JOURNAL OF ENVIRONMENTAL SCIENCES AND BUILT ENVIRONMENT RESEARCH (JESBER)
2026, Vol. 1, No. 2, pp. 387-400
Published by Faculty of Environmental Sciences, University of Calabar, Nigeria
Print ISSN: 3141-5547 | OPEN ACCESS

Research article

SAFEGUARDING THE FLOW: A POLICY FRAMEWORK FOR THE SAFE AND SECURE ROAD HAULAGE OF PETROLEUM PRODUCTS IN NIGERIA

Abubakar Zakariyya Al-Hasan[1] & Nicholas Osagie Ebehikhalu[2]*

[1] Department of Urban and Regional Planning, School of Environmental Studies, Auchi Polytechnic, Auchi, Edo State, Nigeria, Email: alhasanaz@gmail.com; az_hasan@auchipoly.edu.ng
[2] Department of Geography and Environmental Management, Faculty of Social Sciences, University of Abuja, Abuja, Nigeria, Email: ebehikhalunicho@yahoo.co.uk
*Corresponding author: ebehikhalunicho@yahoo.co.uk; nicholas.ebehikhalu@uniabuja.edu.ng

ABSTRACT

The supply chain of petroleum products is vital for socio-economic development. Road haulage of petroleum in Nigeria is a crucial yet dangerous part of the national logistics system. Although essential for keeping the economy active and distributing energy, this transport mode is often affected by accidents, fires, cargo theft, and insecurity. These repeated incidents cause significant human, environmental, and economic damage, exposing ongoing issues in regulation, enforcement, and institutional coordination. This paper uses qualitative desk research, following a documented search, screening, and thematic-coding protocol (Section 5.0), to examine the governance structure behind petroleum haulage in Nigeria. It reviews policy documents, laws, and reports while drawing comparisons with international frameworks such as the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR). The analysis, structured through the lenses of Risk Governance, High Reliability Organisation, and Socio-Technical Systems theory, reveals important gaps in driver training, fleet management, emergency response, and inter-agency cooperation, which increase risks and weaken the sector's resilience. To tackle these problems, the paper suggests a three-tier policy framework: an Immediate tier (0–2 years) aimed at immediate risk reduction through stricter enforcement and raising public awareness; a Short-Term tier (2–5 years) that seeks to strengthen the system by modernising fleets, adopting data-based regulation, and improving cooperation among institutions; and a Medium-Term tier (5–10 years) that recommends structural reforms including multimodal transport options, integrating rail and pipeline alternatives, and aligning Nigeria's regulations with international standards. This framework contributes to academic discourse and policy on transport safety and logistics security, emphasising reforms to foster a safer, more secure, and sustainable system in Nigeria, aligned with Sustainable Development Goals (SDGs) such as 3.6 (road traffic safety) and 11.2 (sustainable transport systems).

KEYWORDS

dangerous goods regulation, logistics security, Nigeria, petroleum haulage, policy framework, risk management, sustainable development goals, transport safety

INTRODUCTION

As the largest producer and exporter of crude oil in Africa, Nigeria is heavily dependent on oil products for transport, energy production, manufacturing, and domestic consumption (Iwayemi et al., 2010). Road transport dominates national distribution due to infrastructure constraints, including inefficient pipelines and limited rail freight capacity (Ezirim, 2021; Umar et al., 2021). However, this dependence has led to frequent accidents, spillages, explosions, and thefts, leading to mass casualties, environmental pollution, and economic disruption (Aderamo, 2012; Olawole and Olapoju, 2018; Ede, 2019). Data from the Federal Road Safety Corps (FRSC) show that tanker-related accidents contribute disproportionately to accidents with high fatality rates, as illustrated by the Niger case of January 2025. These issues go beyond transport safety, threaten energy security, exacerbate environmental damage, and impose a social and economic burden (Ucheobi et al., 2024). They point to weaknesses in the regulatory framework in Nigeria despite reforms under the Petroleum Industry Act (PIA) 2021, which established the Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA) and the Nigerian Upstream Petroleum Regulatory Commission (NUPRC), but left out enforcement and international coherence (Federal Republic of Nigeria, 2021).

Globally, frameworks such as the United Nations Model Regulations and ADR provide comprehensive guidelines on driver training, vehicle standards, and emergency protocols (United Nations, 2023; UNECE, 2021). In contrast, Nigeria lacks an integrated dangerous goods code, with fragmented oversight among agencies such as the FRSC, NMDPRA, and the National Emergency Management Agency (NEMA) (Okonkwo &

Aderogba, 2019; Odeyemi & Ogunjumo, 2019). This fragmentation creates gaps in training, vehicle maintenance, and risk management, compounded by vulnerabilities to theft and hijacking. Traditional Nigerian policy responses have been reactive, focusing on post-disaster measures rather than proactive reforms (Adediran, 2018). Comparative insights from the USA and the EU demonstrate that preventive, standards-based frameworks effectively reduce risks (South African Bureau of Standards, 2011; Schinas & Bergmann, 2021; PHMSA, 2021).

This paper critically examines Nigeria's governance and regulatory environment for petroleum haulage, identifies systemic weaknesses, and proposes a multi-phase policy framework aligned with international standards and local contexts. The central research question is: How does Nigeria's regulatory and institutional framework for petroleum road haulage compare to international standards, and what reforms are required to ensure greater safety and security? The scope focuses on road transport, given its predominance, while acknowledging underdeveloped pipelines and rail (Iwayemi et al., 2010). This study advances policy reform, contributing to SDGs 3.6 and 11.2 by promoting safer transport systems within the policy context set out below. In what follows, the paper outlines its theoretical basis, presents contextual and empirical evidence, and then presents a three-tier policy framework for reform.

LITERATURE REVIEW

CONCEPTUAL AND THEORETICAL FOUNDATIONS

The transport of petroleum and other hazardous materials embodies systemic risk: a complex interplay of human, technical, and organisational factors (Renn, 2008). Traditional risk assessments, focused on mechanical or engineering failures, often overlook the institutional and behavioural dimensions that shape safety outcomes. This study draws upon three interrelated perspectives: (1) risk governance theory, which emphasises the integration of regulatory, organisational, and societal actors in managing complex risks; (2) high reliability organisation (HRO) theory (Weick & Sutcliffe, 2015), which focuses on cultivating continuous learning and error sensitivity in high-risk systems; and (3) socio-technical systems theory (Hollnagel, 2018), which views transport as an interconnected web of technologies, institutions, and human interactions.

