil companies civil society organizations student organizations and religious organizations. The majority of the speakers were health and environmental specialists who provided evidence of the long-term (cancer infertility and longenatal disabilities) and short-term (asthma attacks respiratory infections child pneumonia and heart conditions) effects of soot (Dukor 2021 Ajala 2022).

Review of Empirical Studies

Ebe (2025) investigated how artisanal crude oil refining affected the perception of air quality among rural Nigerians in Rivers State. The study used a cross-sectional descriptive research design to accomplish these goals. Data was gathered in the field using a Bosean multi-gas finder an EG air quality indicator a GPS unit a met meter the participant observer approach and a questionnaire. From each of the six local government areas three communities were chosen at random to fill out a questionnaire and assess the quality of the air during the wet and dry seasons. Crude oil artisanal refining was the studys main focus (74). 5%) according to the findings of the statistical analysis using ANOVA mean and standard deviation inferential measurements (t-test) and SPSS for illustrative insights. They demonstrated their ability to withstand the challenges of the community through artisanal refining (74). Merely 5% of them succeeded in finding employment. Conversely NH₃ PM₂ CO₂ and O₃ are examples of air pollutants. The levels of PM₅ and PM₁₀ were higher than the WHO-recommended upper limit. Due to the unemployment and poverty that many groups in the study area face artisanal refining has grown in popularity as a source of income. In addition to chemicals that damage the ozone layer cause health issues and contribute to climate change this refining process releases dangerous and toxic gases. Inhaling harmful gases can cause respiratory problems for both residents and staff. The study found that public education about the causes of air pollution and its health effects is crucial especially in rural areas. In addition to promoting practices like using clean cooking technologies properly disposing of waste and burning less biomass this may mean closing artisanal refining operations in the areas where they are carried out. The current study and this one are related because they both seek to ascertain how illicit refining impacts the health of residents of Rivers State. Oladoyin is their name. (2024) investigated how public health security in the local government districts of Ogu-bolo and Opobo Degemas was impacted by artisanal petroleum refining. Its primary objective was to investigate the relationship between artisanal petroleum refining and health security in the Rivers States. The study employed a cross-sectional survey design. Both primary and secondary sources of data were used in the analysis. A structured questionnaire was used to collect the primary data. Secondary data was also gathered from national academic literature sources and online resources. Out of the 686900 estimated population 384 respondents were found using the sample size formula for proportion estimation. Also questioned were nine medical specialists from the study area. The analysis included a total of 295 respondents based on the usable questionnaire response rate. 202 of the 68 answers. Four percent of respondents stated that exposure to residues from illegal petroleum refining in the study areas was the cause of health issues. Using SPSS software the gathered data was put through one-way analysis of variance and Pearson correlation. Use the correlation test (-) to determine whether illicit petroleum processing is related. Rivers States health security (1) and 439 showed a marginally negative correlation (zero). On Level 01 two tails are present. According to the studys findings illegal petroleum refining and health security are inversely correlated meaning that as illegal petroleum refining rises health security falls. It is clear that the extensive practice of illegal petroleum refining presents a major risk to the security of public health. According to the study Nigeria can create a national program for safe petroleum refining by integrating the knowledge of illicit refiners into a comprehensive

