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Multi-Sectoral Governance of Microbial Infection Control in Nigerian Urban Development

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Abstract

Urban development and microbial infection control are inextricably linked in Nigeria's rapidly growing cities, yet governance frameworks rarely integrate these domains effectively. This review examines the governance of microbial infection control within Nigerian urban development projects, analyzing how institutional arrangements, policy frameworks, and multi-sectoral coordination shape health outcomes in urban populations. It explores the epidemiological burden of infections in diverse urban settlements—from formal residential areas to informal settlements and slums—documenting significant intra-urban health disparities driven by differential access to infrastructure, housing quality, and basic services. The review evaluates governance responses across multiple sectors, including urban planning, water and sanitation, healthcare delivery, environmental management, and housing policy. It analyzes key challenges: fragmented institutional responsibilities, weak regulatory enforcement, inadequate data systems for evidence-based decision-making, funding constraints, and the particular governance deficits affecting informal settlements. Drawing on recent evidence from Nigerian cities including Ilorin, Akure, Aba, Lagos, and Bauchi, the review identifies promising innovations in participatory governance, multi-stakeholder collaboration, and integrated urban health interventions. It concludes with evidence-based recommendations for strengthening governance architectures to enable more effective, equitable, and sustainable infection control in Nigeria's urban development agenda.

Keywords: Governance, microbial infections, urban development, Nigeria, informal settlements, multi-sectoral coordination

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1. Introduction

1.1 Urbanization and Infection Risk in Nigeria

Nigeria is experiencing one of the fastest urbanization rates in the world, with approximately 52 percent of the population now residing in urban areas—a proportion projected to exceed 70 percent by 2050 (Urbanization Research Nigeria, 2015, as cited in Adeleke *et al.*, 2024). This rapid urban transition, while offering economic opportunities and improved access to services for some, has simultaneously created conditions that amplify microbial infection risks for millions of urban residents.

Urbanization in Nigeria has been characterized by unplanned expansion, inadequate infrastructure, and the proliferation of informal settlements where access to clean water, sanitation, and healthcare is severely limited (Ajala *et al.*, 2025). These conditions create fertile ground for the transmission of infectious diseases including malaria, cholera, typhoid, tuberculosis, and emerging antimicrobial-resistant infections. The COVID-19 pandemic starkly illustrated how urban density, overcrowding, and inadequate infrastructure can accelerate disease transmission, with urban poor communities bearing disproportionate burdens (Adeleke *et al.*, 2024).

The relationship between urban development and infection risk is neither simple nor uniform. Within the same city, infection burdens vary dramatically across different settlement types, reflecting differential access to the determinants of health: housing quality, water and sanitation infrastructure, waste management services, and healthcare facilities (Adeleke *et al.*, 2024; Ajala *et al.*, 2025). Understanding and addressing these intra-urban health inequities requires governance frameworks that recognize infection control as a core objective of urban development policy.

1.2 Governance as a Determinant of Urban Health

Governance encompasses the structures, processes, and practices through which decisions are made and implemented, and through which power and resources are exercised in society. In the context of urban development and infection control, governance determines: which interventions are prioritized, how resources are allocated, whose voices are heard in decision-making, how services are delivered, and how accountability is ensured.

Nigeria's urban governance architecture is characterized by institutional complexity and fragmentation. Responsibilities for urban development and health are distributed across multiple tiers of government—federal, state, and local—and across numerous ministries, agencies, and parastatals. The Federal Ministry of Works and Housing oversees national housing policy and major infrastructure projects. State ministries of physical planning and urban development regulate land use and building standards. Local government areas are constitutionally responsible for primary healthcare and some aspects of environmental sanitation. Additional specialized agencies address water supply, sanitation, environmental protection, and disease control.

This fragmented governance landscape creates significant challenges for integrated approaches to infection control in urban development. Policies formulated in one sector may be undermined by inaction in another. Resources allocated for health may be overwhelmed by the health consequences of poor urban planning. Communities most in need of integrated services may fall through the cracks of sectoral programming (Paul, 2025).

1.3 Objectives and Scope of This Review

This review aims to comprehensively examine the governance of microbial infection control within Nigerian urban development projects. Specific objectives include:

1. To analyze the burden and distribution of microbial infections across different urban settlement types in Nigeria
2. To map the institutional and policy frameworks governing urban development and infection control
3. To evaluate governance challenges in implementing integrated urban health interventions
4. To identify successful governance innovations and lessons from Nigerian cities
5. To propose evidence-based recommendations for strengthening governance architectures for urban infection control

The review covers policies and programs across urban planning, housing, water and sanitation, environmental management, and health sectors, recognizing that effective infection control requires integrated approaches. Geographic focus is on Nigerian cities, with attention to variations across states and settlement types. The time frame emphasizes recent developments (2015–2026), capturing policy evolution under successive administrations and in response to emerging challenges including rapid urbanization, climate change, and antimicrobial resistance.

