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Integrated Water Security, Public Health Resilience, and Sustainable Governance in Nigeria: A Systems-Based Review of Domestic Water Access and Climate Adaptation

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ABSTRACT

Access to safe, affordable, and sustainable domestic water remains one of the major public health and development challenges confronting Nigeria despite the country's extensive surface and groundwater resources. Rapid population growth, climate variability, urban expansion, poor infrastructure maintenance, weak institutional coordination, environmental degradation, and socio-economic inequality continue to intensify domestic water insecurity in rural and urban communities. The consequences extend beyond inadequate household supply to increased transmission of waterborne diseases, poor sanitation, food insecurity, reduced school attendance, gender inequality, and diminished household productivity. This review synthesizes evidence on domestic water accessibility in Nigeria using a systems-based public health perspective that integrates environmental, institutional, infrastructural, technological, and behavioural determinants. A structured narrative review approach was adopted, drawing on peer-reviewed literature, national policy documents, and institutional reports published mainly between 2015 and 2026. Building on earlier Nigerian scholarship on recurring water scarcity, this paper proposes an Integrated Water Security-Public Health Resilience Model that links climate adaptation, water governance, infrastructure resilience, community participation, digital monitoring, household water safety, and public health outcomes. The review shows that fragmented governance, inadequate financing, poor maintenance culture, insufficient water quality surveillance, and limited climate adaptation remain major obstacles to equitable water access. It further demonstrates that women, children, low-income households, and rural populations bear a disproportionate burden. The paper recommends climate-resilient infrastructure, Integrated Water Resources Management, community-owned systems, digital water governance, renewable-energy-powered water supply, strengthened WASH integration in primary healthcare, and transparent institutional accountability. These strategies can support progress toward Sustainable Development Goal 6 while improving health equity and national resilience.

Keywords: Domestic water access; Water security; Public health; Climate adaptation; Water governance; Nigeria; WASH; Sustainable Development Goal 6

1. Introduction

Water is indispensable to human survival, public health, environmental sustainability, and socio-economic development. It supports essential physiological processes, sanitation, food preparation, infection prevention, healthcare delivery, agriculture, and industrial productivity. Access to safe drinking water is therefore not merely a household convenience but a fundamental determinant of population health and human dignity [32, 33, 66, 67]. Inadequate water access increases exposure to infectious diseases, weakens hygiene practices, disrupts education, constrains economic activity, and deepens social inequality.

Globally, the expansion of improved water services has been a major development priority, especially under Sustainable Development Goal 6, which seeks universal and equitable access to safe and affordable drinking water [61, 62, 64]. However, the achievement of this goal remains uneven. Many low- and middle-income countries continue to face water insecurity caused by rapid urbanization, climate variability, population growth, environmental degradation, weak public financing, institutional fragmentation, and inadequate maintenance of water infrastructure.

Nigeria illustrates a striking water security paradox [29, 39, 41, 68]. The country has major rivers, wetlands, aquifers, and substantial rainfall in several regions, yet millions of households do not have reliable access to safe domestic water. Rural communities frequently depend on rivers, streams, shallow wells, ponds, and rainwater sources that are vulnerable to seasonal depletion and microbial contamination. Urban households often face intermittent public water supply because of ageing pipes, leakages, inadequate treatment capacity, inconsistent electricity supply, and growing dependence on private boreholes and commercial vendors. The resulting pattern is not simply a scarcity of natural water resources but a systems failure involving governance, infrastructure, finance, regulation, environmental management, and public health planning.

The public health consequences are substantial [19, 26, 51, 43, 40]. Unsafe water contributes to diarrhoeal diseases, cholera, typhoid fever, dysentery, hepatitis A, parasitic infections, malnutrition, and preventable morbidity among children and vulnerable adults. Where water is scarce, households reduce handwashing, sanitation, food hygiene, and environmental cleaning, thereby increasing exposure to communicable diseases. Women and girls also carry much of the social burden of water collection, which affects education, income generation, safety, and wellbeing.

Climate change is intensifying these challenges [20, 47, 34, 69]. Droughts, irregular rainfall, rising temperatures, and flood events affect both water quantity and quality. In northern Nigeria, drought and desertification reduce surface water availability and groundwater recharge. In southern regions, flooding and poor drainage can contaminate water sources. These climatic pressures interact with weak institutions and deteriorating infrastructure to increase household vulnerability.

A recent review by Igimoh, Modeme, Tijani, and Makata [36] examined recurring water scarcity in Nigeria and emphasized implications for domestic water access, public health, and sustainable management. The present paper builds on that contribution but develops a distinct systems-based review focused on integrated water security, public health resilience, climate adaptation, and sustainable governance. Instead of treating domestic water insecurity as a single-sector concern, this review conceptualizes it as a multidimensional public health challenge shaped by environmental,

institutional, technological, socio-economic, and behavioural determinants.

