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## Assessment of Impact of Transportation of Crude Oil Products on Nigerian Roads: The Way Forward

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### ABSTRACT

This study investigated the impact of broad daylight transportation of crude oil in Nigeria, focusing on its environmental, socio-economic, and security implications. The research explored the common methods used in transporting crude oil, assessed the frequency and impact of accidents or spills during daytime operations, and analyzed the roles of regulatory bodies in managing these activities. Findings revealed that transporting crude oil in broad daylight increases the risk of exposure to theft, vandalism, and sabotage. Environmental degradation due to spills, particularly in the Niger Delta region, was found to be worsened by poorly regulated daytime logistics. Additionally, local communities reported adverse health effects, reduced agricultural productivity, and increased insecurity along crude oil routes. The study also identified gaps in law enforcement, infrastructural deficits, and weak implementation of safety regulations as key factors exacerbating the problem.

### INTRODUCTION

Crude oil transportation is a critical component of Nigeria's energy sector, facilitating the movement of petroleum resources from extraction sites to refineries and export terminals. Nigeria, as one of the leading oil-producing nations in Africa, relies heavily on crude oil for economic growth and revenue generation (Okonkwo & Ugochukwu, 2020). However, the methods and logistics involved in transporting crude oil significantly affect the nation's environment, economy, and security (Muhammad, 2022). The increased road congestion and infrastructural damage caused by heavy-duty oil tankers operating during peak hours. The excessive weight of these tankers accelerates road deterioration, leading to higher maintenance costs and road safety hazards. Moreover, the exposure of crude oil transportation routes to criminal activities makes the process highly vulnerable, resulting in financial and security risks for stakeholders involved (Anene, 2022).

One of the key concerns associated with crude oil transportation in Nigeria is the reliance on broad-day transportation methods, which involve the movement of oil through pipelines, tankers, and trucks during peak hours. This practice raises several challenges, including traffic congestion, road degradation, and environmental pollution (Afolabi *et al.*, 2019). The frequent movement of crude oil in broad daylight also increases the risk of oil theft, pipeline vandalism, and accidents, which have severe economic and environmental consequences (Nwankwo & Elke, 2021).

Furthermore, inadequate regulatory enforcement and infrastructure deficiencies exacerbate these issues (Ogunjiofor, *et al.*, 2023). Many of Nigeria's roads and pipelines are aging and poorly maintained, leading to frequent oil spills and leakages that contaminate land and

water bodies, endangering human health and biodiversity (Udoh, 2022). The implications of these inefficiencies extend to revenue losses, increased operational costs for oil companies, and threats to local communities' livelihoods.

This study aims to analyze the economic, environmental, and social impacts of broad-day crude oil transportation in Nigeria while proposing viable solutions to enhance efficiency and reduce associated risks. Given these challenges, there is an urgent need for a comprehensive analysis of the impacts of broad-day crude oil transportation in Nigeria. This study seeks to identify the key issues associated with this mode of transportation and propose strategic solutions to enhance efficiency, security, and environmental sustainability.

### Economic Impact of Broad-Day Crude Oil Transportation in Nigeria

Broad-day crude oil transportation, particularly via road tankers, has economic implications that affect various sectors, including government revenue, infrastructure maintenance, and the cost of business operations. Despite its importance, this method of transportation presents both positive and negative economic effects.

### Contribution to Revenue Generation and Employment

The transportation of crude oil contributes substantially to Nigeria's economy by supporting revenue generation through taxes, levies, and export earnings. The Nigerian National Petroleum Corporation (NNPC) and private oil marketers benefit from crude oil transport operations, ensuring a steady supply to refineries and export terminals (Okonkwo & Ugochukwu, 2020). Additionally, the sector provides employment opportunities for tanker drivers,

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logistics personnel, security agencies, and maintenance workers, contributing to job creation.

### **Revenue Losses Due to Crude Oil Theft and Vandalism**

A major economic challenge associated with broad-day crude oil transportation is revenue loss due to oil theft and pipeline vandalism. According to the Nigerian Extractive Industries Transparency Initiative (NEITI), Nigeria loses billions of dollars annually to illegal oil siphoning and transportation (NEITI, 2020). Criminal activities such as oil bunkering and diversion of crude oil during transportation negatively impact government earnings and disrupt the supply chain. These losses reduce the funds available for national development projects, including infrastructure and social services.