2. Urban Microbial Infection Burden and Settlement Typologies

2.1 Intra-Urban Health Disparities: Evidence from Nigerian Cities

A growing body of evidence demonstrates that infection burdens vary dramatically within Nigerian cities, reflecting the unequal distribution of health-determining infrastructure and services across different settlement types.

Akure, Ondo State: A study by Adeleke *et al.* (2024) classified Akure's urban structure into four distinct settlement types based on morphological characteristics: informal settlements, medium-density areas, planned settlements, and peri-urban areas. Using very high-resolution satellite imagery and primary survey data, the researchers found that under-five malaria prevalence varied significantly across these settlement classes (P = 1.118e-05), with the highest burden observed in informal and peri-urban settlements compared to lower prevalence in formal planned settlements.

The study documented that children in informal settlements and peri-urban areas bear a disproportionately high malaria burden, reflecting the convergence of multiple risk factors: poor housing quality, inadequate drainage creating mosquito breeding sites, limited access to preventive measures, and barriers to healthcare access. The findings underscore "the urgent need for comprehensive urban development policies to address health inequities by prioritizing physical infrastructure improvements in marginalized areas" (Adeleke *et al.*, 2024).

Ilorin, Kwara State: During preparations for the 2023 bed net distribution campaign, the National Malaria Elimination Programme faced a 40 percent funding shortfall that necessitated developing an approach to prioritize limited resources for populations at highest risk (Adepoju *et al.*, 2025). Working with the Urban Malaria Research Team, researchers co-designed a framework for evidence-based decision-making that incorporated malaria risk scores computed at the ward level using four key variables, including malaria case data and environmental factors.

A crucial finding emerged when researchers analyzed whether local definitions of formal, informal, and slum settlements could inform community-level stratification of malaria risk. Malaria prevalence varied significantly across these settlement categories, leading to the development of specific definitions

for Ilorin. Ultimately, thirteen communities classified as formal settlements in Are 2 ward were de-prioritized during the bed net distribution campaign, ensuring that limited resources reached populations at highest risk (Adepoju *et al.*, 2025).

Abuja, Benue, Plateau, and Kogi States: Ajala *et al.* (2025) examined the relationship between informal settlements and residents' health in north-central Nigeria, focusing on selected settlements in these four states. Their findings revealed a high prevalence of diseases such as malaria, typhoid, and fever, which are "closely linked to poor housing conditions and inadequate healthcare access." The study documented that informal settlements lack crucial infrastructure including clean water, sanitation, and waste management systems, contributing to the spread of infectious diseases and increasing the risk of waterborne illnesses.

2.2 Settlement Typologies and Infection Risk Pathways

The evidence from Nigerian cities supports a conceptual framework linking settlement typologies to infection risk through multiple pathways.

Formal/Planned Settlements: These areas typically feature planned layouts, adequate housing, paved roads, functional drainage, reliable water supply, and organized waste management. Residents enjoy better access to healthcare facilities and higher health literacy. Consequently, infection burdens are generally lower, though risks may persist from environmental contamination originating outside settlement boundaries.

Medium-Density Settlements: These areas represent transitional zones with mixed housing quality and infrastructure access. Infection risks are intermediate but can escalate rapidly when infrastructure maintenance fails or population density increases beyond planned capacity.

Informal Settlements: Characterized by substandard housing, insecure tenure, and absence of basic services, informal settlements concentrate infection risk through multiple mechanisms. Overcrowding facilitates person-to-person transmission of respiratory infections. Lack of clean water and sanitation enables fecal-oral transmission of diarrheal diseases, typhoid, and soil-transmitted helminths. Inadequate drainage creates mosquito breeding sites, sustaining malaria transmission. Absence of waste management leads to environmental contamination and provides breeding grounds for vectors. Limited healthcare access delays treatment and increases severity of outcomes (Ajala *et al.*, 2025; Adeleke *et al.*, 2024).

Peri-Urban Areas: Rapidly urbanizing fringe areas often combine characteristics of rural and urban environments, with infrastructure lagging behind population growth. Residents may face long distances to healthcare facilities, incomplete water and sanitation networks, and exposure to both urban and residual rural infection risks. Adeleke *et al.* (2024) documented significantly higher malaria burdens in peri-urban areas compared to formal settlements.

Slum Locations: A qualitative study across five major Nigerian cities identified that "infectious/contagious diseases spread faster in slum locations" (Akinwale and Adegunle, 2025). The research documented multiple governance failures contributing to this situation: lax slum housing upgrading programmes, weak institutional framework, inadequate housing funding, rural-urban migration, inadequate affordable housing policy, lax political will, absence of basic infrastructure in sub-urban locations, high rate of unemployment, and lack of national housing database.

2.3 Emerging Threats: Antimicrobial Resistance in Urban Environments

Beyond traditional infectious diseases, antimicrobial resistance (AMR) represents an emerging threat with distinct urban dimensions. A study of medical waste management in Lagos documented significant deficiencies across seven healthcare facilities: only 61 percent proper waste segregation at source, 33.3 percent correct identification of pharmaceutical waste protocols, storage durations of 5–10 days (versus recommended 24–48 hours), and widespread mixing of antimicrobial-containing waste with general streams (Yusuf and Olaleye, 2025).