The objectives of this paper are to: (i) synthesize evidence on domestic water security in Nigeria; (ii) examine rural-urban and regional disparities in access; (iii) analyze public health consequences of inadequate water supply; (iv) evaluate governance and policy challenges; (v) explore emerging technologies and innovative interventions; and (vi) propose an integrated model for strengthening domestic water security and public health resilience in Nigeria.

2. Methodology

2.1. Review Design

This paper adopted a structured narrative review design informed by systematic search principles. The design was selected because domestic water security is a multidisciplinary subject that spans public health, environmental science, hydrology, governance, climate adaptation, nursing, engineering, and sustainable development. A narrative approach allowed broad conceptual synthesis while maintaining transparent inclusion criteria.

2.2. Search Strategy

Literature was identified from electronic databases and institutional sources including PubMed, Scopus, Web of Science, ScienceDirect, SpringerLink, Wiley Online Library, Taylor and Francis Online, Google Scholar, African Journals Online, World Health Organization, UNICEF, UN-Water, World Bank, Nigerian government agencies, and relevant water sector reports. Search terms were combined using Boolean operators. Examples included: "water security" AND Nigeria; "domestic water access" AND public health; "water scarcity" AND climate change AND Nigeria; "WASH" AND Nigeria; "water governance" AND Nigeria; and "Integrated Water Resources Management" AND Nigeria.

The review focused mainly on literature published between 2015 and 2026, with older sources included where they provided foundational policy or theoretical value [30, 31, 65, 67, 63]. References were screened for relevance to domestic water access, public health, water governance, climate vulnerability, and sustainable management.

2.3. Eligibility Criteria

Studies and documents were included if they addressed at least one of the following: domestic water supply, water quality, waterborne diseases, WASH, climate-related water vulnerability, Nigerian water governance, rural water systems, urban water infrastructure, sustainable water management, or community water interventions. Publications were excluded if they focused exclusively on industrial water use, irrigation without domestic relevance, or contexts outside Nigeria without transferable lessons.

2.4. Data Extraction and Synthesis

Data extracted included study focus, geographic setting, water source, determinants of water insecurity, reported health outcomes, governance constraints, technological interventions, and policy

recommendations [4, 8, 18, 70]. Evidence was synthesized thematically into six domains: (i) domestic water access, (ii) climate and environmental vulnerability, (iii) public health burden, (iv) governance and institutional performance, (v) technology and innovation, and (vi) community and household resilience.

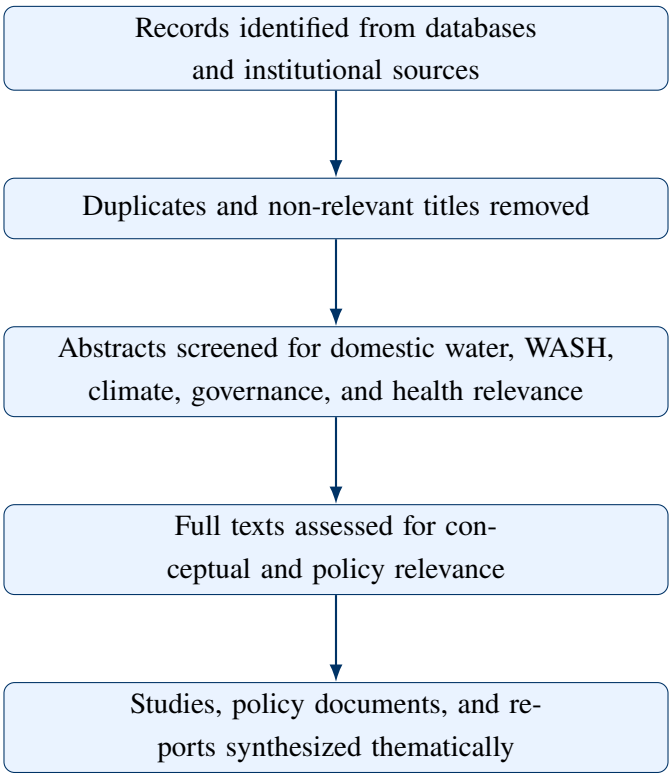

Figure 1: Literature identification and synthesis process.

3. Conceptual Foundation

3.1. Water Security as a Public Health Concept

Water security refers to the reliable availability of an acceptable quantity and quality of water for health, livelihoods, ecosystems, and production [33, 66, 61, 69]. In a domestic context, it includes physical availability, accessibility, affordability, safety, reliability, and acceptability. From a public health perspective, water insecurity affects health directly through ingestion of contaminated water and indirectly through poor hygiene, poor sanitation, food insecurity, school absenteeism, gender inequality, and poverty.

