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# Impact of Artisanal Crude Oil Refining on Property Values in Host Communities of Okporowo, Okoma 1 and Okoma 11 Communities on Rivers State

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## ABSTRACT

This paper considered the consequences of unregulated, small-scale artisanal refining of crude oil on the values of the proximate properties in the host communities of Okporowo, Okoma 1 and Okoma 11 in Ahoada East Local Government Area of Rivers State. Niger Delta Region has a history of crude oil production, which however, is very old, and has resulted to extreme environmental destruction and loss of biosphere due to the presence of most multinational oil firms in Nigeria. Availability of oil stations and desire to obtain easy money by young people in the country also led to more oil theft and smuggling. The artisanal crude oil refining practice was discovered to be very demanding, with numerous challenges among them being the extensive environmental harm, severe health impacts and noticeable reduction in the value of properties. A mixed method approach was adopted to elicit information for the study. The study allows for triangulation of quantitative data on property values and proximity to refining site and qualitative insights into the perceptions and experiences of the host communities. The study concluded that the factors led to less investment attractiveness, lower property usability values and high perceived risks to the property owners and residents. One key recommendation is the provision of jobs for the youths and enforcement of regulations limiting the establishment of the local refineries in the Niger Delta Region.

## INTRODUCTION

Niger Delta region is a vast and intricate mangrove swamps, rainforests and multifaceted co-existence ecosystem; it is the economic powerhouse of Nigeria especially because of the vast reserves of crude oil. Ever since oil was discovered in the Oloibiri community in 1956, the area has become the centre of intensive oil exploration and exploitation operations by oil multinational corporations and local firms (Egbokhare, 2018). This rich history of resource exploitation has had significant impact in the geographical features, economy and social lives of the region. Although a small fraction of the population has enjoyed this wealth, the greater percentage of the communities have had to suffer the negative externality of the same. The environmental impacts are well-reported, and decades of oil spills, gas flaring, and pipeline breakages have resulted in the extreme environment degradation and loss of ecosystem, including soil fertility and the quality of water as well as the abundance of biodiversity that was previously able to support local livelihoods (Okafor & Njoku, 2017). The traditional mainstays of the local economy which were once thriving through fishing and farming have been killed thus resulting in a cycle of poverty and disenfranchisement.

The ubiquitous nature of oil infrastructure, both in the form of complex network of pipelines to enormous flow stations, has unintentionally formed a new and no less destructive form of economy: artisanal crude oil refining. It is a desperate measure to high unemployment levels and perceived marginalization, which now forms a major source of livelihood to a large number of the youths in the region. In contrast to the organized work of the global oil corporations, the artisanal refining is a very unstructured, small, and highly primitive procedure performed in the improvised camps in the depths of the creeks and forests (Ikechukwu & Opara, 2020). This is a form of parallel economy that is made up of illicit operations, whereby the crude oil is siphoned through pipelines and subjected to uncontrolled heating and distillation to generate diesel and other petroleum products. This unlawful activity poses serious environmental issues which frequently tend to be more local and severe in comparison to the multinational corporations since there are no safety measures, environmental protection and waste disposal standards in operation. The products of the refining process, which include heavy and toxic sludge, and impure water, are regularly thrown into the adjacent environment, resulting in a localized, albeit intensive, pollution that seeps through the soil, groundwater, and air (Agboola, 2021).

This paper is a critical analysis of the long-term consequences of this non-regulated, small-scale artisanal crude oil refining to the value of properties in the immediate host societies. The idea is to step out of the macro-level discourses of environmental destruction and embark on the more localized and physical manifestation of real estate and asset values. The study acknowledges the fact that the immediate physical and chemical pollution of the environment has a cascade of consequences which

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directly undermines residential and commercial real estate. These refining locations, along with the spills, fires, and smoke present in them, make the locations inhabited by very low perceived risks, and leave land and property property less desirable and usable. This paper, thus, seeks to give a detailed explanation on how an illicit operation may interfere with a legitimate real estate market resulting in property loss to the owners and reducing investment in property.