technology. The company is known as Jinyemiema. (2024) looked into how illegal oil bunkering and refining affected the environment in Rivers State. The purpose of this essay is to suggest possible remedies for these unfavorable human behaviors. To collect primary data the study used both qualitative and quantitative research methods. To collect data residents of Gokana Local Government Area 140 in Rivers State Nigeria were given structured questionnaires to fill out. Five riverine communities that were carefully selected filled out sixty-three questionnaires. Twenty-eight copies of the survey were sent to each community and the head of the councils youth development committee. The samples were used to investigate why illegal refinery operations and bunkering persist in spite of government protests. The results indicate a lack of infrastructure and basic amenities that support local small businesses in addition to poverty ignorance greed and ineffective institutions to prevent oil theft also known as bunkering. According to research 48% of young people participate in it because they are unhappy with the dearth of employment options 21. Owing to peer pressure 8% of young people regularly participate in activities related to oil. Thirty percent of young people believe that oil activity damages ecosystems. Less than one percent of respondents stated that illicit refineries are a new local technology. According to the report the government should launch programs to empower young people and create jobs locally. This study is still vital because the main causes of illicit refining are poverty ignorance greed and a lack of institutions to prevent mate oil theft. The group of Okwakpams. Particulate matter pollution and crude oil exploration activity were evaluated in the towns of Rivers East and Rivers South-East Rivers State in 2024. The research employed a completely randomized block design or CRBD. The ambient air quality was measured in-situ at four stations—two from each community—using the Extech Meteorology Metre and the Aero Qual 500 Series (Gas Monitor) GT 321 Particulate Metre Automated Global Position System (GPS). The clustered column chart and mean were utilized in the data analysis. According to the study the Igwuruta and Bodo communities CO₂ concentrations exceeded the WHO-recommended daily limit of 462 parts per million by 613 and 694 parts per million respectively. When combined with other PMP pollutants NO₂ equals 0. O₃ is false. Each milliliter contains 98 milligrams. At 4 µg/m³ So₂ is not present. It is 00 µg/m³. CH₄ and CO add up to 0 µg/m³. NH₃ equals 5 µg/m³. 2 µg/m³ to 3. Zero is equal to five. 022 µg/m³ Pm₁₀ is equivalent to zero. A cubic meter has 34018 micrograms in it. The WHO-recommended daily limits for those specific PMPs remained below 6°C. The high CO₂ concentration exacerbates the discoloration of the plants and highlights the soot.

METHODOLOGY

Research Design

The survey design used in this study was descriptive. The goal of a descriptive cross-sectional survey design is to systematically gather and describe the facts features and characteristics of a particular population (Nworgu 2016). According to Nworgu (2016) this design involves the researcher gathering data typically from a sizable sample selected from a specific population and describing specific characteristics of the sample as they exist at the specific time of the study. This design is suitable for the study since the researcher wanted to collect data from a sample of locals in order to determine the determinants and perceived health consequences related to illicit crude oil refining among residents of Rivers States Rivers East Senatorial Zone without changing any of the variables.

Research Area

This study was carried out in the Rivers East Senatorial Zone of Nigeria. In May 1967 Rivers State was founded by the military government of General Yakubu Gowans from the former Eastern Region. It is one of 36 states in Nigeria and Port Harcourt serves as its capital. It is important economically because it is the center of Nigerias oil industry. Rivers State is one of Nigerias oil-rich states situated in the southern Niger Delta Region.

Population for the Study

The population for the study comprises the residents of the eight Local Government Areas in Rivers East Senatorial Zone, that are living in the communities affected by the illegal crude oil refining activities. with the population of Emohua 263,817, Etche 325,953, Ikwerre 247,908, Obio Akpor 607,324, Ogu-Bolo 97,586, Okorika 290,114, Omuma 131,145, Port Harcourt 707,056, summing it total of 2,670,903 inhabitant in the eight Local Government Areas as the population for the study. Premium Times Nigeria (2023).

Sample and Sampling Techniques

The sample size of the study was 400 residents determine with Taro Yamana formula.

$$n = \frac{N}{1+n(e)^2}$$

Where n = sample size,

N = population

e = margin of error (0.05) under study

However

n = sample size (?)

n = population (2,670,903)

e = standard sample error (0.05)

$$n = \frac{2,670,903}{1+2,670,903 (0.05)^2}$$

$$n = \frac{2,670,903}{1+2,670,903 (0.0025)}$$

$$n = \frac{2,670,903}{1+6,677}$$

$$n = \frac{2,670,903}{6,678} = 399.9$$

Approximately ± 400

400 residents in the eight Local Government areas constitutes the sample size for this study using convenient sample technique which is a non-probability sampling techniques, the researcher conveniently administer 400 copies of questionnaire to residents of the eights Local Government Areas of Rivers East senatorial zone that were accessible to her.

