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Urban formalities versus informalities: Case study of Katwe informal settlements, Kampala Uganda

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Abstract: Formal settlements refer to those settlements that comply with legal and regulatory frameworks, while informal settlements, commonly known as slums, arise without official sanction and often lack basic services and infrastructure. Informal settlements are an inherent reality that are integral parts of the urban centers in most developing nations such as the capital city of Uganda, Kampala. Currently, the city is experiencing numerous urban challenges such as inadequate housing, overcrowding, crime, and limited access to basic social services. These challenges have adverse social, economic and environmental impacts. Formal settlements typically provide basic services in proclaimed townships. By integrating formal standards into informal contexts, regeneration can conceptualize meeting formal necessities such as decent housing. This research explores the intersection of formality and informality within the urban center of Kampala, specifically in Katwe district. The research aims to explore regeneration actions in Katwe, aiming to enhance quality of living. This goal will be pursued through strategic approaches that enhances social equality and identifying social generators of activities for improved quality of life; Defining components of housing typologies for enhanced individual quality of life through self-built sustainable constructions; Establishing a unifying design focal point in the neighborhood to cultivate identity. The adopted research methodology for this exploration was developed based on a mixed-method research approach, employing procedures such as document analysis and observational study to gather necessary information from Katwe informal settlement in Kampala.

Keywords: urban informalities; urban formalities; urban regeneration; slums; informal settlement; social sustainability

1. Introduction

The inevitability of informal settlements or slums is undeniable, yet there exists ample opportunity for enhancing their living standards. The endeavor to uplift the quality of life within these environments is crucial and can be achieved through a process of regeneration. Urban regeneration necessitates a multifaceted approach, encompassing redevelopment, preservation, re-use, re-activation of public spaces, and diversification of economic activities. According to [1] regeneration initiatives worldwide aim to reshape urban areas into more diverse and vibrant neighborhoods, extending positive impacts throughout the broader cityscape [1]. This integrated and inclusive process encompasses physical, environmental, and socio-economic measures, rendering urban regeneration an effective tool for fostering inclusive, resilient, safer, and sustainable cities. However, the primary objectives of urban regeneration typically include:

- Addressing barriers to expansion and reducing low employment rates.
- Enhancing the attractiveness of regions for both residents and investors.
- Unleashing potential in underprivileged areas.
- Increasing resident satisfaction with their living environments.
- Creating pathways for advancement in disadvantaged communities.

Globally, close to one billion individuals lack a permanent residence, facing the daily threat of losing their makeshift homes. A significant portion of this population resides in slum neighborhoods characterized by high population density, inadequate living conditions, and limited incomes. The proliferation of informal settlements has escalated in recent decades due to ongoing processes of socioeconomic change and urbanization, with nearly a quarter of the global urban population now residing in such settings [2]. Despite their prevalence, informal settlements often occupy a marginalized position in planning, policymaking, and development agendas. Typically situated on the outskirts of urban areas, informal settlements utilize underutilized or unsuitable land for formal structures, such as slopes or wetlands. Tactlessly, detailed information regarding the spatial and temporal characteristics of these settlements is often scarce, leaving residents with a sense of invisibility due to the lack of public services and fragmented physical connections with the broader city. However, informal settlements and their inhabitants remain socially and economically integrated into surrounding urban areas, playing an indispensable role in the sustainability of many developing cities [2].

Moreover, informal settlements serve as crucial buffers against hazards and address significant health and environmental challenges [3]. In contrast, formal settlements represent areas where essential services are provided within designated townships. For instance, in Kampala, Uganda, the emergence of several informal settlements can be attributed to factors such as population growth, land scarcity, and unemployment [4]. Notably, Katwe, situated in Makindye Division, Kampala's burgeoning capital, stands out as a significant informal settlement. Comprising two major parishes, Katwe 1 and Katwe 2, this settlement has become a focal point for various businesses and activities. Katwe 2, established in 1986 near the railway line, the clock tower, and Queen's Way flyover, primarily serves as a residential area for workers, deriving its name from metal fabricators who used their heads to work. Katwe emerged as a focal point of African innovation during Uganda's independence from Britain in 1962 [5]. This era witnessed a dynamic convergence of artisans, craftsmen, vendors, wholesalers, herbalists, and technicians engaging in a myriad of business endeavors [5]. The culture of ingenuity fostered during this period continued to thrive, fostering a burgeoning industry marked by an increase in locally manufactured goods. By 2007, Katwe boasted a remarkable landscape, hosting over 3000 skilled artisans and metal fabricators dispersed across more than 800 individual enterprises.

However, amidst Katwe's success story lies a darker narrative. The area began to attract individuals, particularly young men and women lacking formal education but armed with practical skills. Regrettably, some of these individuals turned to criminal activities, ranging from prostitution and petty theft to more severe offenses like armed

robbery and murder. According to [6], Katwe gained notoriety as the most perilous area [6]. This concerning trend prompted political and community leaders to attribute the rising crime rate to factors such as high unemployment, widespread substance abuse, and rural-to-urban migration. Contrary to the apprehensions voiced in 2007, a subsequent analysis by [4] reveals a metamorphosis in Katwe's landscape [4]. Significant developments have occurred, including the paving of feeder roads with support from Belgian initiatives. The once chaotic soil trenches have been replaced with well-structured concrete trenches in specific zones. However, as noted by [4] the Katwe 2 neighborhood still grapples with despair, underscoring the persistent challenges faced by certain segments within the area [4]. Thus, Katwe's evolution from a bastion of creativity to a nexus of industrial prowess and social issues underscores the intricate interplay between progress and enduring challenges. The duality within Katwe's narrative necessitates a nuanced comprehension of the factors influencing its trajectory, blending the optimism of advancement with the sobering realities impacting specific communities within the broader context.

- **Aims, Objectives and Novelty of the Research**

The main objective is to Identify the formal patterns needed to be inserted in an informal context to regenerate the Katwe 2 slum area.

- To study regeneration of slums based on the assessment of existent typology
- To analyze a hybrid typology which provoke a fusion between the formalities and informalities in the slum.
- To identify good prospects of attaining an architectural environment that can be felt, navigated through and enjoyed with ease.

2. Literature review

Urbanization in developing countries often results in the emergence of both formal and informal settlements (see **Figure 1**). Formal settlements refer to those that comply with legal and regulatory frameworks, while informal settlements, commonly known as slums, arise without official sanction and often lack basic services and infrastructure. This literature review examines the characteristics, causes, and impacts of formal and informal settlements in urban centers of developing countries, highlighting key differences and common challenges. The dichotomy between formal and informal settlements in urban centers of developing countries highlights significant socio-economic and spatial disparities. While formal settlements offer organized infrastructure and services, informal settlements are characterized by precarious living conditions and lack of basic amenities [7]. Addressing the challenges posed by informal settlements requires integrated and inclusive urban policies that focus on upgrading existing slums, increasing the supply of affordable housing, and strengthening urban governance. Sustainable urban development in developing countries hinges on the ability to bridge the gap between formal and informal settlements, ensuring equitable access to resources and opportunities for all urban residents [8].

Informal settlements, also referred to as shanty or squatter communities, vary in nomenclature depending on regional planning and legal frameworks. In terms of policy

responses and strategies, addressing the challenges of informal settlements requires comprehensive policy interventions which includes (a) Slum Upgrading: Programs aimed at improving infrastructure and living conditions in informal settlements without displacing residents have shown promise. These initiatives focus on providing basic services, enhancing housing quality, and improving access to education and healthcare [9], (b) Affordable Housing: Developing affordable housing projects through public-private partnerships can help meet the housing needs of low-income populations. Subsidized housing and inclusive zoning policies are essential components of such strategies [10] and lastly; (c) Strengthening Urban Planning: Enhancing urban planning and governance is crucial. This includes implementing effective land use policies, improving regulatory frameworks, and ensuring community participation in planning processes. The characteristics of Formal and Informal Settlements; (a) Formal Settlements are planned and regulated by government authorities. They typically feature organized infrastructure, including roads, sanitation, water supply, and electricity. Housing in these areas is built according to established building codes and zoning laws, which ensures structural safety and access to amenities [10], (b) Informal settlements, in contrast, lack official recognition and planning. These areas often emerge on marginalized land with poor living conditions, characterized by inadequate access to basic services such as clean water, sanitation, and electricity. Housing structures are usually self-built and do not adhere to building codes, making them vulnerable to environmental hazards [11,10].



Figure 1. Overview of formal and informal settlement in an urban center.

In regards to the Causes of Informal Settlements, the proliferation of informal settlements in developing countries can be attributed to several factors; (a) rapid urbanization accelerated urban growth outpaces the capacity of governments to provide adequate housing and infrastructure. Rural-urban migration driven by the search for better economic opportunities contributes significantly to this phenomenon [10] (b) economic Disparities, in other words widespread poverty and inequality limit the ability of many urban residents to afford formal housing. High land prices and a shortage of affordable housing options force low-income populations into informal settlements, lastly (c) inadequate urban planning, weak governance and lack of effective urban planning exacerbate the issue. Informal settlements often arise due to insufficient land use regulations and the absence of proactive housing policies [12].

