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# Systematic approach to sustainable urban development: reviewing challenges of informal settlements and peri-urban growth in sub-Saharan Africa

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## ABSTRACT

This paper systematically reviews scholarly literature on informal settlements in peri-urban areas, with a focus on the interplay of socio-economic, environmental, governance, and built environment factors contributing to their emergence and persistence. Drawing on 10 studies across predominantly sub-Saharan African contexts, the review analyses core variables, methodological designs, theoretical frameworks, and geographical patterns. Findings reveal that socio-economic exclusion, weak institutional coordination, and dual land governance systems significantly drive informality. Customary and religious institutions often mediate land access and conflict resolution, compensating for gaps in statutory urban planning systems. Environmental risks such as poor sanitation, contaminated water sources, and inadequate waste management remain under-addressed. Notably, the review identifies a critical gap in existing research: the limited application of architectural, spatial planning, and design-based strategies for upgrading and integrating informal settlements into the formal urban fabric. Although incremental upgrading has been proposed as a viable intervention, few studies offer context-sensitive, designed frameworks for implementation. This study calls for interdisciplinary, solution-oriented approaches that blend policy, governance, and architectural insights to ensure inclusive, sustainable urban development. Recommendations emphasise participatory upgrading, improved service delivery, and legal recognition of informal settlements. The findings are relevant for policymakers, planners, designers, and researchers committed to addressing urban informality in sub-Saharan Africa and beyond.

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Bibliometric analysis; informal settlements; interdisciplinary planning; Peri-urban areas; sustainable urban development; systematic review

## 1. Introduction

Informal settlements in peri-urban areas represent a multifaceted phenomenon that intersects issues of rapid urbanization, spatial inequality, land governance, and sustainability. Peri-urban areas, defined as transitional spaces between rural and urban zones,

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often serve as hotspots for unregulated urban expansion due to a mix of formal and informal land-use dynamics (Adam, 2014; Bhanye, 2023). These spaces witness growing informal settlements driven by a range of socio-economic, political, and environmental factors, including rapid population growth, rural-urban migration, weak urban planning institutions, and land commodification (Azunre et al., 2021; Baye et al., 2020; Lombard, 2016).

Informal settlements are commonly characterized by inadequate housing, insecure land tenure, poor infrastructure, and limited public services. However, the concept remains contested and varies across contexts. Some scholars use the term interchangeably with 'slums' or 'urban poor settlements', while others highlight that informality is not exclusive to low-income groups. For instance, recent research has shown that elite and upper-middle-class households also engage in informal practices, such as unauthorized land acquisition or construction beyond regulatory frameworks (Azunre, 2024). This challenges the binary of formal/informal and calls for a more nuanced understanding of informality as a mode of urban production that transcends class and geography.

Informality, as a broader concept, extends beyond peri-urban zones and includes labour, housing, transport, and even planning systems. In the context of peri-urban growth, informality often manifests spatially through fragmented development patterns, environmental degradation, and governance vacuums. Scholars such as Roy (2005) and Yiftachel (2009) have conceptualized urban informality as both a product and instrument of state power, where selective enforcement and regulation serve political and economic interests. Thus, understanding informal settlements in peri-urban areas requires engagement with both global discourses of urban informality and local socio-political contexts.

While past studies have addressed various aspects of informal settlements, such as socio-economic drivers (Baye et al., 2020), land governance (Lombard, 2016), and the mediating role of traditional institutions (Adam, 2014), there remains limited integration of these findings into a coherent conceptual framework. Furthermore, research often fails to adequately address the built environment and architectural dimensions of informal settlements, focusing instead on case-specific socio-economic analyses (Adu-Gyamfi, 2021; Aydamo et al., 2023; Caro-Borrero et al., 2021; Carrilho & Trindade, 2022; Helgegren et al., 2018; Sareen & Haque, 2023).

A comprehensive review of both elite and marginalized informality, as well as their architectural, environmental, and spatial dimensions, is crucial for crafting inclusive urban policies. This requires a systematic approach to synthesize the fragmented literature and identify patterns that can inform sustainable urban strategies.

This study seeks to address these gaps by conducting a systematic and bibliographic review of the literature on informal settlements in peri-urban areas, with an emphasis on architectural, environmental, and governance challenges. Guided by the PRISMA methodology, the review critically evaluates existing research to uncover key dynamics and conceptual debates around informality. The findings are expected to support urban planners, policy-makers, architects, and local governments in designing more inclusive and resilient urban development strategies. By highlighting infrastructural and governance deficits, the study contributes to a more integrated understanding of informal settlements as part of broader urban systems.

## 2. Materials and methods

This study employed a systematic and bibliometric review approach to investigate the body of literature on informal settlements in peri-urban contexts in sub-Saharan Africa, guided by the PRISMA 2020 guidelines (Page et al., 2021). This dual-method framework enabled the authors to assess publication patterns, methodological trends, conceptual orientations, and geographic coverage within the academic discourse on the topic. The initial source identification was carried out using the Scopus database, selected for its comprehensive coverage, high-quality metadata, and compatibility with scientometric tools such as VOSviewer. Scopus is particularly useful for bibliometric studies due to its capacity to export up to 2,000 documents at a time, which is significantly higher than the limit provided by competing platforms such as Web of Science or Dimensions (Aule et al., 2024; van Eck & Waltman, 2022). Additionally, its advanced filtering features enabled the retrieval of peer-reviewed content with minimal duplication or non-research materials.