Instrument for Data Collection

The study used a structured, self-administered questionnaire titled “Determinants and Perceived Health Consequences of Illegal Crude Oil Refining Questionnaire (DPHCICORQ).” It contained a total of 42 items distributed across 3 sections. Section A consisted of 4 items capturing background data on gender, age, monthly income, and education. Section B consisted of 25 items used in measuring the determinants of illegal crude oil refining structured on a 4-point likert of VHE (very high extent), HE (High extent), LE (Low extent), and VLE (Very low extant). Section C assessed perceived health

consequences with 13 items on a 4-point agreement scale of Strongly Agree, Agree, Disagree, and Strongly Disagree.

Validity of the Instrument.

To ensure the validity of the instruments, the questionnaire with the research objectives, research questions and hypotheses were given to three (3) Experts in Health Education and Promotion that are active lecturers in the Department of Health Promotion, Environmental and Safety Education.

Their corrections and professional inputs were affected under the scrutiny of the researchers' supervisors to ensure face, and content validity of the instruments before final administration. Hence, the validity of the instrument will be ascertained.

Reliability of the Instrument.

Reliability of the study instrument was established using a split half approach with Cronbach's alpha to assess internal consistency. A pilot sample of 20 respondents was randomly drawn from Rivers West Senatorial District to administer the instrument and compute alpha coefficients for each subscale and for the entire scale. The result of the analysis revealed the reliability coefficient of the determinants of ICOR with 25 items was 0.730 while that of Perceived Health Consequences with thirteen items was 0.714. The reliability coefficient of the entire items of instrument was 0.792, indicating acceptable overall reliability. According to Cichoń (2020), instrument with reliability coefficients of 0.60 and above are acceptable for data collection.

Method of Data Collection.

Letter of introduction from Head of Department (HOD), of Health Promotion, Environmental and Safety Education, University of Port Harcourt for identification purpose and to show the authenticity of the process. The letter was presented to the head of selected local government areas which helped for identification purposes, solicited participation and cooperation of the participants. Two research assistants were guided to assist in the data collection process to ensure that the questionnaire will be properly served to the respondents, filled and retrieved. Instructions pertaining to the feeling of the questionnaire will thoroughly be explained to the respondents and all completed questionnaires will be retrieved immediately from the respondents.

Method of Data Analysis

Data analysis proceeded in three stages. First, instrument reliability was confirmed with split half Cronbach analysis from a pilot of 20 respondents drawn in Rivers West Senatorial District. Second, descriptive statistics addressed profile and pattern questions. Frequencies and percentages summarized demographics for Table 4.1. Research Questions 1 to 4 used means and standard deviations with an a priori decision rule. All the research questions were analyzed using mean and standard deviation. While H01 was tested at 0.05 alpha using z-test. Hypotheses 2, 3, and 4 were tested at the same 0.05 alpha level using Analysis of Variance (ANOVA).

Results

Table 4.1: demographic and socioeconomic characteristics of the respondents

Factor	Group	f	%
Gender	Female	138	35.1
	Male	255	64.9
Age	18–29 years	159	40.5
	30–39 years	137	34.9
	40–49 years	60	15.3
	50+ years	37	9.4
	Monthly Income	<#50,000	133
	#50,000–#99,999	125	31.8
	#100,000–#199,999	77	19.6
	#200,000+	58	14.8
Level of education	Primary	38	9.7
	Secondary	296	75.3
	Tertiary	59	15.0

Note: n=393

Respondents were predominantly male 255 (64.9%) versus female 138 (35.1%). Ages skewed young: 18–29 years, 159 (40.5%); 30–39, 137 (34.9%); 40–49, 60 (15.3%); 50+, 37 (9.4%). Monthly income clustered below #100,000: <#50,000, 133 (33.8%); #50,000–#99,999, 125 (31.8%); #100,000–#199,999, 77 (19.6%); #200,000+, 58 (14.8%). Education was mainly secondary 296 (75.3%), with tertiary 59 (15.0%) and primary 38 (9.7%). Overall, the sample (n=393) is youthful, male-leaning, and lower-income, with most having secondary education—useful context for interpreting perceptions and reported health consequences related to illegal oil refining in Rivers East.