Furthermore, impacts of informal settlements pose several challenges and have significant impacts on urban development: (a) Health Risks: Poor living conditions and lack of sanitation lead to health hazards, including the spread of communicable diseases. The absence of clean water and waste management services exacerbates these risks [13], (b) Environmental Degradation:

Informal settlements contribute to environmental degradation through unregulated construction and the lack of waste disposal systems. Encroachment on ecologically sensitive areas further exacerbates these issues [14], (c) Social Inequality: Residents of informal settlements often face social exclusion and lack access to essential services, education, and employment opportunities. This perpetuates cycles of poverty and marginalization [15].

Urban informalities encompass the unregulated, often improvised aspects of urban living that arise in response to the lack of formal infrastructure and services. These include:

- Housing: Informal settlements, often constructed without adherence to building codes or zoning laws. Examples include shantytowns, slums, and squatter settlements.
- Services: Informal provision of basic services like water, electricity, and waste disposal, often through community initiatives or black markets.
- Economy: Informal economic activities such as street vending, informal markets, and small-scale, unregistered businesses.
- Social Networks: Strong reliance on community networks for support, safety, and resource sharing.

Characteristics:

- Self-Built and Improvised: Structures and services are often created by the residents themselves without formal approval.
- Lack of Official Recognition: These areas and activities are usually not officially recognized by the government.
- Resilience and Adaptability: Informal systems are often highly adaptable and resilient, quickly responding to the needs of the community.

Interactions and Dynamics:

- Complementarity: In many cases, formal and informal systems complement each other. For example, informal settlements might rely on formal infrastructure (like

tapping into existing electricity grids illegally) while also providing services and housing solutions not covered by formal systems.

- Conflict: There can be conflicts between formal authorities and informal residents, especially concerning land tenure, eviction, and regularization efforts.
- Integration: Efforts to integrate informal settlements into the formal urban framework can include upgrading infrastructure, legalizing property rights, and providing formal services while respecting the existing community structures and dynamics.
- Adaptation: Informal settlements often adapt formal concepts to fit their needs, creating hybrid systems that blend formal infrastructure with informal practices.

The rapid urbanization witnessed in recent years has led to a noticeable rise in informal settlements, a stark reflection of urban poverty and its associated challenges [16]. These settlements, characterized by haphazard and spontaneous emergence, disrupt the conventional urban landscape, often described with terms like suburbanization, dysfunctional texture, and informal habitats [17]. They primarily house low-income groups engaged in informal occupations, contributing to what some scholars perceive as unsustainable urban development and fostering social issues.

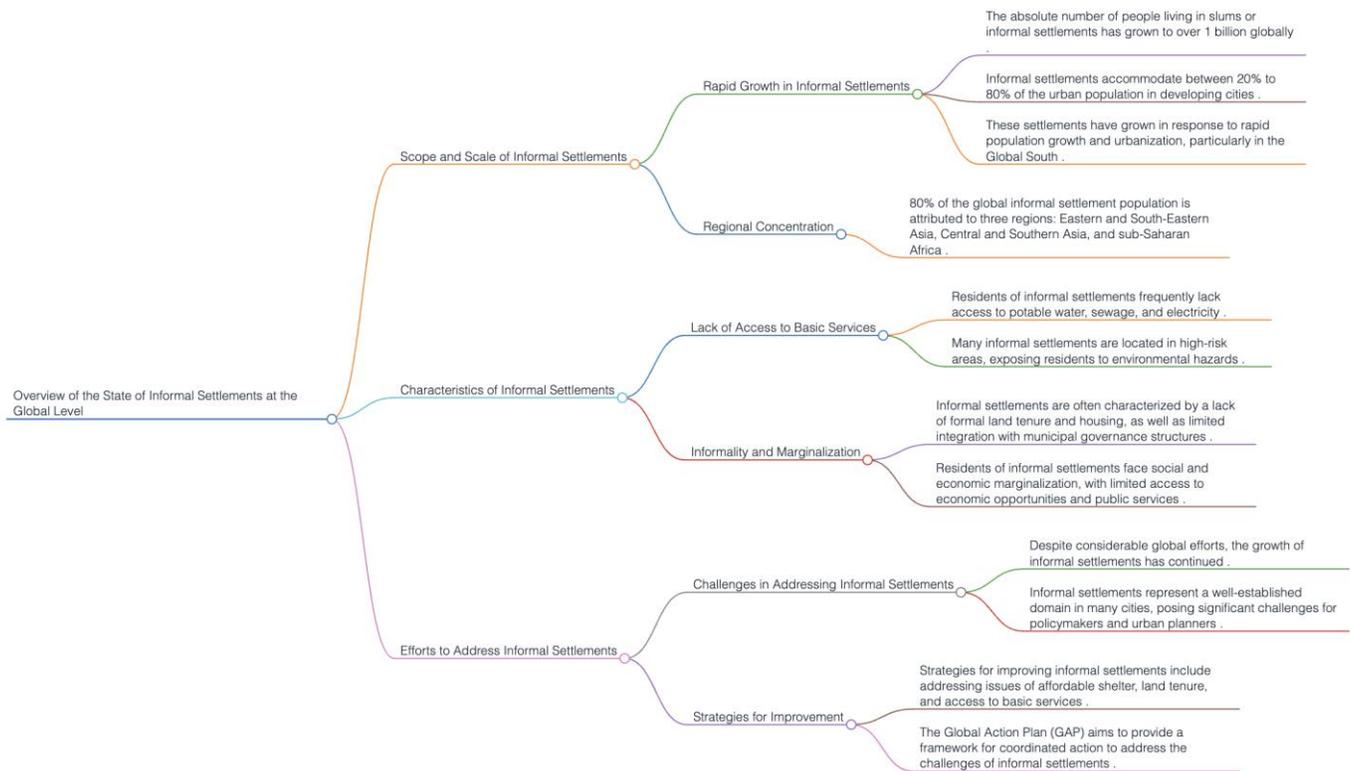


Figure 2. Overview of the state of informal settlements at the global level.

Globally, it is estimated that over 1 billion people live in slums and informal settlements, with the majority concentrated in three regions: Eastern and South-Eastern Asia, Central and Southern Asia, and Sub-Saharan Africa. These informal settlements

often lack access to basic services like potable water, sanitation, and electricity. The population living in informal settlements has been growing rapidly, driven by factors like urbanization, population growth, and economic inequality. Despite efforts to address these issues, the number of people living in informal settlements continues to rise. Informal settlements represent a well-established domain in many developing cities, with 20%–80% of the urban population living in these types of settlements [18]. These settlements emerge in response to the lack of affordable and adequate formal housing options. Overall, the global state of informal settlements is concerning (see **Figure 2**), with a significant and growing population living in substandard conditions without access to basic services. Addressing the challenges of informal settlements remains a critical development issue worldwide.

2.1. Exploring the theories for informal settlement existence

Exploring informal settlements unveils underlying theories explaining their existence and dynamics. Understanding the dynamics of informal settlements and urban regeneration requires a multidisciplinary approach, drawing from urban planning, sociology, economics, and political science [19–21, 7]. Here are some key theories and conceptual frameworks that inform the study of informal settlements and urban regeneration:

2.1.1. Modernization theory

Modernization theory suggests that development follows a linear progression from traditional to modern societies. Informal settlements are seen as transitional phases that will eventually integrate into the formal urban economy as development progresses. Informal settlements are temporary and will diminish as economies modernize; Emphasizes the role of formal institutions in guiding development.

2.1.2. Dependency theory

Dependency theory argues that underdevelopment in certain regions is a result of exploitative relationships between developed and developing countries. Informal settlements are seen as a consequence of global economic inequalities and local manifestations of broader systemic issues [21]. Informal settlements are structurally embedded in global capitalist systems.

2.1.3. Structuralism

Structuralism focuses on the structural factors that perpetuate informal settlements, such as economic policies, land tenure systems, and urban governance frameworks. It emphasizes the need for systemic change to address the root causes of informality. Informal settlements are a product of exclusionary urban policies and economic.

2.1.4. Urban political economy

This theory examines the role of political and economic power in shaping urban spaces, including informal settlements [22]. It looks at how capital accumulation, state policies, and class relations influence urban development and regeneration. Urban

development is shaped by power dynamics and economic interests, additionally informal settlements often exist due to political neglect or marginalization.

2.1.5. Social capital theory

Social capital theory emphasizes the importance of social networks, trust, and community engagement in informal settlements. It argues that strong social capital can enhance residents' ability to improve their living conditions and participate in urban regeneration. Social networks and community bonds are crucial for resilience and collective action and urban regeneration projects should leverage existing social capital.

2.1.6. Right to the city

Developed by Henri Lefebvre, this theory advocates for the democratization of urban spaces, emphasizing that all residents, including those in informal settlements, have the right to shape and access the city. It calls for inclusive urban policies and practices. Urban regeneration should be participatory and equitable, and, focuses on residents' rights to adequate housing, services, and participation in urban governance.

2.1.7. Sustainable livelihoods framework

This framework looks at how households in informal settlements use various assets (human, social, natural, financial, and physical) to sustain their livelihoods [23]. It emphasizes a holistic approach to understanding and improving living conditions. Urban regeneration should enhance the various assets that residents rely on, and focuses on building resilience and reducing vulnerability.