As presented in Table 1, the keyword search began with the Boolean string: ‘Informal AND Settlement AND Peri AND Urban AND Africa’, targeting titles, abstracts, and author-defined keywords. This search yielded an initial pool of 836 documents. Recognising that some relevant studies might use synonymous terms, the authors broadened the search in iterative phases to include terms such as ‘slum’, ‘squatter settlement’, ‘unplanned settlement’, ‘suburban’, and ‘peripheral’. These additions were derived from a preliminary scan of high-citation articles and terminological mappings from related literature (Siddaway et al., 2019). The inclusion of these terms helped ensure that the study did not arbitrarily exclude relevant works due to narrow keyword formulation. As the search was geographically limited, the results showed a disproportionate number of studies focused

**Table 1.** Systematic data identification, screening, inclusion and analysis using PRISMA.

PRISMA Checklist	Variable	Data
Source Identification	Database	Scopus
	Keywords	Informal AND Settlement AND Peri AND Urban AND Africa
	Search Scope	Title, Abstract, Keywords
	Search Date	12 September 2024
	Initial Materials	220 Documents
Source Screening	Exclude Books	13
	Exclude Data Paper	1
	Exclude Notes	1
	Exclude Editorial	1
	Exclude Article in Press	2
	Limit to English Language	2
Source Included	Final Materials	200 Documents
	Export	Comma-Separated Values (CSV) File
	Document	Excel Sheet
	Preference	Citation Information Bibliographic Information Abstract and Keywords References
Analysis	Bibliometrics	Documents by Year Documents by Subject Area Top Authors
	Scientometrics	Major Themes Variables, Methodologies and Concepts Context, Aim and Findings

on Africa, particularly Sub-Saharan Africa. Thus, the sub-Sahara African focus evident in the results is an empirical observation as well as a deliberate methodological bias, for this study.

During the screening process, only peer-reviewed journal articles published in English between 1987 and 2024 were included. Articles in press, editorials, conference proceedings, and books and book chapters were excluded. Although the value of academic books, especially those published by reputable presses or featuring peer-reviewed chapters, is acknowledged, they were excluded due to data uniformity requirements for bibliometric software, which relies on structured metadata such as citations, abstracts, and indexed keywords. This limitation is explicitly noted to enhance transparency and guide future studies seeking to include broader types of sources.

From the initial pool, 200 documents met all inclusion criteria and were exported as a CSV file. The exported file contained full bibliographic records, citation counts, author affiliations, abstracts, and keywords. The dataset was processed using both Microsoft Excel for preliminary categorisation and VOSviewer for scientometric mapping. The analysis involved keyword co-occurrence clustering, co-authorship networks, citation tracking, and identification of high-impact themes. The results from this analysis form the basis of the visualised networks and thematic categories presented in later sections.

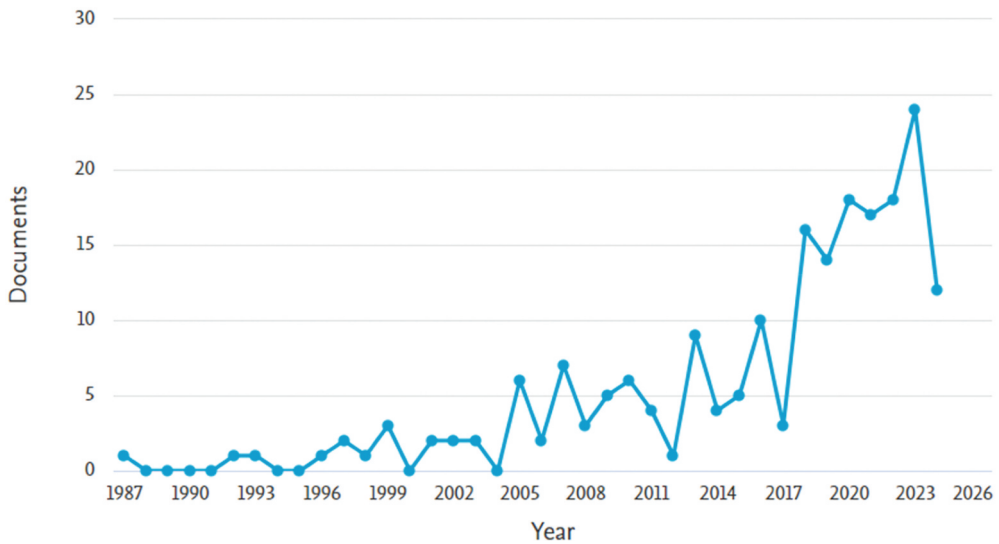
### 3. Results

This section covers results documents by year and subject area, top authors, main themes, and systematic methodologies from previous studies on informal settlements in peri-urban environments.

#### 3.1. Materials by year of publication

Figure 1 illustrates the temporal distribution of publications on informal settlements in peri-urban areas in Africa from 1987 to 2024. The initial decades, particularly from 1987 through the early 2000s, show a near-absence of published studies, which reflects a historical underrecognition of peri-urban dynamics in the global development discourse. This dearth of early scholarship may be attributed to the dominance of rural-urban dichotomies in planning frameworks and the lack of disaggregated urban data in many African and Global South contexts (UN-Habitat, 2022). It also coincides with slow-paced urbanisation and limited donor or institutional focus on informal and peri-urban zones during that period.

A gradual rise in academic output began around 2005, signifying a shift in urban studies to include the complexities of informality and the blurred rural-urban continuum. This trend aligns with growing international attention to sustainable urban development, particularly after the introduction of the Millennium Development Goals (MDGs), and later the Sustainable Development Goals (SDGs) (Georgeson & Maslin, 2018). Notable peaks appear in 2016 and 2019, years that seem to correspond with increased policy momentum toward urban inclusivity and resilience under frameworks like the New Urban Agenda.