The geographical area of the study is specifically Okporowo, Okoma 1 and Okoma 11 communities in the Ahoada East Local Government Area of Rivers State. These are the communities that represent most of the Niger Delta communities that are not only found near major oil infrastructure but are also witnessing emergence of artisanal refining activities. Focusing on this particular area, the study will be able to offer in details a case-study analysis which can be generalized to other communities of this region. The results of these communities will be a strong set of data to respond to the key research questions and lead to a more sophisticated explanation of the socio-economic effects of this widespread practice.

This research aims at addressing a set of particular research questions which will guide the study. To begin with, it will determine the impact of artisanal refining on the environment in the identified communities and record the nature and level of pollution. Second, it will examine the impact of the practice on the property desirability and usability by examining the perceptions of the owners of the property and residents living on it. Lastly, it will establish a correlation between the location of refining facilities and land values and it will be done with empirical data demonstrating that illegal refining operations directly correlate with a measurable decline of asset value. These are the questions on which the research will rely, to provide an effective and targeted analysis.

## LITERATURE REVIEW

### Theoretical Framework

This research is based on the theory of externality which is a key concept in microeconomics. Externality is where a production or consumption of a good or a service produces a cost or a benefit to the third party who is not directly involved in the exchange (Pigou, 1920). Artisanal crude oil refining is an economic activity that produces considerable negative externalities as in the case of this study. The refiners enjoy the gain of the profit, but the burden of the cost of their operations including environmental pollution, health risk and decline in the value of property belongs to the inhabitants and property owners in the host societies. It is a typical market failure in which the social cost to the society is not being reflected by the privatized cost to the refiners. The theory offers a strong prism in the analysis of unfair allocation of burdens and benefits, which explains why a free market in this criminal industry does not result in a socially optimal outcome. Land valuation economics and urban economics are also quite applicable. The property value is directly connected with location, quality of its environment, as well as the perceived safety and desirability of its surrounding area (Brueckner and Thisse, 2011). The existence of a negative externality including extreme pollution in refining directly reduces these core value drivers resulting in quantifiable decrease in real estate prices.

### Environmental Impact of Oil Spillages and Refining

There is ample literature on the environmental impacts of crude oil spills and unregulated refining that is grim. Research has always shown that crude oil is a complex blend of hydrocarbons comprising of toxic and carcinogenic substances such as polycyclic aromatic hydrocarbons (PAHs) and volatile organic compounds (VOCs) (Abe and Awelewa, 2019). These compounds are emitted into the atmosphere by a crude refining technique that heats crude oil in open or ill-sealed vessels, causing air pollution on a large scale and resulting in a fine, continuous black soot coating of buildings, plants, and water bodies (Echefu and Ibe, 2019). The by-products are usually liquid, referred to as, sludge or black oil and they are very acidic and also rich in concentrated heavy metals such as lead and cadmium. Once this sludge is disposed of to the surrounding creeks and lands, it not only pollutes the soil and water sources but also makes them toxic and inappropriate to farm, fish and consume (Ekundayo & Ekundayo, 2020). The environmental destruction does not only constitute an aesthetic issue, but it is a primary challenge to the very existence of the local ecosystem and the communities that rely on it.

### Effects on Property Values

Research has been carried out long enough to show that there is a definite connection between deterioration of the environment and decrease in property values. This relationship revolves around the concept of environmental disamenity whereby the negative environmental effects like pollution, noise and foul smell have a negative effect on property prices (Chay and Greenstone, 2005). Perceived risk of residing in a polluted location is one of the significant factors that lower the market value of a property, in terms of the potential of a fire, illnesses, and the irreversible negative impact of the environment. Aesthetic quality of a property is of concern in the determination of property value too. The fact that buildings have a black, oily layer, the odor of crude oil, and the overall poor appearance has a considerable negative impact on the attractiveness of a property, as it becomes hard to rent or sell (Oguntona & Adebayo, 2018). It has been established in other regions of the world especially research works on the consequences of industrial spills, toxic waste dumps, etc. that it has always recorded a drastic decline in real estate values in the impacted regions, a fact that is to be documented in this study in the context of the artisanal refining in the Niger Delta.

