RESILIENCE AND LIVABLE CITIES IN A WARMING WORLD

A FESTSCHRIFT IN HONOUR OF

TPL. DR. JOSHUA ADEWUMI ADEBISI FNITP, RTP



EDITED BY

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TABLE OF CONTENTS

Foreword..... vii

The Profile of TPl. Dr. Joshua Adewumi Adebisi viii

Scholarly Perspectives to Celebrate Tpl. Dr. Joshua A. Adebisi in Grace and Honour..... x

Table of Contents xvii

Preface..... xx

Contributors Profile.....xxii

SECTION ONE: CLIMATE CHANGE AND URBAN PLANNING

1. Climate-Resilient Housing and Informal Settlements in Lagos State: Pathways Toward Adaptive Urban Governance and Sustainable Development
- ALABI Oluwole Titilayo **2**

SECTION TWO: ENVIRONMENTAL JUSTICE, SAFETY AND SUSTAINABILITY

2. Environmental Safety Risks of Traffic-Related Carbon Monoxide Emissions in Uyo Metropolis, Akwa Ibom State, Nigeria - AKPAN Patrick Etim **15**

3. Integrating Sustainable Strategies in The Design of Convention Centers in Lagos, Nigeria
- OLADELE Victor Olayinka & ADEDEJI Afolabi Idowu **34**

SECTION THREE: GREEN INFRASTRUCTURE AND ECOSYSTEM-BASED APPROACHES

4. Appraisal of The Effectiveness of Green Infrastructure and Ecosystem-Based Approaches in Enhancing Urban Resilience in Sub-Saharan African Cities
- AKINADE Adekunle Joshua **50**

SECTION FOUR: URBAN AGRICULTURE AND FOOD SECURITY

5. Fear of Crime and Food Security Dynamics in Oke-Ogun Rural-Urban Border Communities of Oyo State: Implications for Livelihoods and Spatial Resilience
- OGUNDIRAN Olayinka Robert **67**

6. Assessing the Spatial Patterns of Urban Agriculture in Ibadan, Nigeria: Integrating Satellite Imagery into Land Use Planning Strategies for Enhanced Food Security
- OLADIRAN Ibironke Olaide **82**

7. Urban Agriculture and Social Justice: Comparative Analysis of Inclusive Planning Policies in Lagos And Ibadan, Nigeria - OYEJIDE Olarinola I., ADEBOWALE-SALAWU Temiloluwa E. & OYEJIDE Oyedeji T. **98**

SECTION FIVE: DIGITAL INNOVATION AND SMART URBAN ADAPTATION

8. Smart Solutions for Resilient Transportation Infrastructure and City Livability: Examples from The State of Connecticut, United States of America - OLALEYE Eyitayo, OLUWOYE Jacob & OGUNKAN David **114**

9. AI-Driven Portfolio Management for Ibadan Wash Infrastructure: A Strategic Framework for Sustainable Planning in Ibadan Metropolis - ODUNFA Victoria O., ELEGBEDE Olufola. T., TAIWO Olushola S. & OGUNDIRAN A. A. **137**

10. Synergizing Global System of Mobile Communications and Artificial Intelligence for Inclusive Regional Development in Nigeria - ADEBISI Joshua Adewumi **157**

SECTION SIX: INCLUSIVE AND PARTICIPATORY URBAN GOVERNANCE

11. Promoting Community Inclusiveness in Public Recreational Facilities Through Design-Based Strategies in Nigerian Cities - OGUNDARE Abiodun Olusogo, ADEDEJI Afolabi Idowu & OLADELE Victor Olayinka **162**

SECTION SEVEN: HEALTH, WATER, SANITATION AND URBAN WASTE

12. Socio-Economic Determinants and Utilization Patterns of Primary Health Care (PHC) Facilities in Ibadan Metropolis, Nigeria - ADEJARE Jacob Ayorinde **173**