The study identified multiple environmental contamination pathways through which AMR genes disseminate in urban environments: wastewater discharge, storage site leachate, transport spillage, and inadequate final disposal. These pathways expose waste handlers, communities, and environmental matrices to antimicrobial residues and resistant bacteria. Facilities generated 215.56 kg/day of medical waste, with pharmaceutical waste comprising 5–8 percent yet receiving no specialized treatment beyond standard hydroclave sterilization—inadequate for degrading antimicrobial compounds (Yusuf and Olaleye, 2025).

Nigeria's fragmented policy framework, characterized by weak enforcement and absent AMR-specific provisions, exacerbates these challenges. Cost constraints, limited technical capacity, and insufficient training emerged as primary implementation barriers (Yusuf and Olaleye, 2025).

The One Health dimensions of urban AMR are increasingly recognized. A schematic framework developed by Muoghalu *et al.* (2025) illustrates the interconnectedness of human, animal, and environmental health in addressing multidrug-resistant organisms in Nigeria, emphasizing transmission pathways of antibiotic resistance genes. Data from a 2022 multi-center hospital study in Lagos and Abuja documented 70 percent *Escherichia coli* resistance to third-generation cephalosporins. A 2022 study on antibiotic residues in Nigerian water systems identified 30 percent resistance gene transmission via environmental sources, yet only 5 percent of facilities meet WHO standards for wastewater monitoring (Muoghalu *et al.*, 2025).

3. Governance Frameworks for Urban Development and Infection Control

3.1 Institutional Architecture

Nigeria's governance of urban development and infection control operates across multiple tiers and sectors, creating a complex institutional landscape.

Federal Level: The Federal Ministry of Works and Housing oversees national housing policy, coordinates major infrastructure projects, and sets standards for building and construction. The Federal Ministry of Environment regulates environmental sanitation, waste management, and pollution control. The Federal Ministry of Health and Social Welfare, through agencies including the Nigeria Centre for Disease Control and the National Primary Health Care Development Agency, provides policy direction and technical guidance for disease control. The Federal Ministry of Water Resources and Sanitation leads national water supply and sanitation policy.

State Level: State ministries of physical planning and urban development regulate land use, approve building plans, and enforce development controls. State environmental protection agencies monitor and enforce environmental standards. State ministries of health operate secondary health facilities and coordinate primary healthcare services. State water corporations and rural water supply and sanitation agencies (RUWASSA) manage water supply systems.

Local Government Level: Local government areas are constitutionally responsible for primary healthcare delivery, environmental sanitation, and some aspects of waste management. However, these functions have historically been underfunded and underperformed due to financial dependence on state governments and limited technical capacity (Paul, 2025).

Specialized Agencies: Additional agencies address specific dimensions: the National Environmental Standards and Regulations Enforcement Agency (NESREA) enforces environmental standards; the National Agency for Food and Drug Administration and Control (NAFDAC) regulates pharmaceuticals and food safety; state environmental protection agencies monitor compliance; and urban development authorities manage specific cities or regions.

3.2 Policy Frameworks

Multiple policy frameworks govern dimensions of urban development and infection control, though integration across sectors remains limited.

National Urban Development Policy: This framework guides urban planning and development, emphasizing sustainable urbanization, infrastructure provision, and slum upgrading. Implementation has been constrained by weak coordination across government levels and limited resources.

National Housing Policy: The policy aims to provide affordable housing for all Nigerians, including provisions for slum upgrading and urban renewal. However, implementation gaps persist, with Akinwale and Adegunle (2025) documenting "lax slum housing upgrading programmes" and "inadequate affordable housing policy" as persistent challenges.

National Environmental Sanitation Policy: This policy addresses waste management, drainage, and sanitation services, recognizing their importance for disease prevention. Implementation varies widely across states and localities.

National Health Policy and Strategic Plans: Successive National Strategic Health Development Plans have included provisions for urban health, though implementation has been fragmented. The Nigeria Health Sector Renewal and Investment Initiative represents a more comprehensive approach to health system strengthening, with potential implications for urban health service delivery (Federal Radio Corporation of Nigeria, 2025b).

National Action Plan for Antimicrobial Resistance (NAP-AMR): The updated NAP-AMR (2024) adopts a One Health approach, linking human health, animal health, and environmental sectors. However, only 45 percent of activities in the first plan were implemented by 2021 due to funding constraints and competing priorities (Springer, 2025). The plan includes provisions for environmental surveillance and waste management, recognizing urban environments as critical sites for AMR transmission (Yusuf and Olaleye, 2025).

National Water, Sanitation, and Hygiene (WASH) Action Plan: The plan sets targets for ending open defecation and increasing access to safely managed water and sanitation. Progress in urban areas has been mixed, with rapid urbanization outpacing infrastructure expansion.

3.3 Regulatory Frameworks and Enforcement

Regulatory frameworks establish standards for urban development and environmental health, but enforcement remains a critical weakness.