3.2. Integrated Water Resources Management and Social Determinants of Health

This review is anchored on Integrated Water Resources Management (IWRM) and the Social Determinants of Health framework [46, 9, 65]. IWRM promotes coordinated development and management of water, land, and related resources in ways that maximize social and economic welfare without compromising ecological sustainability. The Social Determinants of Health framework recognizes that health outcomes are shaped by living conditions, income, education, environmental safety, gender relations, and public services. Combining these perspectives allows domestic water insecurity to be examined as both a resource management problem and a public health equity

problem.

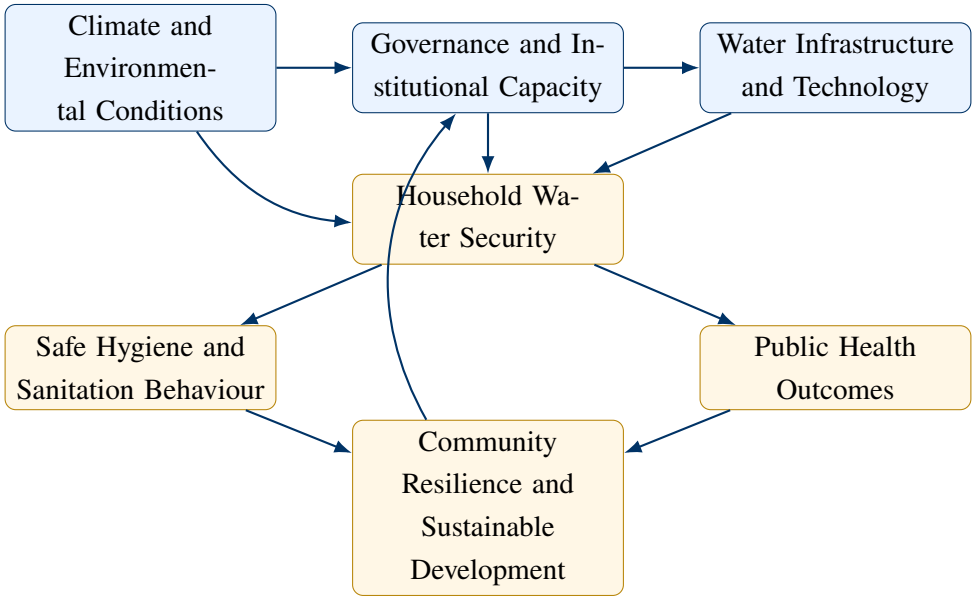

Figure 2: Integrated Water Security-Public Health Resilience Framework.

4. Current Status of Domestic Water Security in Nigeria

Nigeria's domestic water system is shaped by geography, climate, institutional capacity, public investment, and settlement patterns. The country has substantial surface and groundwater resources, yet access to safely managed water remains uneven. Water availability varies sharply between the humid southern regions and the drier northern zones. However, rainfall abundance alone does not guarantee domestic water security. Urban pollution, oil-related contamination, flooding, poor waste disposal, and weak regulation can compromise water quality in water-rich areas, while drought, desertification, and groundwater stress affect drier regions.

4.1. Rural-Urban Disparities

Urban residents are more likely to be close to formal infrastructure, but many public water systems are intermittent. Households therefore rely on boreholes, wells, water tankers, sachet water, and private vendors. This increases household expenditure and may expose residents to unregulated water quality. Informal settlements often suffer the greatest inequity because they lack formal pipe connections and pay higher prices to vendors.

Rural communities frequently depend on rivers, streams, shallow wells, ponds, springs, and rainwater. These sources may be unsafe during rainy seasons because of runoff and may disappear during dry seasons. Distance to water sources imposes time and energy costs, especially for women and girls. In many communities, water collection competes with schooling, farming, trading, childcare, and rest.

Table 1: Comparative indicators of domestic water security in rural and urban Nigeria.

Indicator	Rural Communities	Urban Communities	Public Health Implication
Primary sources	Streams, wells, ponds, rainwater, boreholes	Municipal supply, boreholes, vendors, packaged water	Variable quality and safety
Supply reliability	Seasonal and often distant	Intermittent but closer	Household water insecurity
Affordability	Low cash cost but high time burden	Higher cash expenditure	Inequitable access
Infrastructure	Limited treatment and maintenance	Ageing networks and leakages	Contamination and service failure
Gender burden	Mostly women and girls	Mixed but still unequal in low-income areas	School and work disruption
Climate vulnerability	Drought and seasonal depletion	Flood contamination and demand pressure	Disease outbreaks and scarcity

4.2. Regional Patterns

The North-East and North-West are highly affected by drought, desertification, irregular rainfall, and competition among domestic, agricultural, and livestock water needs. The North-Central region benefits from major river systems but still experiences infrastructure and governance constraints. Southern Nigeria receives higher rainfall, yet flood contamination, industrial pollution, poor drainage, and urbanization affect water safety. Metropolitan areas such as Lagos, Port Harcourt, Benin City, Ibadan, and Onitsha face growing water demand that has outpaced public supply capacity.