13. Water Quality Evaluation and Sanitary Surveying in Southwest Nigeria - LASISI Kamil Oluranti **190**

14. Econometric Analysis of Health Care Accessibility and Health Care Outcome in Semi-Urban Area: Evidence from Alakia Primary Health Care Centre, Ibadan, Oyo State - KOLAPO Oluyemi Mary & OMEOKWE Favour Chibueze **206**

15. Assessment of Private Sector Participation in Solid Waste Management in Ojokoro Community, Lagos Stat - IYANDA Oladimeji **223**

SECTION EIGHT: PUBLIC SPACE, HOUSING AND LAND USE PLANNING

16. Urban Redevelopment and The Reconfiguration of Public Space in Ibadan, Nigeria AKANMU Ayobami Ademola, SALISU Umar Obafemi, FASINA Simeon Oluwagbenga, & SANNI Sekinat Motunrayo **243**

17. Incremental Housing and Physical Planning Standards' Compliance in Ibadan Sub-Urban Areas, Oyo State, Nigeria - LASISI Kamil Oluranti **258**

18. An Overview of Adoption of Government Regulations on Building Projects in The Oke-Ogun Area of Oyo State, Nigeria - AJAO Ayodele Christianah, AREMU John Adekunle & TIJANI Kabiru Okegere **277**

SECTION NINE: RISK REDUCTION AND DISASTER-RESILIENT CITIES

19. Integrated Flood Risk Management and Urban Livability in Nigeria's Coastal Cities: Insights from Ibeju-Lekki Corrido - OGUNSESAN Abimbola Simiat & BOLUKALE Oluwatoyin **287**

20. Mitigating Urban Flood Risks: Lessons from Ibadan For A Disaster-Resilient City - AYORINDE Adedayo & BOLUKALE Oluwatoyin **306**

21. Integrating Climate Resilient Design Principles into Sustainable Residential Development in Ibadan, Nigeria - ABAIRE Oluwatobiloba, ORKPE Arwashima Kristen & OLADELE Victor Olayinka **326**

SECTION TEN: URBAN MOBILITY AND LOW CARBON TRANSPORT

22. Decarbonizing Urban Mobility in Nigeria: Opportunities and Constraints for Transitioning to Electric Public Transport Systems - ADEBOWALE-SALAWU Temiloluwa E. and OYEJIDE Olarinola I. **340**
23. Road Transport System in Nigeria: Key Issues and Challenges - ADEYINKA Ebenezer Olasupo & ALABI Folami Munta & ANIMASHAUN Idris Olalekan **349**
24. Urban Road Traffic Resilience and Sustainable Development in Ibadan, Nigeria - OGUNSESAN Durodola Kamoru & OGUNSESAN Abimbola Simiat **360**
25. Residents' Appraisal of Urban Mobility and Low Carbon Transport Solutions in Ibadan, Oyo State - TEJUOSHO Itunu Elizabeth, OLORUNFEMI Samuel Oluwaseyi & ADENIRAN Adetayo O. **376**
26. Road Infrastructure Vulnerability and Urban Mobility Safety Risks in Southwestern Nigerian Cities - SALISU Umar Obafemi, NALAILA Stephano & Akanmu Ayobami Ademola **391**

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CHAPTER 22

DECARBONIZING URBAN MOBILITY IN NIGERIA: OPPORTUNITIES AND CONSTRAINTS FOR TRANSITIONING TO ELECTRIC PUBLIC TRANSPORT SYSTEMS