Building and Planning Regulations: State physical planning laws establish standards for building construction, setback requirements, and infrastructure provision. However, enforcement is limited, particularly in informal settlements where most development occurs outside formal regulatory frameworks. The absence of effective enforcement contributes to the proliferation of substandard housing that amplifies infection risk (Ajala *et al.*, 2025; Akinwale and Adegunle, 2025).

Environmental Health Regulations: Regulations governing waste disposal, drainage maintenance, and sanitation are weakly enforced, particularly in low-income urban communities. Yusuf and Olaleye (2025) documented that Nigeria's "fragmented policy framework, characterized by weak enforcement and absent AMR-specific provisions, exacerbates these challenges."

Healthcare Facility Standards: Regulations governing healthcare waste management exist but are inadequately monitored and enforced. The Lagos study found that only 61 percent of facilities achieved proper waste segregation at source, and pharmaceutical waste received no specialized treatment (Yusuf and Olaleye, 2025).

3.4 Multi-Sectoral Coordination Mechanisms

Effective infection control in urban development requires coordination across multiple sectors, yet such mechanisms remain underdeveloped.

Inter-Ministerial Committees: Some states have established inter-ministerial committees to coordinate urban development and environmental health, but their effectiveness varies. In Bauchi State, the "Accelerating Inclusive Sanitation and

Hygiene Economy in Nigeria" project is spearheaded by the Federal Ministry of Water Resources and Sanitation through an inter-ministerial committee, in collaboration with the Bauchi State Government (News Agency of Nigeria, 2024).

Sector-Wide Approach (SWAp): The Nigeria Health Sector Renewal and Investment Initiative emphasizes a Sector-Wide Approach to address fragmentation and improve coordination across health and related sectors (Federal Radio Corporation of Nigeria, 2025b). Extending this approach to urban development and environmental health could improve integration.

Partnerships with Development Partners: International partners including the World Bank, UNICEF, and the Sanitation and Hygiene Fund (SHF) support urban WASH and health initiatives, often bringing multi-sectoral perspectives. The SHF-funded project in Bauchi involves collaboration between federal and state ministries, WaterAid, and development banks (SHF, 2025; News Agency of Nigeria, 2024).

4. Governance Challenges in Urban Infection Control

4.1 Institutional Fragmentation and Poor Coordination

The distribution of responsibilities across multiple government tiers and sectors creates significant coordination challenges. Policies formulated at federal level may not be adopted or implemented at state and local levels. Urban planning decisions made by one ministry may have health consequences that another ministry must address without input into the original decision.

This fragmentation is particularly problematic for addressing the determinants of urban health, which cut across sectoral boundaries. Infection risks arising from poor housing, inadequate drainage, contaminated water, and absent waste management cannot be addressed by the health sector alone. Yet mechanisms for joint planning, coordinated implementation, and shared accountability across sectors remain weak (Paul, 2025).

4.2 Regulatory Enforcement Deficits

Even where adequate regulations exist, enforcement remains a critical weakness. Several factors contribute to this deficit:

Limited Capacity: Regulatory agencies lack the staff, resources, and technical capacity to monitor compliance across rapidly expanding urban areas. Environmental health officers are too few to inspect the millions of properties requiring oversight.

Political Economy Constraints: Enforcement actions that threaten powerful interests—including property developers, industrial polluters, or informal sector operators with political connections—may be blocked or diluted. Corruption undermines regulatory integrity.

Informal Settlement Dilemma: In informal settlements, most development occurs outside formal regulatory frameworks. Applying standard enforcement approaches could result in mass demolitions and displacement, raising profound equity concerns. Yet tolerating substandard conditions perpetuates infection risks for residents (Ajala *et al.*, 2025; Akinwale and Adegunle, 2025).

Weak Sanctions: Even when violations are detected, sanctions are often too weak to deter non-compliance. Prosecutions are rare, fines are low, and enforcement actions are easily challenged.

4.3 Data Gaps and Limited Evidence-Based Decision-Making

Effective governance requires reliable data to understand problems, design interventions, and track progress. Yet urban health data in Nigeria suffer from multiple limitations:

Inadequate Surveillance Systems: Disease surveillance systems capture only a fraction of urban infections, particularly among populations that rely on informal healthcare providers. Adepoju *et al.* (2025) emphasized that "enhancing surveillance systems is crucial for a more comprehensive approach to intervention tailoring."

Lack of Settlement-Level Data: Most health data are aggregated at local government or ward levels, masking intra-urban disparities. The Ilorin experience demonstrated that ward-level data may be insufficient for targeting interventions, requiring more granular community-level stratification (Adepoju *et al.*, 2025).

Weak Health Information Systems: Even where data are collected, quality is often poor—incomplete records, delayed reporting, and lack of denominator data compromise usefulness for decision-making.

Limited Integration Across Sectors: Data from health, urban planning, environmental, and water sectors are rarely integrated, limiting understanding of multi-sectoral determinants and intervention effects.