Analysing petroleum haulage requires a risk management lens that integrates scientific, economic, social, and political dimensions within institutional structures (Renn, 2008). In Nigeria, fragmented regulations and low public trust amplify these risks. High-reliability organisation (HRO) theory emphasises redundancy, training, and safety culture to prevent catastrophic failures (Weick & Sutcliffe, 2015). Viewing transport as a socio-technical system encompassing vehicles, infrastructure, institutions, and human behaviour explains how subsystem failures compromise overall safety (Hollnagel, 2018). In Nigeria's petroleum transport sector, marked by institutional fragmentation, limited capacity, and low public trust, these frameworks jointly reveal the need to shift from reactive to anticipatory governance. They provide a conceptual lens for designing a more adaptive, data-driven, and participatory regulatory system. These frameworks underpin the analysis of Nigeria's high-risk haulage system, advocating for integrated governance over fragmented interventions.

To operationalise these perspectives analytically, rather than leaving them as background theory, each lens was mapped to a specific coding category applied during the comparative benchmarking exercise reported in Section 6 and Table 2 and 3. Risk Governance Theory informed the coding of institutional and regulatory-gap themes (e.g., inter-agency mandate overlap, absence of a unified dangerous-goods code). HRO Theory informed the coding of operational and behavioural-resilience themes (e.g., driver certification and recertification, redundancy in emergency-response command, safety-culture indicators). Socio-technical systems theory informed the coding of infrastructure–technology–institution interaction themes (e.g., vehicle standards, route design, community risk behaviour around crash sites). This tripartite coding structure guided both the extraction of comparative benchmarks against UN/ADR provisions (Table 2) and the derivation of the three-tier policy framework (Section 8), so that each recommendation is traceable to a specific theoretical and evidentiary basis rather than introduced ad hoc.

Nigeria's Petroleum Road Haulage Context

Safety and Security Challenges

Nigeria's road-based petroleum logistics system faces human, technical, and environmental risks. Frequent tanker explosions, collisions, and hijackings have resulted in severe loss of life and property (Ambituuni et al.,

2015; Mustapha et al., 2025). According to Ucheobi et al. (2024), insecurity during oil transport operations is not merely a transport challenge but a threat to national energy security. Petroleum haulage poses threats to public safety and energy security. Analysing 2,318 accident reports involving petroleum tanker trucks in Nigeria between 2007 and 2012, Ambituuni, Amezaga and Werner (2015) found that 79 per cent of accidents were attributable to human factors, chiefly dangerous driving and speed violations, and that over 70 per cent involved loss of tank containment, leading to spillage, fire, or explosion. Disruptions undermine macroeconomic stability and cause environmental externalities such as water pollution (Ezirim, 2021; Afolabi, 2022). Theft and hijacking by organised networks result in billions of annual losses, eroding revenues and market confidence (Anifowose et al., 2015). Socio-economically, communities face health risks and livelihood erosion, exacerbating inequalities (Orubu et al., 2004).

Human factors remain central to accident causation. Nigeria's licencing framework lacks specialised certification for hazardous goods drivers, unlike ADR provisions (ADR Chapter 8.2, driver training and certification requirements) which mandate periodic training and recertification. The technical dimension is equally concerning: fleet age and mechanical condition are recurrent themes in Nigerian tanker-safety reporting, although the FRSC does not publish a single national fleet-age census; the Corps' own 2026 reporting instead tracks compliance rates directly, and Class G specialised driver-licence compliance among tanker operators rose from 58.2% at the 2015 launch of the Safe-to-Load Programme to 99.4% by early 2026, and installation of API-standard leak-proof tank systems reached 98.3% over the same period (FRSC, cited in Leadership, 2026; PRNigeria, 2026). Environmental and health effects from recurring spills and fires include soil contamination, air pollution, and respiratory illnesses (Afolabi, 2022).

These issues collectively highlight the urgent need for systemic risk management rather than ad hoc responses. South Africa's SANS 1518 standard, which governs the design, construction, testing, approval, and maintenance of road vehicles and portable tanks for dangerous-goods transport, is explicitly aligned with ADR-type technical provisions (South African Bureau of Standards, 2011); its practical effect on Nigerian-comparable accident rates has not been independently quantified in the literature reviewed for this study, and no specific percentage-reduction figure is asserted here. Comparative analysis shows that Nigeria's standards lag behind ADR, with gaps in training, vehicle technology, and emergency response (UNECE, 2021; UNECE, 2023). Adopting an ADR-adapted model could enhance safety (Oguntoyinbo et al., 2024).

Current data (2020–2026): scale and trend of tanker incidents in Nigeria

To bring the evidence base up to date, current FRSC and NEMA reporting was reviewed for this revision. Between 2020 and early 2025, the FRSC recorded 555 tanker-related deaths nationally: 161 deaths from 18 explosions in 2020, 55 deaths from 19 explosions in 2021, 76 deaths from 14 explosions in 2022, 118 deaths from 13 explosions in 2023, 85 deaths from 13 explosions in 2024, and a further seven explosions in January 2025 alone (FRSC data reported in P.M. News, 2025). The single deadliest incident in this period was the Suleja/Niger State explosion of 20 January 2025, in which at least 86 people died, and 52 sustained severe burns after fuel-scooping following a tanker rollover (NEMA, cited in the ICIR, 2025); the Jigawa incident of 15 October 2024 caused the highest single-event fuel-scooping toll on record, 209 deaths (FRSC Corps Marshal Shehu Mohammed, cited in Blueprint, 2025). Fuel scooping accounted for 411 deaths nationally in 2024 alone, 7.6% of that year's total road-traffic fatalities (FRSC Benue Sector Command, cited in Vanguard, 2025). Set against this, the FRSC's Safe-to-Load Programme (launched in 2015) reported a 61.29% reduction in tanker/trailer fatalities and a 15.53% decline in crash-severity index for 2025 over 2024, alongside the driver certification and leak-proofing gains noted above (FRSC, cited in Leadership and PRNigeria, 2026). Read together, these figures show a sector with a large and still-substantial casualty toll, but one in which a specific, named enforcement programme is associated with a measurable recent improvement, a more precise and defensible basis for Section 8's targets than the original submission's unsourced aggregate figures (see Table 1)

Table 1. Tanker-Related Fatalities in Nigeria, 2020–early 2025

Year	Reported tanker explosions	Fatalities
2020	18	161
2021	19	55
2022	14	76

Year	Reported tanker explosions	Fatalities
2023	13	118
2024	13	85
Jan 2025	7	not yet finalized

Source: FRSC data as reported in P.M. News (27 March 2025), 'Tanker crashes claim 555 lives across Nigeria in 5 years FRSC'. Figures are FRSC/media-reported and, consistent with the paper's own methodological caveat (Section 5.7), likely understate true incidence given known under-reporting in Nigerian road-safety data.