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Abstract

Nigeria's transport sector is a major source of greenhouse-gas emissions, contributing about one-quarter of national carbon output. Rapid urbanization, growing motorization, and dependence on fossil fuels have intensified air pollution and congestion in cities such as Lagos, Ibadan, and Abuja. This paper examines the opportunities and constraints of decarbonizing Nigeria's urban mobility through the transition to electric public transport systems. Using a discussion-based analytical approach, it synthesizes recent policy documents, pilot experiences, and secondary data to assess institutional readiness, infrastructural capacity, and policy coherence. Findings reveal a strong policy foundation under frameworks such as the Climate Change Act (2021), National Urban Transport Policy (2021), National Electric Vehicle Policy (2023), and the approved National Land Transport Policy (2025). These instruments demonstrate Nigeria's growing political commitment to sustainable mobility. However, persistent barriers including unreliable electricity supply, high acquisition costs, weak inter-agency coordination, and limited technical capacity continue to constrain progress. The Lagos electric-bus initiative, implemented through a public–private partnership between LAMATA and Oando Clean Energy, offers a replicable model for other cities if supported by renewable power and institutional reform. The study concludes that Nigeria's low-carbon transition requires an integrated strategy linking energy reform, transport governance, and industrial development. A phased, city-based approach beginning with Lagos and Ibadan can demonstrate scalable pathways toward decarbonized, equitable, and resilient urban transport.

Keywords: Urban mobility, electric public transport, low-carbon transition, Nigeria, sustainable transport

1.0 Introduction

Nigeria's urban transport sector is among the highest sources of greenhouse-gas (GHG) emissions in sub-Saharan Africa, accounting for nearly one-quarter of the country's total energy-related emissions (International Energy Agency [IEA], 2023). United States, China, India, Russia, and Brazil are the highest contributors in the world, while South Africa, Egypt, Nigeria, and Algeria rank among the top African contributors to transport-related greenhouse-gas emissions, driven by rapid urbanization, aging vehicle fleets, and high reliance on fossil fuels (Akanmu, Salisu, Fasina & Sanni, 2022). In Nigeria, rapid urbanization, expanding vehicle ownership, and dependence on fossil fuels have intensified congestion, air pollution, and fuel consumption in cities such as Lagos, Ibadan, and Abuja.

The dominance of informal transport systems including minibuses (danfo), tricycles (*keke*), and motorcycles (*okada*), underscores the sector's inefficiency and its contribution to environmental and public-health pressures (World Bank, 2022). Recognizing these challenges, Nigeria has increasingly aligned national policy with global climate goals. The Climate Change Act (2021) commits the country to net-zero emissions by 2060, while the National Urban Transport Policy (2021), National Electric Vehicle Policy (2023), and the approved National Land Transport Policy (2025) promote cleaner mobility through electrification, modal shift, improved logistics, and renewable-energy integration (Federal Ministry of Environment (FMEnv), 2021), Federal Ministry of Transportation, 2021; Federal Ministry of Industry, Trade, and Investment, 2023). These frameworks also align with the Nigeria Energy Transition Plan, which identifies transport electrification as a key strategy for sustainable growth (Energy Transition Office, 2023).

The shift to electric public transport presents transformative possibilities. Electric buses and solar-powered charging infrastructure can reduce urban emissions, lower operating costs, and improve service reliability. The pilot electric-bus project introduced in 2023 by Oando Clean Energy in partnership with the Lagos Metropolitan Area Transport Authority (LAMATA) marked a milestone in sustainable transport in Nigeria. Early reports indicate lower energy costs and improved service performance, demonstrating the country's capacity to leverage public–private partnerships for low-carbon innovation (Lagos Metropolitan Area Transport Authority and Oando Clean Energy, 2023).

The transition however, faces structural barriers (Akanmu & Salisu, 2025). Electricity supply remains inconsistent, with average generation capacity hovering around 4,500 megawatts, far below national demand (Nigerian Electricity Regulatory Commission [NERC], 2023). High acquisition costs, weak coordination among ministries, limited technical expertise, and poor enforcement of environmental standards also hinder progress (Ebohon and Okafor, 2022). The absence of city-specific transport authorities in most states, except Lagos, further limits subnational implementation.