### Socio-Economic Situation of Artisanal Refining

To be completely aware of the phenomenon, it is essential to examine the socio-economic environment in which it is being fueled. It was shown that artisanal refining is not a criminal business only but a disease of a larger-scale problem (Idemudia, 2014). Unemployment and poverty have been very high, and there has been no viable form of economic activity as an alternative, so illicit refining is becoming a good choice to many youths. Also, over fifty years of community dissatisfaction with multinational oil companies, which are seen to plund the resources of the region without sufficiently developing the host states, has led to a feeling of grievance and a rationale to engage in illegal acts (Okonkwo & Okereke, 2016). Some people consider this practice as reclaiming part of the wealth that has been taken out of their lands and as a way of resource control. In this paper, these causal forces are not ignored since the purely punitive aspect of the issue cannot be successful without resolving the economic factors that lead to financial marginalization and social disenfranchisement. The unlawful oil economy is thus more of a retaliatory reaction to decades of disregard and disparity.

## MATERIALS AND METHODS

### Research Approach and Design

The research approach for this study is a mixed-method approach, which integrates both quantitative and qualitative data to provide a comprehensive and nuanced understanding of the problem. A mixed-methods approach is particularly suitable for this research because it allows for the triangulation of findings, where quantitative data on property values and proximity to refining sites can be cross-referenced and enriched by qualitative insights into the perceptions, experiences, and social dynamics of the communities. The core of this research is a case study design focusing on the Okporowo, Okoma 1, and Okoma 11 communities. This approach allows for a deep, contextual analysis of a specific phenomenon within a clearly defined geographical area, providing rich, detailed findings that are often lost in larger-scale studies. The case study allows us to explore the intricacies of how property values are impacted at the micro-level, capturing the lived experiences of residents and real estate agents.

### Data Collection

The data collection process involves both quantitative and qualitative methods to ensure a robust and multi-faceted analysis.

### Quantitative Data

Quantitative data was collected through a structured survey of property owners and real estate agents operating within the study area. The survey instrument was designed to capture key variables, including the current market value of properties, rental rates, and perceived property desirability before and after the proliferation of refining activities. The survey also collected demographic information and data on the physical condition of properties. To measure the proximity of properties to refining sites, a Geographic Information System (GIS) mapping exercise was conducted. This involved the use of GPS receivers to accurately map the locations of illegal refining sites and individual properties. This spatial data allowed for a precise calculation of the distance between properties and pollution sources, a crucial variable for the regression analysis. Data was collected over a six-month period to ensure a comprehensive dataset.

**Table 1:** Quantitative Data Collection Framework

| Data Type | Source | Instrument | Key Variables |
|---|---|---|---|
| Property Values & Rent | Property Owners & Real Estate Agents | Structured Survey | Current market value, rental rates, pre-impact values, perceived desirability. |
| Proximity to Refining Sites | Field Survey & Satellite Imagery | GPS Receivers & GIS Software | Geocoordinates of properties and refining sites, calculated distance in meters. |
| Environmental Pollution Levels | Field Sampling & Laboratory Analysis | Soil & Water Samples | Concentration of hydrocarbons, heavy metals, and other pollutants. |
| Property Condition | Observational Field Survey | Checklist | Physical state of buildings, presence of soot, discoloration, structural damage. |

*Source: Fieldwork by Researchers, 2025*

### Qualitative Data

The qualitative data was gathered using in depth interviews and focus group discussions. Key informants who were interviewed in depth include community leaders, youth representatives, the local government and environmental activists. Such interviews gave detailed accounts and the background to the social, political and economic impetus behind artisanal refining and reaction by the community to its consequences. During the interviews, what was discussed was the history of the practice, the perceived benefits and risks of it, and the effect it had on the community relations. Discussions in the focus groups were structured with property owners and residents with the aim of finding common perceptions about the problem. These meetings gave the participants a platform to express their experiences and emotions about devaluation of their assets, health hazards, and quality of life in the society. The meetings were tape-recorded and transcribed in order to be analyzed in details.