2.1.8. Informality as an urban process

This perspective sees informality not as a static condition but as a dynamic process that continuously shapes and is shaped by urbanization. It recognizes the agency of informal settlers in contributing to urban development. Informality is an integral part of urbanization, contributing to the city's evolution, and, urban regeneration should recognize and integrate informal practices and knowledge.

2.2. Application to urban regeneration

Urban Regeneration Strategies:

- **Participatory Planning:** Involve residents in the planning and implementation processes to ensure that their needs and perspectives are addressed.
- **Incremental Upgrading:** Focus on gradual improvements rather than large-scale demolitions and reconstructions, respecting existing social and economic networks.
- **Integrated Development:** Combine physical infrastructure improvements with social and economic development initiatives.
- **Policy Reform:** Advocate for changes in land tenure laws, zoning regulations, and urban policies to support inclusive development.
- **Social Capital Building:** Strengthen community organizations and social networks to enhance collective action and resilience.

- **Sustainable Practices:** Incorporate environmental sustainability into urban regeneration projects to ensure long-term viability and resilience.

By drawing on these theories and approaches, urban regeneration initiatives can more effectively address the complexities of informal settlements, leading to more inclusive, sustainable, and equitable urban development.

2.3. Criteria for identification of informal settlements

Based on the literature review, several criteria are crucial for identifying informal settlements (IS). These criteria encompass various aspects such as land tenure systems, typology, morphology, economic issues, and number of levels, public spaces, building quality, and geometric shape [24–28,22].

- **Land Tenure Systems:** In IS, land is often unofficially designated, lacking official title deeds. Residents typically rely on informal means to assert their possession of both land and residential units.
- **Typology:** Structures within IS exhibit poor quality and are subject to significant wear and tear, reflecting their transient nature.
- **Morphology:** Housing within IS deviates from conventional norms, with plots utilizing space beyond typical standards. This results in limited open space within residential units.
- **Economic Issues:** IS face limited accessibility to essential welfare services and facilities, with lower provision and utilization rates compared to urban areas.
- **Number of Levels:** Residential dwellings in IS often feature single-story structures, influenced by economic constraints and unconventional building methods.
- **Public Spaces:** IS typically lack visible public spaces or recreational areas due to the necessity of establishing unauthorized structures.
- **Building Quality:** Structures within IS exhibit ongoing wear and tear and possess low-quality construction, with an absence of discernible facades.
- **Geometric Shape:** Housing in IS develops spontaneously, lacking predetermined geometric structures. Factors such as available land and surrounding characteristics influence their formation.

These criteria collectively define informal settlements, characterized by their unauthorized and unregulated nature, emerging outside of official urban development programs [29]. Construction often occurs without necessary municipal permits, emphasizing their informal status [30]. The United Nations defines attributes of Informal Settlement (IS) areas, which are characterized by minimal living spaces and limited access to proper living conditions and resources for marginalized communities [31, 29]. As urban centers experience population growth beyond their capacity for comprehensive development, IS expand on city outskirts. Key characteristics include deteriorated urban aesthetics, substandard living conditions affecting well-being, limited employment opportunities, distinct subcultures, high population density, and insufficient educational and welfare infrastructure leading to low literacy rates, widespread poverty, rampant drug abuse, and high levels of social deviance [32].

In general, slum formation and management present diverse insights into their emergence, characteristics, and potential solutions, in many parts of the developing countries such as Ghana. Slums primarily arise due to rapid urbanization, limited urban infrastructure investment, and rural migration, with regional variations influenced by historical events [28]. For instance, inadequate post-war housing led to slums in Brazil, while colonial legacies in Africa left cities with poor planning frameworks, unprepared for population surges such as the case Ghana [22]. The classification of slums reveals global diversity, with types ranging widely across regions such as Turkey and Mexico, and no universally agreed definition. UN-Habitat outlines slums based on shelter inadequacies, including sanitation and tenure issues. Historically, slums were first documented in 19th-century England, and similar conditions appeared globally, exemplified by the U.S. “Hooverilles” during the Great Depression.

According to [22] efforts to alleviate slums have varied: the U.S. and U.K. introduced public housing policies, though slum conditions persist [22]. Since the 1950s, urban regeneration has become a comprehensive response, emphasizing environmental, economic, and social revitalization, with notable projects in London’s King’s Cross and Paris’s La Défense. For Ghana, a contextualized urban regeneration approach accounting for unique local dynamics emerges as a viable solution for sustainable slum transformation, addressing the pressing needs of marginalized communities such as Ga Mashie, Chorkor, and Zongo communities [22].

2.4. Urban regeneration

Urban regeneration, also known as urban renewal, involves strategic interventions to bring positive changes to targeted sections of cities or towns. Collaboration between public and private sectors is common, aligning with broader master plans to revitalize specific areas within the built environment, particularly focusing on urban regions such as slums where deprivation is prevalent [33]. The primary goal is to create new opportunities for local communities by repurposing underutilized or obsolete land and structures [34, 35]. Businesses often invest in these areas to facilitate transformative interventions.

Despite the diverse strategies employed, the overarching aim remains consistent: enhancing prosperity and quality of life while addressing social inequalities [36]. Urban regeneration initiatives aim to promote social inclusivity and, at times, energy efficiency in cities through various works and investments designed to restore underutilized assets and redistribute opportunities [37, 38]. The key objectives typically include successful clearance or improvement of slum neighborhoods, physical redevelopment with consideration for public spaces and residential buildings, and addressing socio-economic problems affecting urban areas. While the concept has been in use since the early 1900s, urban regeneration is understood as a modern approach to reconstructing unwanted buildings or areas, with rebuilding as a consistent theme throughout its evolution.

The framework for urban regeneration of informal settlements in urban centers involves a multifaceted approach that addresses the physical, social, and economic aspects of these areas. The key elements of this framework include;

- Upgrading and regularization of land tenure: Providing secure land tenure and property rights to informal settlement residents is a critical first step to enable further development and investment.
- Participatory planning and community engagement: Engaging with the local community and involving them in the planning and decision-making process is essential for effective and sustainable regeneration.
- Improvement of infrastructure and basic services: Upgrading and extending infrastructure such as water, sanitation, electricity, and transportation networks is necessary to improve living conditions and access to opportunities.
- Economic development and livelihood support: Integrating informal economic activities into the formal economy, providing access to finance and training, and generating employment opportunities can enhance the economic viability of informal settlements.
- Holistic and integrated approach: Urban regeneration should adopt a comprehensive and integrated approach that addresses the physical, social, and economic aspects of informal settlements simultaneously, rather than focusing on single-track interventions [39, 40].
- Contextual implementation: The framework should be tailored to the specific context and needs of the informal settlement, taking into account local socio-cultural, political, and economic factors.

By implementing this multidimensional framework (see **Figure 3**), urban regeneration efforts can transform informal settlements into more inclusive, sustainable, and resilient communities.



Figure 3. Framework for studying Urban Regeneration.

2.4.1. Principles of urban regeneration

The key principles of urban regeneration include the following [41, 42]:

- Comprehensive analysis of urban conditions.
- Simultaneous adaptation of physical, social, economic, and environmental facets.
- Holistic and cohesive strategy formulation and execution.
- Alignment with sustainable development principles.
- Establishment of quantifiable operational objectives.
- Optimal utilization of resources, including natural and human capital.
- Stakeholder participation and collaboration.
- Monitoring of progress and adaptation to evolving circumstances.
- Recognition of varying speeds in strategy implementation.
- Provision for resource reallocation to maintain balance in achieving objectives.

These principles serve as guiding frameworks for effective urban regeneration initiatives, ensuring sustainable and inclusive development in urban areas.

2.4.2. Components of urban regeneration

Urban regeneration strategies encompass economic, social/cultural, and environmental aspects:

- **Economic Regeneration:** Focuses on business growth, job creation, and income enhancement through initiatives such as supporting startups and improving employment opportunities. Examples include establishing public transport hubs to attract investments [43].
- **Social/Cultural Regeneration:** Promotes arts, culture, education, and well-being to empower residents and enhance community cohesion. Projects like museums in disadvantaged areas stimulate business growth.
- **Environmental Regeneration:** Concentrates on land renewal, including the development of public parks and recycling programs. Brownfield site redevelopment and environmental projects are also emphasized.
- **Integrated Physical and Educational Interventions:** Combining physical and educational interventions to address various urban challenges cohesively.

2.4.3. Advantages of urban regeneration

Urban regeneration offers numerous benefits [43, 44]:

- **Preventing Urban Decline:** Bolsters infrastructure to prevent further deterioration.
- **Job Creation:** Stimulates employment through new businesses.
- **Improved Accessibility:** Enhances access to services and transportation.
- **Increased Property Value:** Augments the value of properties.
- **Environmental Benefits:** Promotes energy-efficient practices and reduces CO₂ emissions.
- **Aesthetic Enhancement:** Enhances the visual appeal of neighborhoods.

These advantages contribute to community well-being and development.

2.4.4. Solving urban problems through regeneration

Urban regeneration initiatives address various urban challenges [45]:

- Identity Crisis: Instills community character to residential areas.
- Public Space and Density: Expands public spaces and green areas to improve urban livability.
- Energy Efficiency: Enhances energy efficiency in renovated buildings, aligning with sustainability goals.