### **Infrastructure Damage and High Maintenance Costs**

The reliance on road transportation for crude oil movement significantly affects Nigeria's road infrastructure. Heavy crude oil tankers exert excessive pressure on highways, leading to rapid deterioration and increased government expenditure on road repairs (Afolabi *et al.*, 2019). The frequent movement of oil tankers accelerates the wear and tear of major highways, particularly in oil-producing states such as Rivers, Delta, and Bayelsa, where crude oil transportation is more intense. Overloaded tankers exert excessive pressure on road surfaces, resulting in cracks, potholes, and eventual structural failure (Ogunjiofor and Umeonyiagu, 2025). Affected roads require frequent maintenance and rehabilitation, increasing government expenditure on road repairs (NEITI, 2020).

The cost of maintaining and reconstructing these roads places a financial burden on the government, diverting resources from other critical areas.

### **Impact on Business and Transportation Costs**

Broad-day crude oil transportation affects business operations by contributing to traffic congestion and delays in goods movement. Major highways used by oil tankers experience gridlocks, leading to increased fuel consumption and transportation costs for other businesses (Udoh, 2022). The high cost of crude oil transportation is often transferred to consumers through increased fuel prices, affecting industries that depend on petroleum products for production. Additionally, the risk of accidents and spills results in financial losses for businesses and insurance companies. Also, investors may be discouraged from engaging in sectors that depend on road transport due to the risks associated with poor infrastructure.

### **Increased Road Accidents and Safety Risks**

The presence of crude oil tankers on Nigerian roads has led to an increase in road accidents, often resulting in loss of lives and environmental hazards (Anene, *et al.*, 2022). Many accidents occur due to poor vehicle maintenance,

reckless driving, and overloading of tankers (Okonkwo & Ugochukwu, 2020). Additionally, tanker rollovers and collisions often lead to crude oil spills, which pose fire hazards and contribute to road surface deterioration (Anene, *et al.*, 2023a). According to the Federal Road Safety Corps (FRSC), oil tanker-related accidents account for a significant percentage of road fatalities in Nigeria (FRSC, 2021).

### **Environmental and Health Implications**

The damage caused to roads by crude oil transportation also has environmental and health consequences. Poor road conditions increase dust emissions, which can lead to respiratory problems among commuters and nearby residents (Udoh, 2022). Furthermore, crude oil spills from damaged tankers contaminate soil and water sources, leading to long-term environmental degradation. The combination of air pollution from vehicle emissions and oil spills negatively affects public health in regions where crude oil transportation is frequent.

### **Government Policies and Road Management Strategies**

Efforts to address the impact of crude oil transportation on road infrastructure and traffic management have been met with challenges. While the Nigerian government has introduced weight regulations and axle load limits, enforcement remains weak due to corruption and inadequate monitoring (NEITI, 2020). Proposals to invest in alternative transportation methods, such as pipelines and railways, have been slow to materialize due to funding constraints and bureaucratic inefficiencies. Strengthening regulatory frameworks and investing in sustainable transport solutions are essential for mitigating the negative impacts of crude oil road transportation.

### **Alternative and Safer Methods of Crude Oil Transportation**

The transportation of crude oil in Nigeria is predominantly road-based, relying on tankers that pose risks to infrastructure, public safety, and the environment. Given the frequent accidents, oil spills, and economic losses associated with road transportation, there is an urgent need to explore alternative and safer methods for crude oil movement. The alternatives are;

#### **Pipeline Transportation**

Pipelines remain the safest and most efficient means of transporting crude oil over long distances. They reduce road congestion, lower accident risks, and minimize environmental pollution compared to road transport (Afolabi *et al.*, 2019). Countries with well-developed oil infrastructure, such as the United States and Saudi Arabia, rely heavily on pipelines for crude oil movement.

In Nigeria, the crude oil pipeline network is extensive but suffers from vandalism, illegal tapping, and poor maintenance, reducing its effectiveness (NEITI, 2020). Strengthening pipeline security, implementing surveillance

technologies, and enforcing strict penalties for vandalism can improve pipeline reliability. The Nigerian government has made efforts to revamp its pipeline infrastructure under the Petroleum Industry Act (PIA, 2021), but more investments and security measures are needed to make pipelines a viable alternative.

### **Rail Transportation**

Rail transport is a cost-effective and safer alternative to road-based crude oil transportation. Countries like Canada and Russia have successfully integrated rail systems into their oil transportation networks (Nwankwo & Eke, 2021). Nigeria's railway system, though underdeveloped, has the potential to support crude oil transportation, reducing pressure on roads and minimizing accidents. The Nigerian Railway Corporation (NRC) has been undergoing modernization, with recent investments in standard-gauge rail lines. If crude oil transport is integrated into Nigeria's railway system, it could enhance safety, efficiency, and cost-effectiveness. However, challenges such as insufficient rail infrastructure, lack of specialized oil tank wagons, and inconsistent government policies must be addressed to make rail a viable alternative (Udoh, 2022).