Infrastructure and Logistics Characteristics

Nigeria's petroleum road haulage is constrained by deteriorating transport infrastructure. Road haulage carries the majority of Nigeria's downstream petroleum products, with over 5,000 tankers engaged in daily haulage and trucking accounting for approximately 95% of domestic petroleum-product transport volume, reflecting the country's limited pipeline and rail capacity (Anifowose et al., 2011, as cited in Ambituuni et al., 2014). Potholes, lack of road shoulders and rest areas, and ageing tankers significantly heighten operational risks (Onyema, 2019). High-profile incidents, such as the 2018 Lagos-Otedola explosion and 2019 Onitsha fire, illustrate these vulnerabilities (Okonkwo & Eke, 2022).

Security Environment, Community Policing and Local Vigilance Initiatives

Local communities along haulage routes are key stakeholders in security; community surveillance networks for spill reporting and emergency response, as in the Niger Delta, where local monitoring reduced spill detection time from 72 to <12 hours (Orubu et al., 2004), and the training of local populations as first responders in vulnerable areas (e.g. coastal communities) that can use their situational awareness to identify spills early (Ambituuni et al., 2015) would contribute to transparent impact disclosure. Local populations can be mobilised through awareness campaigns and liaison frameworks with law enforcement to share real-time intelligence and monitor security conditions.

Local socio-economic programmes that reduce community complicity in haulage crime, community-policing principles that formalise local engagement and social capital, and investment in corridor-based emergency response units together strengthen the security architecture. Real-time public reporting of spill volumes and toxins, for example, through a tamper-evident digital ledger, would support transparent impact disclosure. This bottom-up approach augments top-down enforcement. Organised crime exploits vulnerabilities through hijackings, insider collusion, and cyber threats, particularly in hotspots with weak enforcement (Romsom, 2022). This disrupts supplies and increases costs.

Economic Pressures, Fleet Condition and Social Impacts

The Nigerian freight sector is dominated by small operators, often operating an ageing fleet with limited capital to upgrade it. Unlike Europe, where strict cycles for fleet renewal are required under ADR, the Nigerian regulatory framework does not impose any age limit or mandatory retrofitting requirements on tankers. This economic reality creates a vicious circle: operators reduce the cost of maintaining their vehicles, drivers are under pressure to maximise their trips (and thus engage in fatigue-inducing practices), and enforcement authorities often rely on periodic fines rather than preventive checks (Mustapha et al., 2025). Consequently, many tankers remain vulnerable to rollover, brake failure, and explosion. Theft causes fiscal deficits and higher prices (Anifowose et al., 2015). Socially, violence and environmental degradation fuel secondary crimes, necessitating integrated responses (Afolabi, 2022).

Community Behaviour and Risk Culture

A particularly Nigerian dimension of petroleum haulage risk is the phenomenon of fuel scooping after tanker crashes, as communities gather at crash sites to siphon spilt fuel despite repeated fatalities (Olawole and Olapoju, 2018). This is a reflection of a lack of public awareness of risk, a lack of socioeconomic opportunities in communities, and weak enforcement of the law at the crash scene. ADR and other international frameworks operate on the assumption of compliance with exclusion zones; however, in Nigeria, such assumptions are not tenable without sustained risk communication and community-level deterrence.

Infrastructure and Routing Issues

Tanker accidents are exacerbated by the poor state of Nigeria's road infrastructure, with poorly maintained highways, narrow carriageways, and inadequate truck parks, all of which provide an unsafe environment for heavy vehicles to operate in (Ucheobi et al., 2024). While ADR specifies segregated dangerous goods routes and time-of-day restrictions (ADR 1.9, restrictions on carriage by the competent authority), the Nigerian network does not have such differentiated planning, and attempts to regulate, such as the Lagos daytime tanker bans, have been unevenly enforced and resisted by industry (Akinwale, 2020). Such restrictions have been ad hoc and reactive without an evidence-based national route-risk mapping programme.

International Standards Benchmarking and Best Practices

The United Nations Model Regulations and the European ADR form the global benchmark for the safe transport of dangerous goods. They prescribe detailed requirements on driver training, vehicle specifications, placarding, emergency procedures, and data reporting. The ADR mandates vehicle design, driver training, labelling, and enforcement (ADR Parts 8–9, driving crew and vehicle equipment requirements; ADR 5.3, placarding and marking), reducing accidents in Europe (UNECE, 2021). The USA enforces inspections and monitoring (PHMSA, 2021), while South Africa's SANS 1518 standard incorporates ADR-aligned technical principles (South African Bureau of Standards, 2011). These frameworks are periodically updated to reflect technological advances and evolving risk landscapes. This emphasises adaptability, contrasting with Nigeria's rudimentary approach.

The European Union has pursued a formal policy target of halving road fatalities per decade under its Road Safety Programme, a target explicitly linked to sustained investment in harmonised vehicle, driver, and infrastructure standards, including ADR-governed dangerous-goods transport (European Transport Safety Council; European Commission road-safety statistics. In contrast, Nigeria's regulatory system diverges substantially across critical dimensions:

1. Driver Certification: No specialised “dangerous goods” licence; training remains operator-driven.
2. Vehicle Standards: No mandatory fleet renewal or retrofitting requirements.
3. Emergency Response: Fragmented coordination among the NEMA, FRSC, and NMDPRA.
4. Data and Monitoring: Absence of a centralised incident-reporting database.

This comparative benchmarking illustrates Nigeria's considerable gap from international best practices and underscores the importance of adopting an integrated, enforceable national framework.

Governance, Policy, and Institutional Gaps

The Nigerian framework includes the Petroleum Act and the PIA 2021, but there are overlaps between the FRSC, NMDPRA, and NEMA (Ambituuni et al., 2014; Olujobi et al., 2022). Enforcement is weak due to corruption and lack of capacity (Brown, 2021; Onyema, 2019). This reactive environment undermines public confidence and impedes progress towards the SDGs. Nigeria's oil governance is characterised by overlapping mandates, inconsistent enforcement, and weak institutional coordination. Although the Petroleum Industry Act (PIA) 2021 restructured the sector, it remains heavily focused on the fiscal and investment aspects rather than on operational security (Olujobi et al., 2022).

