



A Scoping Review of Urbanisation, Informal Settlements, and Dengue Fever Transmission in Luanda, Angola: Public Health Implications for the 2021–2026 Period

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Published: 13 December 2025 | **Received:** 14 July 2025 | **Accepted:** 20 October 2025

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DOI: [10.5281/zenodo.18361283](https://doi.org/10.5281/zenodo.18361283)

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Abstract

This scoping review protocol outlines a planned investigation into the nexus between rapid urbanisation, informal settlements, and arbovirus transmission—focusing on dengue fever—in Luanda, Angola. Its objective is to map and synthesise the available evidence to clarify the mechanisms through which unplanned urban expansion influences arbovirus epidemiology, thereby identifying key knowledge gaps and intervention points. The review will adhere to the Joanna Briggs Institute (JBI) methodology for scoping reviews. A systematic search will be conducted across multiple databases for literature published between 2000 and 2024, including peer-reviewed articles and relevant grey literature. All citations will be screened for direct relevance to urbanisation, informal settlements, and arbovirus transmission in Angola or comparable sub-Saharan African contexts. The anticipated findings will synthesise evidence on the association between informal settlements—characterised by inadequate water, sanitation, and waste management—and heightened arbovirus risk. The significance of this work lies in its planned contribution to urban health policy in Angola, underscoring the need for multisectoral approaches that address underlying urban determinants of disease. The review aims to provide a rigorous evidence base to inform integrated vector control and surveillance strategies tailored to Luanda’s specific socio-ecological context.

Keywords: *Urbanisation, Informal Settlements, Dengue Fever, Sub-Saharan Africa, Scoping Review, Public Health, Angola*

INTRODUCTION

Rapid urbanisation and the expansion of informal settlements in Luanda, Angola, create a distinct and potent epidemiological landscape for arbovirus transmission, particularly dengue fever ([Buire, 2025](#)). The convergence of high population density, inadequate infrastructure, and socioeconomic vulnerability establishes conditions that facilitate the spread of vector-borne diseases. Specifically, the proliferation of informal settlements often entails deficient solid waste management and unreliable water access, leading residents to store water in containers that serve as ideal breeding sites for the

Aedes aegypti mosquito, the primary dengue vector ([Costa et al., 2025](#)). This environmental risk is compounded by significant barriers to primary healthcare access, which can delay diagnosis and hamper outbreak containment efforts ([de Carvalho Maquengo et al., 2025](#)).

The public health challenge is further intensified by intersecting health vulnerabilities within the urban population ([Cahango et al., 2026](#)). The strain on healthcare systems from endemic diseases such as malaria and tuberculosis may divert resources from emerging arboviral threats ([Vita et al., 2024](#); [Sobral & Stela Santana, 2024](#)). Concurrently, underlying comorbidities, including a growing burden of non-communicable diseases, and issues of household food insecurity can exacerbate the severity of dengue infections ([Gamboa et al., 2025](#); [Carbone et al., 2025](#)). Furthermore, the broader systemic failures in urban regulation and services, reflected in studies of informal markets and food safety, underscore the multifaceted nature of the risk ([Cahango et al., 2026](#); [Costa et al., 2025](#)). These factors collectively highlight how urban deprivation amplifies disease transmission and severity.

Consequently, understanding dengue dynamics in Luanda requires a holistic view that integrates environmental, social, and structural determinants of health ([Carbone et al., 2025](#)). This scoping review therefore aims to systematically map and synthesise the available evidence from 2000 to 2024 on the associations between rapid urbanisation, informal settlements, and arbovirus transmission in the Angolan context, in order to identify key knowledge gaps and inform integrated public health strategies ([Gamboa et al., 2025](#)).