### **Inland Waterway and Coastal Transportation**

Nigeria's extensive inland waterways and coastal areas provide an alternative route for transporting crude oil. Barges and tankers can move oil through rivers and coastal waters, reducing reliance on roads. Inland waterway transport is already used in countries like the United States and Indonesia, where river-based crude oil movement minimizes road congestion and reduces carbon emissions (Okonkwo & Ugochukwu, 2020).

Despite its potential, inland waterway transportation in Nigeria faces challenges such as inadequate port infrastructure, piracy, and siltation of river channels. The Nigerian Maritime Administration and Safety Agency (NIMASA) has been working to enhance maritime security and improve port facilities to support crude oil transportation (NIMASA, 2021). Increased investment in navigational aids, port dredging, and security measures will be essential to fully utilize this alternative.

### **Multimodal Transportation System**

A combination of multiple transportation modes—such as pipelines, rail, and inland waterways—can create an efficient and safer crude oil transportation system. In this model, pipelines could handle long-distance transport from oil fields to major terminals, railways could manage regional distribution, and waterways could serve as an alternative for moving oil to export terminals and refineries (Afolabi *et al.*, 2019).

Countries with advanced oil transportation networks, such as the United States and China, use multimodal systems to optimize efficiency, reduce costs, and enhance safety (NEITI, 2020). Implementing a similar system in Nigeria

will require large-scale infrastructure development, policy reforms, and private-sector participation.

## **MATERIALS AND METHODS**

### **Area of Study**

The study focuses on major crude oil-producing and transportation corridors in Nigeria, particularly the Niger Delta region, which includes states such as Rivers, Bayelsa, Delta, and Akwa Ibom. These states are heavily affected by crude oil spills, pipeline vandalism, theft, and road accidents involving crude oil tankers. Additionally, key crude oil transportation routes leading to Lagos and Port Harcourt refineries, export terminals, and depots are considered due to their role in national crude oil distribution.

### **Selected Populace for the study**

The population of this study includes individuals and organizations directly or indirectly affected by crude oil transportation. These include:

- i. Crude oil transport workers (tanker drivers, logistics managers)
- ii. Residents of oil-producing communities
- iii. Environmental experts and activists
- iv. Security agencies (e.g., Nigeria Security and Civil Defense Corps, Nigerian Police)
- v. Regulatory bodies (e.g., Department of Petroleum Resources, Nigerian Midstream and Downstream Petroleum Regulatory Authority)
- vi. Government officials in transportation and energy sectors

### **Sample and Sampling Technique**

A stratified random sampling technique is used to ensure fair representation across different stakeholder groups. The sample size is determined using the Yamane formula, considering a margin of error of 5% for statistical reliability. The study selects respondents from crude oil-affected communities, government agencies, and industry professionals to ensure diverse perspectives.

### **Method of Data Collection**

The data collection process is conducted in the following stages:

- i. Distribution of Questionnaires – Questionnaires are administered physically and electronically to targeted respondents.
- ii. Interviews – Key informants from regulatory agencies and affected communities are interviewed to provide in-depth insights.
- iii. On-Site Observations – Visits to oil spill sites, major crude oil transport routes, and vandalized pipeline areas for first-hand assessment.
- iv. Document Review – Examination of existing literature, policy documents, and statistical reports to supplement primary data.

## RESULTS AND DISCUSSION

### Basic information of the respondents

On gender distribution in Table 1, out of the 100 respondents surveyed, 58% identified as male, 39% as female, and 3% preferred not to disclose their gender. This indicates a slightly male-dominated respondent base, possibly reflecting the higher male presence in industrial and security-related occupations. In terms of age, the most represented age group was 26–35 years, accounting for 30% of the respondents, followed by 36–45 years at 25%. Respondents aged 18–25 made up 12%, while those between 46–55 and 56 years and above accounted for 18% and 15%, respectively. This distribution reflects a mature and active working population with relevant experiences in the sector.

