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THE IMPACT OF ARTISANAL REFINING ON ENVIRONMENTAL SECURITY IN RIVERS STATE

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ABSTRACT

This study examines the impact of artisanal refining on environmental security in Rivers State. The population of the study was 196,780 households in Rivers State. A sample size of 384 was determined from this population using Krejcie and Morgan sampling technique. Questionnaire and interview were used in data collection and the collected data were analysed using descriptive statistic, the mean and standard deviation. The result revealed that artisanal refining affect environmental security in Rivers State. Hence the study concludes that artisanal refining is responsible for environmental security degradation in Rivers State. Therefore, the study recommended that Government should encourage oil companies to take responsibility by establishing environmental impacts and invest in community development programs for rapid response teams to address health emergencies related to pollution. They should develop disaster preparedness plans for communities affected by pollution from illegal refining. Invest in research to develop innovative solutions for pollution control and health improvement. Government and oil companies should establish local emergency response units specifically trained to handle explosions and fires from artisanal refineries, ensuring they have the necessary tools and resources to respond quickly and effectively to ensure environmental security in Rivers State.

Keywords: Artisanal Refining, Makeshift Refining Exploration, Environmental Security.

Introduction

Rivers State, Nigeria is home to significant oil reserves, but artisanal refining has become a prevalent practice, posing substantial threats to environmental security. The unregulated refining of crude oil in makeshift facilities has led to devastating environmental consequences, including oil spills, air and water pollution, and habitat destruction (NJES,2020). Despite various law enforcement strategies to combat illegal refining, the practice persists, contributing to pollution and socio-economic instability. Studies have explored the impact of artisanal refining on food, health, and environmental security, emphasizing the need for comprehensive approaches to address the underlying causes and enhance environmental security in the region. The current paper aims to contribute to the existing literature by examining the impact of artisanal refining and its effects on environmental security in Rivers State, exploring the complex relationships between economic, social and environmental factors, and to inform policies and strategies that mitigate its negative consequences and promote sustainable development.

Statement of the Problem

In the Rivers State oil pollution impacts soil's ecological functions, compacting it and affecting water and nutrient availability, directly harming plant growth and production (Ogbeifun, 2014). The effects of crude oil pollution are felt at multiple levels, but the local populations in oil-bearing areas suffer the most (UNEP, 2011). Artisanal refining exacerbates insecurity in the Niger Delta, contaminating the environment and posing health risks from polluted air and soot, leading to conditions like heart attacks, cancer, and respiratory issues. The region's economic growth is stunted as businesses collapse, investments decline, and unemployment rises. Infrastructure destruction and a lack of safe environments for economic activities hinder socioeconomic advancement and wealth generation (Ikelegbe, 2018). Despite increased government spending on security, the populace still faces significant risks and economic setbacks.

Artisanal refining in Rivers State, Nigeria, has dire impacts on environmental security across economic, environmental, health, and social dimensions. Economically, it leads to revenue losses and undermines traditional livelihoods through agricultural and fisheries contamination (Nriagu & Udofia, 1989; Ayodele & Ayodele, 2018). Environmentally, it causes severe pollution and ecological degradation, harming health and ecosystems (Izah et al., 2016; Obinna & Obinna, 2017). Addressing these issues requires comprehensive policy interventions, environmental remediation, and a nuanced understanding of the socio-economic dynamics to improve environmental security and foster sustainable development in the region. Hence, the present study examined the impact of artisanal refining on environmental security in Rivers State.

Aim and Objectives of the Study

The aim of the paper was to examine the impact of Artisanal refining on environmental security in Rivers State. The objectives of the paper were to:

1. Examine the effect of makeshift refining on environmental security in Rivers State.
2. Ascertain the causes of makeshift refining explosions on environmental security in Rivers State
3. Investigate the influence of government responses on the impact of Artisanal refining on environmental security in Rivers State.

Significance of the Study

The importance of this paper is to add to the burgeoning literature on artisanal refineries in Rivers State. Practically, policy makers, civil society groups, military architectures, students and additional scholars might profit from this work. In the case of policy makers, they should draw attention to creating new rules on the topic of illegal refining or the current laws should be modified to make the penalty for artisanal refiners more rigorous. The findings from this paper will offer insights into understanding the threats posed to national security and development by activities of the militancy and other groups. The environmental devastation brought on by hydrocarbon exploitation in Rivers State, Niger Delta has made this paper particularly essential. This paper studied the influence of artisanal refining on environmental security in Rivers State. The conceptual scope of the research comprises two key concepts: artisanal refinement utilizing dimensions and environmental security using three metrics. The theoretical basis of the research is the Relative Deprivation Theory which studies how underprivileged populations, often bearing the

brunt of environmental deterioration and pollution, feel social injustices and breaches of their rights. The unit of analysis focuses on the families that have expertise about artisanal refining in Rivers State of Nigeria.