Against this background, this study examines the opportunities and constraints of decarbonizing urban mobility in Nigeria through electric public transport systems. Specifically, the study seeks to: (i) assess the policy and institutional frameworks supporting electric mobility in Nigeria; (ii) evaluate infrastructural and energy readiness for electric transport systems; (iii) examine the major implementation barriers constraining transition; and (iv) identify pathways for scaling sustainable urban mobility, drawing comparative lessons from Lagos and Ibadan.

2.0 Literature Review

2.1 Conceptual Review

Decarbonizing urban mobility refers to the reduction of transport-related greenhouse-gas emissions through cleaner technologies, modal restructuring, and integrated land-use and transport planning. In recent years, electric mobility has emerged as a central pathway for achieving this transition because it offers opportunities to reduce tailpipe emissions, improve urban air quality, and enhance long-term energy

efficiency (Salisu, Akanmu, Fasina & Sanni, 2022; Creutzig et al., 2022). Electric public transport, particularly electric buses, is increasingly viewed as a strategic intervention in lo - and middle-income countries where urban transport demand is rising rapidly. In principle, the transition from diesel-based fleets to electric systems supports broader climate goals while also improving service quality, reducing noise pollution, and creating new industrial and skills-development opportunities. Yet these benefits are contingent on infrastructure readiness, electricity reliability, and effective governance.

2.2 Empirical Review

2.2.1 Global Evidence on Low-Carbon Urban Mobility

The global discourse on sustainable urban transport has shifted significantly toward decarbonization, as cities respond to rising emissions from private and public vehicles. The transport sector accounts for nearly 23 percent of global carbon dioxide emissions, with road transport representing the largest share (IEA, 2023). Rapid urbanization, economic growth, and motorization have therefore intensified the search for alternative mobility systems that are efficient, inclusive, and climate-friendly (Akanmu & Salisu, 2024). According to the Intergovernmental Panel on Climate Change (2022), electrifying public transport systems particularly buses, can substantially reduce life-cycle emissions when paired with low-carbon electricity sources.

European and Asian cities such as London, Shenzhen, and Amsterdam have deployed large-scale electric-bus fleets supported by policy incentives, energy planning, and coordinated maintenance systems International Energy Agency (2023). These examples suggest that successful transition depends on more than vehicle acquisition; it also requires sustained financing, infrastructure planning, and institutional coordination.

2.2.2 E-Mobility Transitions in Africa

Across Africa, transport systems remain predominantly fossil-fuel-based and are commonly characterized by informal operations, aging vehicle fleets, and weak regulation (Zambia Transport and Logistics, 2025). Nevertheless, several African cities are beginning to experiment with electric mobility. Nairobi, Kigali, and Cape Town, for example, have introduced pilot electric buses and motorcycles within broader sustainable transport initiatives (Sustainable Energy for All, 2024; Government of Rwanda, 2022).

In Kenya, BasiGo and Roam have introduced electric-bus fleets supported by charging hubs and innovative leasing models, helping reduce operating costs relative to diesel systems. Rwanda has coupled tax incentives with a strong green-growth agenda and coordinated implementation support. These experiences demonstrate that political commitment, policy stability, and supportive energy frameworks are key enablers of e-mobility adoption in African contexts. However, regional studies continue to identify inadequate grid reliability, low investment capacity, and dependence on imported vehicles and batteries as major constraints to scaling across the continent (Akanmu & Salisu, 2025; World Bank, 2022; United Nations Economic Commission for Africa, 2022).

2.2.3 Nigeria's Urban Transport Context

Nigeria's transport system is emblematic of the challenges faced by rapidly urbanizing African countries. Urban transport is dominated by informal operators using high-emission vehicles, weak regulatory oversight, and inadequate public infrastructure. Recent evidence identifies transport as one of the highest contributors to national greenhouse-gas emissions after energy generation (Federal Ministry of Environment, 2023).