Occupationally, Community members made up the largest group (35%), followed by oil industry workers (20%), transporters (15%), and security personnel (10%). Government officials accounted for 8%, while 12% reported other occupations such as environmental workers or traders. This diversity suggests that the impact of crude oil transportation is felt across multiple social and professional strata. In terms of education, majority of respondents (45%) had completed secondary education, while 38% had tertiary education. Only 8% had primary education, and 9% had other forms of education such as vocational or informal training. This educational spread implies that most participants were sufficiently literate to comprehend environmental and policy-related issues.

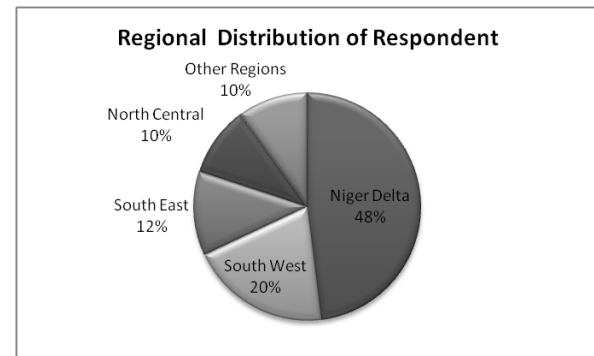
**Table 1:** Gender Distribution Information

Gender Distribution Information		Percentage
Gender	Male	58%
	Female	39%
	Prefers not to say	3%
Age group	18-25	10%
	26-35	30%
	36-45	25%
	46-55	18%
	56+	17%
Occupation	Community members	35%
	Oil industry workers	20%
	Transporters	15%
	Security personnel	10%
	Government officials	8%
	Others	12%
Qualifications	Primary or None	17%
	Secondary	45%
	Tertiary	38%

### State\Region of Residence

Almost half (48%) of the respondents were from the Niger Delta region, the main area of crude oil activities. Other respondents came from the South West (20%), South East (12%), North Central (10%), and other

regions (10%). This regional representation allows for comparison between impacted and less-impacted areas as in Figure 1.



**Figure 1:** Chart of Regional Distribution of Respondent

### Environmental Observations

A significant 77% of respondents acknowledged observing environmental damage due to crude oil transportation, while 23% did not. This indicates widespread awareness or experience of the environmental impacts as seen in Table 2.

Among those who noticed Environmental damages, 60% reported oil spills, 55% water pollution, 35% land degradation, and 30% air pollution. Deforestation was

**Table 2:** Observation of Environmental Damage

Observation of Environmental Damage	Response	Percentage
	Yes	77%
No	23%	
Type of Environmental Damage	Type of damage	Percentage
	Oil spills	40%
	Water pollution	30%
	Air pollution	15%
	Soil degradation	15%
Environmental Impact Rating	Rating	Percentage
	Very severe	30%
	Severe	35%
	Moderate	20%
	Mild	10%
		5%

noted by 25%, and 10% mentioned other issues such as ecosystem loss or agricultural disruption. These responses suggest that crude oil transport significantly affects both land and water ecosystems.

On Environmental Impact Rating, Most respondents (65%) rated the environmental impact as either “severe” (35%) or “very severe” (30%). 20% considered the impact “moderate”, 10% saw it as “mild”, and only 5% believed there was “no impact”. This confirms the perception that crude oil transportation poses a serious environmental challenge as in Table 2.

**Contribution to the Economy/ Vandalism effect**

A majority (68%) believe that crude oil transportation contributes positively to Nigeria’s economy, while 20% disagreed, and 12% were unsure. This suggests that while the economic benefits are recognized, some skepticism remains due to the costs and damages involved.

A high 75% of respondents indicated awareness of oil theft and pipeline vandalism in their areas, reflecting the prevalence of such illegal activities. The remaining 25% had no such knowledge or experience as in Table 3.

On Economic Impact of Vandalism, Respondents cited multiple effects: 70% mentioned loss of government revenue, 15% increased transportation costs, and 10% job losses. 5% mentioned other issues, including reduced foreign investment and insecurity. These highlight the severe economic toll of oil-related criminal activities.

**Table 3:** Contribution to the Economy

Contribution to the Economy	Response	Percentage
	Yes	68%
	No	20%
	Not sure	12%
Awareness of Oil Theft and Vandalism	Response	Percentage
	Yes	75%
	No	25%
Economic Impact of Vandalism	Impact	Percentage
	Revenue loss	70%
	H i g h e r transportation cost	15%
	Job losses	10%
	Others	5%

**Road Damage by Tankers**

Table 4 presented the road/traffic effect of the tankers, 81% of respondents agreed that crude oil tankers contribute to road damage, while only 19% disagreed. This finding supports the growing concern over deteriorating infrastructure in oil-transport corridors.