Literature Review

Concept of Artisanal Refining

In Rivers State, the artisanal refining of petroleum products is referred to as "Kpo-Fire business." The term "Kpo-Fire" refers to a postcolonial vernacular that was used to characterize the prosperous refining and bunkering industry in the Niger Delta. It got its name from the explosion noise made in the mangrove forest when fuel is burned while refining crude oil. The individuals participating see it as their own means of obtaining a share of the national cake. Alhaji Mujahid Asari-Dokubo, the head of the Niger Delta Peoples Volunteer Force (NDPVF), was essentially a warlord in the Niger Delta's creeks in 2003, which is when this operation got its start (Fejokwu, 2014). Asari Oil or fuel was the moniker given to any petroleum product at its beginnings that was not produced in the West African area by the Nigerian National Petroleum Corporation (NNPC).

This unofficial economy has gained popularity. A few decades ago, artisanal petroleum refining rose to prominence in the Niger Delta and the south-south geopolitical zone of Nigeria, which includes Rivers State. In addition to producing very low-quality goods, this illicit petroleum refining and its related operations have seriously harmed the environment and degraded the Niger Delta ecosystem. Environmental problems have been worse in the previous several years due to the expansion of illicit refineries in the area (Elum et al., 2016). Pollution has an impact on soil, vegetation, groundwater and surface water supplies, wildlife, rich biodiversity, and atmospheric air. The escalation of the greenhouse effect resulting from climate change and global warming, acid rain, photochemical smog, reduced atmospheric visibility, depletion of the ozone layer, soot/heavy metals deposition, poor water quality, contamination of surface water and groundwater, soil contamination, disturbance of communities, flora and fauna, and devastation of ecosystems are among the environmental impacts of the petroleum industry (E&P Forum, 1997; Speight, 2005; Mariano & La Rovere, 2007; Orszulik, 2008; Isa, 2012; Jafarinejad, 2015, 2016).

Makeshift Refining

There are improvised oil refineries (Kpo fire) in the vicinity. Indigenous methods for distilling locally produced gin, known as Ogogoro or Kaikai, are utilized to convert crude oil into different petroleum products. Crude oil is boiled; the fumes are collected, cooled, and condensed in tanks to be utilized locally for energy, illumination, or transportation. Metal pipes and drums are welded together for this purpose. Since 2011, the Kpo-fire, or temporary (local) oil refineries, have been burning, and in early 2015, they started to progressively fade. Makeshift refining, also referred to as artisanal or illicit refining, is the process of turning crude oil into petroleum products that may be used, usually using improvised and dangerous techniques. This approach is common in areas with large oil deposits but no infrastructure for authorized and controlled processing. The procedure usually entails heating crude oil in drums or basic distillation equipment to separate it into different components including kerosene, diesel, and gasoline.

Makeshift Refining Explosions

Explosions are a significant hazard in makeshift refining operations due to the volatile nature of crude oil and the rudimentary equipment used. The risk of explosions arises from several

factors, including improper handling of volatile substances, inadequate safety measures, and the use of equipment not designed for refining activities. Research by the World Health Organization (WHO) highlights that explosions in makeshift refineries can result in serious injuries or fatalities among workers and nearby residents (WHO, 2017). The combustion of hydrocarbons in crude oil generates flammable gases, which, when ignited in confined spaces or improperly sealed equipment, can lead to sudden and violent explosions.

According to data from the special edition of the weekly update spotlights natural resources conflict and human-induced environmental disasters in the Niger Delta with a focus on unregulated artisanal oil refining related violence and disasters in Rivers State, artisanal oil refining related violence and disasters caused over 150 fatalities in the Rivers State between January 2020 and August 2023. Recent data shows the prevalence of artisanal oil refining related violence and fire outbreaks in the State. In March 2023, for instance, 12 persons were reportedly killed in an explosion caused by oil bunkering and artisanal refining activities in Rumuekpe community, Emohua LGA. In July, 16 persons including fishers were reportedly killed by fire while they were scooping spilled petroleum products at a Jetty in Okrika LGA. In August, government security forces allegedly bombed several artisanal oil refineries and neutralized many oil thieves at different locations in Akuku-Toru, Bonny and Degema LGAs. Recently, on October 01, 2023, 35 persons were allegedly killed by fire at an artisanal oil refinery in Ibaa town, Emohua LGA (Niger Delta Weekly, 2003). This shows the detrimental effect of makeshift refining explosions. The figure below shows an explosion from makeshift refining.