This overlap is not merely theoretical: the NUPRC and NMDPRA jurisdictional conflict over integrated upstream-midstream facilities and export-terminal operations became explicit enough that the Presidency issued a formal directive on June 26 2023, delineating regulatory oversight between the two agencies pending amendment of the PIA; a documented instance of institutional fragmentation, which this paper argues undermines haulage safety governance (Aluko & Oyebode, 2023). The directive itself has since been criticised by legal commentators for reverting parts of the sector to the pre-PIA Department of Petroleum Resources model it was meant to replace (Fountain Journal of Law, 2026), underscoring that the coordination problem identified in this paper's Finding F1 (Section 6.1) has not yet been durably resolved.

METHODS

Research Design

This study follows a qualitative, exploratory desk-review design, synthesising secondary data to compare Nigeria's petroleum road-haulage governance with international (UN/ADR) benchmarks. The comparative analysis is structured by the three-theory coding framework set out in Section 2.1.

Search Strategy and Sources

Academic databases: Google Scholar and Scopus.

Grey literature and official sources: Federal Republic of Nigeria (Petroleum Industry Act 2021 and subsidiary legislation); NMDPRA and NUPRC regulatory guidelines and press directives; FRSC annual and incident reports; NEMA situation reports; UNECE ADR text; and UN Model Regulations.

Search terms used in this study: combinations of 'Nigeria tanker accident FRSC', 'petroleum haulage Nigeria statistics', 'NUPRC NMDPRA Petroleum Industry Act', 'ADR dangerous goods clause [topic]', and named-author searches for each secondary source cited in the original submission (e.g. 'Ambituuni Amezaga Werner 2015', 'Abban Kramp South African Journal of Transportation').

Date range: sources cited range from 2004 (Orubu et al.) to August 2026 (current FRSC reporting)

Inclusion and Exclusion Criteria

Included were peer-reviewed articles, official regulatory/legislative texts, and government/agency reports directly addressing petroleum or dangerous goods road transport, safety regulations, or comparable international standards. Sources without identifiable authors/publishers, opinion pieces without an evidentiary basis, and duplicate reporting of the same primary statistics were excluded.

Document Corpus and Screening

For this verification pass, every substantive quantitative or legal claim in the original submission (23 discrete claims) was checked individually against the cited source and, where possible, against an independent primary or current source; 19 were confirmed or correctable in place, 2 were found to rest on references that could not be located in any indexed database and were removed (the Abban & Kramp SANS 1518 statistic and the Yannis et al. 'Trends and reductions' statistic), 1 in-text citation ('Ezirim and Abiodun, 2024') had no matching source and was removed, and 1 (the Ambituuni et al. 2015 accident breakdown) was found to be materially misreported and was corrected to match the published study.

Coding Framework and Thematic Analysis

Documents were coded deductively against the three theory-derived categories established in Section 2.1 (institutional/regulatory gaps — Risk Governance; operational/behavioural resilience — HRO; infrastructure–technology–institution interaction — Socio-Technical Systems), supplemented by an inductive pass to capture themes not anticipated by the framework (e.g. community fuel-scooping behaviour). Within each category, Nigerian provisions were matched against the corresponding UN/ADR clause to produce the gap statements reported in Table 2 (Section 6).

Minimising Selective Interpretation

Wherever possible, each substantive quantitative claim was checked against at least two independent sources before inclusion; single-source figures are flagged in the text.

An explicit search was conducted for disconfirming or complicating evidence (e.g. studies reporting improvement in Nigerian enforcement) rather than only evidence supporting the paper's thesis.

Ethical Considerations

No human participants or primary data were involved in this study; all material analysed is drawn from the public domain (published literature, gazetted regulation, and publicly issued agency reports). Accordingly, formal institutional ethics review was not required for this desk-based policy research, consistent with standard practice for secondary-source policy analysis; the authors nonetheless applied source-neutrality and citation-accuracy

safeguards throughout, and acknowledge the inherent limitation that publicly available Nigerian regulatory and incident data may itself be subject to under-reporting.

FINDINGS AND ANALYSIS

Four evidence-based findings emerge from the thematic comparison summarised in Table 2, each attributable to a specific theoretical lens (Section 2.1) and each directly informing one or more elements of the policy framework in Section 8.

Table 2: Key Evidence-Based Findings and Policy Implications

Finding	Theme (lens)	Statement	Link to Section 8
F1	Institutional fragmentation (Risk Governance)	No single agency holds statutory authority over the full petroleum-haulage safety chain; the FRSC, NMDPRA, NEMA, and NUPRC mandates overlap without a formal coordination protocol.	Feeds directly into the Strengthened Institutional Architecture element (PTSB) in Section 8.
F2	Absence of competency-based resilience mechanisms (HRO)	Driver certification, vehicle-technology standards, and incident-reporting are voluntary or absent; therefore, the system has no built-in mechanism to detect and correct emerging risks before they become a crash.	Feeds directly into the Digital Compliance Infrastructure (DSCB) and driver training actions in Section 8.
F3	Weak socio-technical integration between infrastructure, technology and behaviour (Socio-Technical Systems)	Route design, fleet age, and community risk behaviour (fuel scooping) interact to compound risk in ways that a single-cause explanation (e.g., ‘bad roads or ‘poverty’ alone) does not capture.	This feeds directly into the route-risk mapping and Community Safety Compact actions in Section 8.
F4	Economic disincentives sustain non-compliance	Small operators face no financial pathway to fleet renewal; therefore, enforcement without financing is unlikely to change behaviour.	It directly feeds into the Financing and Economic Incentive Sub-Framework (PHSF) in Section 8.

Benchmarking Table

Table 3 presents the clause-level comparison underlying F1–F4.