4.3. Emerging Trends

Between 2015 and 2026, five trends have become prominent. First, urbanization increased pressure on existing water infrastructure. Second, climate variability made water availability less predictable. Third, household dependence on private boreholes expanded. Fourth, public-private partnership debates intensified around affordability and regulation. Fifth, digital water technologies, GIS mapping, solar-powered boreholes, and real-time monitoring systems became increasingly relevant for sustainable water management.

5. Public Health Consequences of Domestic Water Insecurity

Unsafe domestic water is a major environmental determinant of communicable disease transmission. Waterborne and water-related diseases persist where drinking water is contaminated, sanitation is inadequate, drainage is poor, and hygiene practices are constrained by water shortages. Cholera, typhoid fever, acute diarrhoeal illness, dysentery, hepatitis A, schistosomiasis, and parasitic infections are associated with unsafe water and poor sanitation.

5.1. Disease Transmission Pathways

Contaminated water transmits pathogens through ingestion, food preparation, poor hand hygiene, and contact with infected freshwater. Flooding can mix sewage with surface water and damage shallow wells. Drought can force households to use unsafe sources. Broken pipelines and poorly sealed storage containers can recontaminate water after collection.

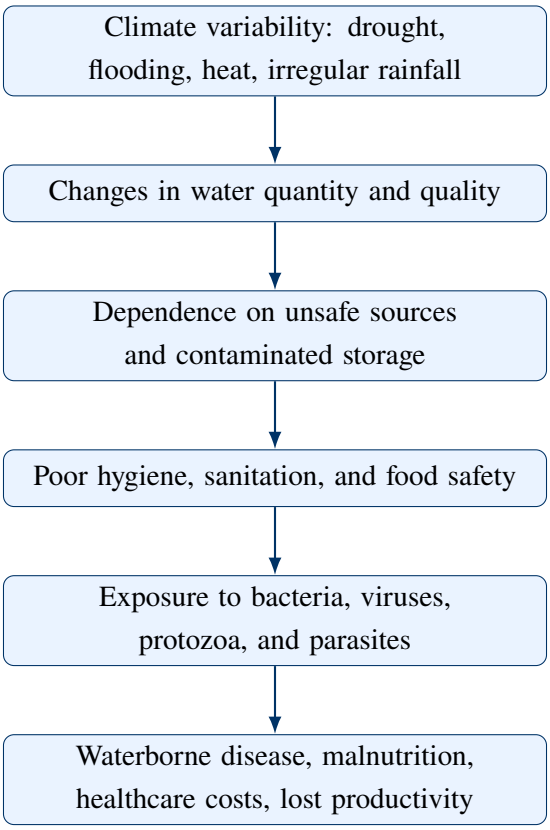

Figure 3: Climate-water-disease pathway model.

Table 2: Major water-related diseases and preventive measures.

Disease	Typical Agent	Transmission	Health Effects	Prevention
Cholera	*Vibrio cholerae*	Contaminated water or food	Severe diarrhoea, dehydration	Safe water, sanitation, oral rehydration, hygiene
Typhoid fever	*Salmonella Typhi*	Contaminated food and water	Fever, abdominal symptoms, complications	Water treatment, food hygiene, vaccination where indicated
Diarrhoeal disease	Bacteria, viruses, protozoa	Unsafe water and poor hygiene	Dehydration, malnutrition	Handwashing, household water treatment
Dysentery	*Shigella* and amoebic pathogens	Fecal-oral route	Bloody diarrhoea, intestinal inflammation	Safe sanitation and potable water
Hepatitis A	Hepatitis A virus	Fecal-oral transmission	Acute liver infection	Safe water, sanitation, vaccination
Schistosomiasis	*Schistosoma* species	Contact with contaminated freshwater	Chronic organ damage	Safe water, snail control, treatment

5.2. Gender, Equity, and Vulnerability

Domestic water insecurity is also a social justice issue. Women and girls often spend hours collecting water, particularly in rural areas and informal settlements. This burden reduces school attendance, income-generating opportunities, rest, and participation in community life. Low-income households may pay more per litre through vendors than wealthier households connected to formal networks. Children, pregnant women, older adults, and persons with chronic illness face higher risks from unsafe water because of increased vulnerability to infection and dehydration.