Successful regeneration goes beyond physical transformation, strategically addressing diverse challenges for a renewed urban landscape benefiting residents, businesses, and the environment.

2.5. Urbanization

Urbanization driven by industrialization and population growth is leading to an increasing number of people migrating to cities worldwide [46, 47]. This trend is expected to continue, with 7 out of 10 individuals projected to reside in urban areas by 2050 [48]. However, rapid urban growth presents challenges, particularly in managing resources to meet the demand for affordable housing.

2.5.1. Challenges faced

One major issue is the proliferation of substandard housing conditions, especially in densely populated urban slums. These areas lack basic amenities like clean water, adequate shelter, sanitation, and electricity [49]. Migration from rural to urban areas due to economic reasons contributes to the growth of slums, where migrants settle due to the high cost of urban living. Additionally, homelessness is a significant concern, with approximately 140 million homeless individuals globally, often resulting from eviction from slums [49].

2.5.2. Global urban population

Currently, over eight billion people reside in urban areas worldwide, with over 500 city regions each boasting populations exceeding one million [2]. Some cities are evolving into megacities and megalopolitan regions with populations exceeding 60 million. This rapid urbanization exacerbates the demand for affordable housing, particularly near mass transit and job centers [48, 39].

2.5.3. Factors influencing housing affordability

For [50–52] fluctuations in housing prices are influenced by various factors:

- Demographic Shifts: Changes in household size and population density impact housing demand [52].
- Supply and Demand Dynamics: Balancing housing unit availability with population needs is crucial.
- Economic Policy Changes: Alterations in economic policies, such as interest rates and housing finance accessibility, affect housing markets [53].

- **Public Policy Impact:** Government regulations, land use zoning, and taxes significantly shape housing affordability and availability.

Therefore, addressing the challenges of urbanization, particularly in providing affordable housing, is essential for sustainable urban development and ensuring dignified living conditions for the growing global population.

2.5.4. Influences on the housing affordability

In Katwe, Kampala, Uganda, housing affordability challenges have significant public health implications. High costs of living and limited affordable housing options in this densely populated area force many residents into overcrowded and inadequate housing. Such conditions can exacerbate public health risks, including respiratory diseases from poor air quality, the spread of infectious diseases, and mental health strain associated with cramped living environments [54].

Insights from studies on housing affordability in Katwe can guide public health-focused retrofitting methods that prioritize both affordability and health. Retrofitting initiatives could, for example, enhance ventilation systems, improve water and sanitation facilities, and ensure resilience against flooding, which is a recurrent issue in Kampala. These improvements would help reduce disease risks while making housing more sustainable and affordable for residents.

Additionally, a field-scale sampling methodology tailored to Katwe's unique geographic and social dynamics can facilitate scalable retrofitting interventions across other neighborhoods in Kampala and beyond. This approach would enable public health and housing officials to customize retrofitting solutions that address specific local conditions, ensuring that the benefits of these upgrades are broadly accessible [55]. Consequently, implementing such measures can improve the health and wellbeing of residents, fostering a healthier urban environment and enhancing the quality of life for Katwe's growing population.

According [56–59], the housing affordability is influenced by a multitude of interconnected factors, shaping both supply and demand dynamics. Key contributors include:

- **Demographic and Behavioral Shifts:** Changes in population demographics and societal behaviors influence housing demands, impacting the types and quantities of housing sought after.
- **Migration Patterns and Employment Opportunities:** Urbanization trends and job opportunities drive fluctuations in housing demand as individuals seek better livelihoods in urban areas.
- **Extended Life Expectancy:** Longer life spans alter housing needs, leading to increased demand for senior living arrangements and assisted care facilities.
- **Building Codes and Regulations:** Regulatory standards such as building codes and zoning regulations shape construction projects and affect housing availability and affordability.
- **Rising Trend of Solo Living:** Cultural shifts towards independent living contribute to a higher demand for single-person housing units [60].

- Delayed Household Formation among Young Adults: Economic factors and lifestyle choices influence young adults to postpone forming their own households, affecting housing demand.
- Exclusionary Zoning Practices: Zoning practices limit housing supply in certain areas, impacting affordability and accessibility [60, 61].

2.5.5. Influential elements impacting housing tenure decisions

According to [62, 63], actors influencing housing tenure decisions (homeownership, private rental, social rental) include:

- Employment Dynamics: Fluctuations in employment rates drive demand for rental properties and social housing, potentially contributing to homelessness.
- Real Household Finances: Slow growth in household incomes compared to housing prices influences tenure choices.
- Affordability Metrics: Affordability concerns steer individuals towards rental options over homeownership [64].
- Interest Rate Climate: Prevailing interest rates affect mortgage costs and homeownership attractiveness.
- Mortgage Accessibility: Mortgage availability facilitates homeownership, impacting tenure choices.
- Economic and Housing Market Confidence: Confidence levels in the economy and housing market influence the appeal of homeownership. Lower confidence levels may deter individuals from owning homes [65].

Figure 4 below, expressed the graphical representation of the literature review of the research.

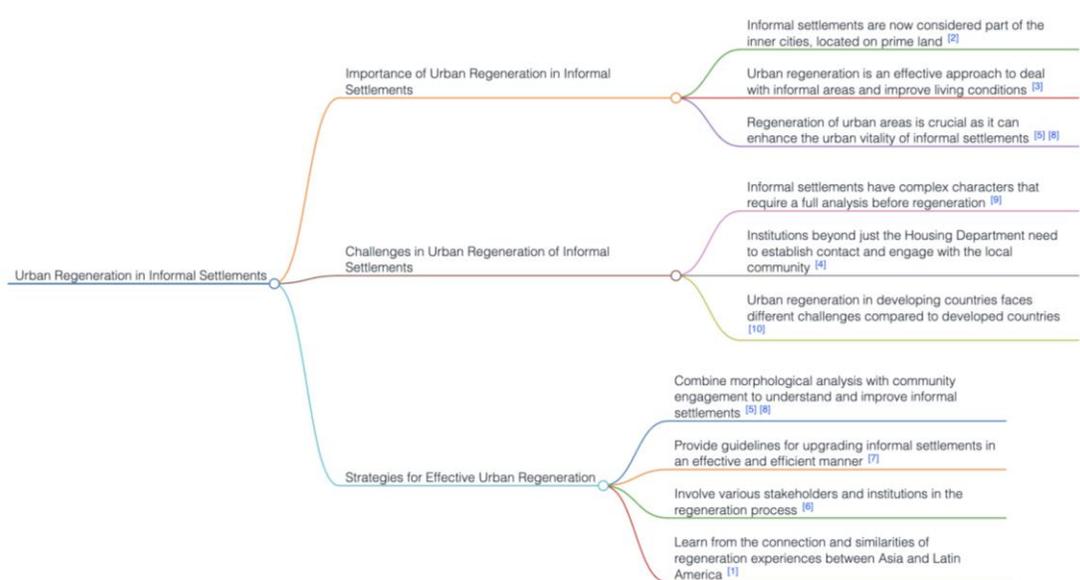


Figure 4. Graphical representation of the literature review summary detailing urban regeneration in an informal settlement.

1. [50] 2. [20]; 3. [41]; 4. [42]; 5. [31]; 6. [46]; 7. [18]; 8. [29]; 9. [51]; 10. [19].

3. Research methodology

The research design functions as a roadmap to achieve predetermined objectives, employing a mixed-methods approach integrating both qualitative and quantitative methods. Through a descriptive case study strategy, the research interprets data to comprehend complex issues such as inadequate housing, aiming for comprehensive insights. Key aims of qualitative research include understanding the context, gathering firsthand perspectives, and transforming data into narratives while reducing reliance on standardized instruments. The design specifies determining data-collection groups, implementing random selection, and managing groups in experimental contexts. Centered on Katwe in Makindye Division, the research utilizes random sampling to capture diverse perspectives efficiently (see **Figure 5**).

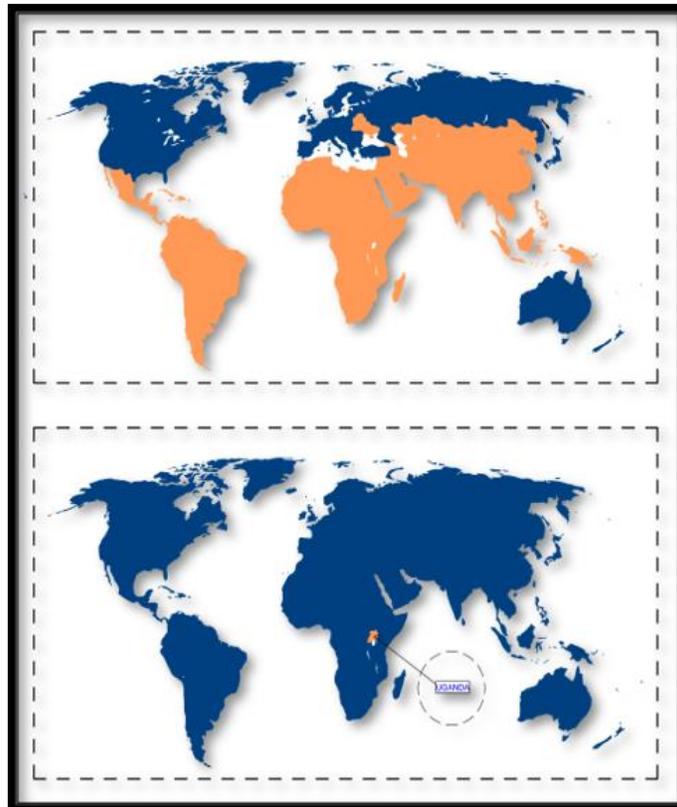


Figure 5. Map of the world showing the geographical location of Uganda.