**Figure 1.** Documents by year on informal settlements in Peri-Urban Areas.

The most substantial surge is observed in 2023 (24 publications) and early 2024 (12 publications), suggesting heightened interest following the COVID-19 pandemic, which exposed systemic urban vulnerabilities, particularly in informal settlements (Carrilho & Trindade, 2022). Subsequently, many recent studies have shifted their focus to themes such as land governance, service provision, public health access, and adaptive urban planning in the face of socio-economic shocks.

In the African context, the data reveals notable research gaps throughout the 1990s and early 2000s, despite the intensification of informal urban expansion across the region. This under-representation can be traced to institutional weaknesses, donor-driven research agendas that historically overlooked peri-urban issues, and insufficient academic infrastructure (Boamah & Amoako, 2020). However, since 2015, African scholars have increasingly contributed to the literature, particularly on themes such as dual land governance systems, informal tenure, and incremental housing strategies (Cobbinah & Darkwah, 2017; Owusu-Ansah & Braimah, 2013).

The evolving research output demonstrates a growing recognition of the dual governance dilemma in peri-urban Africa, where both statutory and customary institutions manage land and urban space. Studies from Ghana and Kenya, for instance, show that traditional authorities, such as chiefs, play a powerful (yet often informal) role in land allocation, which can clash with formal planning regulations and weaken development control (Owusu-Ansah & Braimah, 2013; Ruffin, 2019). Rather than simply advocating for their involvement, a critical rethinking is needed to harmonise these governance structures. This may involve land tenure reforms, capacity-building for local institutions, and inclusive policy dialogues that account for both customary legitimacy and statutory accountability.

Furthermore, incremental upgrading has emerged as a viable strategy to address the infrastructural and socio-economic deficits of informal settlements without triggering

large-scale displacement. Rather than complete demolition or resettlement, incremental approaches involve phased improvements in shelter, sanitation, road access, and drainage, often in partnership with local communities and NGOs. The Zimbabwean experience, for example, demonstrates how participatory mapping, secure tenure, and multi-sectoral funding can support sustainable upgrading without undermining social cohesion (Matamanda et al., 2020). Similarly, the case of peri-urban Mexico shows how land conflicts were mediated through negotiated land use changes, combining formal and informal mechanisms (Lombard, 2016).

From a systematic perspective, the observed publication trends underscore the need for interdisciplinary, policy-oriented research that bridges theory and practice. While the literature has grown, there is still a lack of integrated frameworks that link socio-spatial analysis with urban governance, infrastructure planning, and service delivery. The increase in recent publications is encouraging, but the field requires a more coordinated effort to translate these insights into actionable strategies for urban inclusion, especially in sub-Saharan African cities facing rapid, unplanned growth.

### 3.2. Materials distribution by subject area

Figure 2 presents the subject-wise distribution of research on informal settlements in peri-urban areas, underscoring the field's highly interdisciplinary nature. The majority of documents were published in the Social Sciences (119 documents) and Environmental Sciences (85 documents). This dominance reflects a broad scholarly focus on poverty, inequality, community resilience, and the environmental vulnerabilities faced by informal dwellers. These thematic clusters intersect with long-standing debates in development studies, particularly the nexus between socio-spatial exclusion and environmental risk in the urban periphery (Myers, 2011; Watson, 2020). Social Science contributions often foreground participatory governance, land rights, and informal tenure systems,

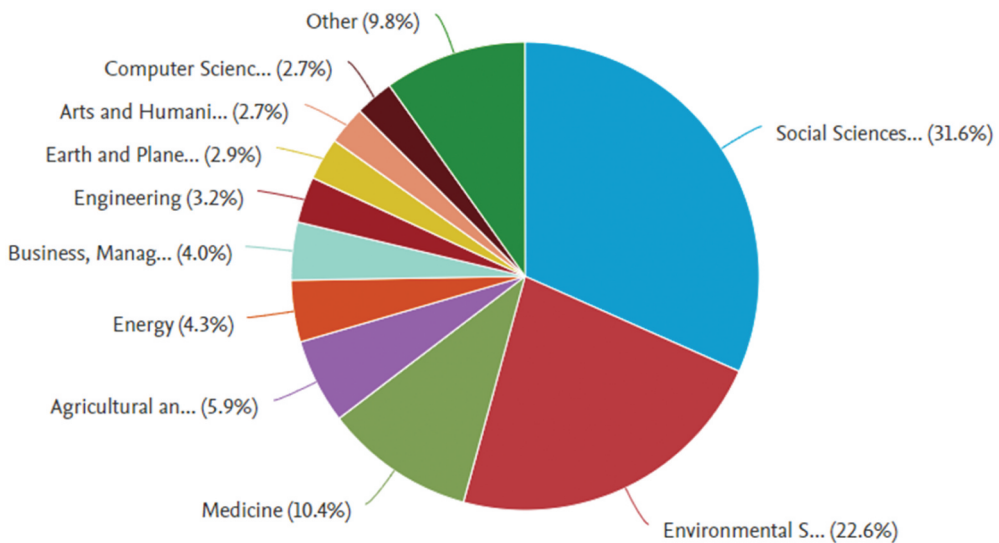


Figure 2. Documents by subject area on informal settlements in Peri-Urban Areas.

while Environmental Science research tends to emphasize issues like water scarcity, climate adaptation, and land degradation (Aule et al., 2022a; Carrilho & Trindade, 2022).