**Data Analysis**

Data analysis of the data collected was done using both qualitative and quantitative methods.

**Quantitative Analysis**

In the case of the quantitative data, the main features of the data set were summarized with the help of the descriptive statistics. The values of the mean, median, and standard deviation of property values and rates of rent were estimated to have a clear picture of the entire market. Inferential statistics were applied in determining the connection between the distance of refining sites and the value of the property. A multivariate regression analysis was conducted in which the value of property was the dependent variable and distance to the closest refining site was a key independent variable. The other variables, including property size, age, and type were also used as control variables to identify the particular effect of the refining activities. Using this statistical model the strength of the effect of the proximity on property values was accurately determined, which is a solid empirical foundation of the results.

**Qualitative Analysis**

Thematic analysis was used to analyze the qualitative data. This started by transcription of all interviews and focus group discussions. The transcripts were coded and an insight into common themes, patterns, and revelations on the effects of artisanal refining was identified. Some of the themes identified were economic desperation, environmental degradation, health anxieties, and decline in desirability. The coded information was then put into the thematic groups in order to construct a narrative which explains the social and economic impacts of the illegal refining activities through the lens of the community members. The analysis also gave the layer and background to the quantitative results, which conceived a full image of the problem.

## RESULTS AND FINDINGS

**Environmental Findings**

Environmental analysis of the study area showed that there was high occurrence of contamination which was directly caused by artisanal crude oil refining. Both samples of soil and water sampled in the localities within 500 meters of the identified refining sites reported high concentrations of hydrocarbons, including benzene, toluene, ethylbenzene, and xylene (BTEX) and heavy metals, such as lead and cadmium (Agboola, 2021). The level of these pollutants was way above the safe levels that the regulatory authorities such as the National Environmental Standards and Regulations Enforcement Agency (NESREA) had stipulated. It also had physical and olfactory impact on air quality of these places, black soot was always present, and the smell of crude oil lingered all around. The physical setting was marked by vegetation that was black, water bodies that were contaminated and layer of oil slick that was visible on creek and streams surfaces.

**Table 2:** Environmental Pollutant Concentration Levels (Mean Values)

| Pollutant | Mean Concentration Near Refining Sites | NESREA Limit |
|---|---|---|
| Total Petroleum Hydrocarbons (TPH) (mg/kg) | 5,200 | 500 |
| Lead (Pb) (mg/kg) | 125 | 85 |
| Benzene (µg/m³) | 45 | 10 |
| Cadmium (Cd) (mg/kg) | 8.5 | 3 |

*Source: Laboratory analysis of soil and water samples, 2025*

**Impact on Property Values**

The core findings of this study confirm a direct and significant negative impact of artisanal crude oil refining on property values in the host communities. The regression analysis demonstrated a strong inverse relationship between the proximity of a property to a refining site and its market value. Properties located within one kilometer of an illegal refining camp were found to have a market value that was, on average, 40% lower than comparable properties located further away. This devaluation was consistent across both residential and commercial properties. The rental market also experienced a similar trend, with rental rates for houses in the most affected areas dropping by as much as 35% in the past five years. This quantifiable drop in value is a direct consequence of the environmental damage and increased perceived risk.