5.3. Healthcare Delivery and WASH

Healthcare facilities require reliable water for infection prevention, sterilization, maternity care, wound care, laboratory services, cleaning, and safe patient care. Interruptions in water supply weaken healthcare quality and increase infection risks. Nurses and community health workers are important actors in household water safety education, hygiene promotion, disease surveillance, and outbreak response. Integrating WASH into primary healthcare can reduce preventable disease and improve community resilience.

6. Water Governance, Institutions, and Policy Challenges

Nigeria's water governance system involves federal, state, and local institutions. The Federal Ministry responsible for water resources provides national policy direction, while River Basin Development Authorities, state water agencies, local government councils, environmental agencies, and community organizations perform overlapping roles. This layered structure can support decentralization, but weak coordination has produced duplication, delayed implementation, poor accountability, and uneven service delivery.

6.1. Policy Environment

Important water sector policies and programmes include the National Water Resources Policy, national water supply and sanitation frameworks, the Partnership for Expanded Water Supply, Sanitation and Hygiene, climate adaptation strategies, and SDG 6 implementation commitments. These instruments emphasize safe water, sanitation, integrated resource management, public-private collaboration, rural water supply, and environmental sustainability. However, implementation remains limited because of insufficient financing, weak monitoring, bureaucratic fragmentation, corruption risks, and inadequate technical capacity.

Table 3: Water governance priorities and implementation challenges in Nigeria.

Policy Area	Objective	Challenge	Priority Response
Integrated water management	Coordinate domestic, agricultural, industrial, and ecological water needs	Fragmented responsibilities	Policy harmonization and basin-level planning
Rural water supply	Expand potable water to underserved communities	Poor maintenance and limited finance	Community ownership and maintenance funds
Urban water systems	Improve treatment and distribution	Ageing pipes, leaks, weak revenue systems	Rehabilitation and performance monitoring
Water quality regulation	Ensure safe drinking water	Limited surveillance and laboratory capacity	Routine testing and public reporting
Climate adaptation	Reduce drought and flood vulnerability	Weak operational implementation	Climate-resilient infrastructure and early warning
Public-private partnerships	Mobilize capital and technical expertise	Affordability and equity concerns	Transparent contracts and pro-poor safeguards

6.2. Financing and Maintenance

Sustainable water supply requires capital investment and continuous operation and maintenance. Many projects fail because maintenance budgets are inadequate or because technical support ends after construction. Boreholes, pumps, pipes, treatment systems, and reservoirs require routine inspection, repairs, spare parts, and trained personnel. Funding models should therefore include lifecycle costs rather than only construction costs.

6.3. Community Participation

Community participation improves sustainability by increasing local ownership and accountability. Water User Associations, women's groups, traditional institutions, youth groups, and community development committees can support planning, monitoring, fee collection, maintenance, and hygiene education. Women's participation is especially important because women are primary household water managers in many communities.

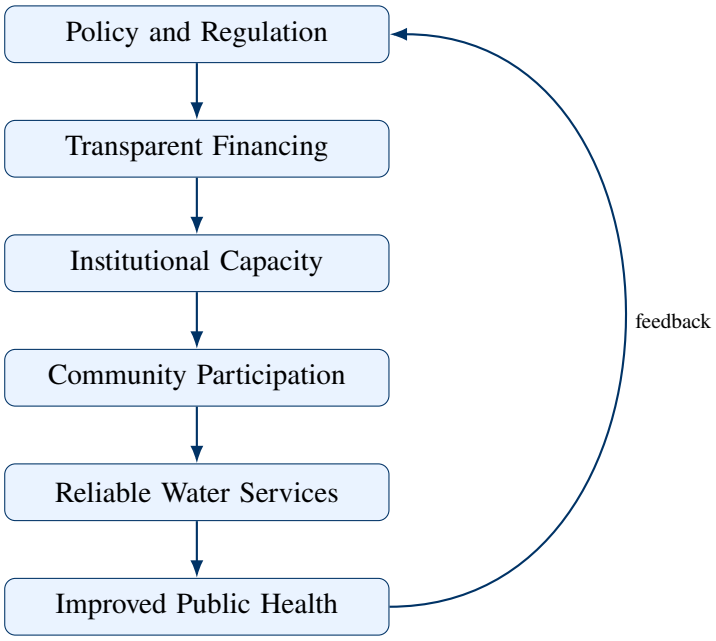

Figure 4: Integrated governance model for sustainable domestic water security.