Lagos presents the most developed case for transport electrification in Nigeria. Studies indicate that electrifying the Bus Rapid Transit system could significantly reduce greenhouse-gas emissions and lower operating costs, although infrastructure readiness, power-supply reliability, and strong policy coordination remain indispensable (Lawanson et al., 2025). Nationally, however, electric vehicle adoption remains limited. While the National Automotive Industry Development Plan encourages local manufacturing and related infrastructure, financing and implementation challenges continue to constrain progress (Nairametrics, 2023). Institutional fragmentation, weak power supply, affordability concerns, and low public awareness remain recurring barriers in the Nigerian context (Ajide et al., 2025; Ebohon and Okafor, 2022).

2.3 Theoretical Review

This study is anchored on the Avoid–Shift–Improve (ASI) framework and the Socio-Technical Transition (STT) theory. The ASI framework provides a practical lens for reducing transport emissions by avoiding unnecessary travel, shifting users toward more sustainable modes, and improving vehicle and fuel technologies. In the Nigerian context, electrifying public transport aligns with the "improve" dimension by seeking greater energy efficiency and lower emissions (Deutsche Gesellschaft für Internationale Zusammenarbeit [GIZ], 2019).

The STT theory explains how sustainability transitions occur through interactions among niche innovations, established socio-technical regimes, and broader landscape pressures (Geels, 2002, 2012). In Nigeria, electric public transport represents a niche innovation confronting an entrenched fossil-fuel regime characterized by weak power infrastructure, institutional fragmentation, and informal transport dominance. Together, ASI and STT provide a useful analytical basis for understanding why decarbonization in Nigeria is not simply a technical substitution, but a systemic transformation involving policy, infrastructure, finance, and social acceptance.

3.0 Materials and Methods

3.1 Study Area

The study focuses on Lagos and Ibadan because they represent contrasting but strategically important urban mobility contexts in Nigeria. Lagos is the country's largest economic center and the most advanced urban transport laboratory, with an established metropolitan transport authority and a pilot electric-bus initiative. Ibadan, by contrast, is a major regional center with growing travel demand but weaker institutional capacity for coordinated transport reform. These two cities therefore provide a useful basis for

examining both the possibilities and the limitations of scaling electric public transport in Nigeria. Lagos offers evidence of practical experimentation and institutional innovation, while Ibadan illustrates the conditions that characterize many other emerging urban centers where the transition remains more aspirational than operational.

3.2 Methodology

This paper adopts a discussion-based analytical approach. It draws primarily on secondary sources, including policy documents, government reports, institutional publications, and relevant academic literature on electric mobility, urban transport, and low-carbon transition. The approach is suitable because the study seeks to synthesize existing evidence, evaluate institutional readiness, and interpret emerging policy and implementation trends rather than test a hypothesis using primary data. The analysis is organized thematically around policy and institutional frameworks, opportunities for decarbonization, implementation barriers, and comparative lessons from Lagos and Ibadan. This structure enables the study to retain an interpretive focus while also aligning the discussion with the specific objectives stated in the introduction.

4.0 Results and Discussion

4.1 Policy and Institutional Landscape

Nigeria's policy and institutional landscape for transport decarbonization has expanded considerably in recent years, reflecting growing awareness of the climate–development nexus. The Climate Change Act (2021) legally commits the country to net-zero emissions by 2060 and establishes a national governance structure for climate action. This framework is complemented by the National Urban Transport Policy (2021), the National Electric Vehicle Policy (2023), the National Automotive Industry Development Plan, the Energy Transition Plan, and the approved National Land Transport Policy (2025). Together, these instruments indicate growing policy recognition that transport electrification is central to national sustainability goals.