Question 1: To what extent is corruption a determinant of illegal crude oil refining (ICOR) among residents of Rivers East Senatorial District, Nigeria?

Table 4.2: mean analysis of the extent corruption is a determinant of illegal crude oil refining (ICOR) among residents of Rivers East Senatorial District, Nigeria? (n=393)

Corruption as determinant of ICOR	Mean	Std. Dev	Remark
5 Corruption among security agents allows illegal crude oil refining (ICOR) to continue in Rivers East Senatorial District.	2.92	.970	High
6 Payments (bribes) to law enforcement officers protect those involved in ICOR from arrest and prosecution.	2.97	.914	High
7 Corrupt community leaders benefit financially from ICOR and therefore support the activities.	2.96	.963	High
8 Lack of punishment for corrupt officials encourages more people to engage in ICOR.	2.97	.969	High
9 Many residents believe “nothing will happen” to ICOR operators because corruption protects them.	2.98	.937	High
Aggregate mean and Std.Dev	2.95	.500	High

*mean <2.50 very low extent; 2.50-2.9.00 Low Extent; 2.70-3.00 high extent; 3.1-4.00 Very

Higher Extent

The data in table 4.2 showed the analysis of the extent corruption is a determinant of illegal crude oil refining (ICOR) among residents of Rivers East Senatorial District, Nigeria. The result revealed an aggregate mean score of 2.95 ± 0.50 , rated as High, indicates that respondents strongly perceive corruption as an important determinant of involvement in ICOR in Rivers East Senatorial District. Across all five items, mean scores are consistently close to 3.0, suggesting that practices such as bribery, protection by corrupt officials, and lack of punishment substantially sustain ICOR. This implies that corruption is a strong determinant of illegal crude oil refining in Rivers East Senatorial District, Nigeria.

Question 2: To what extent is easy access to oil pipelines a determinant of ICOR in Rivers East Senatorial District, Nigeria?

Table 4.3: mean analysis of the extent easy access to oil pipelines is a determinant of illegal crude oil refining (ICOR) among residents of Rivers East Senatorial District, Nigeria? (n=393)

Easy Access to pipelines as determinant of ICOR		Mean	Std. Dev	Remark
10	Easy physical access to oil pipelines makes it easier for people in this area to start ICOR activities.	2.78	.992	High
11	Poor fencing and weak monitoring of oil pipelines encourages people to tap crude oil for ICOR.	2.88	.974	High
12	Oil pipelines passing directly through communities increase opportunities for residents to engage in ICOR.	2.65	.974	Low
13	The presence of abandoned or poorly maintained pipelines in this area promotes ICOR activities.	2.72	.973	High
14	Knowledge of specific weak points on pipelines makes it easy to siphon crude oil for ICOR.	2.92	.965	High
aggregate of Easy access		2.74	.505	High

**mean <2.50 very low extent; 2.50-2.9.00 Low Extent; 2.70-3.00 high extent; 3.1-4.00 Very*

Higher Extent

The data in table 4.3 showed the analysis of the extent easy access to oil pipelines is a determinant of illegal crude oil refining (ICOR) among residents of Rivers East Senatorial District, Nigeria. The result revealed an aggregate mean score of 2.74 ± 0.505 , rated as High, indicates that respondents perceive easy access to oil pipelines as an important determinant of involvement in ICOR in Rivers East Senatorial District. Although one item was rated Low, most mean scores clustered around the high category, suggesting that physical closeness, poor fencing, weak monitoring and knowledge of pipeline weak points collectively promote ICOR. This implies that easy access to oil pipelines is a strong determinant of illegal crude oil refining in Rivers East Senatorial District, Nigeria.

Question 3: To what extent is non-implementation of Memoranda of Understanding (MOUs) with host communities a determinant of ICOR?