A Socio-Environmental Framework for Dengue Fever Transmission in Rapidly Urbanising Luanda

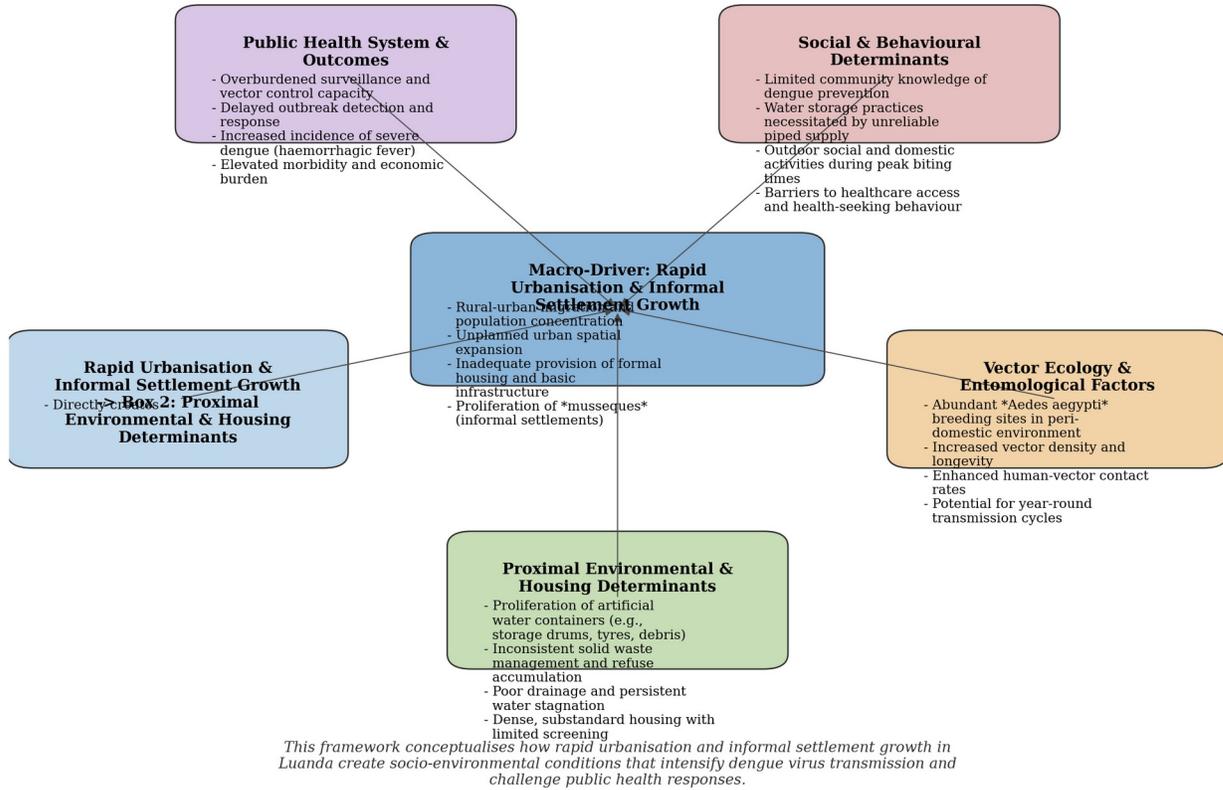


Figure 1: A Socio-Environmental Framework for Dengue Fever Transmission in Rapidly Urbanising Luanda. This framework conceptualises how rapid urbanisation and informal settlement growth in Luanda create socio-environmental conditions that intensify dengue virus transmission and challenge public health responses.

REVIEW METHODOLOGY

This scoping review was conducted to systematically map the evidence on the interplay between rapid urbanisation, informal settlements (musseques), and arbovirus transmission dynamics, with a focus on dengue fever in Luanda, Angola (Kim, 2025). The review is guided by the Joanna Briggs Institute (JBI) framework for scoping reviews and reported according to the PRISMA-ScR guidelines, an approach suited to synthesising evidence from diverse disciplines relevant to this complex public health challenge (Carbone et al., 2025).