On Frequency of Traffic Congestion, 30% reported experiencing traffic congestion weekly due to oil transportation, 10% daily, and 25% monthly. Meanwhile, 20% faced it rarely, and 15% had never encountered it. This indicates that congestion is a routine issue for many in oil-affected areas.

Respondents listed multiple problems: 75% noted potholes and road deterioration, 12% identified congestion, and 8% observed increased accident rates. A few (5%) mentioned other issues such as noise or long travel times. These issues underscore the urgent need for infrastructure maintenance.

**Security Issues**

In Table 5, 68% had witnessed or heard of security issues related to crude oil transportation, while 32% had not.

This further confirms that insecurity is a major concern for communities along transport routes.

The most commonly reported challenges were oil theft

**Table 4:** Road Damage/ Traffic Congestion by Tankers

Road Damage by Tankers	Response	Percentage
	Yes	81%
	No	19%
Frequency of Traffic Congestion	Frequency	Percentage
	Daily	10%
	Weekly	30%
	Monthly	25%
	Rarely	20%
	Never	15%
Major Road Issues	Issue	Percentage
	Potholes and deterioration	75%
	T r a f f i c Congestion	12%
	Accident	8%
	Other	5%

and smuggling (50%), followed by pipeline vandalism (30%), and armed attacks on transporters (15%). Other issues such as community clashes were mentioned by 5%. These threats pose risks not only to property but also to human lives.

**Table 5:** Security Issues and Challenges

Security Issues	Response	Percentage
	Yes	68%
	No	32%
S e c u r i t y Challenges	Security Challenge	Percentage
	Oil theft\ smuggling	50%
	Pipeline vandalism	30%
	Armed attacks on transporters	15%
	Others	5%

**Government Policy Awareness and Enforcement**

Only 25% believed there are adequate policies governing crude oil transportation, while 30% said there were none, and 45% were unsure. This reveals a major gap in awareness or in actual policy implementation as in Table 6.

A large majority (65%) felt that the government is not enforcing crude oil transport regulations effectively, while 35% believed otherwise. This sentiment suggests distrust in regulatory agencies and enforcement mechanisms

**Suggested Improvements/Transportation Mode**

To improve management, 50% suggested stronger law enforcement, 30% supported alternative transport

**Table 6:** Policy Awareness

Policy Awareness	Response	Percentage
	Yes	25%
	No	30%
	Not sure	45%
Government Enforcement	Response	Percentage
	Yes	35%
	No	65%

methods (like pipelines or rail), and 10% recommended better road maintenance. Other suggestions (10%) included community engagement and technological monitoring as shown in Table 7.

**Table 7:** Suggested Improvements

Suggested Improvements	Suggestion	Percentage
	Stronger law enforcement	50%
	Alternative transport method	30%
	Improved road maintenance	10%
	Other	10%
Preferred Transportation Mode	Transportation mode	Percentage
	Pipeline	45%
	Rail	25%
	Inland \ Coastal waterways	15%
	Multimodal transport system	15%

Pipeline transportation was the most favored option (45%), followed by rail (25%). Inland water and coastal transportation received 15% and multimodal transports another 15%. This shows a strong preference for safer and more efficient non-road method.

**Positive Economic Impacts of Broad Day Transportation of Crude Oil**

The results in Table 8 indicate a strong perception of positive economic impacts. A majority (80%) of respondents agreed that transporting crude oil during the day improves delivery efficiency and reduces delays. This could be attributed to better visibility, access to emergency services, and real-time traffic management.

Additionally, over 80% believed that job opportunities have increased, especially in logistics, security, and monitoring roles. The findings also showed that energy costs are perceived to be lower during daytime operations due to minimized reliance on artificial lighting and night allowances.

Moreover, 76% of the participants agreed that daytime operations enhance local economic activity, as communities along the route engage in support services like food vending, mechanical repairs, and accommodation. Lastly, many believed that daylight operations support government regulation and revenue generation, as activities are more observable and accountable.

**Negative Economic Impacts of Broad Day Transportation of Crude Oil**

Despite the benefits, the results in Table 9 also show that broad-day crude oil transportation poses economic challenges. 76% of respondents agreed it increases traffic congestion, especially on already burdened highways,

**Table 8:** Response Summary – Positive Economic Impacts

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Improves delivery efficiency and reduces delays	45	29	13	10	3
Creates job opportunities	35	30	20	10	5
Reduces energy and operational costs	40	35	15	7	3
Enhances local economic activities along corridors	36	39	13	8	4
Increases government revenue through improved regulation	32	42	15	7	4

affecting both commuters and transport-dependent businesses.