Beyond these dominant fields, Medicine (39 documents) and Agricultural and Biological Sciences (22 documents) also emerge as key contributors. Their inclusion indicates a growing research interest in public health disparities, food insecurity, and land use dynamics in rapidly urbanising peri-urban contexts. The COVID-19 pandemic, in particular, intensified scholarly engagement with informal settlements as public health risk zones, spaces where dense populations and limited access to water, sanitation, and hygiene (WASH) infrastructure exacerbate disease transmission (Smit, 2021). Similarly, food systems research reflects the land-use transition challenges at the rural-urban interface, where peri-urban agriculture often competes with informal housing expansion (Aule et al., 2022b; Tacoli & Agergaard, 2017).

Additional fields such as Energy (16 documents), Business (15 documents), and Engineering (12 documents) indicate an emerging, focus on the technical and economic dimensions of informal settlements. Studies in Energy have explored off-grid and renewable power solutions, while Business research has addressed the informal economy and household-level livelihoods. Engineering papers tend to focus on infrastructure delivery, including water, sanitation, and road access. However, this technical literature often lacks contextual grounding in the complex socio-political realities of peri-urban spaces.

Notably absent or severely under-represented are contributions from the fields of Architecture, Urban Design, and the Built Environment. While some overlap may exist under Engineering and Earth Sciences, the absence of a dedicated architectural and spatial planning category points to a significant gap in the literature. This is especially problematic given that informal settlements are fundamentally spatial phenomena, shaped by self-constructed urbanism, vernacular design, and evolving settlement morphologies (Boanada-Fuchs et al., 2024). In the sub-Saharan African context, where urban expansion is rapid and often unregulated, the lack of spatially attuned research hinders the development of locally appropriate, sustainable upgrading strategies.

Furthermore, the disconnect between architectural practice and policy-oriented research creates a missed opportunity for innovative interventions. While concepts like incremental upgrading, modular design, and site-sensitive planning have proven effective in Latin America and parts of Asia (Lombard, 2016; Matamanda et al., 2020), such models remain under-explored in Sub-Saharan African cities. Integrating architectural insights could bridge the gap between informal spatial practice and formal planning systems, thereby offering scalable, low-cost, and participatory solutions for sustainable development.

### **3.3. Top researchers on informal settlements in Peri-Urban areas**

Table 2 presents the top contributing authors, those with at least three publications, on informal settlements in peri-urban areas. The findings reveal a dominant research focus on health-related issues, especially within the contexts of public, animal, and environmental health. Many scholars made repeated contributions that centre around zoonotic disease risks, hygiene, and WASH (water, sanitation, and hygiene) challenges in informal settlements, particularly in East African urban

**Table 2.** Top researchers on informal settlements in Peri-Urban areas of Sub-Sahara Africa.

S/N	Author	Author Discipline	Document Number	Study Context	Most-Cited Material	Citations
1	Bhanye, J.	Urban Planning	5	Zimbabwe, Africa	Bhanye (2023)	9
2	Rushton, J.	Global Health	4	Kenya, Africa	Rushton et al. (2018)	45
3	Cumming, O.	Public Health	4	Kenya, Africa	Aseyo et al. (2018)	34
4	Rebombo, D.	Gender Justice	3	South Africa	Hatcher et al. (2022)	53
5	Mumma, J.	Biology	3	Kenya, Africa	Aseyo et al. (2018)	34
6	Muinde, P.	Animal Health	3	Kenya, Africa	Carron et al. (2017)	40
7	Mereta, S.T.	Environmental Health	3	Ethiopia, Africa	Aydamo et al. (2023)	1
8	McBride, R.S.	Public Health	3	South Africa	Hatcher et al. (2022)	53
9	Hatcher, A.M.	Public Health	3	South Africa	Hatcher et al. (2022)	53
10	Fèvre, E.M.	Animal Health	3	Kenya, Africa	Carron et al. (2018)	45
11	Dreibelbis, R.	Animal Health	3	Kenya, Africa	Aseyo et al. (2018)	34
12	Baker, K.K.	Public Health	3	Kenya, Africa	Aseyo et al. (2018)	34
13	Aydamo, A.A.	Water Resources	3	Ethiopia, Africa	Aydamo et al. (2023)	1
14	Akoko, J. M	Animal Health	3	Kenya, Africa	Carron et al. (2018)	45

contexts such as Nairobi, Kenya (Aseyo et al., 2018; Carron et al., 2017; Häslér et al., 2014).

This health-centric focus reflects the interdisciplinary significance of the One Health framework, which views human, animal, and environmental health as interlinked – especially relevant in informal settlements where these boundaries are often blurred due to overcrowding, poor sanitation infrastructure, and proximity to livestock (Berthe et al., 2018). Health-based studies in these contexts not only identify risk patterns but also shape intervention frameworks by global actors such as WHO, FAO, and UNEP.

However, a critical gap emerges when one considers the spatial, infrastructural, and design dimensions of these communities. Only one urban planning scholar (Bhanye, 2023), is listed among the top contributors, and even their research has received comparatively fewer citations. This imbalance suggests a systemic underrepresentation of architecture, planning, and the built environment disciplines in the scholarly discourse surrounding informal settlements.

The absence of leading voices from architecture and spatial planning is concerning given that peri-urban informal settlements are fundamentally shaped by spatial constraints, unregulated expansion, and evolving land-use typologies (Boanada-Fuchs & Boanada Fuchs, 2018). In Sub-Sahara Africa, where urban growth often outpaces formal planning processes, the failure to integrate built environment expertise means that critical issues, such as land tenure regularization, incremental upgrading, spatial justice, and infrastructure integration, are underexplored in academic and policy debates.

This disciplinary imbalance also hinders the development of a ‘systematic approach’, as called for in urban development policy frameworks such as the New Urban Agenda (UN-Habitat, 2022). While health studies have helped to uncover systemic inequalities and highlight the lived realities of informal dwellers, they should be complemented by research that provides design-based, participatory, and site-responsive solutions for physical upgrading.