Table 3. Comparative Analysis of Petroleum Product Road Haulage Standards

Dimension	Nigeria (Current Provisions)	International Benchmark (UN/ADR)	Gap Identified
Driver Training & Certification	Basic licencing under the FRSC framework; no specialised 'dangerous goods' certification; training is largely operator-driven and inconsistent (FRSC, 2023; NMDPRA, 2025).	ADR 8.2: Mandatory specialised training, certification, and periodic refresher courses for drivers of tank vehicles carrying dangerous goods (UNECE, 2021).	Absence of a formalised, competency-based ADR-equivalent certification scheme
Vehicle Standards	Roadworthiness checks by VIO/FRSC; tankers are often old and lack stability control, rollover protection, or telematics. No binding requirement for ADR-class equipment (Mustapha et al., 2025; NMDPRA, 2025).	ADR 9.x: Vehicles must be fitted with advanced braking systems, rollover protection, electronic stability control, age limits for tankers, and regular technical inspections (UNECE, 2021).	Vehicle technology requirements are largely absent, and there is an ageing fleet without safety retrofits.
Documentation & Placarding	Tankers carry generic waybills; hazard placards are inconsistently used; and enforcement is weak (Ucheobi et al., 2024).	ADR 5.3: Strict placarding, hazard labels, and documentation (transport documents and instructions in writing) are required at all times (UNECE, 2021).	Inconsistent documentation and weak or absent placarding practices.
Loading/Unloading Standards	Basic depot-level protocols; enforcement is fragmented between the NMDPRA and depot operators. No detailed provisions on vapour recovery or spill containment (NMDPRA, 2025).	ADR 7.5: Strict rules on loading/unloading, vapour recovery, grounding/earthing, and supervision during transfer (UNECE, 2021).	There are gaps in the detailed loading/unloading safety standards and monitoring.
Routing & Restrictions	Tankers are allowed on most highways and urban roads; however, some ad hoc restrictions (e.g., Lagos daytime bans) are poorly enforced.	ADR 1.9: Designated routes, tunnel restrictions, urban area exclusion zones, and time-of-day restrictions for high-risk cargoes (UNECE, 2021).	Lack of national route-risk mapping and weak enforcement of restrictions.
Emergency Response & Incident Command	NEMA leads, often with the FRSC; response capacity is limited; weak coordination with regulators (NMDPRA, NUPRC). Community crowding/fuel scooping is common (Okonkwo & Aderogba, 2019).	ADR/UN guidance: integrated incident command, mandatory emergency information for responders, pre-planned routes, and community exclusion measures (UNECE, 2021).	Fragmented command, limited preparedness, and unsafe community response behaviour.
Community Risk Management	Risk communication is sporadic; there are no national education campaigns, and reliance on police cordons at accident sites.	International practice: Proactive public risk communication campaigns; sanctions for fuel scooping; and community engagement in safety culture (UNECE, 2021).	Lack of systematic community risk education and enforcement measures
Data & Incident Reporting	FRSC/NEMA publish periodic statistics; under-reporting is common; and there is no centralised database of dangerous-goods incidents.	ADR 1.8.5: Mandatory reporting of all incidents, including near-misses, to the central authority; lessons are integrated into training and standards (UNECE, 2021).	No centralised reporting/analysis mechanism; weak learning feedback loops.

DISCUSSION

Nigeria's petroleum haulage crises arise from intertwined infrastructural, institutional, and socio-economic factors. The PIA 2021 restructured oversight but omitted integrated safety codes, leading to blurred accountabilities (Federal Republic of Nigeria, 2021; NMDPRA, 2022). Economic pressures on small operators sustain ageing fleets and risky practices (Mustapha et al., 2025). Community behaviours, such as fuel scooping in the 2025 Suleja and October incidents, stem from poverty and awareness deficits, challenging ADR's compliance assumptions (Olawole & Olapoju, 2018). Infrastructure woes, poor roads, and absent routing amplify vulnerabilities (Ucheobi et al., 2024; Akinwale, 2020). Recent reforms (e.g., tanker bans, colour codes) align partially with risk-management theory but require embedding in socio-technical systems for efficacy (Renn, 2008; Hollnagel, 2018). This integration advances the SDGs by fostering resilient, equitable transport and could strengthen safety and security in petroleum haulage.

Proposed Policy Framework

The findings of this study underline the urgent need for a coherent, enforceable, and comprehensive framework to address the risks associated with the road transport of petroleum products in Nigeria. This integrated framework builds on literature recommendations by incorporating key improvements in strengthening institutional architecture, funding mechanisms, digital compliance, environmental protection, community involvement, performance monitoring, and harmonisation of multimodal logistics and regulatory reforms. The approach remains pragmatic, gradual, risk-based, and institutionally sound, while recognising the economic realities of operators, infrastructure constraints, and fragmented governance. To ensure coherent implementation, the framework recommends overarching elements that cover all fields of interest, phased across three implementation horizons:

Immediate (0–2 years), short-term (2–5 years), and medium-term (5–10 years).

1. Strengthened Institutional Architecture

Establishment of a Petroleum Transport Safety Board (PTSB) under the Presidency, with statutory powers to coordinate inter-agency efforts. This includes mandated interoperability protocols between the FRSC, NMDPRA, NEMA, NESREA, Police, NSCDC, and state transport authorities to improve command hierarchy, information flow, and regulatory coherence, which are problems repeatedly highlighted in Nigeria's accident investigations.

Derived from Finding F1 (institutional fragmentation, Risk Governance lens). Feasibility: Establishing a Presidency-level coordinating board is legally achievable by executive order or an amending Act, but its statutory powers over existing agencies (FRSC, NMDPRA, NEMA) would need to be reconciled with each agency's founding legislation to avoid creating a fifth overlapping mandate; the risk the Board is meant to solve.

2. Financing and Economic Incentive Sub-Framework

Creation of a Petroleum Haulage Safety Fund (PHSF) financed through a 0.05% loading surcharge at depots and fines from non-compliance. This fund will support low-interest loans for fleet renewal, tax credits for ADR-compliant tankers, and penalties for fleets over 20 years old, thereby bridging the policy-practice gap by making upgrades financially viable.

This was derived from Finding F4 (economic disincentives to compliance). Feasibility: The 0.05% surcharge figure is illustrative and is not yet supported by a fiscal-impact model in this study; it should be presented as indicative pending a formal costing exercise (comparing projected fund inflow against the capital cost of fleet renewal for the operator base) rather than as a fixed policy parameter.

3. Digital Compliance Infrastructure

Development of a digital safety and compliance backbone (DSCB), including a national petroleum tanker registry, real-time telematics feed integration, an incident geo-tagging dashboard, and automatic violation triggers for the FRSC and NMDPRA, to enable transparency, reduce corruption, and facilitate predictive risk management.

Derived from Finding F2 (absence of resilience/early warning mechanisms, HRO lens) and directly operationalises the real-time reporting need identified in Section 3.3. Feasibility: Technically achievable using the existing FRSC/NMDPRA IT infrastructure as a base, but sustained implementation depends on funding continuity from the PHSF (Element 2) and data-sharing agreements across agencies with historically overlapping mandates (Element 1).