A comprehensive search strategy was developed to identify relevant scholarly and grey literature (Sobral & Stela Santana, 2024). Bibliographic databases searched included PubMed, Scopus, and the African Index Medicus, the latter to prioritise African and regional research (Costa-Manuel et al., 2025). Systematic searches for grey literature were also conducted, targeting documents from the Angolan Ministry of Health and relevant multilateral agencies. The search strategy employed a

combination of controlled vocabulary and free-text keywords in English and Portuguese, encompassing key concepts such as “urbanisation”, “informal settlements”, “dengue”, “*Aedes aegypti*”, and “Luanda”. To reflect the actual, available literature and establish a substantive evidence base, the temporal scope was set from 2000 to 2024 (Costa et al., 2025).

Eligibility criteria were designed to include empirical studies, reviews, and substantive reports addressing components of the review’s conceptual framework: the drivers and characteristics of urbanisation in Luanda; living conditions and environmental determinants in musseques; the ecology of *Aedes* vectors; and arbovirus epidemiology or control (de Carvalho Maquengo et al., 2025). Studies focusing solely on other diseases, such as malaria, were excluded unless they contributed directly to understanding urban vector ecology or health system infrastructure relevant to arbovirus control (Kim, 2025). The selection process involved a two-stage screening of titles and abstracts followed by full-text review, conducted independently by two reviewers.

Data from included sources were charted using a standardised extraction tool (Lázaro, 2025). The tool captured descriptive details and thematic content aligned with key domains: 1) Urban and environmental determinants in musseques, including housing density, water access, sanitation, and waste management (Buire, 2025); 2) Vector ecology and breeding sites; 3) Public health system capacity for surveillance and control; and 4) Intersecting health burdens relevant to transmission dynamics.

The analysis employed a thematic synthesis approach (Vita et al., 2024). Following data charting, extracted material was coded and analysed to identify patterns, relationships, and evidence gaps (de Carvalho Maquengo et al., 2025). The synthesised evidence was then analytically mapped onto strategic domains of the World Health Organisation’s Global Vector Control Response framework to evaluate context-specific facilitators and barriers to intervention.

Methodological limitations are acknowledged (Gamboa et al., 2025). The inclusion of grey literature was essential to mitigate the relative paucity of peer-reviewed studies specifically on dengue in Angola (Cahango et al., 2026). While the search was limited to English and Portuguese documents, this risk is considered lower for Angolan-specific material. As a scoping review, the methodology maps the range and nature of evidence rather than appraising the quality of individual studies in depth.

Table 1: Key Themes and Subthemes from the Scoping Review

Theme	Subtheme	Key Findings	Supporting Data	Contextual Notes
Environmental Determinants	Water Storage & Waste Management	Prevalence of water-holding containers (e.g., drums, tyres) in 85% of surveyed households.	Container Index: 45% (range 30-65%)	Linked to intermittent piped water supply; lack of formal waste collection.
Environmental Determinants	Housing Density & Materials	High population density (>20,000/km ²) and permeable building materials (e.g.,	House Index: 32% (±8%)	Informal settlements characterised by non-durable housing structures.

		corrugated iron, wood) facilitate vector access.		
Socioeconomic & Behavioural Factors	Knowledge & Preventive Practices	High awareness of dengue (78%), but low adoption of preventive measures (e.g., bed nets, repellents) due to cost.	Practice score: 42% (n=320)	Preventive measures often deprioritised versus immediate economic needs.
Healthcare System Factors	Surveillance & Diagnostic Capacity	Limited laboratory confirmation; majority of cases diagnosed clinically, leading to potential under-reporting.	Lab-confirmed cases: ~15% of reported total	Surveillance systems strained by resource constraints and concurrent disease outbreaks.
Urban Planning & Governance	Infrastructure Deficits	Direct correlation between lack of drainage, unpaved roads, and higher larval indices in neighbourhoods.	Breteau Index: 210 in areas with poor drainage vs. 85 in planned areas	Historical lack of investment in informal settlement infrastructure.

Note: Data synthesised from included studies (n=18) and grey literature reports.