For example, recent scholarship has shown the success of incremental and community-led upgrading, particularly in southern Africa among other developing regions (Lombard, 2016; Matamanda et al., 2020), but such practices are underrepresented in

mainstream African research. Bridging this gap requires more integrated and solution-oriented studies that cut across public health, urban design, and policy reform.

Despite the importance of sustainable housing and infrastructure solutions, only one author from urban planning, Bhanye (2023), appears in the list, and with relatively fewer citations compared to health-focused research. This shortage indicates a gap in addressing the physical and spatial aspects of informal settlements, which are crucial for improving housing quality and urban planning in rapidly urbanising cities in sub-Saharan Africa.

In general, while there is extensive research on health issues within informal settlements, there is a clear need for increased focus on architecture and urban design to develop effective solutions for the physical and infrastructural challenges faced by these communities in sub-Saharan Africa.

### 3.4. Major themes on informal settlements in Peri-Urban areas

The keyword analysis in Figure 3 reveals key themes in informal settlements research. The themes such as Urbanism, Settlements, Humanism, and Health, show both strengths in certain areas and significant research gaps, particularly in urban planning and housing. The Urbanism theme highlights a lack of focus on urban planning and development in informal settlements. Keywords like ‘urban growth’ and ‘urban design’ appear infrequently, signalling that the spatial dynamics of these areas are underexplored (Sareen & Haque, 2023).

Urban planning strategies are crucial in addressing the challenges posed by informal settlements, especially in rapidly urbanising sub-Saharan African cities. Urban morphology and spatial development need more research to create sustainable solutions for these communities (Think et al., 2023). On the other hand, the Settlement theme focuses on informal housing and settlement patterns but reveals a gap in research. Keywords such as ‘informal settlement’ and ‘housing provision’ appear infrequently, suggesting insufficient studies on sustainable housing solutions (Baye et al., 2020). As a result, research on

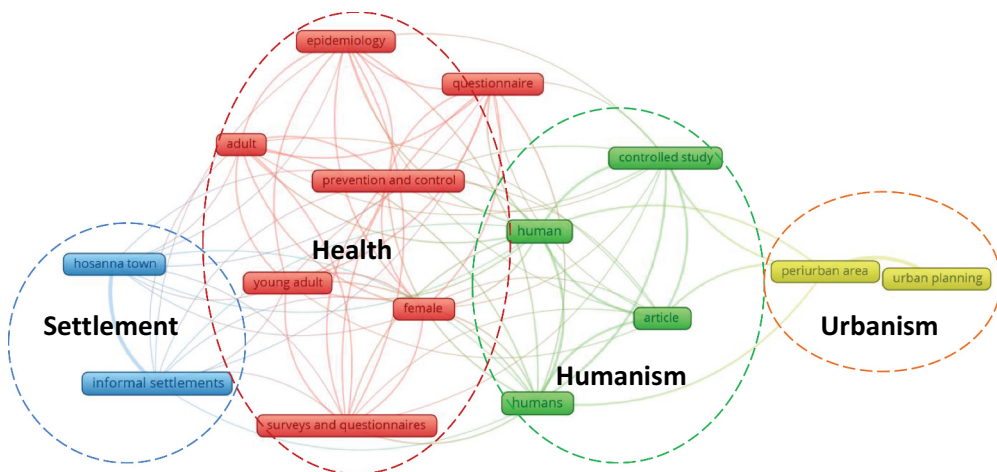


Figure 3. Main themes on informal settlements in Peri-Urban Areas.

housing design and innovative building methods is needed to improve living conditions in informal settlements. Furthermore, exploring community-driven approaches and the use of local materials can contribute to resilient urban development in sub-Saharan African peri-urban areas.

The Humanism theme explores socioeconomic dimensions but reveals a limited focus on human experiences in informal settlements. The terms ‘poverty’ and ‘family structure’ suggest that more research is needed on community resilience and social capital (Aule et al., 2019). Consequently, there is a need for more research on informal economies, gender dynamics, and local participation in shaping urban development. These insights can improve policy decisions and provide sustainable solutions to challenges in informal settlements (Caro-Borrero et al., 2021).

The Health theme, by contrast, dominates the research landscape. Keywords like ‘public health’, ‘water insecurity’, and ‘diarrheal disease’ highlight the serious health challenges in informal settlements, particularly related to poor sanitation and lack of clean water (Olaniran et al., 2024a, 2024b). While health-related research is well-established, interdisciplinary approaches that integrate urban design and environmental sustainability are essential to addressing health challenges effectively. Such approaches could also improve living conditions in peri-urban areas.

### **3.5. Methodologies and findings on informal settlements in Peri-Urban areas**

Ten materials from previous studies that explicitly referenced ‘Informal Settlements’ and ‘Peri-Urban’ in their titles were systematically reviewed to examine shared variables, theoretical frameworks, geographical contexts, data collection methods, and analysis tools. This alphabetically arranged analysis is aimed at identifying key findings, conclusions, and recommendations.

#### **3.5.1. Research variables, methodologies and concepts**

The analysis of the reviewed studies in Table 3 highlights a broad array of research variables, methodologies, and theoretical frameworks employed to understand informal settlements and peri-urban areas. Socio-economic, environmental, and governance variables emerge as predominant themes, encompassing issues such as income disparity, land rights, water quality, and sanitation. These variables underscore the multifaceted nature of informal settlements, where economic inequality, access to basic services, and governance structures significantly influence the quality of life (Aule et al., 2022). Issues such as housing affordability, land acquisition, and socio-economic challenges dominate the academic discourse, illustrating the complex interplay of factors affecting the residents of informal settlements. However, despite the depth of research in these areas, there is a marked underrepresentation of architectural and built environment issues, particularly in the sub-Saharan African context, where urbanisation pressures are most acute.