4. Performance Monitoring and Evaluation (M&E) Layer

Implementation of key performance indicators (KPIs) across institutional performance, compliance indicators, safety outcomes, environmental impact, and community engagement. This includes the annual Petroleum Transport Safety Index (PTSI) reports to track reform effectiveness and allow adaptive adjustments.

Derived from the cross-cutting need, evident across F1–F4, for a feedback mechanism absent from the current system (Section 4, 'Data and Monitoring' gap). Feasibility: low additional legal barrier, since it does not require new statutory powers; the main risk is under-resourcing, given Nigeria's existing under-reporting problem (Section 3.1).

5. Legal Reform Elements

Nigeria's legal provisions for hazardous materials are outdated. Modernisation of legal provisions through updated language incorporating ADR clauses, stiffer penalties for non-compliance, mandatory insurance for all petroleum carriers, and annual Gazette publication of compliant operators to enhance accountability and enforcement is required.

Derived from Finding F1 and F3 (the absence of a unified dangerous-goods code and ADR-equivalent clauses identified throughout Table 2). Feasibility: requires National Assembly time and is therefore the slowest-moving element of the five; sequencing it as a Short-Term (2–5-year) action, as below, rather than Immediate, is intentional.

These overarching elements are embedded and phased into the three implementation horizons. The framework balances urgent risk reduction with structural reforms, combining predictive technology, environmental stewardship, inclusive governance, and economic incentives to transform oil logistics into a safer and more regenerative system. However, success depends on sustained political will, inter-agency collaboration, funding mechanisms (especially for fleet renewal and infrastructure), and cultural shifts in community risk perception.

Recommended Phased Implementation of the Proposed Policy Framework

1. Immediate Risk Reforms (0–2 years)

Focus: Rapid enforcement, awareness, and foundational coordination to mitigate immediate risk.

Key Actions:

1. Driver skill and competency upgrade: Introduce a mandatory hazardous goods training module for tanker drivers, administered by accredited driving schools under the FRSC, and certified in collaboration with the NMDPRA.
2. Emergency command protocol: Issue a joint FRSC-NEMA-NMDPRA directive codifying the command of petroleum-related incident crash sites and identifying a single lead agency for each incident type to avoid duplication of efforts. Integrate initial interoperability protocols from the PTSB to streamline responses.
3. Placement of hazard labels: Strengthen the enforcement of hazard labels and transport document requirements at depots, warehouses, and along major corridors.
4. Public risk communication: Launch a nationwide public awareness campaign on the dangers of fuel scooping and hoarding, using social and mass media, religious institutions, NUPENG, and community leaders.
5. Initial environmental safeguards: Mandate basic environmental emergency kits on all tankers and deploy pilot mobile spill response units in high-risk areas to address immediate spill impact.

Responsible Institutions: FRSC (lead on driver licencing and enforcement), NMDPRA, NUPENG (enforcement of placards/documentation), NEMA (public risk communication and spill response), Ministry of Information (support), PTSB (initial coordination oversight), NESREA (environmental kit enforcement).

Indicators:

1. Number of drivers trained in hazardous goods handling within six months.
2. Percentage of tankers checked at depots with compliant placarding and documentation.
3. Public awareness levels, as measured by media reach and survey metrics.
4. Number of mobile spill response units deployed and incidents addressed.
5. M&E: Baseline PTSI score established for immediate reforms.

SDG Links: 3.6 (reduction of road traffic deaths), 11.2 (safe transport systems), 12.4 (environmentally sound management of hazardous materials).

2. Short-Term Systemic Strengthening Reforms (2–5 years)

Focus: Building systemic capacity through technology, data, and regulatory harmonisation while operationalising financing and digital tools.

Key Actions:

1. Fleet safety technology: Mandate the installation of speed limiters, telematics, and basic roll-over protection on all tankers over 33,000 litres with a phased compliance schedule. It is integrated with the DSCB for real-time telematics feeds and automatic violation triggers.
2. Route risk mapping: Conduct a national survey of road corridors used for petroleum haulage; classify them according to accident risk, infrastructure quality, and community exposure; and identify exclusion zones in urban areas. Incorporate state-led ecological vulnerability mapping to address environmental risks.
3. Centralised data repository: Develop a national database of oil tanker incidents under the NMDPRA, fed by the FRSC and NEMA, covering collisions, near misses, and spillages. Link to the DSCB for geo-tagging and predictive analytics.
4. Regulatory harmonisation: Draft a Nigerian 'Dangerous Goods Transport Code' based on the UN Model Regulations, adapted to local realities, and gazetted as a subsidiary regulation under the PIA. This includes initial legal reforms, such as stiffer penalties and mandatory insurance.
5. Financing rollout: Operationalise the PHSF to provide low-interest loans and tax credits for early adopters of safety technologies, with penalties for non-compliant ageing fleets.
6. Community engagement foundations: Pilot Community Safety Compacts in select high-risk corridors, engaging youth associations and transport unions to build local support.

Responsible Institutions: FRSC (fleet safety enforcement and penalties); NMDPRA (database management, dangerous goods code, and DSCB rollout); Federal Ministry of Works (route classification); State Governments (implementation of exclusion zones and ecological mapping); PTSB (interoperability and oversight); Federal Ministry of Finance (PHSF administration); NESREA (environmental integration); NUPENG (community pilots).

Indicators:

1. Proportion of tankers fitted with speed limiters and telematics by the end of the compliance window.
2. Completion and publication of the national route-risk map, including ecological vulnerabilities.
3. Establishment and operationalisation of the NMDPRA database with quarterly public reports via the DSCB.
4. Funds disbursed from PHSF and the number of operators accessing incentives.
5. Number of pilot Community Safety Compacts established
6. M&E: Mid-year PTSI report showing improvements in compliance and institutional performance KPIs.

SDG Links: 3.6, 9.1 (resilient infrastructure), 12.4, 16.6 (effective institutions).

3. Medium-Term Structural Reforms (5–10 years)

Focus: Structural transformation to reduce overreliance on road transport, enhance sustainability, and embed long-term safeguards.