Uganda, located in East Africa (see **Figure 5**), exemplifies this trend with unprecedented population growth projected until 2050. Despite concerns about population size, the real issue lies in the rapid pace of expansion. With an annual growth rate of 3%, Uganda's population is expected to increase from 42 million in 2021 to 71.4 million by 2040 [4, 66]. At the urban scale, Kampala, Uganda's capital, experiences substantial population growth, particularly in informal settlements like Katwe [4]. These settlements, characterized by dense and vibrant communities, emerge on unconventional terrain, illustrating the unique challenges and opportunities for intervention [67].

Primary methods encompass photography, observation, and sketching, complemented by secondary data collection from various sources (see **Figure 6**). Document analysis involves scrutinizing profiles and local documentation to achieve comprehensive outcomes [68–70]. Researchers introduce a conceptual framework to depict interconnections among variables when examining slum upgrades, providing a holistic view of the research’s focus and objectives. Through meticulous analysis and interpretation of primary and secondary data, the research aims to yield meaningful outcomes.

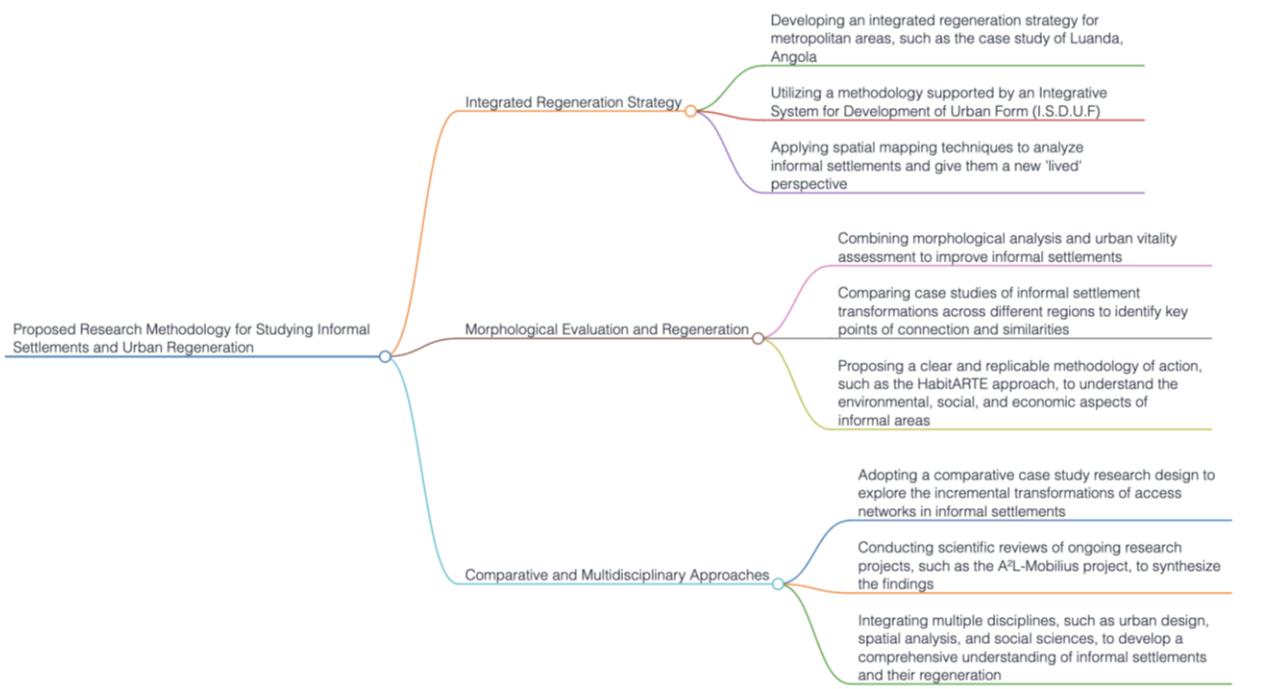


Figure 6. Graphical representation of the research methodology for studying informal settlements in relation to urban regeneration.

The observational study in Katwe, Kampala, used a structured approach to explore socio-environmental and public health challenges. Specific locations across Katwe were chosen to represent various conditions, including dense informal settlements, semi-formal residential zones, commercial areas, and public spaces. Selection criteria focused on factors like population density, housing conditions, access to amenities, and vulnerability to environmental hazards, ensuring a comprehensive cross-section of Katwe’s urban landscape. Observations took place over three months to account for seasonal variations and were conducted at different times of day to capture daily variations in activity and conditions. The primary focus of observations included housing quality, waste disposal practices, water sources, overcrowding, and environmental risks such as pollution. Public health aspects, such as access to healthcare and visible health hazards, were also assessed. Observational data were recorded using checklists, photographs, maps, and sketches. Analysis involved thematic coding to identify patterns and challenges, with quantitative summaries and qualitative insights to highlight the correlations between housing quality,

infrastructure, and health risks. This detailed approach provided a robust basis for identifying critical issues and forming policy recommendations for urban planning and public health improvements in Katwe.

4. Analysis and discussion

This section presents a thorough examination of data and findings concerning the interplay between formal and informal components within slum areas, with a specific emphasis on the Katwe regeneration context. Adopting a typological framework, it investigates multiple facets of this interaction. The section is organized into subsections that elaborate on data quality, assess slum regeneration through established typologies in Kampala, and scrutinize a hybrid typology that integrates formal and informal elements. Furthermore, it identifies potential interventions aimed at fostering an architectural environment that is both accessible and enriching. Data for this analysis is derived from case studies, on-site observations, and triangulation.

Specifically, the focus is on revitalizing the Katwe slum through innovative strategies within a typological framework to enhance livability. Before proposing interventions, it's essential to understand the context of Katwe. The area represents one of many informal settlements in the global south, characterized by underdeveloped infrastructure and lower economic prosperity. With rapid urbanization, particularly in Africa, regions like Katwe face significant challenges.

The first intervention proposed is the Rehabilitation of the Katwe settlement, aiming to address the challenges faced by slum dwellers and improve their living conditions through typological housing approaches. The goals include providing secure and hygienic housing environments and enhancing overall well-being by eradicating deteriorating living conditions. However, several challenges accompany this rehabilitation process:

- **Land acquisition:** Securing land for rehabilitation projects is complicated due to issues like informal settlements, unclear land titles, and involvement of multiple stakeholders.
- **Infrastructure:** Lack of fundamental infrastructure such as clean water supply, sanitation facilities, electricity, and proper road access poses a challenge and requires substantial investments.
- **Financial constraints:** Limited resources hinder comprehensive rehabilitation programs encompassing housing, infrastructure, and social amenities.
- **Community engagement:** Overcoming social divisions, building trust, addressing resistance to change, and accommodating diverse needs among residents are obstacles to fostering active participation.
- **Temporary relocation:** Planning and providing support during residents' temporary relocation is necessary to minimize disruptions to livelihoods and social networks.
- **Stakeholder coordination:** Coordinating various stakeholders including government agencies, NGOs, private entities, and community representatives is a prolonged process essential for success.

The main aim of this analysis is to explore and recommend approaches for sustainable urban regeneration intervention program that will strive and eventually formalize the urban informalities within the case study area of Katwe in the capital city of Kampala. The programme relates to the strategic importance of urban planning as an enabler of the integration and physical/spatial connectivity of the settlements with the surrounding districts, combined with the improvement of public space and the provision of public assets: streets, accessibility, and basic infrastructure services such as water, sewers, drainage, and street paving aimed at improving the quality of life, decent housing and public services (see **Figures 7–9**). Although it is not named as such, the street-led upgrading approach established the foundations for the land tenure regularization and registration and, by default, for the future consolidation of the settlements, while encouraging individual housing construction and home improvement.

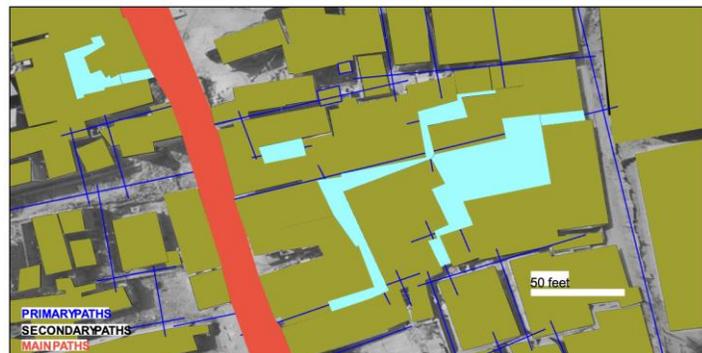


Figure 7. The mapping of the different circulation patterns in the slum settlement, highlighting primary, secondary and main circulation paths.