Fig. An explosion from Makeshift Refining.
Source: Sweet Crude Reports, October, 5 2023.

Concept of Environmental Security

Environmental security in Rivers State, Nigeria, is a significant concern due to widespread environmental degradation caused by extensive oil exploration and industrial activities. The region, rich in oil and natural gas, has faced severe pollution, including oil spills and gas flaring, which have contaminated water sources, destroyed arable land, and harmed local ecosystems. This

environmental degradation has led to health issues, loss of livelihoods, and social unrest among the local population. Studies have shown that oil pollution in the Niger Delta, including Rivers State, has resulted in decreased agricultural productivity and fishery yields, exacerbating poverty and food insecurity in the region (Nriagu et al., 2016). The Ogoni crisis in the 1990s, marked by protests against environmental damage and demands for economic and social justice, highlights the link between environmental degradation and conflict (Watts, 2004). Efforts to address these challenges include the United Nations Environment Programme (UNEP) environmental assessment of Ogoniland, which calls for comprehensive remediation and sustainable management of natural resources to restore environmental security and promote stability in Rivers State (UNEP, 2011).

Environmental security fosters a stable environment that enables people to prosper and contribute to the economy, significantly promoting economic development and progress. Shielded from threats like violence, poverty, and health issues, individuals are more likely to engage in productive activities, invest in their education, and join the labor force, enhancing human capital and productivity (UNDP, 2021). Nations with higher environmental security experience lower crime rates, reduced healthcare and law enforcement costs, and more resources for economic projects. In the context of Rivers State, the illicit refining of crude oil, known as "Kpo-Fire business," has significantly impacted human security. This practice involves boiling crude oil and condensing the vapors to produce low-quality petroleum products, causing severe environmental damage and health hazards. The rise of artisanal refining is linked to socio-economic struggles and perceived economic exclusion by local communities.

Governments Response influence on the effect of Artisanal Refining on Environment Security

Numerous Nigerian governments have recognized the vital role that security plays in promoting harmonious cohabitation and establishing an environment that is conducive to the expansion of sustainable economic activity. This may have aided in the establishment of security agencies that are fully staffed with individuals who have received training and who are armed with the necessary equipment to swiftly remove any perceived threat to the lives and property of the country. Additionally, with the express purpose of effectively protecting Nigerian residents' lives and property, a national security policy has been created to ensure internal security and is included in the constitution.

Theoretical Framework

The theoretical framework of this study utilizes Samuel A. Stouffer's Relative Deprivation Theory to analyze artisanal refining and environmental security in Rivers State. This theory, articulated in "The American Soldier" (1949), posits that individuals feel deprived when they perceive a discrepancy between their circumstances and their entitlements, especially in comparison to others. In Rivers State, this perception arises as residents compare their economic situations with those benefiting from the official oil industry, leading to feelings of deprivation and entitlement to better living conditions. This sense of deprivation, exacerbated by environmental degradation and historical grievances, drives individuals to engage in illegal crude oil refining. The resulting socio-economic and security challenges include environmental damage, economic loss, and increased crime. Addressing these issues requires robust, transparent public institutions and effective policies to mitigate deprivation and conflict, highlighting the need for institutional reforms in the region.

Empirical Review

In the Niger Delta of Nigeria, Eseoghene et al. (2022) conducted an empirical investigation on oil spills and caught fish productivity. The Food and Agricultural Organization (FAO), Central Bank of Nigeria (CBN), Federal Department of Fisheries (FDF), and Department of Petroleum Resources (DPR) provided the secondary data for this research, which covered the years 1986 to 2018. The Auto-Regressive Distributed Lag (ARDL) Bounds estimation approach was used in the investigation. The results showed that, at a 5% level of significance, oil spills had a detrimental effect on fish output in Nigeria. For the first simulation, the ARDL error correction model (ECM) displayed a comparatively low result of -0.28. This suggests an adjustment speed that is rather modest, capturing the pace of return to equilibrium. Thus, the research indicates that in the Nigerian Niger Delta, the amount of caught fish productivity is reduced by oil spills. Since fishing is the principal industry in the area, its continued viability is crucial. Sustainable extraction, usage, and management of the Niger Delta's oil resources may achieve this.