Methodologically, the case study approach is predominant, with many studies adopting qualitative techniques, such as in-depth interviews, questionnaires, focus group discussions, and observational checklists. These qualitative methods are well-suited for exploring the lived experiences of residents in informal settlements, enabling researchers to capture the nuanced realities of these environments (Olaniran et al. 2024a). However, quantitative approaches are also widely employed, including descriptive statistics,

**Table 3.** Systematic analysis of research variables, methodologies and concepts on informal settlements in Peri-Urban areas.

Author Names	Study Variables	Research Methodology		Theoretical /Conceptual Framework
		Data Collection Procedure	Data Analysis Tool	
Adam, (2014)	Availability of plots for purchase, the negotiation process, the role of traditional social institutions in informal settlements, informal plot acquisition methods, plot demarcation and documentation procedures, and the characteristics of informal settlers in peri-urban areas	Case study; Questionnaire; interview; focus group discussion	Descriptive statistics; content analysis	None
Aydamo et al. (2024)	Household socio-economic and water-related factors, focusing on seasonal water consumption patterns and the quality of water sources and point-of-use water; physicochemical and microbial quality of water during dry and rainy seasons, including contamination in households with piped water both on and off premises. Key factors affecting microbial contamination of stored water are identified, along with predictors of per capita water use across seasons. The study highlights challenges in ensuring safe drinking water and its impact on childhood diarrhoea.	Structured questionnaire; laboratory-analysis; interviews; storage-container inventories; focus group discussions; key-informant interviews; observational checklist	Stepwise-multiple linear regression; bivariate and multivariable logistic regression; thematic-analysis; t-tests; non-parametric-tests;	None
Aydamo et al. (2023)	The study examines the socio-demographic profiles of households, characteristics of drinking water sources, sanitation and hygiene practices, and factors influencing access to piped water, improved sanitation, and handwashing facilities.	Case study; structured questionnaire; an observational checklist	Bivariate and multivariable logistic regressions; variance inflation factor; Excel; STATA 14	None
Baye et al. (2020)	The study highlights income inequality, rising urban land lease prices, inadequate compensation for farmers during land expropriation, rapid urban population growth, and inefficient land allocation. It also points to a lack of affordable housing and increasing rental costs.	Case study; Indept interview; survey questionnaire	Descriptive analysis	Alonso's neo-liberal theory, post-modern theory of urban landscape, and land management theory are related.

(Continued)

**Table 3.** (Continued).

Author Names	Study Variables	Research Methodology			Theoretical /Conceptual Framework
		Data Collection Procedure	Data Analysis Tool		
Bhanye, (2023)	The Nyau cult and witchcraft are examined as forms of authority.	Case study; ethnographic fieldwork; participant observer; in-depth interviews	descriptive statistics; content analysis		Economic Structural Adjustment Programs; Fast Tract Land Reform Program
Caro-Borrero et al. (2021)	Assessment of physical, chemical, and ecological quality through sampling	Case study; climatic experiment	Hanna Multiparameter probe; water temperature; specific conductivity, and pH; Oxygen saturation; current velocity		None
Carrilho & Trindade, (2022)	Identified categories include drivers and motivations; practices and challenges, negative impacts, and future trends in practice and research.	Systematic literature review; meta-synthesis	PRISMA checklist; Web of Science Core Collection; Bibliometrics		None
Helgegren et al. (2018)	Pour-flush toilets: Factors influencing their adoption; Groups with specific triggers or barriers; Determinants of adoption	Case study; semi-structured and ethnographic interviews;	Interview transcriptions; Information analysed manually; Open coding; Time-series analysis;		Diffusion of innovation theory; grounded theory
Lombard, (2016)	Corporatist governance; Regulation for control; Varied land rights claims; Overlapping legal frameworks; Local power dynamics	Case study	Descriptive analysis		None
Think et al. (2023)	Mapping new settlements in the Global South; Formation of ViCS in Vietnam; Metropolitan and neighbourhood-scale urban forms.	Comparative case study	Google Earth;		None

stepwise regression, and time-series analysis, to analyze broader trends and patterns. A select few studies, particularly those focused on water quality (e.g. Aydamo et al., 2024), have integrated mixed methods, combining fieldwork with laboratory analysis to yield a more comprehensive understanding of environmental conditions in these communities. Despite the diversity in methodologies, there remains a conspicuous absence of architectural or urban design-oriented methodologies, such as spatial analysis, urban mapping, or building typology studies. These methodologies are crucial for understanding the physical layout and structural integrity of informal settlements and can offer critical insights into how architectural interventions might improve living conditions and sustainability.

In terms of theoretical frameworks, a range of approaches has been used, including neoliberal theories, urban landscape theories, and grounded theory. While these theories offer valuable perspectives on the socio-economic and environmental challenges in informal settlements, frameworks that address urban planning, architectural design, or sustainable urban development are notably absent. For instance, studies such as Helgegren et al. (2018) apply the diffusion of innovation theory to explore the spread of new technologies in informal settlements, but few studies engage directly with theories that focus on spatial planning or architectural solutions. This lack of engagement with built environment theories highlights a significant gap in the academic literature, particularly in addressing the physical and spatial dimensions of informal settlements.