7. Emerging Technologies and Innovative Approaches

Digital transformation can strengthen water service delivery by improving data collection, decision-making, infrastructure maintenance, water quality monitoring, and public accountability. Traditional water management often relies on manual inspection and reactive repairs. Digital systems can shift water management toward prediction, prevention, and transparent performance tracking.

7.1. GIS, Remote Sensing, and Climate Monitoring

Geographic Information Systems can map water points, service gaps, disease hotspots, flood-prone areas, groundwater potential, and population demand. Remote sensing can monitor rainfall patterns, soil moisture, vegetation loss, drought severity, watershed degradation, and flood risks. Combining GIS and remote sensing can guide borehole siting, reservoir planning, watershed conservation, and

emergency response.

7.2. Artificial Intelligence and Predictive Analytics

Artificial Intelligence and machine learning can support water demand forecasting, leak detection, drought prediction, infrastructure maintenance scheduling, and outbreak risk modelling. AI-driven systems can analyze rainfall, groundwater levels, population growth, service interruption reports, and disease surveillance data to support early warning and targeted interventions.

7.3. Solar-Powered and Decentralized Systems

Unreliable electricity supply constrains pumping and treatment operations. Solar-powered boreholes and treatment systems can provide more reliable water supply in off-grid rural communities and peri-urban settlements. Decentralized water systems, including small treatment plants, community storage, and household water treatment, can complement centralized municipal networks.

Table 4: Emerging technologies for improving domestic water security.

Technology	Application	Expected Benefit	Nigerian Relevance
GIS mapping	Spatial planning	Better infrastructure targeting	Mapping underserved settlements
Remote sensing	Climate and watershed monitoring	Drought and flood early warning	National climate adaptation
IoT sensors	Real-time monitoring	Leak detection and water quality alerts	Urban distribution systems
AI analytics	Prediction and optimization	Improved maintenance and outbreak warning	Smart water governance
Solar pumps	Renewable water supply	Lower operating costs and reliability	Off-grid rural water supply
Mobile reporting	Community feedback	Faster fault reporting	Borehole and pipeline maintenance
Cloud databases	Data integration	Evidence-based planning	National water information systems

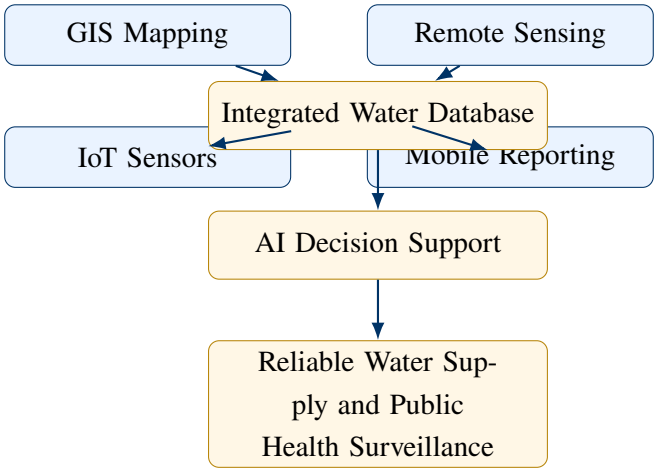

Figure 5: Digital water governance framework.

7.4. Challenges to Technology Adoption

Technology adoption faces barriers such as weak electricity supply, poor digital infrastructure, insufficient technical skills, inadequate funding, limited data sharing, cybersecurity risks, and weak maintenance culture. To overcome these barriers, Nigeria requires investment in technical training, university-industry collaboration, open water data systems, local manufacturing capacity, and sustainable financing.

8. Integrated Water Security-Public Health Resilience Model for Nigeria

The central contribution of this review is the Integrated Water Security-Public Health Resilience Model. The model synthesizes environmental sustainability, governance, infrastructure, technology, household behaviour, healthcare integration, and socio-economic development into a unified framework.

8.1. Model Components

The model contains seven interconnected domains. Environmental sustainability includes watershed protection, groundwater recharge, pollution control, afforestation, and climate adaptation. Institutional governance includes transparent policy, financing, regulation, monitoring, and intergovernmental coordination. Climate-resilient infrastructure includes treatment plants, boreholes, pipes, reservoirs, rainwater harvesting, and renewable energy systems. Technological innovation includes GIS, remote sensing, IoT, AI, and mobile reporting. Household behaviour includes safe storage, point-of-use treatment, hand hygiene, sanitation, and waste management. Healthcare integration includes WASH education, disease surveillance, outbreak response, and primary healthcare engagement. Socio-economic development includes education, gender equity, productivity, food security, and poverty reduction.