The study by Ordinioha and Brisibe (2013) examines the impact of crude oil spills in the Nigerian Niger Delta by interpreting data from various published research. The study collects quantitative information on the amount of crude oil spilled annually, the levels of contaminants in surface and ground water, ambient air, and plant and animal tissues, and the direct effects on household food security and human health through manual and online searches. Key findings include that the Niger Delta experiences an average of 240,000 barrels of crude oil spills each year, primarily due to mechanical failure (17.04%), third-party activities (20.74%), and unknown reasons (31.85%). Spills contaminate surface water, ground water, ambient air, and crops with hydrocarbons, carcinogens like polycyclic aromatic hydrocarbons and benzo(a)pyrene, radioactive elements, and trace metals. Oil spills result in a 60% decrease in family food security, a 36% reduction in the ascorbic acid content of vegetables, and a 40% decrease in the crude protein content of cassava. Exposure to crude oil can lead to infertility, cancer, and increases in infantile malnutrition by 24%, and animal studies suggest potential hepatotoxic and hemotoxic effects. The study highlights both short- and long-term health impacts of oil spills on the local population, recommending material relief and medical treatment to address the health effects. However, the study lacks methodological clarity and transparency, as it does not provide specific details on data collection and analysis methods, limiting its reproducibility and transparency.

According to Ekanem and Nwachukwu (2015), who also looked at the efforts of oil companies to remediate the degraded farmlands in the Niger Delta and the extent of environmental degradation in the region. The Niger Delta's fertile alluvial soil, abundant fish population, and saltwater bodies provide the region's mostly farming and fishing inhabitants the motivation they need. The primary industries for the rural population in this area, farming and fishing, have become obsolete due to the ecological destruction caused by oil exploration. In addition to outlining the amount of environmental damage in the Niger Delta, the report aims to assess the oil companies' attempts to restore the region's devastated farmlands and provide suggestions for a sustainable agricultural development there. It concludes that in order to achieve sustainable agricultural production, ongoing environmental degradation remediation, special agricultural intervention by the three tiers of government, youth education, encouragement and motivation, and the provision of subsidized inputs to the actual farmers were required. It identifies three (3) states and thirty-one environments that are severely polluted with oil.

Kadafa (2012) used tabular analysis of data from secondary sources to investigate the environmental effects of oil exploration and extraction in Nigeria's Niger Delta. According to the report, the region's oil sector has made a significant economic contribution to the nation, but unsustainable oil exploration practices have left the Niger Delta region's ecosystems among the five most severely harmed in the world. Using comparative analysis of secondary data covering the years 1976 to 2000 on descriptive techniques like line and bar graphs, Adati (2012) evaluated oil exploration and spillage in the country's Niger Delta region and discovered a decrease in the quantity of oil spills but an increase in the number and timing of oil spills. The study recommends improvements in contaminated land laws and significant clean-up funds for oil-polluted areas in Nigeria. However, it lacks specific policy recommendations or feasibility assessments for implementing these recommendations in the Nigerian context. Further research could explore case studies of successful environmental remediation efforts in other oil-producing regions to provide practical guidelines for policy makers in Nigeria.

The United Nations Environment Program (UNEP) conducted a thorough environmental impact assessment (2011) to ascertain the degree of oil pollution and hydrocarbon concentration in Ogoni land and surrounds in order to analyze the effects of oil spills in the Niger Delta on human health. They said that Ogoni land has an abnormally high amount of pollution, which presents serious health risks. Extreme hydrocarbon contamination of the soils, rivers, dams, agricultural crops, vegetables, and shellfish resulted in a rise in health issues including cancer, liver damage, acute respiratory infections, and issues with reproduction. More than four thousand samples from wells, surface water, and ground water in the area were collected and examined. Samples of soil were taken out of 780 boreholes. The UNEP project team also looked at almost 5,000 medical records. According to the evaluation, since the Niger Delta experiences heavy rains, oil spills have a propensity to spread swiftly into fields and streams and have the potential to seep into subsurface water. This was corroborated by Ordinioha and Brisibe (2013), who pointed out that residents in the Niger Delta face increased risks of exposure to toxins via interaction with and consumption of food and water, as well as direct reliance on the natural environment for food and subsistence. They reviewed the quantity of hydrocarbons in the Niger Delta's terrestrial and marine environments as well as the possibility of human population exposure to these pollutants. They also examine how local oil spills may affect people's health. Their findings indicated a rise in the incidence of anemia, renal illness, cancer, diarrhea, and malnutrition in children, all of which are directly linked to high hydrocarbon concentrations. Both studies highlight the extensive environmental and health impacts of oil pollution in the Niger Delta.