Figure 8. Neighborhood adjacency in the context.



Figure 9. Neighborhood adjacency in the context.

Based on various typologies observed in the settlement, it's essential to map and categorize them to comprehend their functions effectively, as depicted in **Figure 7**. This understanding will inform the development of intervention strategies for rehabilitating these units in the neighborhood. Additionally, during a site visit, these typologies were further delineated in plan layouts to estimate their spatial coverage, as demonstrated in **Figures 8 and 9**.

The analysis suggests the introduction of wet areas such as toilets and baths in every three housing units to improve waste and sanitation management, with connections to sewer channels. Additionally, each household should have a designated solid waste collection point within the neighborhood. Design strategies should focus on creating spatial forms that enhance security by eliminating blind spots and fostering community awareness about improper waste disposal. Analysis of the case study highlighted these issues during a site visit. Despite the resilience of the neighborhood, security concerns persist due to remaining blind spots. Proposed interventions include adjustments to studio unit designs to accommodate safe cooking, storage for food security, and other essential functionalities. Examples of such interventions are illustrated in provided **Figure 10**.

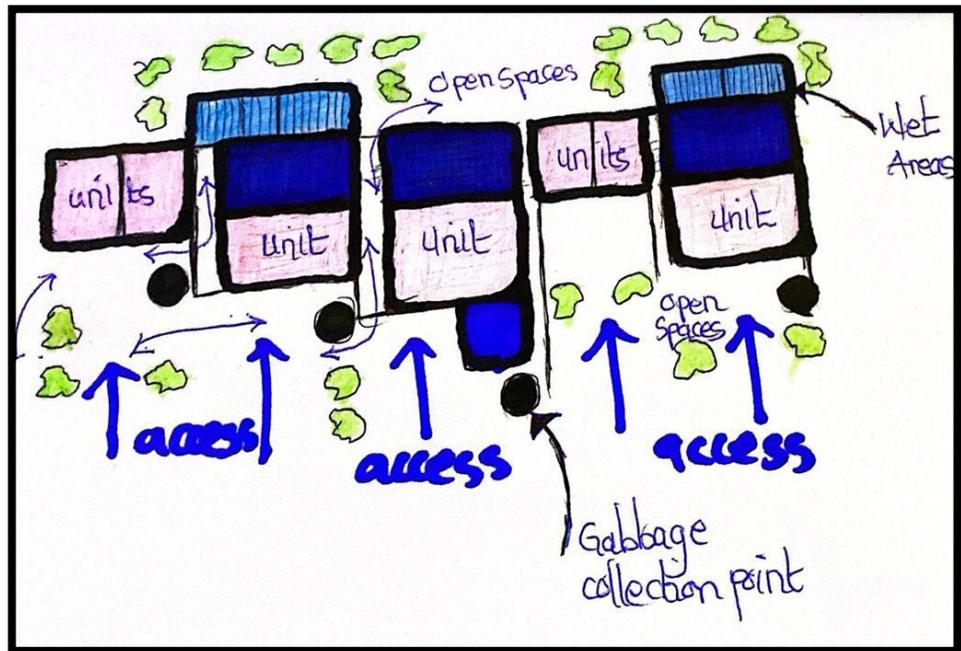


Figure 10. Space ideas to support activities.

This approach brings several positive aspects such as the ability to use both local resources and manpower/workers, with the necessary training and logistical preparation. The Increasing of overall density and therefore justify some necessary facilities through a larger user base. Minimize costs by focusing on the technical wall to provide all necessary infrastructures. Adding flexibility to a planned community, which is always a challenge, through a participated and self-driven process of construction around the infrastructure core. Preparing future governance by integrating metering solutions in the product itself

and thus facilitating control and costing analysis (since most of the utilities, when existing, are now free but will transition into paid in the near future). Furthermore, to achieve a sustainable outcome the plan integrated several strategies and solutions. In the environmental dimension the plan envisages several areas for risk mitigation through appropriate land use and occupation, mostly economic activities. In economic aspect, the plan implemented a very flexible mixed use zoning approach (to enable “in-house” workshops and small stores), with the “central” avenue destined for larger commercial activities.

Neighborhood Occupancy Analysis:

- The neighborhood’s residences exhibit high flexibility, easily accommodating changes in occupancy over time.
- Units are constructed gradually as means become available, often leading to single units housing extended family members.
- Mr. Martin Charles, a resident of Tawu and Kigganda zones, confirmed this during a site visit.

Mixed-Use and High-Density Trends:

- Mixed-use developments are prevalent in adjacent areas, serving as both financial support for shop owners and a source of goods for residents.
- Despite the absence of proposed interventions, identifiable retail streets are common.
- High population density is already a characteristic of the area, resulting in limited public and green spaces.
- Despite challenges like lack of services and potential for undesirable living conditions, high density has led to the construction of formal structures meeting certain standards.
- Notably, these structures contribute positively to the neighborhood’s architectural landscape.

A comparative discussion of urban regeneration strategies in regions like Asia and Latin America provides valuable insight into the adaptability and scalability of approaches used in Katwe, Kampala. For example, the Favela Bairro program in Rio de Janeiro, Brazil, focused on integrating informal settlements into the city’s infrastructure by improving roads, sanitation, and housing without displacing residents. Similarly, slum redevelopment in Mumbai, India, sought to address overcrowding and poor sanitation through high-density housing initiatives and public-private partnerships, enabling affordable housing options and improved public services. These examples demonstrate diverse approaches to urban regeneration, highlighting community involvement, the use of incremental upgrades, and cross-sector partnerships to drive long-term impact. Comparing these cases with Katwe’s context illustrates how global strategies can be adapted to local needs while addressing common urban challenges such as infrastructure deficits, health risks, and socioeconomic disparities. Integrating insights from these global efforts could support the transferability of strategies to Katwe, showing how flexible, inclusive, and locally informed regeneration methods can achieve sustainable urban outcomes even in complex, informal settings.

4.1. Formal vs. informal dynamics

The Katwe built environment demonstrates that the intersection of formal and informal urban systems is complex but manageable with the right approaches. Effective integration requires a deep understanding of local contexts, flexible policies, and active community involvement. By analyzing Katwe, more inclusive and sustainable strategies for regenerating informal settlements can be established. This approach not only improves living conditions but also preserves the social fabric and economic vitality that characterize these vibrant communities (see **Figure 10**).

4.1.1. Conflicts and alignments

- **Regulatory Challenges:** Formal urban planning often introduces regulations that conflict with the informal practices that residents rely on. For instance, zoning laws and building codes may not accommodate the dense, mixed-use nature of informal settlements.
- **Resource Allocation:** Formal initiatives typically bring better infrastructure and services, such as paved roads, sanitation, and utilities. However, these improvements can lead to increased costs of living and gentrification, potentially displacing long-term residents who cannot afford the new expenses.

4.1.2. Integration strategies

- **Participatory Planning:** Successful integration of formal and informal systems hinges on involving residents in the planning process. This ensures that the development addresses the community's needs and minimizes negative impacts such as displacement and loss of livelihood.
- **Flexibility in Policies:** Urban policies need to be adaptable to the realities of informal settlements. This includes recognizing and formalizing informal land tenure, which can provide security and incentivize residents to invest in their properties.

4.2. Lessons from Katwe

4.2.1. Community adaptation and resilience

- **Informal Economy:** The informal economy in Katwe is a cornerstone of residents' livelihoods. Regeneration projects need to accommodate informal markets and businesses, perhaps by providing designated spaces for them within the new urban framework [69].
- **Social Networks:** Strong social networks in informal settlements can be leveraged to support regeneration efforts. For example, community groups can help disseminate information about new policies and assist in organizing collective action.

4.2.2. Balancing development and inclusivity

- **Incremental Upgrading:** Instead of wholesale redevelopment, an incremental approach can mitigate the risk of displacement. Gradual improvements allow residents to adapt and provide input throughout the process.

- **Affordable Housing:** Ensuring the availability of affordable housing within regenerated areas is crucial. This can include a mix of rental and ownership options, subsidies, and support for self-build initiatives.

4.3. Broader implications

4.3.1. Policy recommendations

- **Inclusive Frameworks:** Policymakers should develop inclusive frameworks that recognize and integrate informal systems. This includes legal recognition of informal land tenure and providing support for informal economic activities.
- **Community Engagement:** Continuous engagement with the community is essential. This includes not just initial consultations but ongoing dialogue to monitor the impacts of regeneration and adjust plans as needed.

4.3.2. Global lessons

- **Context-Specific Approaches:** Every informal settlement has unique characteristics. Strategies that work in Katwe may not be directly transferable to other contexts but can be adapted to fit local conditions.
- **Sustainable Development Goals:** Aligning regeneration projects with the United Nations Sustainable Development Goals (SDGs), particularly those related to sustainable cities and communities (SDG 11), can provide a holistic framework for development.

4.3.3. Implications for urban planning

- **Hybrid Models:** Urban planners should explore hybrid models that blend formal and informal elements. This includes flexible zoning regulations, mixed-use development, and inclusive governance structures.
- **Monitoring and Evaluation:** Establishing robust monitoring and evaluation mechanisms can help track the impacts of regeneration projects and ensure they are meeting their objectives without unintended negative consequences.