4.4 Funding Constraints and Unsustainable Financing

Adequate and predictable financing is essential for effective governance, yet urban health and infrastructure investments face chronic underfunding.

Inadequate Budget Allocations: Government spending on urban infrastructure and health services falls far below what is needed to address accumulated deficits. Per capita health expenditure is among the lowest in Africa, and urban infrastructure budgets are similarly constrained.

Donor Dependence and Unsustainability: Many urban health and WASH initiatives depend on donor funding, raising sustainability concerns when projects end. The SHF-funded project in Bauchi represents an effort to build sustainable local sanitation markets, recognizing that "delaying action puts more lives at risk and exacerbates public health challenges" (News Agency of Nigeria, 2024).

Misalignment of Resources and Responsibilities: Local governments, constitutionally responsible for primary healthcare and environmental sanitation, lack adequate financial resources to fulfill these mandates. The Supreme Court's 2024 ruling granting financial autonomy to LGAs

creates opportunities for better alignment, but realizing this potential requires capacity building and accountability mechanisms (Federal Radio Corporation of Nigeria, 2025b).

4.5 Governance Deficits in Informal Settlements

Informal settlements present particular governance challenges that amplify infection risks for residents.

Tenure Insecurity: Lack of secure tenure discourages residents and governments from investing in housing improvements and infrastructure. Slum upgrading programs are hindered by questions of who owns the land and who should benefit from investments.

Exclusion from Formal Services: Informal settlements are often excluded from formal service delivery systems—water networks, sewage systems, waste collection—on the grounds that they are illegal or unauthorized. Residents pay more for lower-quality services from informal providers.

Limited Political Voice: Informal settlement residents often have limited political voice and are underrepresented in decision-making forums. Their health needs receive less attention than those of more powerful constituencies.

Absence of Planning and Regulation: Development in informal settlements occurs outside formal planning and regulatory frameworks, resulting in haphazard layouts, inadequate infrastructure, and substandard housing that amplify infection risks (Ajala *et al.*, 2025; Akinwale and Adegunle, 2025).

4.6 Political Economy Barriers

Deep-seated political economy factors constrain more effective governance of urban infection control.

Short-Term Political Horizons: Elected officials face incentives to deliver visible, quick-impact projects rather than invest in long-term systems strengthening. Preventive infrastructure—drainage, water supply, sanitation—lacks the political visibility of hospitals or roads.

Elite Capture of Urban Development: Urban development decisions often benefit well-connected elites at the expense of poor communities. Prime urban land is allocated for high-end development while poor communities are pushed to marginal, flood-prone, or environmentally hazardous areas.

Patronage and Corruption: Corruption diverts resources from service delivery to private pockets, undermines regulatory enforcement, and distorts investment priorities. The construction sector is particularly vulnerable to corruption, compromising infrastructure quality and safety.

Resistance to Change: Entrenched interests benefit from existing arrangements and resist reforms that would improve infection control but threaten their advantages.

5. Governance Innovations and Successful Interventions

5.1 Participatory Data-Driven Decision-Making: The Ilorin Framework

The development of an urban LLIN distribution framework in Ilorin, Kwara State, demonstrates the potential of participatory, data-driven approaches to governance under resource constraints. Facing a 40 percent funding shortfall, the National Malaria Elimination Programme collaborated with researchers to co-design a framework for evidence-based decision-making (Adepoju *et al.*, 2025).

The framework employed a participatory action research approach, combined with abductive inquiry, engaging stakeholders purposively identified by the NMEP and the Kwara State Ministry of Health. The process consisted of three phases: planning, data review and co-decision-making, and implementation. During operationalization, malaria risk scores were computed at the ward level using four key variables, including malaria case data and environmental factors, and subsequently mapped. A multi-stakeholder dialogue facilitated the selection of final malaria risk maps.

Crucially, the process incorporated local knowledge by analyzing whether community definitions of formal, informal, and slum settlements could inform stratification of malaria risk. This resulted in the development of locally specific definitions for Ilorin and the de-prioritization of thirteen communities classified as formal settlements in Are 2 ward during the bed net distribution campaign.

The Ilorin experience offers several governance lessons: the value of participatory approaches in evaluating data outputs, particularly in settings with limited and uncertain data; the importance of locally relevant definitions and stratification; and the feasibility of evidence-based priority-setting even under severe resource constraints (Adepoju *et al.*, 2025).

5.2 Urban Renewal as Preventive Health: The Aba Experience

Since 2023, an urban renewal programme in Aba, Abia State, has demonstrated how infrastructure investments can function as population-level health interventions. Onukwuli (2026) argues that "long before a patient meets a doctor, the city has already written part of their medical history," and that "roads, drains, markets, waste systems and lighting quietly determine whether disease will spread or retreat."

The Aba programme's interventions include:

Road Reconstruction: Major arteries including Port Harcourt Road, Aba–Owerri Road, Asa Road, and Faulks Road have been reconstructed, improving traffic flow, reducing accident-prone surfaces, and shortening travel time to health facilities. "In emergencies, minutes are the difference between life and death. Safer roads also mean fewer crashes and less long-term disability" (Onukwuli, 2026).