Methodology

This paper utilized a descriptive research design, which captures a snapshot of a population at a specific moment. This design allows researchers to determine the prevalence of particular characteristics, behaviors, or outcomes within the population without manipulating variables or establishing causal relationships. Data collection methods included surveys, questionnaire with a representative sample, aiming to gather direct information about demographics and other relevant variables. The research was conducted in three Local Government Areas (LGAs) in Rivers State, Nigeria. The study population consisted of 196,780 households engaged in artisanal refining across the three LGAs. Using the Krejcie and Morgan sample table, a sample size of 384 households was determined. Data analysis included descriptive statistics and univariate analysis using SPSS version 23.0.

Data Analysis and Results

Analysis of Items on Questionnaire

Univariate analysis of questionnaire items is essential for summarizing and understanding the central tendencies and distributions of individual responses, which helps in identifying patterns and trends. It provides a clear picture of each item's performance, enabling researchers to assess data quality and item clarity. This foundational analysis informs further statistical procedures and decision-making by highlighting key insights and potential areas for improvement. The study employed mean and standard deviation with a benchmark of -1.96 or +1.9.

Table 1: Deceptive Analysis of Items on Makeshift Refining

Statement	N	SA	A	MA	D	SD	SUM	MEAN	Standard Deviation
1. Many people in this community engaged in artisanal refining practices.	380	90	100	85	75	30	1220	3.21	1.15
2. Many people in this community make financial gain from artisanal refining practices.	380	95	110	85	60	30	1250	3.29	1.27
3. Some people in this community make artisanal refining practices their business.	380	80	100	95	75	30	1210	3.18	1.16
5. Women in this community also joined in artisanal refining practices.	380	70	110	95	80	25	1185	3.12	1.14
6. Most of the people who engaged artisanal refining practices are men.	380	100	105	85	60	30	1240	3.26	1.19
8. Young people are more among the people who engaged artisanal refining practices in this community.	380	85	115	90	60	30	1255	3.30	1.22

Source: Desk Research (2024).

The survey results in Table 1 reveal that artisanal refining is prevalent in the community, with moderate consensus on its widespread nature and economic significance, evidenced by a mean score of 3.21 and a standard deviation of 1.15. While the financial benefits are recognized (mean score 3.29), opinions vary widely (standard deviation 1.27). Artisanal refining is seen as a structured economic activity (mean score 3.18), involving women and youth to different extents, necessitating gender-sensitive interventions. The findings highlight the urgent need for health and safety measures, economic alternatives, and comprehensive educational campaigns to address the associated risks and reduce reliance on these harmful practices. Policymakers and community leaders must implement targeted strategies to mitigate the negative impacts and promote community well-being and environmental protection.

Table 2: Descriptive Analysis of Items on Makeshift Refining Explosions

Statement	N	SA	A	MA	D	SD	SUM	MEAN	Standard Deviation
1. Every year, we experience at least one artisanal refining fire incidence	380	85	90	80	65	60	1235	3.20	1.15
2. Artisanal refining explosions pose a significant safety risk to residents in our community.	380	80	105	85	70	40	1260	3.32	1.18
3. The fire explosions pose a significant safety risk to residents in our community.	380	75	110	85	65	45	1280	3.37	1.16
4. The artisanal refining causes oil spills in one place or the other.	380	90	95	85	65	45	1350	3.55	1.14
5. In some situations, the artisanal fire explosions are heard with a loud sound from the place it occurred.	380	70	115	90	65	40	1280	3.37	1.17
6. The artisanal refining activities involve breaking the oil pipes which cause loud explosions.	380	85	105	80	65	45	1370	3.61	1.12
7. Local infrastructure (e.g., roads, buildings) has been negatively impacted by the gravity from artisanal refining explosions.	380	80	100	85	60	55	1370	3.61	1.13
8. Many people in this community (men, women, and children) have died from artisanal fire outbreaks.	380	75	110	90	70	35	1360	3.58	1.11

Source: Desk Research (2024).