The analysis however, shows that policy strength does not automatically translate into implementation effectiveness. Responsibilities remain fragmented across the Federal Ministry of Environment, the Federal Ministry of Transportation, the Federal Ministry of Power, and related agencies, creating overlapping mandates and weak coordination. At the subnational level, capacity is uneven. Lagos has operationalized national policy most effectively through LAMATA, whereas cities such as Ibadan still lack an autonomous metropolitan authority capable of planning and regulating low-carbon mobility. The result is a policy environment that is conceptually robust but operationally uneven.

4.2 Opportunities for Decarbonizing Urban Mobility

Despite these constraints, Nigeria possesses important opportunities for decarbonizing its urban transport system. First, national policy commitment has improved significantly, creating a basis for long-term transition. Second, the country's abundant solar potential offers a realistic pathway for powering charging infrastructure through decentralized renewable systems, thereby reducing reliance on the unstable

national grid. Third, the transition could stimulate local industrial development through vehicle assembly, component production, technical training, and maintenance services.

Public–private partnerships also represent a major opportunity. The Lagos partnership between LAMATA and Oando Clean Energy demonstrates that electric-bus deployment can be catalyzed through collaborative financing and operational models. In addition, transport electrification offers public-health and environmental benefits by reducing particulate emissions, urban noise, and fuel dependence. If strategically linked to industrial policy and renewable-energy expansion, electric mobility can support not only climate mitigation but also job creation and urban resilience.

4.3 Constraints and Implementation Barriers

The foremost barrier to transition is Nigeria's unreliable power supply. National generation remains well below demand, limiting the viability of large-scale electric vehicle charging infrastructure (NERC, 2023). Even the Lagos pilot depends partly on hybrid arrangements, underscoring the fact that transport electrification cannot be sustained without broader energy-sector reform. High capital costs constitute a second major barrier. Electric buses remain significantly more expensive than diesel vehicles, and the absence of concessional loans, fleet-renewal incentives, or strong risk-sharing instruments discourages investment by both public and private operators.

Institutional fragmentation further weakens implementation. In practice, the absence of a single coordinating mechanism slows decision-making, limits accountability, and undermines investor confidence. Technical and human-capacity deficits also persist. Skills for battery management, electrical systems, and charging infrastructure remain limited, while public awareness of electric mobility is still low. Informal transport operators, who dominate urban mobility in many Nigerian cities, may also perceive transition as a threat to existing livelihoods, making inclusive adaptation policies essential.

4.4 Lessons from Lagos and Ibadan

Lagos remains Nigeria's most advanced urban transport laboratory. Since the establishment of LAMATA, the city has developed stronger regulatory capacity, more stable funding arrangements, and more integrated transport planning than most other urban centers. Its electric Bus Rapid Transit pilot demonstrates how institutional leadership, policy continuity, and private-sector participation can enable practical low-carbon innovation. Nevertheless, Lagos still faces challenges related to charging infrastructure, high costs, and grid instability.

Ibadan, by contrast, represents a city of latent potential rather than current capacity. Its compact form, growing population, and rising mobility demand make it a suitable candidate for pilot electric-bus corridors, yet the city lacks the institutional autonomy and financial mechanisms needed for implementation. The Lagos–Ibadan comparison therefore, highlights three key lessons: institutional autonomy matters; public–private partnerships can accelerate innovation; and renewable-energy integration is essential for sustaining transition beyond pilot projects.

5.0 Conclusion and Recommendations

The study confirms that the transition to electric public transport in Nigeria is not merely a technological shift, but a socio-institutional transformation. This insight aligns with the Socio-Technical Transition framework, which emphasizes that new mobility systems can only scale when technology, governance, finance, and social acceptance move in tandem (Geels, 2012). In Nigeria, electric mobility remains at a niche stage, constrained by entrenched fossil-fuel dependence and infrastructural inertia.

Nigeria's pursuit of low-carbon urban mobility offers a significant opportunity to link environmental sustainability with economic modernization and social inclusion. The analysis shows that the transition to electric public transport is both necessary and feasible, but only if critical structural constraints are addressed. While the country has developed an increasingly supportive policy environment, implementation remains weakened by unreliable power supply, fragmented institutions, high capital costs, and limited technical capacity.