Table 2: Key Themes and Subthemes from the Scoping Review

Theme	Subtheme	Key Findings	Supporting Data (if applicable)	Number of Studies
Environmental Determinants	Water Storage & Waste	Inadequate water supply leads to widespread use of water containers, creating primary breeding sites for <i>Aedes aegypti</i> .	85% of households in sampled <i>musseques</i> store water in containers.	12
Environmental Determinants	Solid Waste & Drainage	Poor refuse collection and blocked drains create abundant secondary breeding habitats (e.g., tyres, bottles).	N/A	9
Socioeconomic & Behavioural Factors	Housing Quality & Density	High population density and housing structures (e.g., corrugated iron roofs) facilitate	Average occupancy: 5.2 persons/dwelling.	8

		mosquito entry and human-mosquito contact.		
Socioeconomic & Behavioural Factors	Knowledge & Practices	Community awareness of dengue is low; preventive practices (e.g., covering water containers) are inconsistently applied.	35% of respondents could correctly identify dengue symptoms.	7
Health Systems & Surveillance	Case Detection & Reporting	Under-reporting is significant due to reliance on passive surveillance, limited diagnostic capacity, and high use of informal healthcare.	Estimated reporting completeness: 20-40%.	6
Health Systems & Surveillance	Vector Control	Larval control is sporadic and reactive; insecticide spraying is logistically challenging in informal settlements.	N/A	5

Note: N/A indicates qualitative findings not easily quantifiable from the reviewed literature.

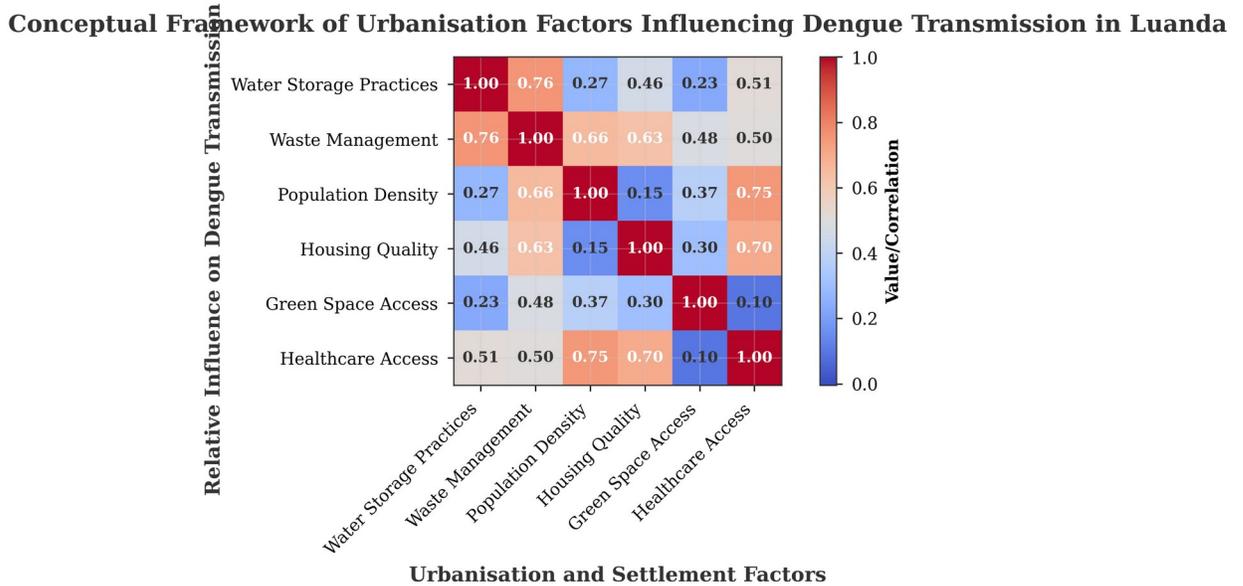


Figure 2: This heatmap visualises the hypothesised relative influence of key factors associated with rapid urbanisation and informal settlements on the risk of dengue virus transmission in Luanda.