In analyzing and discussing the dynamics of urban formalities and informalities in Katwe (see **Figure 11**), Uganda, several key points emerge:

- **Spatial Disparities:** There are evident spatial disparities between formal and informal structures within Katwe. Formalities are often concentrated in planned areas with better infrastructure, while informalities dominate in unplanned settlements where residents build their own homes and infrastructure.
- **Access to Services:** Formalities typically entail the provision of basic services such as water, sanitation, and electricity. However, informal settlements like Katwe often lack adequate access to these services, leading residents to rely on informal solutions such as shared water points and pit latrines.
- **Land Tenure Issues:** Formal land tenure systems are often absent in informal settlements, leading to insecurity of land tenure for residents. This insecurity hampers investment in infrastructure and prevents residents from accessing formal housing options.

- **Informal Economies:** Informal economies play a crucial role in Katwe, providing livelihoods for many residents who engage in activities such as street vending, small-scale manufacturing, and service provision. These informal economies are often resilient and adaptable but may face challenges such as lack of access to formal credit and markets.
- **Community Resilience:** Despite facing numerous challenges, communities in Katwe demonstrate resilience through informal networks, mutual support systems, and community-led initiatives. These grassroots efforts often fill gaps left by formal institutions and contribute to the overall functioning of the settlement.
- **Policy Implications:** There is a need for policy interventions that recognize and integrate the informal dynamics of settlements like Katwe. This requires a shift from top-down, formal approaches to more participatory and inclusive strategies that empower residents and leverage their knowledge and resources.
- **Sustainability:** Achieving sustainable urban development in Katwe requires addressing both formal and informal aspects, including improving access to basic services, promoting sustainable livelihoods, enhancing environmental management, and strengthening social cohesion.



Figure 11. Graphical representation of Katwe’s formal and informal urban dynamics.

In discussing these points, it becomes clear that the regeneration of informal settlements like Katwe requires a holistic approach that acknowledges the complex interplay between formalities and informalities. By understanding and leveraging the strengths of both, policymakers and stakeholders can work towards creating more inclusive, resilient, and sustainable urban environments for all residents.

5. Conclusion

Urban transformation in an informal settlement, if successful, should reveal an incremental development process through which informality and randomly occupied lands are gradually replaced by planned and deliberate actions intended to integrate slums into the formal governance systems that regulate urban land development in cities. The area-based plan and the accompanying street network lay down the foundations for this transformation, which includes social and spatial inclusion, land and property regularization, accessibility to basic infrastructure and an overall improvement in the quality of life of the inhabitants. This street-led transformation reveals the transformative potential of the approach to producing the inclusive city. In this respect, it brings about the following changes:

- The slum dweller becomes a citizen;
- the informal house becomes a house; and
- The informal settlement becomes a formal neighborhood.

In conclusion, exploring the aspect of urban regeneration as a transformative approach to addressing the challenges being made by informal settlements reveals a promising avenue for sustainable urban development. These Informal settlements which are often characterized by inadequate infrastructure, overcrowding, and substandard living conditions of the residential dwellers in the context of Katwe demand an innovative solution that extend beyond traditional urban planning methodologies. However, through the lens of typological regeneration, the emphasis shifts from merely upgrading physical structures to a more comprehensive understanding of the social, economic, and environmental dimensions of this informal settlement. Typological regeneration recognizes the diverse and dynamic nature of these settlements while acknowledging that a one-size-fits-all approach is neither practical nor effective. Instead, it encourages tailored interventions that consider the unique characteristics and needs of each settlement.

The essence is that, the implementation of this typological regeneration strategy fosters a collaborative and participatory process involving local communities, government entities, and various stakeholders. This inclusivity is crucial for the success of any regeneration initiative, as it ensures that the solutions proposed are culturally sensitive, contextually relevant, and driven by the collective aspirations of the very residents of the Katwe slum. Thus, not only addressing the physical deficiencies but also promoting social cohesion and resilience through the art of place making. Furthermore, the integration of place making principles within the framework of typological regeneration holds the potential to create lasting positive impacts on the slum dwellers since this approach prioritizes environmental considerations, energy efficiency, and the use of eco-friendly materials, contributing to the overall well-being of the residents and minimizing the ecological footprint of the settlements. However, it is very essential to acknowledge the challenges associated with implementing typological regeneration in informal settlements. These challenges may include bureaucratic hurdles, limited financial resources, and resistance to change and overcoming these obstacles may always require a multi-faceted strategy that involves policy reforms, financial investment, and community capacity-

building initiatives. In conclusion, typological regeneration emerges as a holistic and adaptable strategy for transforming informal settlements into a vibrant, sustainable, and inclusive urban spaces. By embracing the complexity of these settlements and fostering collaboration among diverse stakeholders, typological regeneration offers a pathway towards building cities that are not only physically upgraded but also socially cohesive, environmentally sustainable, and resilient in the face of future challenges.

As urban regeneration evolves, several avenues for further research emerge. Investigating the long-term social impacts of hybrid urban typologies, which combine residential and commercial spaces, could reveal effects on community interactions and social equity. Additionally, studies on the environmental sustainability of regeneration projects, particularly regarding green infrastructure, are vital for understanding urban resilience. Exploring the roles of community participation and digital technologies can enhance civic engagement in decision-making. Finally, examining the economic implications, such as local employment and housing affordability, will provide insights into the challenges and opportunities within urban regeneration practices.

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References

1. UN-Habitat. Urban regeneration as a tool for inclusive and sustainable recovery. UN-Habitat; 2021.
2. Cinnamon J, Noth T. Spatiotemporal development of informal settlements in Cape Town, 2000 to 2020: An open data approach. *Habitat International*. 2023; 133: 102753. doi: 10.1016/j.habitatint.2023.102753
3. Jacob AA. Influence of Urban Street Vending on Pedestrian Experience and Behaviour: A Systematic Quantitative Review. *Journal of Contemporary Urban Affairs*. 2023; 7(1): 139-163. doi: 10.25034/ijcua.2023.v7n1-10
4. Inkwap E. Know your hood: Katwe, Famous for its African Metallic Artistry. *Daily monitor*; 2013.
5. Van Oostrum M. Appropriating public space: transformations of public life and loose parts in urban villages. *Journal of Urbanism: International Research on Placemaking and Urban Sustainability*. 2021; 15(1): 84-105. doi: 10.1080/17549175.2021.1886973
6. Businge C. Why Katwe is a crime den. *New Vision*; 2007.
7. Shema AI, Kiessel M, Atakara C. Assessment of African Vernacular Built Environment and Power: The Case of the Walled City of Zaria, Nigeria. *Journal of Asian and African Studies*; 2023.
8. Adam AG. Informal settlements in the peri-urban areas of Bahir Dar, Ethiopia: An institutional analysis. *Habitat International*. 2014; 43: 90-97. doi: 10.1016/j.habitatint.2014.01.014
9. World Bank. *Upgrading Informal Settlements: Options for Land-Based Financing*. World Bank; 2017.
10. World Bank. *East Asia and Pacific Cities: Expanding Opportunities for the Urban Poor*. World Bank; 2018.
11. Davis M. Planet of Slums. *New Perspectives Quarterly*. 2006; 23(2): 6-11. doi: 10.1111/j.1540-5842.2006.00797.x
12. Satterthwaite D. *Upgrading Informal Settlements*. *International Encyclopedia of Housing and Home*; 2012.
13. WHO. *Health in Slums: Understanding the Link Between Urban Poverty and Health*. World Health Organization; 2018.