Drainage Rehabilitation and Flood Control: By desilting channels, rebuilding culverts, and managing stormwater, the city is "dismantling the ecological niches where mosquitoes breed and epidemics incubate." Fewer stagnant pools translate into lower malaria transmission, while preventing floodwater

from mixing with sewage interrupts pathways for cholera, typhoid, and other water-borne infections.

Market Reorganization and Sanitation: Structured waste collection and reduction of open dumping and burning cut down on smoke and particulate pollution, protecting residents from chronic respiratory disease and childhood asthma. Improved hygiene in trading spaces reduces exposure to diarrheal illnesses.

Street Lighting: Often treated as a purely security measure, street lighting also reduces nighttime accidents and the psychological stress associated with unsafe public spaces.
Onukwuli (2026) frames these interventions as "upstream prevention"—redesigning the city to "block the environmental routes through which harm travels." The economic implications reinforce the moral argument: "Prevention is cheaper than a cure. Every malaria episode averted through drainage saves households the cost of treatment and lost income. Every serious accident prevented by sound road design spares the health system the far greater expense of surgery, intensive care and long-term rehabilitation."

5.3 Building Local Sanitation Markets: The Bauchi Initiative

In Bauchi State, the "Accelerating Inclusive Sanitation and Hygiene Economy in Nigeria" project, implemented by WaterAid with SHF support, is developing local sanitation markets to address gaps in household sanitation access and support ongoing cholera prevention efforts (SHF, 2025; News Agency of Nigeria, 2024).

The project responds to a context where approximately 60 percent of households rely on pit toilets, roughly one in three lack concrete slabs, and 7 percent practice open defecation. By fostering the emergence of a local sanitation economy—from formalization of jobs for waste evacuators to local businesses converting waste into compost and briquettes—the project provides families with a range of affordable options.

Key governance innovations include:

Multi-Stakeholder Collaboration: The project is spearheaded by the Federal Ministry of Water Resources and Sanitation through an inter-ministerial committee, in collaboration with the Bauchi State Government. Partnerships extend to the Ministry of Industry, Development Banks, and the World Bank (News Agency of Nigeria, 2024).

Market-Based Approaches: Rather than relying solely on public provision, the project promotes market-based approaches to sanitation, recognizing that sustainable solutions require functioning markets that meet consumer preferences and ability to pay.

Women and Youth Empowerment: The project explicitly aims to create opportunities for women and youth within the WASH sector, recognizing that "the transformative impact is especially important for women and girls who continue to face barriers and challenges in accessing gender-responsive sanitation" (SHF, 2025).

Alignment with National Policy: The project aligns with Nigeria's National Action Plan for sanitation and contributes to the broader goal of growing the sanitation economy, estimated to be worth more than USD 12 billion by 2030 (SHF, 2025).
The project aims to directly benefit 904,000 people, representing 60 percent of the population in its geographic scope (News Agency of Nigeria, 2024).

5.4 Integrated Approaches to AMR and Medical Waste

The Lagos study on medical waste management and AMR proposed an integrated framework combining enhanced segregation, AMR-targeted treatment technologies, environmental monitoring, strengthened regulatory enforcement with AMR provisions, and community-based approaches (Yusuf and Olaleye, 2025).

Key elements include:
Enhanced Segregation: Proper segregation of pharmaceutical waste at source is essential to prevent antimicrobials from entering general waste streams and contaminating the environment.

AMR-Targeted Treatment Technologies: Standard sterilization methods such as hydroclave may be inadequate for degrading antimicrobial compounds. Specialized treatment technologies are needed for pharmaceutical waste.

Environmental Monitoring: Regular monitoring of environmental matrices—water, soil, air—for antimicrobial residues and resistance genes can provide early warning of emerging threats and guide interventions.

Strengthened Regulatory Enforcement: Nigeria's fragmented policy framework requires strengthening with AMR-specific provisions and adequate enforcement capacity.

Community-Based Approaches: Engaging communities in awareness and action can reduce environmental contamination and promote responsible antimicrobial use.

5.5 Leveraging Local Government Autonomy

The Supreme Court's July 2024 ruling granting financial autonomy to Nigeria's 774 local government areas creates unprecedented opportunities for strengthening urban health governance at the community level (Federal Radio Corporation of Nigeria, 2025b). With control over resources and decision-making, LGAs can potentially respond more effectively to local health priorities and infrastructure needs.
Realizing this potential requires:

Capacity Building: LGA health teams and financial managers need training in planning, budgeting, procurement, and monitoring.

Transparent Financial Management: Systems must ensure that resources are used for intended purposes and reach frontline services.

Community Participation: Mechanisms for community input into priority-setting and oversight are essential to ensure responsiveness to local needs.

Technical Support: State and federal governments must provide technical support to LGAs, particularly those with limited capacity.

Accountability Mechanisms: Robust monitoring and accountability systems are needed to track performance and address failures.