Table 4.4: mean analysis of the extent non-implementation of Memoranda of Understanding (MOUs) is a determinant of illegal crude oil refining (ICOR) among residents of Rivers East Senatorial District, Nigeria? (n=393)

non-implementation of Memoranda of Understanding (MOUs) as determinant of ICOR		Mean	Std. Dev	Remark
15	Failure of government and oil companies to implement MOUs with host communities pushes youths into ICOR.	2.53	.971	Low
16	Communities where MOUs are not implemented do not see development projects and are more likely to support ICOR.	2.60	.956	Low
17	Unfulfilled promises in MOUs have created anger and resentment that drive people to participate in ICOR.	2.53	.987	Low
18	Poor or delayed implementation of MOUs increases community members' interest in ICOR.	2.61	.949	Low
19	Fair sharing of MOU benefits would make many people currently involved in ICOR willing to stop.	2.60	.998	High
Aggregate of MOU		2.57	.531	Low

*mean <2.50 very low extent; 2.50-2.9.00 Low Extent; 2.70-3.00 high extent; 3.1-4.00 Very

Higher Extent

The data in table 4.4 showed the analysis of the extent non-implementation of Memoranda of Understanding (MOUs) is a determinant of illegal crude oil refining (ICOR) among residents of Rivers East Senatorial District, Nigeria. The result revealed an aggregate mean score of 2.57 ± 0.53 , rated as Low, indicates that respondents only mildly perceive non-implementation of MOUs as a determinant of involvement in ICOR in Rivers East Senatorial District. Across all five items, mean scores cluster within the low category, with just one item rated High, suggesting that, although unfulfilled or poorly implemented MOUs generate resentment and may influence some involvement in ICOR, this influence is not very strong overall. This implies that non-implementation of MOUs is a relatively weak determinant of illegal crude oil refining in Rivers East Senatorial District, Nigeria.

Question 7: What is the perception of the residents on the health consequences of illegal crude oil refining based on gender?

Table 4.8: mean analysis of the perception of the residents on the health consequences of illegal crude oil refining based on gender.

No.	Statement	Male		Female	
		Mean	SD	Mean	SD
1	Illegal crude oil refining activities expose residents to harmful air pollutants.	2.78	0.755	3.11	0.918
2	Prolonged exposure to smoke from crude oil refining causes frequent coughing and chest pains.	3.07	0.978	3.38	0.936
3	Illegal crude oil refining contributes to higher cases of respiratory diseases in the community.	2.74	0.931	3.01	0.966
4	People living near illegal refining sites are	2.88	0.934	3.34	0.976

	at greater risk of skin rashes and irritations.				
5	Illegal refining pollutes water sources, leading to waterborne diseases.	3.06	1.02	3.07	0.976
6	Pregnant women exposed to crude oil refining emissions are at risk of pregnancy complications.	3.05	1.037	3.25	0.921
7	Illegal crude oil refining increases the prevalence of eye problems among residents.	2.91	0.875	3.12	0.883
8	Children in communities with illegal refining are more likely to suffer from asthma and related illnesses.	3.06	0.927	3.12	0.97
9	Inhalation of soot from illegal crude oil refining weakens the immune system.	2.61	0.856	3.28	0.917
10	The practice of illegal crude oil refining increases the risk of long-term illnesses such as cancer.	3.09	1.006	3.07	0.976
11	Residents of illegal refining communities often report frequent headaches and dizziness.	3.05	0.95	3.04	1.003
12	Exposure to refining residues negatively affects the mental health of community members.	3.09	1.006	3.07	0.976
13	Illegal crude oil refining reduces life expectancy in affected communities.	3.05	0.95	3.04	1.003
	Aggregate	2.86	0.940	3.15	0.955

Table 4.8 presents the mean analysis of the perceived health consequences of illegal crude oil refining based on gender. The result showed that the aggregate mean and standard deviation for females and males were $M = 3.15 \pm 0.955$, while males report $M = 2.86 \pm 0.940$ respectively. This implies that mean scores of females were higher than that of the males with a mean difference equals 0.29. hence, there was difference in the perceived health consequences of illegal crude oil refining based on gender.