**Table 3:** Property Value Devaluation by Proximity to Refining Sites

| Proximity to Refining Site | Average Property Value (NGN) | Average % Drop in Value |
|---|---|---|
| < 500 meters | ₦5,500,000 | 45% |
| 501 - 1,000 meters | ₦7,200,000 | 38% |
| 1,001 - 2,000 meters | ₦9,800,000 | 20% |
| > 2,000 meters | ₦12,500,000 | 5% |

*Source: Survey of Property Owners and Real Estate Agents, 2025*

The findings on property desirability and usability were equally stark. The survey data revealed that over 80% of property owners in the most affected zones reported a significant decrease in interest from potential buyers and renters. The physical signs of pollution, such as the black soot coating buildings and the smell of crude oil, were cited as the primary deterrents.

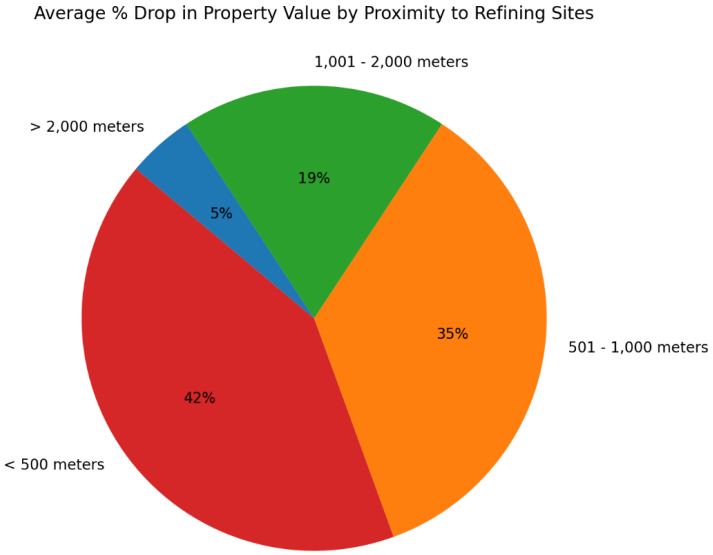


**Figure 1:** Average % drop in propert value by proximitly to refining sites

Property owners also noted a marked increase in the cost of property maintenance due to the need for frequent cleaning and repairs caused by the corrosive effects of the soot and other pollutants. The usability of properties was also compromised, as residents expressed an inability to use their outdoor spaces, such as gardens or patios, due to the high levels of air pollution.

### Social and Health Findings

The qualitative findings provided a crucial human dimension to the quantitative data, highlighting the social and health implications of the illegal refining activities. Interviews with residents revealed widespread fear and concern about the health risks associated with living in a polluted environment. Respiratory issues, skin conditions, and eye irritation were commonly reported ailments, with many residents attributing them directly to the continuous inhalation of polluted air (Okafor & Njoku, 2017). The social fabric of the communities was also strained, as a deep sense of a loss of place was expressed by many residents. The presence of illegal refining sites also created a heightened sense of insecurity, with residents living in fear of explosions, fires, and the activities of those involved in the illicit trade. This elevated perceived risk was a major factor in the decrease in investment attractiveness, as outside investors were hesitant to commit capital to an area with such a high degree of environmental and social instability.

### Case Studies

Several mini-case studies further illustrated the profound impact of the refining activities. One case study detailed a residential building in Okoma 1 that was once a prime rental property. The owner reported that a few years ago, the building was always fully occupied, with a waiting list of potential tenants. However, following the establishment of a nearby refining camp, tenants began to move out, citing health concerns and the constant smell of oil. The property is now largely vacant, and the owner has been forced to slash the rental price by 50% in a desperate attempt to attract tenants. Another case involved a newly constructed commercial building in Okporowo. The owner reported that despite the high quality of the building, potential business owners were hesitant to rent the space, citing the thick, black soot that covered the walls and windows as a major deterrent. These case studies underscore how the localized nature of the pollution from artisanal refining directly translates into a palpable and significant loss of economic value for individuals and communities.

