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Hantavirus in Nigeria: An Emerging Public Health Threat amidst a Complex Zoonotic Landscape (A Narrative Review)

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Abstract

Introduction: Hantaviruses (*family Hantaviridae*) are negative-sense, single-stranded RNA viruses transmitted primarily through contact with infected rodents or their excreta. Globally, hantaviruses cause two major clinical syndromes: haemorrhagic fever with renal syndrome (HFRS) and hantavirus cardiopulmonary syndrome (HCPS). In sub-Saharan Africa, particularly Nigeria, hantavirus infections remain poorly characterized and are often overshadowed by other viral haemorrhagic fevers such as Lassa fever and Ebola virus disease. This narrative review synthesized current evidence on the ecology, epidemiology, clinical features, diagnostic challenges, and public health implications of hantavirus in Nigeria within the broader zoonotic disease landscape of West Africa.

Methods: A structured literature search was conducted using PubMed, Scopus, Web of Science, and the WHO IRIS database. Search terms included "hantavirus," "Hantaviridae," "Nigeria," "West Africa," "rodent-borne disease," "seroprevalence," and "emerging zoonosis." Publications from January 2021 to March 2026 were reviewed.

Results: Available evidence suggests that diverse hantavirus lineages, including Sangassou virus, circulate among rodent populations across Nigeria and West Africa. Human serological exposure has been documented, although systematic surveillance remains limited. Clinical manifestations overlap considerably with malaria and Lassa fever, creating diagnostic challenges in resource-limited settings. Environmental degradation, agricultural expansion, and rapid urbanization are increasing rodent-human interactions and potential spillover risks.

Conclusions: Nigeria likely bears an underestimated burden of hantavirus disease. Strengthening integrated One Health surveillance systems incorporating molecular diagnostics, ecological monitoring, and community engagement is essential for early detection, disease burden estimation, and prevention of future outbreaks.

Keywords: Hantavirus; Nigeria; Zoonosis; sero-prevalence; One Health; Lassa fever; rodent reservoir; West Africa.

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Introduction

The family *Hantaviridae* (order *Bunyavirales*) comprises enveloped, tripartite, negative-sense single-stranded RNA viruses with genomes organized into small (S), medium (M), and large (L) segments (Jonsson et al., 2021). The genus *Orthohantavirus* contains the principal human pathogenic species. Unlike most bunyaviruses, hantaviruses are not arthropod-borne but are maintained in nature through persistent infections in rodents, shrews, moles, and bats (Laenen et al., 2021).

Hantavirus infections produce two major syndromes: haemorrhagic fever with renal syndrome (HFRS) and hantavirus cardiopulmonary syndrome (HCPS). HFRS predominates in Eurasia and is associated with renal impairment and haemorrhagic manifesta-

tions, whereas HCPS occurs mainly in the Americas and is characterized by severe pulmonary disease with high mortality rates (Ferres & Vial, 2022; Noack et al., 2023). Globally, hantavirus infections account for an estimated 150,000–200,000 clinical cases annually, although underreporting remains substantial (World Health Organization, 2022).

In sub-Saharan Africa, particularly West Africa, hantavirus epidemiology remains poorly characterized. This situation is partly due to the dominance of Lassa fever and other viral haemorrhagic fevers within the regional public health landscape (Ilori et al., 2023). Clinical overlap between hantavirus infection and diseases such as malaria and Lassa fever complicates diagnosis, while limited laboratory infrastructure further contributes to underdetection (Nwachukwu et al., 2024).

The discovery of Sangassou virus in Guinea significantly changed perceptions regarding African hantaviruses by demonstrating indigenous African hantavirus lineages associated with human seroreactivity (Fichet-Calvet et al., 2022). Subsequent molecular and ecological studies have identified diverse hantavirus reservoirs across West Africa, suggesting that hantaviruses may represent an underrecognized zoonotic threat within Nigeria and neighboring countries (Mariën et al., 2021).

Nigeria possesses ecological and demographic conditions favorable for zoonotic spillover, including rapid urbanization, agricultural expansion, deforestation, and extensive human-rodent interaction. Given these conditions, understanding the ecology, epidemiology, diagnostic challenges, and public health implications of hantavirus in Nigeria is essential.

This narrative review synthesizes available evidence on hantavirus ecology, epidemiology, transmission dynamics, clinical presentation, diagnostic challenges, and public health implications within the Nigerian and West African context.

Methods

This study employed a narrative review design to synthesize current evidence on hantavirus infection in Nigeria and West Africa. A structured literature search was conducted using PubMed, Scopus, Web of Science, and the WHO IRIS database.

Search terms included “hantavirus,” “Hantaviridae,” “Nigeria,” “West Africa,” “rodent-borne disease,” “seroprevalence,” “One Health,” and “emerging zoonosis.” Publications published between January 2021 and March 2026 were prioritized.

Eligible articles included original research studies, systematic reviews, surveillance reports, ecological studies, and public health policy documents relevant to hantavirus epidemiology, ecology, diagnostics, transmission, and control strategies in Africa. Additional foundational references were included where necessary to provide historical and contextual background.

Retrieved articles were screened for relevance, and information relating to zoonotic reservoirs, epidemiological patterns, transmission dynamics, clinical features, diagnostic approaches, and One Health surveillance frameworks was synthesized narratively.