About 76% also linked it to higher accident risks, noting that fuel-laden tankers in dense traffic pose significant danger. Road degradation was also a concern, with 74% of respondents acknowledging increased damage and

repair costs due to heavy vehicle loads during peak hours. Furthermore, some respondents observed community unrest stemming from perceived environmental and safety risks. Lastly, a majority agreed that roadside businesses may experience disruptions, particularly when traffic diversions or delays interfere with customer access.

**Table 9:** Response Summary – Negative Economic Impacts

Statement	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Increases road traffic congestion and reduces productivity	35	30	20	10	5
Increases risk of accidents and economic losses	40	30	15	10	5
Leads to faster road wear and increased maintenance costs	43	27	12	11	7
Causes community unrest or economic disruption	34	31	16	13	6
Negatively affects small roadside businesses	42	32	15	7	4

**Summary comparison of positive and negative impact**

The comparison in Table 10 reveals that while positive impacts such as employment generation, regulatory oversight, and operational efficiency were highly acknowledged, they are nearly matched by the negative impacts, especially in terms of road safety, congestion, and infrastructure degradation (Anene, *et al.*, 2023b). This shows a dual-impact pattern, where economic gains may come at the cost of public safety and long-

term infrastructure strain. Notably, some areas like local economic stimulation showed mixed perceptions—respondents agree that oil transportation increases business activity but also negatively affects small traders through congestion and safety concerns. This calls for a balanced policy approach that maximizes economic gains while mitigating harmful externalities. From table 10, it is seen that the positive impacts are more than the negative impacts both in economic gain and job creations.

**Table 10:** Summary Comparison of Positive and Negative Impacts

Impact Area	Positive Perception (%)	Negative Perception (%)
Delivery Efficiency	80%	-
Job Creation	80%	-
Cost Reduction	72%	-
Local Economic Stimulation	76%	70%
Regulation and Revenue	72%	-
Traffic Congestion	-	76%
Accident Risk	-	76%
Road Damage	-	74%
Community Disruption	-	68%

**On-Site Observations**

A visit was paid to oil spill site in Port Harcourt Rivers State Nigeria. To get first hand assessment of this study. These observations fall into categories like environmental impact, human activity, and safety hazards.

**Environmental Observations**

- i. Presence of crude oil on soil, water surfaces and vegetation.
- ii. Dead or oil-coated wildlife (e.g., birds, fish): Lost of animal's lives is maximum.
- iii. Discoloration of water and land: It changes the colour of streams around the vicinity making it unsafe for human consumption and it also causes low farm yield products.
- iv. Odor of hydrocarbons in the air.

**Human and Community Impact:**

- i. Local community activities such as fishing, farming and other activities is disrupted.
- ii. Residents complain and experiences health symptoms

frequently.

**Security and Human Activity**

- i. Presence of law enforcement or company personnel.
- ii. Scavengers, illegal bunkering tools or local black-market activity.
- iii. Signs of prior arrests or confrontations.

**Document Review**

**Oil Spill Statistics (2021–2024)**

According to the National Oil Spill Detection and Response Agency (NOSDRA), Nigeria recorded a total of 2,654 oil spill incidents between 2021 and 2024. The annual breakdown is as follows:

- i. 2021: 613 incidents, with 472 attributed to oil theft (76.9%).
- ii. 2022: 794 incidents, with 665 due to oil theft (83.5%).
- iii. 2023: 1,162 incidents, with 1,046 resulting from oil theft (90%).
- iv. 2024: 589 incidents, with 471 caused by oil theft

(approximately 80%).

These figures highlight a persistent challenge with oil theft contributing significantly to environmental degradation.

## CONCLUSIONS

The study finds that daytime crude oil transportation in Nigeria increases risks to the environment, public safety, and national security due to greater exposure to theft, vandalism, and accidents. Weak regulatory enforcement, inadequate surveillance, and poor infrastructure further intensify these challenges, underscoring the need for urgent reforms.

It recommends safer and less conspicuous transport scheduling, enhanced monitoring using technologies like GPS and drones, stronger regulatory compliance, improved infrastructure, and active community engagement. These measures are essential to reduce environmental damage, security threats, and socio-economic impacts in oil-producing regions.

## Suggestions for Further Study

Future research should focus on long-term environmental effects, comparative analysis of day versus night transportation, community impacts, policy effectiveness, and the use of emerging technologies to improve crude oil transport systems

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