Question 8: What is the perception of the residents on the health consequences of illegal crude oil refining based on age?

Table 4.9: mean analysis of the perception of the residents on the health consequences of illegal crude oil refining based on age.

No.	Statement	<u>18–29 years</u>		<u>30–39 years</u>		<u>40–49 years</u>		<u>50+ years</u>	
		\bar{x}	σ	\bar{x}	σ	\bar{x}	σ	\bar{x}	σ
1	Illegal crude oil refining activities expose residents to harmful air pollutants.	3.27	0.709	3.12	0.919	3.27	0.821	3.24	0.863

2	Prolonged exposure to smoke from crude oil refining causes frequent coughing and chest pains.	3.03	0.948	3.10	0.926	2.92	1.078	3.14	0.976
3	Illegal crude oil refining contributes to higher cases of respiratory diseases in the community.	3.11	0.997	3.06	0.906	3.08	0.889	2.97	0.957
4	People living near illegal refining sites are at greater risk of skin rashes and irritations.	3.18	0.885	3.11	1.012	3.00	0.957	3.11	0.966
5	Illegal refining pollutes water sources, leading to waterborne diseases.	3.09	1.030	2.89	1.048	3.27	0.861	3.22	0.854
6	Pregnant women exposed to crude oil refining emissions are at risk of pregnancy complications.	3.02	1.046	3.31	0.889	2.85	1.132	3.32	0.818
7	Illegal crude oil refining increases the prevalence of eye problems among residents.	3.16	0.913	3.14	0.842	2.97	0.901	3.41	0.762
8	Children in communities with illegal refining are more likely to suffer from asthma and related illnesses.	3.09	0.979	3.07	0.917	3.07	0.899	3.11	0.966
9	Inhalation of soot from illegal crude oil refining weakens the immune system.	3.20	0.863	3.23	0.915	3.18	0.792	3.05	0.941
10	The practice of illegal crude oil refining increases the risk of long-term illnesses such as cancer.	3.18	0.980	2.86	1.086	3.25	0.856	3.19	0.776
11	Residents of illegal refining communities often report frequent headaches and dizziness.	3.03	1.012	3.04	0.938	3.08	0.944	3.08	0.954
12	Exposure to refining residues negatively affects the mental health of	3.18	0.980	2.86	1.086	3.25	0.856	3.19	0.776

	community members.								
13	Illegal crude oil refining reduces life expectancy in affected communities.	3.03	1.012	3.04	0.938	3.08	0.944	3.08	0.954
	Aggregate	3.12	0.950	3.06	0.956	3.10	0.918	3.16	0.889

Table 4.9 presents the mean analysis of the perceived health consequences of illegal crude oil refining based on age. The result showed that the aggregate mean and standard deviation for 18–29 years, 30–39 years, 40–49 years, and 50+ years were $M = 3.12 \pm 0.950$, $M = 3.06 \pm 0.956$, $M = 3.10 \pm 0.918$, and $M = 3.16 \pm 0.889$ respectively. This implies that mean scores of respondents aged 50+ were highest, while those aged 30–39 were lowest, with a mean difference equals 0.10. Hence, there was a small difference in the perceived health consequences of illegal crude oil refining based on age.

Question 9: What is the perception of the residents on the health consequences of illegal crude oil refining based on income?

Table 4.10: mean analysis of the perception of the residents on the health consequences of illegal crude oil refining based on income.