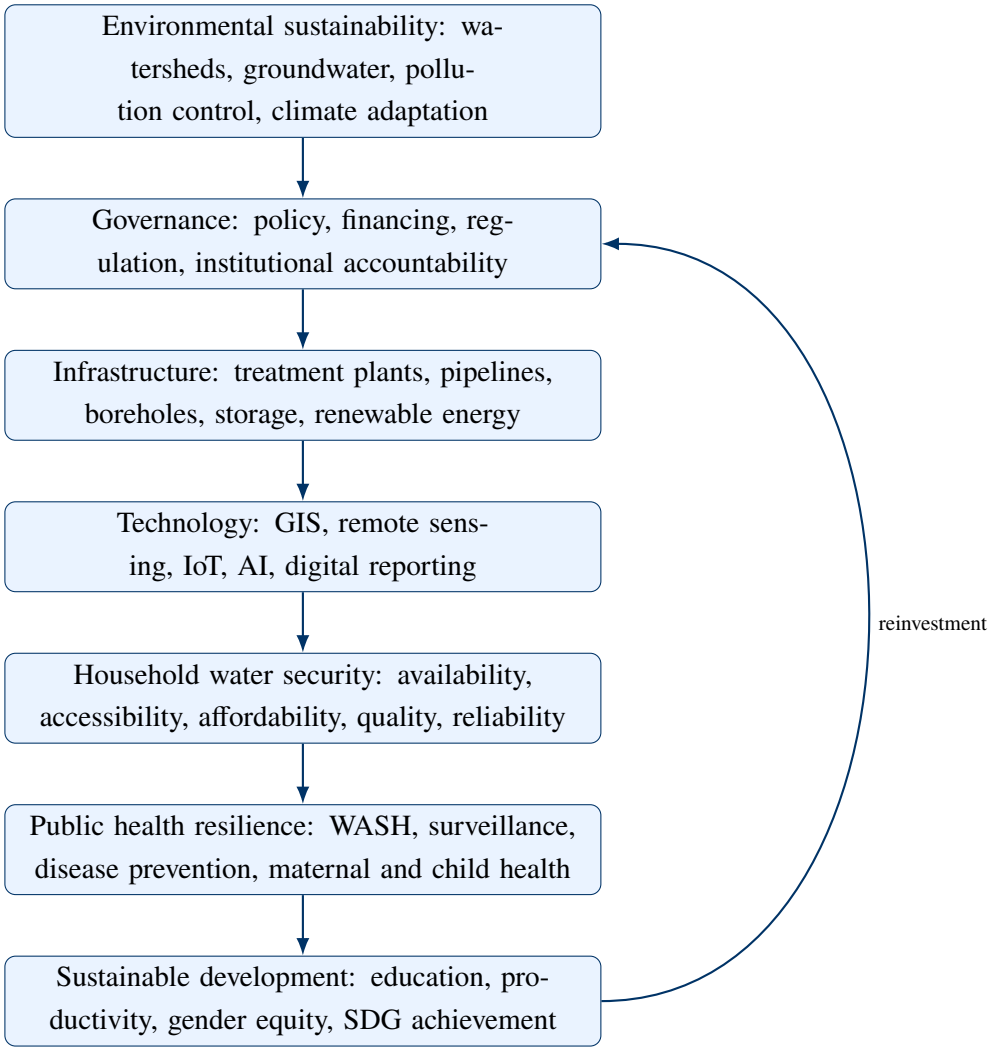

Figure 6: Integrated Water Security-Public Health Resilience Model for Nigeria.

8.2. Implementation Strategy

Implementation requires multisectoral coordination. Government should provide policy direction, financing, regulation, and accountability. Water agencies should maintain infrastructure and monitor quality. Health institutions should integrate WASH into primary healthcare and disease surveillance. Communities should participate in planning, operation, and maintenance. Universities should develop locally relevant technologies and evaluate interventions. Development partners and responsible private investors should support financing and capacity building while protecting affordability and equity, especially where public-private partnership models are considered [60, 35, 38, 24].

Table 5: Integrated implementation strategy for domestic water security.