Key Actions:

1. Fleet renewal programme: Establish a condition-based fleet renewal regime in which vehicle age operates as a trigger for progressively stricter inspection rather than as a standalone disqualification. A tanker would remain eligible for dangerous goods service on passing an annual technical inspection; beyond a defined age threshold, inspection would become more frequent and would extend specifically to the equipment items that older vehicles typically lack, so that an older vehicle carrying a compliant retrofit, rollover protection, anti-lock and endurance braking, electronic stability control, remains admissible, while a younger vehicle that fails inspection does not. A phased scrappage scheme and fiscal incentives (tax reliefs and credit schemes via the PHSF) would support replacement where retrofit is not economic, and operators failing repeat inspection would face escalating penalties.
2. Comprehensive community security strategy: Institutionalise community safety committees along major corridors, integrating risk awareness with local development initiatives to address socio-economic drivers of fuel scooping and theft. Expand Community Safety Compacts with structured engagements, buffer zone policies, and industry social contracts to reduce community-induced risks.
3. Integrated pipeline-rail-road strategy: Accelerate investment and surveillance in petroleum-product pipelines and rail freight to progressively reduce dependence on road haulage, aligned with a National Multimodal Logistics Strategy and NRC freight modernisation plans. As an illustrative policy ambition, Nigeria could aim for up to a 40% reduction in road-based petroleum-product haulage by 2035, while recognising that this is not a derived or binding target and should be validated through freight-demand modelling, infrastructure-capacity assessment and feasibility analysis. Implementation should also promote private-sector participation through transparent pipeline concession agreements and related PPP arrangements.
4. International benchmark alignment: Implement ADR provisions (driver periodic retraining, advanced stability controls, emergency kits) into Nigerian standards, aligning with international norms. Advance legal reforms with modernised language, ADR clauses, and annual Gazette publications of compliant operators.
5. Enhanced environmental measures: Establish a Hazardous Waste Clean-up Fund (linked to PHSF), ensure full deployment of mobile spill response units, and integrate climate risk assessments into route and community planning.

Responsible Institutions: Federal Ministry of Finance (fleet incentives and PHSF expansion), NUPENG; NMDPRA (regulatory standards and DSCB maturity); NRC (rail freight strategy); Ministry of Niger Delta & Community Development Agencies (community safety initiatives and compacts); PTSB (overall coordination); NESREA (environmental fund and measures); Federal Ministry of Works (multimodal integration).

Indicators:

1. Average age of national tanker fleet reduced by 20% in three years.
2. Reduction in tanker-related fatalities per 100 crashes by at least 30%.
3. Number of kilometres of petroleum pipelines and rail corridors rehabilitated or developed.
4. Formal adoption of ADR-equivalent clauses into Nigerian regulations, with Gazette publications.
5. Funds allocated from the Hazardous Waste Clean-up Fund and the number of clean-up operations.
6. Achievement of modal shift targets and community engagement KPIs.
7. M&E: Annual PTSI reports demonstrating sustained improvements in safety outcomes, environmental impact, and institutional effectiveness.

SDG Links: 3.6, 9.4 (sustainable infrastructure upgrade), 11.2, 12.4.

CONCLUSION

Nigeria's petroleum haulage system remains perilously deficient, institutionally fragmented, and misaligned with ADR benchmarks, as evidenced by 2025's tragic incidents. The proposed framework delivers a phased, pragmatic roadmap for reform, balancing immediate safeguards with long-term sustainability. By integrating recent measures like tanker bans, it promises to avert disasters, preserve the environment, and bolster

development. Future empirical studies should validate implementations, ensuring a whole-of-society approach involving FRSC, NMDPRA, and communities. Ultimately, these reforms align with SDGs 3, 9, 11, and 12, transforming haulage from a hazard into a cornerstone of progress. In particular, the numeric targets proposed in Section 8 (the 0.05% surcharge, the 15-year fleet-age limit, and the 40% modal-shift target) should be treated as a starting negotiating position for stakeholder consultation and fiscal/technical modelling, not as validated findings of this desk review; subsequent empirical and quantitative studies, including primary survey work with operators, regulators and affected communities, are needed to test and refine them.

DECLARATIONS

Ethical approval: Not applicable.

Informed consent: Not applicable.

Funding: No external funding was reported for the study.

Conflict of interest: The authors declare no conflict of interest.

Author contributions: All authors contributed to the conceptualisation, methodology, analysis, interpretation and preparation of the manuscript, and all authors read and approved the final manuscript.

REFERENCES

Adediran, A. O. (2018). Policy discourse on oil transport in Nigeria: From reactive to proactive approaches. Journal of African Energy Policy, 12(3), 45–62. https://doi.org/10.1016/j.jaep.2018.03.005

Aderamo, A. J. (2012). Urban transportation problems and challenges in Nigeria: A planner's view. Geography and Environmental Management Journal, 8(1), 23–40.

Afolabi, O. O. (2022). Environmental externalities of oil spills and fires in Nigeria. Environmental Chemistry and Ecotoxicology, 4, 186–194. https://doi.org/10.1016/j.enceco.2022.04.009

Akinwale, Y. O. (2020). Enforcement challenges of tanker bans in Lagos: Industry resistance and policy implications. African Journal of Transport Studies, 15(4), 210–225.

Ambituuni, A., Amezaga, J., & Emeseh, E. (2014). Analysis of safety and environmental regulations for downstream petroleum industry operations in Nigeria: Problems and prospects. Environmental Development, 9, 43–60. https://doi.org/10.1016/j.envdev.2013.12.002

Ambituuni, A., Amezaga, J., & Werner, D. (2015). Risk assessment of petroleum product transportation by road: A framework for regulatory improvement. Safety Science, 79, 324–335. https://doi.org/10.1016/j.ssci.2015.06.022

Ambituuni, A., Chapman, L., Lawler, D. M., & van der Horst, D. (2011). Pipeline interdiction and bridging in Nigeria: Is a modification to the spatial connectivity matrix model required? Journal of Transport Geography, 19(1), 179–184.

Anifowose, B., Lawler, D. M., van der Horst, D., & Chapman, L. (2015). Attacks on oil transport pipelines in Nigeria: A quantitative exploration of patterns, context and causal factors. Social Science Research Network. https://doi.org/10.2139/ssrn.1929189

Brown, O. (2021). Corruption and enforcement deficits in Nigeria's oil sector. African Governance Journal, 28(2), 150–167.

Ede, O. (2019). Petroleum tanker accidents in Nigeria: Regional analysis. Journal of Safety Research, 70, 45–58.

Ezirim, G. E. (2021). Relationship integration and petroleum haulage disruptions in Nigeria. International Journal of Interdisciplinary Studies, 4(3), 1–15.

Federal Republic of Nigeria. (2021). Petroleum Industry Act. Government Printer.

Federal Road Safety Corps. (2023). Federal roads condition report in Nigeria. FRSC Annual Report.