No.	Statement	<u><#50K</u>		<u>#50K-99K</u>		<u>#100K-199K</u>		<u>#200K+</u>	
		\bar{x}	σ	\bar{x}	σ	\bar{x}	σ	\bar{x}	σ
1	Illegal crude oil refining activities expose residents to harmful air pollutants.	3.25	0.773	3.24	0.865	3.25	0.781	3.05	0.867
2	Prolonged exposure to smoke from crude oil refining causes frequent coughing and chest pains.	3.01	0.957	3.18	0.914	3.03	0.986	3.12	1.061
3	Illegal crude oil refining contributes to higher cases of respiratory diseases in the community.	3.11	0.923	3.10	0.940	3.05	0.972	2.97	0.973
4	People living near illegal refining sites are at greater risk of skin rashes and irritations.	3.08	0.930	3.12	0.972	3.25	0.861	3.05	1.050
5	Illegal refining pollutes water sources, leading to waterborne diseases.	3.23	0.934	3.00	1.024	2.94	1.056	2.98	1.017
6	Pregnant women exposed to crude oil refining emissions are at risk of pregnancy complications.	3.05	1.029	3.06	1.050	3.17	0.965	3.40	0.836
7	Illegal crude oil refining	3.11	0.907	3.16	0.865	3.10	0.821	3.28	0.914

	increases the prevalence of eye problems among residents.								
8	Children in communities with illegal refining are more likely to suffer from asthma and related illnesses.	3.11	0.923	3.11	0.961	3.08	0.957	2.97	0.936
9	Inhalation of soot from illegal crude oil refining weakens the immune system.	3.25	0.848	3.14	0.904	3.29	0.792	3.05	0.981
10	The practice of illegal crude oil refining increases the risk of long-term illnesses such as cancer.	3.11	0.963	3.13	1.023	3.04	1.057	3.19	0.926
11	Residents of illegal refining communities often report frequent headaches and dizziness.	3.21	0.962	3.17	0.960	3.04	0.979	2.91	0.996
12	Exposure to refining residues negatively affects the mental health of community members.	3.11	0.963	3.10	1.023	3.04	1.057	3.19	0.926
13	Illegal crude oil refining reduces life expectancy in affected communities.	3.28	0.962	3.07	0.960	3.04	0.979	2.91	0.996
	Aggregate	3.19	0.942	3.11	0.966	3.05	0.957	2.92	0.968

Table 4.10 presents the mean analysis of perceived health consequences of illegal crude oil refining based on income. The aggregate mean and standard deviation for <#50K, #50K to 99K, #100K to 199K, and #200K+ were $M = 3.19 \pm 0.942$, $M = 3.11 \pm 0.966$, $M = 3.05 \pm 0.957$, and $M = 2.92 \pm 0.968$ respectively. This implies that lower income respondents reported higher perceived health consequences, while the highest income group reported the lowest. The mean difference between the highest and lowest aggregates equals 0.27, indicating a modest difference.

Conclusion

In conclusion this study has demonstrated that a combination of opportunity structures poor governance and livelihood pressures support illegal crude oil refining in Rivers East. While non-implementation of MOUs was a weaker driver poverty unemployment corruption and easy access to pipelines emerged as the strongest perceived determinants. Locals link ICOR to respiratory issues skin and eye disorders reproductive risks and shortened life expectancy and they are well aware of the major health risks associated with soot contaminated air and water. These perceptions are influenced by gender and income with women and lower-income groups expressing greater concern while age and education have little bearing. Although there is little direct involvement in refining many people indirectly support it through larger networks. Overall the results point to the need for effective responses that go

beyond raids and arrests to include health outreach livelihood alternatives environmental cleanup accountable security and anti-corruption measures as well as community involvement in decision-making.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. First. In order to dismantle the networks of protection that locals identify as supporting illicit refining the federal and state governments in collaboration with anti-corruption agencies and security commands should create and implement transparent sanctions for officials who accept bribes or shield ICOR operators through independent reporting hotlines regular lifestyle audits and publicized prosecutions.
2. To lessen easy physical access inadequate monitoring and local exploitation of pipeline weak points that locals perceive as facilitating ICOR the Nigerian National Petroleum Company security agencies and host community leadership should work together to redesign pipeline security by fencing vulnerable segments installing community monitored surveillance points and rewarding verified community reports of tampering. Oil companies, state government agencies and recognised community representatives should review, renegotiate and transparently implement existing MOUs by publishing timelines, budgets and project status in community meetings and on notice boards, so that agreements regain credibility and no longer quietly feed resentment that may indirectly support tolerance for ICOR.

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