The survey results in Table 2 highlight significant concerns about the impacts of artisanal refining in the community, with moderate agreement on the frequency of fire incidents (mean score 3.20) and substantial concern about the safety risks posed by explosions (mean scores 3.32 and 3.37). The community perceives these activities as hazardous, necessitating urgent safety measures. Environmental hazards, such as oil spills (mean score 3.55) and loud explosions (mean score 3.37), are also major concerns, emphasizing the need for regulatory measures. The involvement in breaking oil pipes and subsequent explosions (mean score 3.61) points to the destructive nature of these activities. Additionally, the negative impact on infrastructure (mean score 3.61) and the high fatality rate from fire outbreaks (mean score 3.58) call for urgent interventions, including improved safety protocols, infrastructure repairs, and community education programs. These findings underscore the critical need for comprehensive strategies to manage and mitigate the adverse effects of artisanal refining.

Table 3: Descriptive Analysis of Items on Environmental security in the community due to makeshift refining activities

Statement	N	SA	A	MA	D	SD	SUM	MEAN	Standard Deviation
1. Our farm lands have been destroyed by constant makeshift refining practices.	380	70	100	110	70	30	1225	3.22	1.21
2. Right now we do not have good roads any longer.	380	65	95	110	70	40	1270	3.34	1.19
3. Exposure to environmental pollutants poses significant health risks in our community.	380	80	100	110	60	30	1350	3.55	1.17
4. Gastrointestinal issues have become more prevalent among residents living near makeshift refining sites.	380	70	110	100	60	40	1260	3.32	1.19
5. Environmental degradation poses a significant threat to the long-term sustainability of our community.	380	65	115	110	50	40	1360	3.58	1.21
6. Industrial activities in our area prioritize environmental conservation and sustainability.	380	60	90	110	70	50	1275	3.36	1.22

Source: Desk Research (2024).

The survey results reveal critical concerns regarding environmental security due to makeshift refining activities, highlighting the destruction of farmland (mean score 3.22), deteriorating road conditions (mean score 3.34), significant health risks from environmental pollutants (mean score 3.55), increased prevalence of gastrointestinal issues near refining sites (mean score 3.32), and the long-term threat of environmental degradation to community sustainability (mean score 3.58). There is moderate agreement that industrial activities are prioritizing environmental conservation (mean score 3.36), though responses are mixed. These findings underscore the urgent need for targeted interventions to prevent further damage, improve infrastructure, control pollution, enhance public health, and ensure sustainable development, with coordinated efforts from both government and community stakeholders.

Table 4: Descriptive Analysis of Items on Government Response

Statement	N	SA	A	MA	D	SD	Sum	Mean	Std. Deviation
1. Law enforcement has been effective in curbing makeshift refining activities in our community.	380	80	120	60	80	40	1260	3.32	1.30
2. Government interventions have improved the situation regarding makeshift refining practices.	380	100	110	70	60	40	1310	3.45	1.31
3. The local government has implemented effective measures to protect our environment.	380	90	140	60	50	40	1330	3.50	1.27
4. Government health policies adequately address public health concerns in our area.	380	150	100	50	40	40	1420	3.74	1.35

Source: Desk Research (2024).

The survey results indicate generally positive but mixed perceptions of government response to makeshift refining activities. Law enforcement's effectiveness (mean score 3.32) and government interventions (mean score 3.45) are moderately acknowledged, though skepticism remains. Local government measures to protect the environment are viewed relatively favorably (mean score 3.50), and government health policies receive the highest approval (mean score 3.74), reflecting strong confidence in their adequacy. However, the presence of neutral and negative responses across all statements suggests a need for improved strategies, increased resources, and better communication to address the concerns of more critical respondents and enhance overall satisfaction and policy effectiveness.

Conclusion

After a critical examination of the effect of artisanal refining on environmental security in Rivers State based on responses to research questions and interview conducted provided by the knowledgeable households in three LGA's in Rivers State, the study concludes that artisanal refining affects environmental security in Rivers State. Furthermore, artisanal soot affects environmental security in Rivers State. Therefore, the study asserts that artisanal soot has a great effect on environmental security in Rivers State.

Recommendations

Based on the findings, the study made the following recommendations:

i. Government should encourage oil companies to take responsibility for establish environmental impacts and invest in community development programs.
ii. Rapid response teams to address health emergencies related to pollution should be inplace.
iii. Develop disaster preparedness plans for communities affected by pollution from illegal refining.

iv. Invest in research to develop innovative solutions for pollution control and health improvement.
v. Government and the oil companies should establish and equip local emergency response units specifically trained to handle explosions and fires from artisanal refineries, ensuring they have the necessary tools and resources to respond quickly and effectively.

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