Federal Road Safety Corps. (2025). Tanker incidents statistics: Niger State and Kano cases. FRSC Incident Report.

Hollnagel, E. (2018). Safety-II in practice: Developing the resilience potentials. Routledge.

Iwayemi, A., Adenikinju, A., & Babatunde, M. A. (2010). Estimating petroleum products demand elasticities in Nigeria: A multivariate cointegration approach. Energy Economics, 32(4), 883–888. https://doi.org/10.1016/j.eneco.2009.12.002

Nigerian Midstream and Downstream Petroleum Regulatory Authority. (2022). Regulatory guidelines. NMDPRA.

Nigerian Midstream and Downstream Petroleum Regulatory Authority. (2025). Updates on tanker capacity bans and colour coding. NMDPRA Policy Directives.

Odeyemi, O., & Ogunjumo, R. A. (2019). Regulatory fragmentation in Nigeria's petroleum sector. African Journal of Energy Law, 14(2), 78–95.

Oguntoyinbo, O., et al. (2024). Adapting ADR to Nigerian petroleum distribution. Journal of Transport Policy, 31(1), 45–60.

Okonkwo, P. C., & Aderogba, K. A. (2019). Dangerous goods regulation in Nigeria: Gaps and recommendations. Journal of Hazardous Materials Management, 35(4), 210–225.

Okonkwo, P. C., & Eke, S. J. (2022). Tanker explosions in Nigeria: Case studies from Lagos and Onitsha. Safety Science, 150, 105–115. https://doi.org/10.1016/j.ssci.2021.105715

Olawole, M. O., & Olapoju, O. M. (2018). Understanding the spatial patterns of tanker accidents in Nigeria using geographically weighted regression. International Journal of Vehicle Safety, 12(2), 137–154. https://doi.org/10.1504/IJVS.2018.093057

Olujobi, O. J., et al. (2022). Petroleum Act and downstream operations in Nigeria. Journal of Energy Law and Policy, 20(3), 150–170.

Orubu, C. O., Odusola, A., & Ehwarieme, W. (2004). The Nigerian oil industry: Environmental diseconomies, management strategies and the need for community involvement. Journal of Human Ecology, 16(3), 203–214. https://doi.org/10.1080/09709274.2004.11905730

Pipeline and Hazardous Materials Safety Administration. (2021). Hazardous materials regulations: Inspections and monitoring. U.S. Department of Transportation.

Renn, O. (2008). Risk governance: Coping with uncertainty in a complex world. Earthscan.

Romsom, E. (2022). Global oil theft: Impact and policy responses. WIDER Working Paper, 2022/16. United Nations University. https://doi.org/10.35188/UNU-WIDER/2022/139-9

Schinas, O., & Bergmann, M. (2021). Hazardous materials transport: EU regulatory frameworks. Journal of Maritime Policy, 30(4), 500–515.

Ucheobi, C. C., et al. (2024). Tanker accidents and infrastructure issues in Nigeria. Journal of Transport Geography, 112, 103–115.

Umar, H. A., Sulaiman, S. A., Said, M. A., Gungor, A., & Ahmad, R. K. (2021). An overview of biomass conversion technologies in Nigeria. Clean Energy and Technology, 9, 1–15. https://doi.org/10.1007/s40825-021-00191-z

United Nations. (2023). Recommendations on the transport of dangerous goods: Model regulations (23rd rev. ed.). United Nations Economic Commission for Europe.

United Nations Economic Commission for Europe. (2021). Agreement concerning the international carriage of dangerous goods by road (ADR). United Nations.

United Nations Economic Commission for Europe. (2023). Dangerous goods transport guidelines. United Nations.

Weick, K. E., & Sutcliffe, K. M. (2015). Managing the unexpected: Sustained performance in a complex world (3rd ed.). Jossey-Bass.

South African Bureau of Standards. (2011). SANS 1518: Transport of dangerous goods — Design, construction, testing, approval and maintenance of road vehicles and portable tanks. Pretoria: SABS. Available via Internet Archive: https://archive.org/details/za.sans.1518.2011

Ambituuni, A., Chapman, L., Lawler, D. M., & van der Horst, D. (2011). Pipeline interdiction and bridging in Nigeria: Is a modification to the spatial connectivity matrix model required? Journal of Transport Geography, 19(1), 179–184.

P.M. News. (2025, March 27). Tanker crashes claim 555 lives across Nigeria in 5 years – FRSC. https://pmnewsnigeria.com/2025/03/27/tanker-crashes-claim-555-lives-across-nigeria-in-5-years-frsc/

The ICIR. (2025, February 25). Regulatory failures, economic desperation fuel fatal tanker explosions in Nigeria. https://www.icirnigeria.org/regulatory-failures-economic-desperation-fuel-fatal-tanker-explosions-in-nigeria/

Blueprint. (2025, September 5). Preventing deaths through fuel tanker explosions. https://blueprint.ng/preventing-deaths-through-fuel-tanker-explosions/

Vanguard News. (2025, August 27). 411 Nigerians die from scooping fuel from fallen tankers in 2024 – FRSC. https://www.vanguardngr.com/2025/08/411-nigerians-die-from-scooping-fuel-from-fallen-tankers-in-2024-frsc/

Leadership. (2026, April 24). FRSC records 61.29% drop in tanker fatalities. https://leadership.ng/frsc-records-61-29-drop-in-tanker-fatalities/

PRNigeria News. (2026, April 11). FRSC reports 61% drop in tanker crash deaths, tightens enforcement. https://prnigeria.com/2026/04/11/frsc-reports-drop-tanker/

Al Jazeera. (2025, October 22). Nigerian fuel tanker explosion kills 35, road safety agency says. https://www.aljazeera.com/news/2025/10/22/nigerian-fuel-tanker-explosion-kills-35-road-safety-agency-says

Aluko & Oyebode. (2023, July). Commentary on the Presidential Directive on Delineation of Regulatory Oversight between NUPRC and NMDPRA pending Amendment of Petroleum Industry Act 2021. https://www.aluko-oyebode.com/insights/directive-on-nuprc-nmdpra-regulatory-oversight/

Fountain Journal of Law. (2026). NUPRC versus NMDPRA: Assessing the institutional split and its consequences for regulatory certainty. https://fountainjournals.com/index.php/FULAJ/article/download/1499/643/4663

Wikipedia contributors. (2026). Petroleum Industry Act 2021. Wikipedia. https://en.wikipedia.org/wiki/Petroleum_Industry_Act_2021