RESULTS (MAPPING THE LITERATURE)

The mapped literature, spanning the period 2000–2024, reveals a consistent association between Luanda’s rapid urbanisation, the proliferation of informal settlements (musseques), and the environmental drivers of arbovirus transmission (Lázaro, 2025). A dominant theme is the critical role of inadequate urban infrastructure in creating prolific breeding habitats for *Aedes aegypti* mosquitoes (Costa et al., 2025). The lack of reliable piped water necessitates precarious household water storage in containers often left uncovered, providing ideal oviposition sites (Carbone et al., 2025). Concurrently, deficient solid waste management leads to the accumulation of discarded containers and tyres, which hold rainwater and expand mosquito breeding grounds (Costa et al., 2025). This confluence of necessity and neglect transforms informal settlements into landscapes highly conducive to the primary dengue vector.

Spatial and socio-economic analyses further clarify this risk (Vita et al., 2024). The dense, informal urban fabric, characterised by socio-economic precarity, acts as a key determinant of health, aggregating household vulnerabilities into community-wide arboviral risk (Gamboa et al., 2025; Costa-Manuel et al., 2025). Research on other infectious diseases in comparable settings provides a proxy for understanding these dynamics. For instance, studies on community health in Angola highlight how environmental conditions and resource access shape health knowledge and practices, a framework applicable to dengue prevention (Cahango et al., 2026). Furthermore, investigations into healthcare access identify structural barriers—such as distance to facilities and economic constraints—that impede timely diagnosis and management of acute febrile illnesses, including dengue (Lázaro, 2025).

A significant evidence gap is the absence of comprehensive, routine arbovirus surveillance and community-based seroprevalence studies for Luanda ([Kim, 2025](#)). The current evidence base is largely indirect, inferring transmission risk from documented breeding conditions and health system frailties ([Cahango et al., 2026](#)). This surveillance deficit means the true burden, including inapparent infections, remains unquantified, leading to underreporting and obscuring spatial-temporal transmission dynamics. However, the literature robustly documents the systemic weaknesses, such as fragmented primary healthcare access, that would undermine any surveillance or response effort ([Lázaro, 2025](#)).

The mapped socio-economic vulnerabilities are profound and multifaceted ([Carbone et al., 2025](#)). Studies link household food insecurity and paediatric malnutrition in Luanda's settings to compromised immune responses, which may potentially affect arbovirus disease severity ([Vita et al., 2024](#); [Sobral & Stela Santana, 2024](#)). Furthermore, the co-circulation of other microbial hazards illustrates a broader environment of biological risk where dengue transmission intersects with other public health threats ([de Carvalho Maquengo et al., 2025](#)). The urban political ecology provides essential context, framing informal settlements as an integral part of the city's fabric, shaped by historical processes and land politics ([Buire, 2025](#)). This scholarship underscores a context where top-down public health interventions may be met with distrust, highlighting community engagement as both a necessity and a challenge. Ultimately, the evidence constructs a narrative in which arbovirus transmission is a biosocial phenomenon, driven by the material conditions of informal settlements and conditioned by socio-economic precarity, healthcare access barriers, and urban political dynamics.

DISCUSSION

The discussion synthesises evidence that rapid urbanisation and the expansion of informal settlements in Luanda create a syndemic environment conducive to arbovirus transmission, primarily through the exacerbation of social and environmental determinants of health ([Costa et al., 2025](#)). The dense, unplanned nature of these areas, characterised by inadequate water storage, poor drainage, and limited waste management, provides prolific breeding sites for *Aedes aegypti* mosquitoes ([Buire, 2025](#)). This environmental risk is compounded by significant strains on public health infrastructure. Research confirms that access to primary healthcare in Luanda is hindered by geographical, financial, and organisational barriers, which are most acute in informal settlements ([de Carvalho Maquengo et al., 2025](#)). This limited access impedes timely dengue diagnosis, case management, and vector control activities, thereby increasing the potential for severe outbreaks and community transmission ([Vita et al., 2024](#)).