6. Recommendations for Strengthening Governance

6.1 Enhancing Institutional Coordination

Establish Urban Health Intersectoral Platforms: Cities should establish intersectoral platforms bringing together ministries and agencies responsible for urban planning, health, environment, water, sanitation, and housing. These platforms should meet regularly, with clear terms of reference, and be empowered to coordinate planning, budgeting, and implementation.

Integrate Health Impact Assessment into Urban Development: All major urban development projects should undergo health impact assessment to identify potential positive and negative health effects and ensure that interventions maximize health benefits while minimizing harms. This requires building capacity for HIA within urban planning agencies.

Strengthen Federal-State-Local Government Linkages: Clear mechanisms for policy translation and resource flow across government tiers would improve coherence and implementation. The Sector-Wide Approach being promoted in health could be extended to urban development and environmental health.

6.2 Strengthening Regulatory Enforcement

Build Regulatory Capacity: Environmental health and planning enforcement agencies require adequate staffing, resources, and technical capacity to monitor compliance across rapidly expanding urban areas. Recruitment, training, and retention strategies should address current deficits.

Strengthen Sanctions and Deterrence: Penalties for regulatory violations should be sufficient to deter non-compliance. Prosecution of serious violations should be pursued consistently to demonstrate that regulations will be enforced.

Develop Differentiated Approaches for Informal Settlements: Rather than applying standard enforcement approaches that could result in mass displacement, develop differentiated strategies that combine regularization, upgrading, and progressive compliance. This requires political will and investment in slum upgrading.

Engage Communities in Regulatory Oversight: Community-based monitoring can supplement official enforcement, particularly in informal settlements where official presence is limited. Training and supporting community health committees and environmental health volunteers can extend regulatory reach.

6.3 Improving Data Systems and Evidence-Based Decision-Making

Strengthen Urban Health Surveillance: Disease surveillance systems should be strengthened to capture urban health burdens more accurately, including data from informal healthcare providers. Settlement-level stratification should be standard practice.

Integrate Data Across Sectors: Platforms for integrating health, environmental, water, sanitation, and urban planning data would enable better understanding of multi-sectoral determinants and more effective targeting of interventions.

Invest in Geospatial Technologies: Very high-resolution satellite imagery and geospatial analysis, as demonstrated in Akure (Adeleke *et al.*, 2024) and Ilorin (Adepoju *et al.*, 2025), can support settlement classification, risk mapping, and intervention targeting. These technologies should be mainstreamed into urban planning and health surveillance.

Build Local Capacity for Data Analysis: Training local government and health facility staff in data analysis and use would improve evidence-based decision-making at operational levels.

6.4 Mobilizing and Sustaining Financing

Increase Budget Allocations to Urban Health and Infrastructure: Government at all levels should increase allocations to urban health services, WASH infrastructure, and slum upgrading. Earmarked funds should be protected from diversion and efficiently disbursed.

Leverage Local Government Autonomy: With financial autonomy, LGAs should allocate adequate resources to primary healthcare, environmental sanitation, and local infrastructure. Transparent budgeting and community oversight are essential.

Develop Innovative Financing Mechanisms: Beyond government budgets, explore land value capture, development impact fees, green bonds, public-private partnerships, and results-based financing to mobilize additional resources for urban health infrastructure.

Ensure Sustainability Planning: All donor-funded projects should include sustainability plans from inception, with clear strategies for transition to domestic financing and local ownership. The Bauchi sanitation market initiative offers a model for building sustainable local systems (SHF, 2025; News Agency of Nigeria, 2024).

6.5 Empowering Communities and Strengthening Accountability

Strengthen Community Participation Mechanisms: Ward development committees, health facility committees, and community development associations should be strengthened with training, resources, and clear roles in planning and oversight. Linking these bodies to LGA planning processes would enhance community voice.

Invest in Health Literacy and Community Mobilization: Sustained investment in health communication—through community mobilizers, schools, religious institutions, and media—can improve knowledge and practices related to infection prevention and environmental health.

Engage Traditional and Religious Leaders: Traditional rulers and religious leaders exercise significant influence in urban communities. Engaging them as champions of urban health can accelerate behavior change and increase acceptance of interventions.

Promote Gender Equity in Urban Health Governance: Programs should explicitly address gender dynamics, ensuring women's participation in decision-making, access to information and services, and benefit from economic opportunities in the sanitation economy (SHF, 2025).

6.6 Prioritizing Slum Upgrading and Informal Settlement Integration

Scale Up Slum Upgrading Programs: Nigeria requires a major scaling up of slum upgrading investments, providing security of tenure, basic infrastructure, and improved housing in informal settlements. The finding that infectious diseases spread faster in slum locations (Akinwale and Adegunle, 2025) underscores the urgency.

Integrate Informal Settlements into Formal Service Delivery: Informal settlements should be integrated into formal water, sanitation, and waste management systems, recognizing residents' rights to basic services regardless of tenure status.

Develop Contextually Appropriate Standards: Building and planning standards should be adapted to informal settlement contexts, allowing for progressive improvement rather than requiring immediate compliance with standards designed for formal developments.