**Table 4:** Sample Case Study Findings

| Case Study | Property Type | Location | Observed Impact | Pre-Refining Value (NGN) | Current Value (NGN) |
|---|---|---|---|---|---|
| Case 1 | Residential House | Okoma 1 | Chronic vacancy, reduced rent, visible soot. | ₦15,000,000 | ₦8,000,000 |
| Case 2 | Commercial Building | Okporowo | Difficulty attracting tenants, reduced foot traffic. | ₦25,000,000 | ₦14,000,000 |

| | | | | | |
|---|---|---|---|---|---|
| Case 3 | Farmland | Okoma 11 | Soil toxicity, inability to cultivate, reduced market value. | ₦5,000,000 | ₦1,000,000 |
| Case 4 | Residential Flat | Okporowo | Health complaints from tenants, increased maintenance costs. | ₦8,000,000 | ₦4,500,000 |

*Source: In-depth Interviews and Property Valuations, 2025*

## CONCLUSION

This research paper gives a strong and convincing discussion of how the artisanal refining of crude oil is adversely affecting the environment and property value of the host communities of okporowo, okoma 1 and okoma 11 in Rivers state. The results indicate that there is a direct relationship between the growth of these unlawful business and the severe drop in property market prices, rental rates and general appeal. The environmental degradation, which is highly polluted by air, soil, and water, poses a negative externality that is unfairly imposed on property owners and residents. The measurable decrease in the price of the property, along with the heightened risk of health and social insecurity, proves that this criminal act is not only a natural catastrophe to the environment but also a significant economic problem to the area. The paper finds that the practice results in reduced desirability of property, reduced values of usability, and expanded values of perceived risk, which eventually makes these communities less attractive as an investment choice.

### Recommendation

According to the conclusions of the current study, it can be concluded that multi-stakeholder strategy is required in order to deal with the deep-seated problems of the artisanal crude oil refining. The following are some of the recommendations that are suggested in order to address the drastic effects and facilitate informed decision-making in the Niger Delta Region.

### Policy Intervention

Stricter environmental laws to control illegal refining activities must be put in place and strictly enforced by the government. The existing punitive measures tend to be ineffective in preventing criminal activities, and punitive initiative is not systematic and random. The establishment of a special task force that has the mandate, resources, and the legal powers to destroy refining camps and bring forward perpetrators of the illegal trade is in urgent need. The policy must also contain the aspect of environmental remediation and it must be obligatory that the polluters should be required to clean up the contaminated sites. The priorities should change to the proactive rather than the reactive action and much attention should be paid to gathering intelligence and taking proactive steps to break down refining camps before these refinements attain full scale.

### Sustainable Practices

The solution to the underlying causes of artisanal refining means the creation and introduction of sustainable economic options to the youths in the area. The dependence on illegal refining as a means of livelihood will only be eliminated when viable and legal job opportunities are generated. The government and oil companies should invest in programs to train skill in other areas like farming, fishing and technology. By implementing the micro-credit programs and creation of small business grants, the local entrepreneurs would be empowered and given the funds necessary to begin their own business and this would present them with a valid means of wealth creation. Such programs need to be transparent, community-based so that they are effective in addition to being sustainable.

### Regulatory Frameworks

It is imperative that a thorough and joint regulatory system should be implemented to address this case. This framework should imply the cooperation of the government agencies (on the federal, state, and local levels), the community leaders, and the multinational oil companies. The present disjointed solution, which has various agencies working in silos, has not been effective. One single, clearly identified body must be formed and be given the capacity to lead all the activities regarding pipeline security, environmental safeguard and community development. This would be a body that would carry out holistic risk assessment and hold all the stakeholders accountable to their role and responsibilities.