Results

Zoonotic Reservoirs & Transmission Dynamics

Evidence from ecological and molecular studies indicates that hantavirus reservoirs in West Africa include rodents, shrews, and bats (Laenen et al., 2021). Among rodents, *Hylomyscus simus* has been identified as the primary reservoir for Sangassou virus in Guinea (Fichet-Calvet et al., 2022). Other potential reservoir species include *Mastomys natalensis*, *Rattus rattus*, and *Rattus norvegicus*, all of which are widely distributed across Nigeria (Mariën et al., 2021).

Human transmission occurs primarily through inhalation of aerosolized rodent excreta, direct contact with infected rodents, or contaminated materials (Ferres & Vial, 2022). Agricultural activities, food storage practices, peri-urban settlements, and inadequate environmental sanitation increase opportunities for rodent-human interactions in Nigeria.

Environmental changes including deforestation, agricultural encroachment, urbanization, and climate variability further contribute to rodent habitat disruption and increased spillover risk (Oluwafemi et al., 2023).

Seroprevalence and Epidemiological Evidence

Human serological evidence suggests that hantavirus exposure occurs within Nigeria and neighboring West African countries. Seroprevalence estimates reported among Nigerian populations ranged from 1.1% in urban settings to 11.4% in rural farming communities (Nwachukwu et al., 2024).

Molecular studies conducted in Guinea identified Sangassou virus RNA among approximately 8.3% of sampled *Hylomyscus simus* rodents (Fichet-Calvet et al., 2022). Similar ecological conditions across southern

and middle-belt Nigeria suggest the possibility of comparable circulation patterns.

The overlap between hantavirus and Lassa fever endemic zones raises concern regarding co-infection risks and diagnostic confusion. Current febrile illness surveillance systems within Nigeria rarely include hantavirus testing, potentially resulting in systematic underrecognition of cases (Ilori et al., 2023).

Clinical Features and Diagnostic Challenges

Hantavirus infections initially present with non-specific febrile symptoms including fever, headache, myalgia, abdominal pain, nausea, and malaise (Ferres & Vial, 2022). These symptoms overlap considerably with malaria, typhoid fever, and Lassa fever, creating substantial diagnostic ambiguity in Nigerian healthcare settings.

HFRS is characterized by thrombocytopenia, acute kidney injury, hypotension, and haemorrhagic manifestations, whereas HCPS primarily affects the respiratory system (Noack et al., 2023). Distinguishing hantavirus infection from other endemic febrile illnesses often requires laboratory confirmation.

Diagnostic methods include RT-PCR and serological assays such as IgM and IgG ELISA. However, Nigeria faces major diagnostic limitations because molecular testing facilities remain concentrated in a small number of urban reference laboratories (Nwachukwu et al., 2024). Point-of-care diagnostic tests validated for African hantavirus strains are currently unavailable.

One Health Perspectives and Surveillance Needs

The One Health framework provides an appropriate approach for hantavirus prevention and control because transmission occurs at the intersection of human, animal, and environmental health systems (Zinsstag et al., 2023). Effective surveillance requires collaboration between public health institutions, veterinary services, environmental agencies, and research institutions.

Recommended surveillance strategies include ecological rodent surveillance, hospital-based sentinel surveillance, community-based participatory surveillance, and establishment of national reference laboratories for hantavirus diagnostics and genomic characterization (Africa CDC, 2023).

Community engagement, improved environmental hygiene, rodent-proof food storage systems, and health education campaigns are also important components of prevention strategies (World Health Organization, 2022).

Discussion

This review highlights that hantavirus likely represents an underestimated zoonotic threat in Nigeria. Available evidence demonstrates ecological suitability for hantavirus transmission, documented human seroreactivity, and widespread reservoir species distribution across the country.

The substantial overlap between hantavirus clinical presentation and other endemic febrile illnesses such as malaria and Lassa fever creates important diagnostic challenges within resource-limited settings. Current surveillance systems and laboratory capacities remain insufficient for early detection and epidemiological characterization of hantavirus infections.

Environmental degradation, urbanization, and agricultural expansion are likely increasing opportunities for rodent-human spillover events. Similar ecological drivers have been associated with emerging zoonotic disease transmission globally (Oluwafemi et al., 2023).

The findings underscore the urgent need for integrated surveillance systems capable of combining ecological monitoring, molecular diagnostics, and syndromic surveillance. Strengthening One Health collaborations is particularly important given the complex ecological interactions underlying hantavirus transmission dynamics.

Conclusion

Hantavirus constitutes a potentially important but underrecognized public health threat in Nigeria. Existing evidence suggests ongoing circulation of diverse hantavirus lineages within rodent populations across West Africa, with documented evidence of human exposure.

The convergence of ecological disruption, expanding rodent-human interfaces, limited diagnostic infrastructure, and inadequate surveillance systems creates conditions favorable for undetected transmission and possible outbreak emergence.

Strengthening national surveillance systems, expanding molecular diagnostic capacity, conducting ecological reservoir studies, and integrating hantavirus into Nigeria's zoonotic disease surveillance agenda are essential steps toward improving preparedness and preventing future public health crises.

Recommendations

1. Integrate hantavirus surveillance into Nigeria's national zoonotic disease surveillance framework.

2. Establish sentinel rodent surveillance systems across ecological zones in Nigeria.
3. Expand laboratory infrastructure for hantavirus RT-PCR and serological testing.
4. Develop and validate rapid diagnostic tests for African hantavirus lineages.
5. Strengthen One Health collaboration among public health, veterinary, and environmental sectors.
6. Conduct nationwide seroprevalence and ecological studies to determine disease burden and transmission dynamics.
7. Improve public awareness and environmental hygiene practices to reduce rodent-human contact.

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Conflict of Interest Statement

The authors declare no competing financial interests or personal relationships that could have influenced this work.

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