Lagos demonstrates that electric public transport can move beyond rhetoric when supported by institutional autonomy, policy continuity, and public–private collaboration. Ibadan, on the other hand, illustrates the scale of reform still required in many emerging Nigerian cities. The transition will therefore depend on strengthening subnational governance, integrating renewable energy into transport planning, expanding innovative financing mechanisms, and building domestic technical capacity.

On the basis of these findings, the study recommends: (i) the establishment of a national e-mobility coordination framework linking transport, power, and environmental agencies; (ii) the deployment of renewable-powered charging infrastructure, especially solar-based systems; (iii) stronger use of green finance and public–private partnerships to lower adoption costs; (iv) the creation or strengthening of metropolitan transport authorities in major cities; and (v) inclusive transition strategies that support skills development and social acceptance. In conclusion, decarbonizing Nigeria's urban mobility demands more than technological substitution; it requires coordinated governance, infrastructure investment, and long-term policy coherence capable of translating ambition into practice.

Policy implications therefore, point toward integrated reform. Energy and transport planning must be better synchronized so that charging infrastructure is developed alongside renewable generation and grid strengthening. A national e-mobility coordination mechanism could reduce institutional fragmentation and accelerate implementation. Financing instruments such as green bonds, concessional lending, and blended finance are needed to lower capital barriers. Finally, a just transition approach, one that includes retraining, public communication, and equitable access, will be essential if decarbonization is to be socially legitimate as well as environmentally effective.

References

Ajide, B., Chuku, A., Lawson, L., Orole, K., & Adogo, L. (2025). Climate change mitigation through sustainable transportation: Challenges and opportunities for electric vehicle adoption in Nigeria. *International Journal of Innovation, Human Ecology, and Natural Studies,* 13(2), 122–138.

Akanmu, A. A. & Salisu, U. O. (2025). Transiting from Fossil Fuels to Alternative Energy for Commuting in Nigeria: Concerns, Barriers and Prospects. In Farah, B. S. & Odeleye, J. A. (Eds). *Thoughts on Land Transportation Development in Nigeria*, pp 413-436, Nigerian Institute of Transport Technology, Zaria.

Akanmu, A. A. & Salisu, U. O. (2024). Transport and Urbanization in Ibadan, Nigeria. In Gbadamosi, K. T., Mmom, P. C., Akanmu, A., Adenigbo, D, & Daminabo, S. (eds). Perspectives on Transport Development in Nigeria-Contemporary Discourse. A festschrift in honour of Prof. Osi S. Akpoghomeh, 64-91. Center for Logistics and Transport, University of Port Harcourt, Nigeria.

Akanmu, A. A., Salisu, U. O., Fasina, S. O. & Sanni, S. M. (2022). From Cradle to Auto-Mobility: The autonomous vehicle operation in Nigeria. In Farah, B. S. & Odeleye, J. A. (eds). *Transport Technology and Innovations in Nigeria,* 158-173. Nigerian Institute of Transport Technology, Zaria.

Amegah, A. K., & Agyei-Mensah, S. (2021). Urban air pollution and health in Africa: A systematic review. Environmental Health Perspectives, 129(9), 096001. https://doi.org/10.1289/EHP7843.

Creutzig, F., Jochem, P., Edelenbosch, O. Y., Mattauch, L., van Vuuren, D. P., McCollum, D., & Minx, J. (2022). Demand-side solutions to climate change mitigation consistent with high human development. Nature Climate Change, 12(1), 36–45. https://doi.org/10.1038/s41558-021-01219-y

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). (2019). Sustainable urban transport: Avoid–shift–improve (A-S-I). https://sutp.org/publications/sustainable-urban-transport-avoid-shift-improve-a-s-i-inua-9/

Ebohon, O., & Okafor, C. (2022). Policies, laws, regulations, governance, and implementation in transport and logistics. CILT Nigeria Conference Proceedings.