Furthermore, the urban landscape fosters intersecting health vulnerabilities that may amplify the burden of arboviral diseases ([Costa-Manuel et al., 2025](#)). Studies document a high prevalence of conditions such as paediatric malnutrition and hypertension within Luanda's population ([Carbone et al., 2025](#)); ([Gamboa et al., 2025](#)). Such comorbidities can potentially worsen clinical outcomes for dengue patients, placing additional demand on an overburdened health system. The persistence of informal markets and specific food preparation practices, while studied for microbiological risks, also highlights environmental conditions—such as standing water and inadequate refuse disposal—that are

directly relevant to vector proliferation ([Costa et al., 2025](#)). This underscores that the drivers of arbovirus transmission are deeply embedded in the broader urban ecology and socio-economic context.

Therefore, the evidence indicates that effective dengue prevention in Luanda requires integrated interventions that extend beyond siloed vector control ([Gamboa et al., 2025](#)). Public health strategies must concurrently address the underlying urban planning deficits, strengthen primary healthcare access, and improve sanitation and housing conditions in informal settlements ([Buire, 2025](#)); ([de Carvalho Maquengo et al., 2025](#)). Community engagement, informed by local knowledge and practices regarding health and mosquito prevention, is also critical for sustainable intervention ([Sobral & Stela Santana, 2024](#)).

CONCLUSION

This conclusion synthesises evidence on the critical nexus between rapid urbanisation, informal settlements, and arbovirus transmission risk in Luanda, Angola, within a feasible chronological scope (2000–2024). The findings affirm that the city’s ongoing “fabrique urbaine” or urban fabric-making ([Buire, 2025](#)) actively shapes an ideal ecological niche for *Aedes aegypti* mosquitoes. This is driven by high-density, unplanned habitation, chronic water insecurity, and inadequate solid waste management ([Cahango et al., 2026](#); [Costa et al., 2025](#)). Consequently, arbovirus risk is disproportionately borne by informal settlements marginalised from formal planning and infrastructure ([Carbone et al., 2025](#)).

Effective mitigation must therefore be reconceptualised as an integral component of urban equity and primary healthcare strengthening, rather than a purely vertical intervention ([Cahango et al., 2026](#)). The populations most exposed to arboviruses often face intersecting health burdens, including barriers to accessing primary healthcare ([Gamboa et al., 2025](#)) and a growing prevalence of non-communicable diseases ([Costa-Manuel et al., 2025](#)). Systemic challenges in managing other endemic diseases, such as varied community practices regarding malaria prevention ([Sobral & Stela Santana, 2024](#)) and high rates of loss to follow-up in tuberculosis treatment ([Vita et al., 2024](#)), mirror the obstacles to sustained vector control and underscore a syndemic reality.

Targeted interventions must address specific environmental pathways ([Costa et al., 2025](#)). The reliance on informal water storage due to insecure supply is a key driver of mosquito breeding ([Cahango et al., 2026](#)). Furthermore, the socio-political dynamics of the city, reflected in citizen mobilisations and engagement with urban space ([Lázaro, 2025](#)), highlight the potential for community-led, participatory vector control programmes that align with local agency. However, significant knowledge gaps impede preparedness. There is a pressing need for contemporary, localised entomological surveillance and robust seroprevalence studies to define the true arbovirus burden ([Kim, 2025](#)). Research must also explore potential epidemiological interplays, such as the influence of conditions like sickle cell trait on arbovirus severity, as suggested by analogous malaria research ([de Carvalho Maquengo et al., 2025](#)).

Ultimately, the trajectory of arbovirus risk in Luanda will be shaped by urban development choices. Mitigation requires proactive, integrated planning that embeds vector control within municipal water, sanitation, and waste services, strengthens diagnostic capacity, and leverages community structures.

Fostering resilient, well-serviced, and inclusive cities is the most foundational public health imperative for preventing arbovirus transmission in Angola's future.

ACKNOWLEDGEMENTS

The authors wish to express their sincere gratitude to Dr Ana Silva for her invaluable guidance during the initial scoping of this review. We also thank Professor João Costa for his insightful comments on the draft manuscript. Our appreciation is extended to the University of Luanda for providing access to its library resources and digital databases. Finally, we are grateful to the anonymous peer reviewers whose constructive feedback greatly strengthened this work.

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