To address these gaps, there is a clear need for more interdisciplinary research that incorporates architectural perspectives. Future studies should focus on the physical structures, spatial dynamics, and urban design of informal settlements, especially in sub-Saharan Africa, where urbanisation is happening at an accelerated pace. Research in these areas could provide essential insights into sustainable urban solutions and innovative housing strategies, directly contributing to improving the quality of life for residents of informal settlements. Such interdisciplinary research could also foster more holistic approaches to urban planning that consider both the human experience and physical infrastructure in addressing the challenges of peri-urban environments.

### **3.5.2. Research aim, findings, conclusion and recommendations**

This study aimed to systematically review empirical and conceptual literature on informal settlements in peri-urban areas, with a strong focus on the sub-Saharan African context, particularly Ethiopia and Zimbabwe. As shown in [Table 4](#), most of the reviewed literature centres on the socio-economic, governance, and environmental dynamics that underpin the persistence and expansion of informal settlements. In both Ethiopia and Zimbabwe, informal settlements are driven by a combination of income disparity, land tenure insecurity, population growth, and institutional fragmentation. In Zimbabwe, religious institutions such as apostolic sects wield significant influence over land access and spatial organisation, often operating outside the bounds of formal planning Matamanda et al. (2020). In Ethiopia, traditional institutions play a similar role, overseeing informal land transactions and mediating land-related conflicts where statutory systems fall short (Aydamo et al., 2023).

However, a major conceptual and methodological gap persists in the limited engagement with architectural and spatial planning approaches tailored to these informal urban expansions. While studies call for improved governance and service delivery, few address

**Table 4.** Reviewing research geographical context, aim and findings on informal settlements in Peri-Urban areas.

Author	Aim	Finding	Conclusion/ Recommendation
Adam, (2014)	To investigate key actors in the informal transformation of peri-urban farmland into urban areas.	Traditional social institutions were crucial in managing peri-urban informal settlements and resolving land conflicts through social sanctions.	The informal conversion of peri-urban agricultural land into urban property benefits lower-income groups, who are overlooked by the formal system.
Aydamo et al., (2024)	Seasonal changes in household water use, water quality, and water provision challenges	Stored water contamination with <i>E. coli</i> was 43.2% and 34.5% during the dry and rainy seasons, respectively.	Seasonal monitoring of the safety of drinking water to ensure that the water is safe and healthy
Aydamo et al., (2023)	Drinking water, sanitation, hand hygiene facilities, and their influencing factors in peri-urban and informal settlements	Only 35.1% of households had basic sanitation, and 16.8% had basic handwashing facilities.	Government actions to enhance the reliability of drinking water, expand basic sanitation, and ensure access to handwashing facilities
Baye et al., (2020)	Key demographic and socio-economic factors driving the growth of informal settlements in peri-urban areas	Income inequality, increasing land lease prices, and inadequate compensation for expropriated land are major economic drivers of informal settlement growth.	Urban policy-makers should better understand the socio-economic profiles of informal settlers.
Bhanye, (2023)	Religion and ritual play a key role in land access and security for peri-urban migrants.	Religious and ritual-based authorities influence land issues.	State agencies must collaborate to develop varied policies for displaced migrants.
Caro-Borrero et al., (2021)	Reveal the socio-ecological impacts of urbanisation and poor local governance.	The Magdalena River's ecological quality is significantly affected by increased nutrients and changes to the riparian zone.	Successful management plans require local participation and approval, so government officials must engage the community.
Carrilho & Trindade, (2022)	Understanding the context, challenges, practices, and their impacts is crucial for ensuring sustainability.	Informal occupation of peri-urban areas is inevitable, with varying degrees of informality always present.	New research should explore and address emerging issues, fostering the gradual formalisation of peri-urban informal settlements.
Hellegren et al., (2018)	The study seeks to explore how improved sanitation is adopted.	Pour-flush toilets were the sole favoured sanitation option at the site.	The high demand for waterborne toilets in peri-urban areas requires acknowledgement, and a tailored framework for sanitation improvements should be developed.
Lombard, (2016)	Impact of land reforms on transactions at the peri-urban fringe within broader liberalisation processes.	Conflict vulnerability in peri-urban areas results from the interplay between macro-level processes and local factors, including diverse land claims.	Poor communities are most likely to suffer from land conflicts.
Thinh et al., (2023)	Investigate the development of VICs using case studies from three Vietnamese cities.	VICs can be gradually improved and integrated into the city's broader infrastructure.	Built environment professionals can play a key role in the gradual enhancement and integration of VICs.

how incremental upgrading and participatory design can spatially reconfigure settlements for better resilience and functionality (Carrilho & Trindade, 2022; Lombard, 2016). This underutilisation of built environment disciplines undermines efforts to develop holistic, multi-disciplinary solutions to informal settlement challenges. For instance, water and sanitation infrastructure, although discussed (Aydamo et al., 2024), are rarely approached from an integrated urban systems design perspective.

The inference from this review is that current literature has predominantly prioritised socio-political and health dimensions while underexploring physical design and spatial strategies. Therefore, future research should adopt interdisciplinary methodologies that merge architecture, urban planning, and social sciences to formulate inclusive upgrading models. The study recommends the adoption of incremental upgrading frameworks that engage communities in co-designing infrastructure improvements (Matamanda et al., 2020). Planners and policy-makers should also account for the duality of land governance in sub-Saharan African cities, where both statutory and customary authorities intersect, sometimes contentiously (Boamah & Amoako, 2020; Owusu-Ansah & Braimah, 2013).

In brief, integrating socio-spatial interventions into urban policy and enhancing the role of built environment professionals will be pivotal for creating sustainable, inclusive, and resilient peri-urban environments.