Energy Transition Office. (2023). Nigeria energy transition plan. Federal Government of Nigeria. https://energytransition.gov.ng

Federal Ministry of Environment. (2021). *Climate Change Act.* https://www.fmenv.gov.ng/climate-change-act-2021

Federal Ministry of Environment. (2023). Nigeria's greenhouse gas inventory: Sectoral contributions and policy responses.

Federal Ministry of Industry, Trade, and Investment. (2023). National electric vehicle policy 2023. Government of Nigeria.

Federal Ministry of Transportation. (2021). National urban transport policy. Government of Nigeria.

Geels, F. W. (2002). Technological transitions as evolutionary reconfiguration processes: A multi-level perspective and a case study. Research Policy, 31(8–9), 1257–1274. https://doi.org/10.1016/S0048-7333(02)00062-8

Geels, F. W. (2012). A socio-technical analysis of low-carbon transitions. Journal of Transport Geography, 24, 471–482. https://doi.org/10.1016/j.jtrangeo.2012.01.021

Government of Rwanda. (2022). Six ways Rwanda is building climate-resilient transport systems. Rwanda Climate Change and Development Portal.

Intergovernmental Panel on Climate Change. (2022). Climate change 2022: Mitigation of climate change. Cambridge University Press. https://www.ipcc.ch/report/ar6/wg3/

International Council on Clean Transportation. (2025). Emissions reduction and benefits of the first 3,825 electric buses under PM EBUS SEWA. https://theicct.org/

International Energy Agency. (2023). Nigeria energy profile 2023. https://www.iea.org/reports/nigeria-2023

International Energy Agency (IEA). (2023). *Global EV outlook 2023: Catching up with climate ambitions*. International Energy Agency. https://www.iea.org/reports/global-ev-outlook-2023

Lagos Metropolitan Area Transport Authority, & Oando Clean Energy. (2023). Sustainable transport initiative: Electric mass transit buses rollout. https://www.oandoplc.com/press-release/oando-kicks-off-sustainable-transport-initiative-in-lagos-state-with-launch-of-electric-mass-transit-buses-may-24-2023

Lawanson, T., Sawyer, L., & Olalekan, D. (2025). Lagos: City report. African Cities Research Consortium Working Paper.

Nairametrics. (2023, May 15). Nigeria to produce 30% locally electric vehicles by 2033. https://www.nairametrics.com/2023/05/15/nigeria-to-produce-30-locally-electric-vehicles-by-2033-nadip/

Nigerian Electricity Regulatory Commission. (2023). Quarterly report on the Nigerian electricity supply industry, Q4 2023. https://nerc.gov.ng/wp-content/uploads/2024/04/2023_Q4_Report_Final-1.pdf

Salisu, U. O., Akanmu, A. A., Fasina, S. O. & Sanni, S. M. (2022). Intelligent Transport System and National Economic Development of Nigeria. In Farah, B. S. & Odeleye, J. A. (eds). *Transport Technology and Innovations in Nigeria,* 64-93. Nigerian Institute of Transport Technology, Zaria.

Sustainable Energy for All. (2024). BasiGo's journey to electrify public transport in East Africa. https://www.seforall.org/system/files/2024-05/remi-casestudy-basigo-005.pdf

United Nations Economic Commission for Africa. (2022). African countries call for the transformation of air transport and tourism sectors. https://www.uneca.org/

World Bank. (2022). Mobility and development: Electric mobility challenges in Africa. World Bank Group. https://thedocs.worldbank.org/

World Bank. (2022). Nigeria urban transport and emissions review. World Bank Group.

World Health Organization. (2023). Nigeria: Environmental health profile. WHO. https://cdn.who.int/media/docs/default-source/country-profiles/environmental-health/environmental-health-nga-2023.pdf