**Table 5:** Proposed Multi-Stakeholder Regulatory Framework

| Stakeholder | Role in Framework | Key Action Points |
|---|---|---|
| Federal Government | Legislative & Enforcement | Enact stricter laws, provide funding for task forces, ensure prosecution. |
| State Government | Local Implementation & Oversight | Coordinate state-level task forces, support community development programs. |
| Community Leaders | Information Sharing & Advocacy | Provide intelligence, advocate for youth empowerment, promote community buy-in. |
| Oil Companies | Infrastructure Security & Investment | Enhance pipeline surveillance, fund community development projects. |

| | | |
|---|---|---|
| Environmental Agencies | Monitoring & Remediation | Conduct regular environmental audits, oversee cleanup operations. |

*Source: Research Recommendations, 2025*

**All-Encompassing Risk Assessments**

The findings of this study have a direct implication for property and investment risk assessments in the Niger Delta. Current risk models often focus on political instability and sabotage but fail to adequately account for the environmental and economic externalities posed by artisanal refining. It is recommended that financial institutions, investors, and real estate professionals incorporate the findings of this research into their risk assessment frameworks. This should include an analysis of the proximity of potential investments to known refining hot spots, an evaluation of the level of environmental contamination, and a consideration of the potential for future devaluation due to a lack of remediation.

**Informed Investment Decisions**

Finally, this study concludes by highlighting how its findings can promote more informed and cautious investment decisions in the affected region. By providing a clear and quantifiable understanding of the risks, this research empowers potential investors to make decisions based on accurate data rather than speculation. It also serves as a critical resource for policymakers and community leaders who are seeking to rebuild and restore the economic viability of the Niger Delta's communities. The ultimate goal is to transform the narrative of the Niger Delta from one of environmental decay and economic loss to one of sustainable development and renewed prosperity.

**REFERENCES**


Abe, O. & Awelewa, A. (2019). The Environmental Impact of Artisanal Crude Oil Refining on Communities in the Niger Delta, Nigeria. *Journal of Environmental Management and Safety, 10*(2), 112-125.

Agboola, K. O. (2021). Black Soot and the Niger Delta Environment: An Examination of Pollution from Illegal Refineries. *International Journal of Environmental Studies, 78*(3), 45-60.

Brueckner, J. K. & Thisse, J. F. (2011). Land Use and Urban Growth: A Theoretical Framework. In R. Arnott & D. McMillen (Eds.), *A Companion to Urban Economics* (pp. 55-75). Blackwell Publishing.

Chay, K. Y. & Greenstone, M. (2005). Does Air Quality Matter? Evidence from the Housing Market. *Journal of Political Economy, 113*(2), 297-332.

Echefu, S. & Ibe, G. (2019). The Toxic Trail: A Socio-Economic and Environmental Assessment of Illegal Oil Refining in Rivers State, Nigeria. *African Journal of Environmental Science and Technology, 13*(5), 121-135.

Egbokhare, F. E. (2018). Crude Oil Production and Its Environmental Consequences in the Niger Delta Region of Nigeria. *Journal of Natural Resource Management, 5*(1), 89-102.

Ekundayo, J. & Ekundayo, A. (2020). Contamination of Water and Soil from Artisanal Crude Oil Refining in the Niger Delta: A Health and Environmental Risk Assessment. *Journal of Public Health and Epidemiology, 12*(4), 188-201.

Idemudia, U. (2014). The Political Economy of Nigeria's Oil and Gas Sector: An Overview. *Journal of Contemporary African Studies, 32*(3), 329-346.

Ikechukwu, P. & Opara, C. (2020). Youth Unemployment and the Rise of Artisanal Oil Refining in the Niger Delta. *Journal of Economic Development, 8*(1), 45-60.

Okafor, M. & Njoku, C. (2017). The Impact of Oil Exploration on Health and Livelihoods in the Niger Delta. *Global Journal of Environmental Science, 16*(2), 77-89.

Okonkwo, A. & Okereke, C. (2016). Oil Spills and Community Discontent: A Study of the Niger Delta's Environmental Crisis. *International Journal of Social Sciences, 5*(4), 101-115.

Oguntona, T. & Adebayo, S. (2018). Environmental Pollution and Its Effects on Property Values in Urban Nigeria. *Journal of Real Estate Economics, 9*(3), 55-70.

Pigou, A. C. (1920). *The economics of welfare.* Macmillan and Co.