Address Underlying Drivers: Rural-urban migration, unemployment, and unaffordable housing drive the growth of informal settlements. Addressing these underlying factors through integrated urban and rural development policies is essential for long-term solutions (Akinwale and Adegunle, 2025).

6.7 Implementing One Health Approaches in Urban Contexts

Strengthen Environmental Surveillance for AMR: Nigeria should expand environmental surveillance for antimicrobial residues and resistance genes, particularly in urban water systems. The finding that only 5 percent of facilities meet WHO standards for wastewater monitoring (Muoghalu *et al.,* 2025) indicates significant gaps.

Improve Healthcare Waste Management: Investments in healthcare waste management infrastructure, training, and regulatory enforcement are urgently needed to prevent environmental contamination with antimicrobials and resistant organisms (Yusuf and Olaleye, 2025).

Integrate Human, Animal, and Environmental Health: One Health platforms should be established at city level, bringing together human health, veterinary services, and environmental management agencies to address shared threats.

Promote Rational Antimicrobial Use in Urban Populations: Public education campaigns should address appropriate antimicrobial use, complementing regulatory efforts to control over-the-counter sales.

7. Conclusion

Governance of microbial infection control in Nigerian urban development projects sits at the intersection of multiple policy domains—urban planning, housing, water and sanitation, environmental management, and health—yet integration across these sectors remains limited. The evidence reviewed in this paper demonstrates that infection burdens vary dramatically across urban settlement types, with informal settlements, slums, and peri-urban areas bearing disproportionately high risks. These disparities are not natural or inevitable; they reflect governance choices about where to invest, whose needs to prioritize, and which standards to enforce.

The governance challenges are substantial: institutional fragmentation that scatters responsibility across multiple agencies and government tiers; weak regulatory enforcement that allows substandard conditions to persist; data gaps that obscure intra-urban disparities and impede evidence-based decision-making; chronic underfunding that leaves infrastructure deficits unaddressed; and particular governance deficits affecting informal settlements where most urban growth occurs outside formal systems. Deep-seated political economy factors—short-term political horizons, elite capture, patronage, corruption—constrain more effective action.

Yet the evidence also demonstrates that change is possible. The Ilorin framework for participatory, data-driven decision-making shows how evidence can guide resource allocation even under severe constraints. The Aba urban renewal programme illustrates how infrastructure investments can function as population-level health interventions, "dismantling the ecological niches where mosquitoes breed and epidemics incubate" (Onukwuli, 2026). The Bauchi sanitation market initiative demonstrates how multi-stakeholder collaboration and market-based approaches can address persistent sanitation gaps while creating economic opportunities (SHF, 2025; News Agency of Nigeria, 2024).

These innovations share common elements: participatory approaches that engage stakeholders in problem definition and solution design; data systems that reveal intra-urban disparities and guide targeting; multi-sectoral collaboration that transcends institutional silos; attention to sustainability through market development and local ownership; and recognition that infrastructure investments are health investments.

Several cross-cutting themes emerge from this analysis. First, **settlement-level stratification** is essential for understanding and addressing urban health inequities. Aggregated data mask the disparities that matter most for targeting interventions. Second, **participatory governance** that engages communities, particularly informal

settlement residents, in decision-making produces better outcomes and stronger accountability. Third, **infrastructure as prevention**—investing in drainage, roads, water supply, sanitation, and waste management—yields health dividends that exceed what clinical services alone can achieve. Fourth, **sustainable financing** requires moving beyond donor dependence to domestic resource mobilization and market development. Fifth, **One Health approaches** recognizing the interconnections of human, animal, and environmental health are essential for addressing emerging threats like antimicrobial resistance.

The Supreme Court's 2024 ruling granting financial autonomy to local governments creates unprecedented opportunities for strengthening urban health governance at the community level. Realizing this potential requires capacity building, transparent financial management, community participation, technical support, and robust accountability mechanisms. The Nutrition 774 initiative and similar efforts to leverage LGA autonomy for community-driven development offer models that could be extended to urban health and sanitation.

Ultimately, the governance of microbial infection control in Nigerian urban development is not merely a technical challenge but a moral imperative. As Onukwuli (2026) argues, "From a moral philosophical standpoint, this imposes an ethical burden on governance. A state that tolerates environments that predictably generate avoidable illness and injury is not simply inefficient; it is morally deficient. It fails in the primary obligation of authority: the duty to organise society in ways that protect and enhance human flourishing."

The transformation underway in Aba suggests what becomes possible when that ethic of care is taken seriously. Development then ceases to be a mere accumulation of projects and contracts. It becomes the quiet, continuous construction of conditions in which life is less fragile. In a country where preventable diseases still claim too many lives, the deepest form of healing may lie not only in what doctors prescribe, but in what governments build.

The challenge now is to scale and sustain these innovations across Nigeria's rapidly growing cities. This requires political will, institutional capacity, sustained investment, and unwavering commitment to equity. It requires governance that recognizes urban development as health policy, infrastructure as prevention, and the health of the poorest as the truest measure of civilized life.

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