Domain	Key Interventions	Expected Outcomes
Governance	Policy harmonization, transparent budgeting, regulatory enforcement	Improved institutional performance
Infrastructure	Climate-resilient treatment, storage, pipes, boreholes, maintenance	Reliable domestic water services
Technology	GIS, AI, IoT, remote sensing, mobile reporting	Evidence-based decision-making
Public health	WASH, surveillance, hygiene education, outbreak preparedness	Reduced disease burden
Environment	Watershed protection, pollution control, climate adaptation	Sustainable water resources
Community	Water user associations, women's participation, local monitoring	Ownership and sustainability
Research	Interdisciplinary studies, innovation hubs, water security index	Continuous policy improvement

Economic affordability, agriculture, and household livelihood studies further show that water insecurity is linked to poverty, agricultural productivity, and domestic water expenditure [2, 5, 17, 59, 44]. Additional studies of urban water governance, infrastructure stress, and pollution reinforce the need for integrated planning and institutional reform [11, 48, 53, 55, 27]. Evidence on water quality, gendered collection burdens, community participation, and behaviour change supports the public health and equity emphasis of this review [57, 56, 52, 50, 12]. Additional supporting sources were used to strengthen the synthesis across policy, climate finance, public-private partnership debates, and implementation evidence [1, 3, 6, 7, 15, 21, 23, 25, 28, 37, 42, 49, 54].

9. Policy Recommendations and Future Research Directions

9.1. Policy Recommendations

First, water governance should be strengthened through clearer institutional mandates, transparent procurement, routine performance audits, and stronger monitoring of water quality and infrastructure functionality [8, 14, 45]. Second, investment should prioritize climate-resilient infrastructure, including urban network rehabilitation, decentralized treatment, rural boreholes, rainwater harvesting, storage systems, and solar-powered pumping [13, 16, 58]. Third, domestic water security should be integrated into public health planning through WASH education, community nursing, hygiene promotion, disease surveillance, and school-based health programmes [65, 63, 40].

Fourth, digital water governance should be accelerated through national water databases, GIS mapping, remote sensing, IoT sensors, and AI-supported decision systems. Fifth, community participation should be strengthened by supporting Water User Associations, women's participation, local maintenance committees, and social accountability mechanisms. Sixth, research and

innovation should be expanded to include climate-health modelling, household water behaviour, cost-effectiveness analysis, low-cost purification technologies, and development of a Nigerian Water Security Index.

Table 6: Priority actions for strengthening domestic water security.

Strategic Area	Short-Term Priority	Long-Term Goal
Governance	Clarify roles and improve accountability	Integrated national water governance
Infrastructure	Repair broken systems and reduce leakages	Climate-resilient water network
Technology	Pilot digital monitoring tools	Smart water management
Public health	Expand WASH through primary care	Reduced waterborne disease burden
Environment	Protect watersheds and water sources	Sustainable freshwater ecosystems
Community	Train local water committees	Community-owned resilient systems
Research	Increase multidisciplinary studies	Evidence-driven policymaking

9.2. Future Research Directions

Future research should prioritize climate-health modelling to estimate water-related disease risks under different climate scenarios. AI-based prediction models should be developed for drought forecasting, water demand estimation, infrastructure maintenance, and outbreak prediction. Economic evaluations should compare the cost-effectiveness of boreholes, rainwater harvesting, point-of-use treatment, solar-powered systems, and centralized treatment [10, 22, 58, 69]. Longitudinal studies should examine household adoption of safe water storage, sanitation, and hygiene interventions. A One Health approach should link human health, ecosystem health, animal health, and environmental management. Finally, a national Water Security Index would enable routine measurement of accessibility, quality, affordability, reliability, sustainability, and governance performance.

10. Conclusion

Domestic water security remains one of Nigeria's most important public health and sustainable development challenges [68, 39, 67, 36]. The evidence reviewed in this paper shows that water insecurity is not merely a problem of physical scarcity. It is a complex systems challenge shaped by climate variability, weak governance, poor infrastructure, insufficient financing, environmental degradation, social inequality, technological gaps, and household behaviour.

The health implications are wide-ranging. Unsafe water contributes to diarrhoeal diseases, cholera, typhoid fever, malnutrition, poor sanitation, school absenteeism, lost productivity, and healthcare costs. Women, children, rural households, informal settlements, and low-income populations bear disproportionate burdens. Addressing domestic water insecurity is therefore central

to disease prevention, maternal and child health, gender equity, education, poverty reduction, and national resilience.

This review advances existing literature by proposing an Integrated Water Security-Public Health Resilience Model for Nigeria. The model emphasizes environmental sustainability, accountable governance, climate-resilient infrastructure, digital water management, household water safety, WASH integration, and community participation. It provides a practical framework for policy, research, and intervention planning. Achieving Sustainable Development Goal 6 will require sustained political commitment, increased investment, transparent institutions, technological innovation, community ownership, and interdisciplinary collaboration. Strengthening domestic water systems should be recognized as a strategic investment in the health and sustainable development of Nigeria.

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Conflict of Interest

The author declares no conflict of interest.

Funding Statement

This research received no external funding.

Ethical Approval

Not applicable. This study is a review of published literature and did not involve human participants or animals.

Data Availability

All information synthesized in this review was obtained from published literature, institutional reports, and policy documents cited in the reference list.

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