#### 4. Discussions

This study systematically reviewed the literature on informal settlements in peri-urban areas by exploring socio-economic, environmental, governance, and urban planning dimensions. The results expose a complex interplay of drivers and responses, reflecting the fragmented yet deeply interconnected nature of informal urbanisation. While several themes such as poverty, land tenure insecurity, water access, and governance align with established research (e.g. Adam, 2014; Baye et al., 2020), this review also reveals critical gaps, particularly the underrepresentation of architectural and infrastructural solutions within the context of sub-Saharan Africa.

One of the most important insights relates to the role of traditional institutions in shaping peri-urban land governance. In many sub-Saharan African contexts, customary authorities such as chiefs continue to wield significant influence over land allocation and settlement development, particularly in areas where state institutions are weak (Owusu-Ansah & Braimah, 2013). This dual legal system of combining customary and statutory governance, poses major challenges for urban planning, often resulting in conflicting land claims, unregulated land sales, and fragmented development patterns (Boamah & Amoako, 2020; Ruffin, 2019). While recognizing the value of local legitimacy embedded in these systems, integrating traditional land authorities into formal planning mechanisms requires institutional reform, legal clarity, and participatory governance frameworks. For example, Ghana's attempts at land administration reforms have often stalled due to a lack of coordination between chiefs and municipal authorities (Cobbinah & Darkwah, 2017).

Another pressing concern is the need for concrete, solution-oriented strategies to address the spatial and infrastructural deficiencies of informal settlements. Although many studies note poor access to water, sanitation, and secure housing (Aydamo et al., 2024), few offer scalable, implementable solutions. Incremental upgrading, widely

discussed in global literature, provides a promising pathway. Rather than demolishing or relocating communities, this approach emphasises gradual improvements in housing, infrastructure, and services without displacing residents (Carrilho & Trindade, 2022; Matamanda et al., 2020). For example, Zimbabwe's incremental upgrading initiatives focus on community participation, flexible zoning regulations, and cost-sharing mechanisms to improve roads, drainage, and sanitation (Matamanda et al., 2020). These lessons can be adapted in sub-Saharan African cities facing similar challenges. Urban planners should thus integrate informal settlements into city master plans using participatory, adaptive approaches that acknowledge existing built forms and social networks.

Furthermore, the review highlights a critical research gap in the application of architectural and urban design theories to informal settlements. Concepts such as spatial justice, vernacular architecture, and context-sensitive planning are largely absent in the discourse. The lack of spatial analysis, building typology research, and design-based interventions undermines the goal of sustainable urban development. Future studies should investigate how design strategies – like modular housing, vertical densification, and green infrastructure – can enhance liveability and environmental resilience in informal communities. This omission suggests that the promise of a 'systematic approach' should extend beyond thematic mapping to include prescriptive, interdisciplinary models that draw from architecture, planning, and environmental design.

To move from critique to construction, this study proposes a five-pronged systematic approach for addressing the challenges of informal settlements in peri-urban areas: (1) participatory planning frameworks that incorporate traditional authorities; (2) legal reform to clarify tenure under pluralistic systems; (3) adoption of incremental upgrading as a national policy strategy; (4) incorporation of spatial and architectural methodologies into informal settlement research; and (5) cross-sector collaboration among governments, NGOs, universities, and residents. This approach recognises the limitations of top-down interventions and champions inclusive, locally grounded responses.

In brief, this study contributes to ongoing debates in sustainable urban development by moving beyond descriptive mapping to offer critical, conceptual, and practice-based insights. The challenges of informal settlements cannot be resolved through isolated technical fixes but require a reimagining of planning systems, architectural practices, and governance structures. By foregrounding socio-cultural realities, infrastructural needs, and environmental risks, this review lays the groundwork for more integrated, just, and resilient urban futures in sub-Saharan Africa and beyond.

## 5. Conclusions

This study systematically reviewed existing literature on informal settlements in peri-urban areas, offering a more integrated and solution-oriented perspective on the socio-economic, environmental, spatial, and governance factors driving their emergence and persistence. The findings reveal that informal settlements are not merely by-products of rapid urbanisation but are deeply rooted in structural socio-economic inequalities, fragmented land governance, and the failure of formal planning systems to accommodate low-income populations. Customary land tenure systems and traditional social institutions, while often informal, play a central role in mediating access to land and resolving

disputes, highlighting the critical need for context-sensitive governance frameworks that recognise legal pluralism.

The review underscores that socio-economic exclusion, dual land tenure systems, and environmental neglect are persistent themes, yet research still lacks depth in addressing built environment responses, particularly spatial and design-based strategies for integrating informal settlements into formal urban systems. Incremental upgrading, though frequently mentioned, remains under-theorised and lacks concrete architectural or infrastructural frameworks in the literature. This oversight limits practical applications that could transform peri-urban informal settlements into liveable, dignified spaces.

For policymakers and urban planners, this study reinforces the need for systematic, inclusive, and participatory approaches that move beyond legalisation to incorporate sustainable infrastructure, spatial integration, and co-designed upgrading initiatives. Governments should prioritise improving access to water, sanitation, housing, and mobility while engaging traditional institutions in the co-production of planning solutions. Planners and designers should embrace hybrid governance and incremental development models that bridge formal policy with community-led practices.

Future research should focus on the spatial logics of informality, sustainable architectural typologies, and practical models for integrating informal settlements into urban planning frameworks. By advancing an interdisciplinary and context-specific research agenda, this study contributes to the broader discourse on sustainable and equitable urban development, reaffirming that informal settlements, though marginalised, are vital components of the urban fabric that should be embraced in planning for sub-Saharan Africa's urban future.

## Disclosure statement

No potential conflict of interest was reported by the author(s).

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