14. UN-Habitat. *The Challenge of Slums: Global Report on Human Settlements 2003. Management of Environmental Quality: An International Journal*. 2004; 15(3): 337-338. doi: 10.1108/meq.2004.15.3.337.3
15. Satterthwaite D, Mitlin D. *Reducing Urban Poverty in the Global South*. Routledge; 2013.
16. Bhogle SD. *Reconditioning Dharavi: A Toolkit of Strategies for Incremental Development* [Master's thesis]. Illinois Institute of Technology; 2022.
17. Arif MM, Ahsan M, Devisch O, et al. *Integrated Approach to Explore Multidimensional Urban Morphology of Informal Settlements: The Case Studies of Lahore, Pakistan*. *Sustainability*. 2022; 14(13): 7788. doi: 10.3390/su14137788
18. Uzun B, Celik Simsek N. *Upgrading of illegal settlements in Turkey; the case of North Ankara Entrance Urban Regeneration Project*. *Habitat International*. 2015; 49: 157-164. doi: 10.1016/j.habitatint.2015.05.026
19. Yilmaz O, Alkan M. *Assessing the impact of unplanned settlements on urban renewal projects with GEE*. *Habitat International*. 2024; 149: 103095. doi: 10.1016/j.habitatint.2024.103095
20. Hassan GF. *Regeneration as an approach for the development of informal settlements in Cairo metropolitan*. *Alexandria Engineering Journal*. 2012; 51(3): 229-239. doi: 10.1016/j.aej.2012.02.003
21. Shema AI, Abdulmalik H. *Urban vertical farming as a path to healthy and sustainable urban built environment*. *A+ Arch Design International Journal of Architecture and Design*. 2022; 8(1): 67-88. doi: 10.17932/IAU.ARCH.2015.017/arch_v08i1004
22. Abass AS, Kucukmehmetoglu M. *Transforming slums in Ghana: The urban regeneration approach*. *Cities*. 2021; 116: 103284. doi: 10.1016/j.cities.2021.103284
23. Fernandes J, Chamusca P, Pinto J, et al. *Urban Rehabilitation and Tourism: Lessons from Porto (2010–2020)*. *Sustainability*. 2023; 15(8): 6581. doi: 10.3390/su15086581
24. Baye F, Wegayehu F, Mulugeta S. *Drivers of informal settlements at the peri-urban areas of Woldia: Assessment on the demographic and socio-economic trigger factors*. *Land Use Policy*. 2020; 95: 104573. doi: 10.1016/j.landusepol.2020.104573
25. Hantalo AH, Dube EE. *Dynamics of Informal Settlement Expansion on the Urban Fringe: The Case of Birbir Town, Southern Ethiopia*. *Journal of Contemporary Urban Affairs*. 2023; 7(1): 86-102. doi: 10.25034/ijcua.2023.v7n1-6
26. Kamalipour H. *Exploring informal urbanism*. *The Routledge Handbook of Urban Design Research Methods*; 2023.
27. Kamalipour H, Iranmanesh A. *Morphogenesis of Emerging Settlements: Mapping Incremental Urbanism*. *Land*. 2021; 10(1): 89. doi: 10.3390/land10010089
28. Subbaraman R, Murthy SL. *The right to water in the slums of Mumbai, India*. *Bulletin of the World Health Organization*. 2015; 93(11): 815-816. doi: 10.2471/blt.15.155473
29. Balarabe MK, Ibrahim AS, Ahmad M. *Economic Diversification and the Urban Image; Changing the Narrative on Street Vending*. *Journal of Contemporary Urban Affairs*. 2019; 3(1): 52-61. doi: 10.25034/ijcua.2018.4682
30. Agyabeng AN, Peprah AA, Mensah JK, et al. *Informal settlement and urban development discourse in the Global South: Evidence from Ghana*. *Norsk Geografisk Tidsskrift - Norwegian Journal of Geography*. 2022; 76(4): 242-253. doi: 10.1080/00291951.2022.2113428
31. Venter A, Marais L, Morgan H. *Informal Settlement Upgrading in South Africa: A Preliminary Regenerative Perspective*. *Sustainability*. 2019; 11(9): 2685. doi: 10.3390/su11092685
32. UN-Habitat. *Financing Urban Shelter*. Routledge; 2013.
33. Ascensão E. *Interfaces of informality*. *City*. 2016; 20(4): 563-580. doi: 10.1080/13604813.2016.1193337
34. Armstrong G, Wilkinson S, Cilliers EJ. *A framework for sustainable adaptive reuse: understanding vacancy and underuse in existing urban buildings*. *Frontiers in Sustainable Cities*. 2023; 5. doi: 10.3389/frsc.2023.985656
35. Hwang SW, Lee SJ. *Unused, underused, and misused: an examination of theories on urban void spaces*. *Urban Research & Practice*. 2019; 13(5): 540-556. doi: 10.1080/17535069.2019.1634140
36. Diefendorf JM. *Urban Reconstruction in Europe After World War II*. *Urban Studies*. 1989; 26(1): 128-143. doi: 10.1080/00420988920080101
37. Van Doorn L, Arnold A, Rapoport E. *In the age of cities: The impact of urbanization on house prices and affordability*. In: *Hot property: The housing market in major cities*. Springer International Publishing; 2019.
38. Mahmoud IH. *Placemaking for Green Urban Regeneration*. Springer International Publishing; 2022.

39. Wurm M, Taubenböck H, Weigand M, et al. Slum mapping in polarimetric SAR data using spatial features. *Remote Sensing of Environment*. 2017; 194: 190-204. doi: 10.1016/j.rse.2017.03.030
40. Chan APC, Adabre MA. Bridging the gap between sustainable housing and affordable housing: The required critical success criteria (CSC). *Building and Environment*. 2019; 151: 112-125. doi: 10.1016/j.buildenv.2019.01.029
41. Amado MP, Ramalheite I, Amado AR, et al. Regeneration of informal areas: An integrated approach. *Cities*. 2016; 58: 59-69. doi: 10.1016/j.cities.2016.05.015
42. Mohamed AA, Ubarevičienė R, van Ham M. Morphological evaluation and regeneration of informal settlements: An experience-based urban design approach. *Cities*. 2022; 128: 103798. doi: 10.1016/j.cities.2022.103798
43. Ricciardelli A, Raimo N. *Assessing Sustainability and Organizational Innovation of Urban Regeneration Projects*. Springer International Publishing; 2023.
44. Leary ME, McCarthy J, eds. *The Routledge Companion to Urban Regeneration*. Routledge; 2013.
45. Dickinson H. *Performing Governance*. Palgrave Macmillan UK; 2014.
46. Cherunya PC, Truffer B, Samuel EM, et al. The challenges of livelihoods reconstruction in the context of informal settlement upgrading. *Environment and Planning A: Economy and Space*. 2020; 53(1): 168-190. doi: 10.1177/0308518x20926514
47. Shema AI, Balarabe MK, Alfa MT. Energy efficiency in residential buildings using nano-wood composite materials. *International Journal of Civil Engineering and Technology (IJCIET)*. 2018; 9(3).
48. Dovey K, van Oostrum M, Chatterjee I, et al. Towards a morphogenesis of informal settlements. *Habitat International*. 2020; 104: 102240. doi: 10.1016/j.habitatint.2020.102240
49. Güneralp B, Lwasa S, Masundire H, et al. Urbanization in Africa: challenges and opportunities for conservation. *Environmental Research Letters*. 2017; 13(1): 015002. doi: 10.1088/1748-9326/aa94fe
50. Garfinkel E. *The urban slum as a model for sustainable development: case study: Villa 31*. Northeastern University library; 2023.
51. Nzau B, Trillo C. Affordable Housing Provision in Informal Settlements through Land Value Capture and Inclusionary Housing. *Sustainability*. 2020; 12(15): 5975. doi: 10.3390/su12155975
52. Amado M. Wall-Up: Method for the regeneration of settlements and housing in the Developing World. *Sustainable Cities and Society*. 2018; 41: 22-34. doi: 10.1016/j.scs.2018.05.024
53. André C. A bird's eye view of OECD housing markets. *OECD Economics Department Working Papers*; 2010.
54. Abhishek N, Jenamani M, Mahanty B. Urban growth in Indian cities: Are the driving forces really changing? *Habitat International*. 2017; 69: 48-57. doi: 10.1016/j.habitatint.2017.08.002
55. Koley S. Challenges in Sustainable Development of Smart Cities in India. *Sustainability*. 2020; 13(4): 155-160. doi: 10.1089/sus.2020.0017
56. Fegue C. Informal settlements' planning theories and policy-making in sub-Saharan Africa – from 'site' to 'people': a critical evaluation of operations 'Murambatsvina' and 'Garikai' in Zimbabwe. *International Journal of Sustainable Development and Planning*. 2007; 2(4): 445-460. doi: 10.2495/sdp-v2-n4-445-460
57. Haruna PB, Zubairu S, Olagunju RE, et al. Liveability Considerations: Towards Designing Sustainable Public Housing in Niger State, Nigeria. *Journal of Contemporary Urban Affairs*. 2023; 7(2). doi: 10.25034/ijcua.2023.v7n2-16
58. Malik S, Roosli R, Tariq F. Investigation of informal housing challenges and issues: experiences from slum and squatter of Lahore. *Journal of Housing and the Built Environment*. 2019; 35(1): 143-170. doi: 10.1007/s10901-019-09669-9
59. Adamy A, Meillyta M, Maharani L, et al. Disaster Vulnerability Assessment of Low-Cost Houses in Java Island. *Journal of Contemporary Urban Affairs*. 2023; 7(2): 20-37. doi: 10.25034/ijcua.2023.v7n2-2
60. Whittemore AH. Exclusionary Zoning. *Journal of the American Planning Association*. 2020; 87(2): 167-180. doi: 10.1080/01944363.2020.1828146
61. Ghasempour A. Informal settlement; concept, challenges and intervention approaches. *Specialty journal of architecture and construction*. 2015; 1(3-2015): 10-6.
62. Deuskar C. Clientelism and Planning in the Informal Settlements of Developing Democracies. *Journal of Planning Literature*. 2019; 34(4): 395-407. doi: 10.1177/0885412219842520
63. Gan X, Zuo J, Wu P, et al. How affordable housing becomes more sustainable? A stakeholder study. *Journal of Cleaner Production*. 2017; 162: 427-437. doi: 10.1016/j.jclepro.2017.06.048

64. Olanrewaju A, Tan SY, Abdul-Aziz A. Housing providers' insights on the benefits of sustainable affordable housing. *Sustainable Development*. 2018; 26(6): 847-858. doi: 10.1002/sd.1854
65. Schmuecker K. *The good, the bad and the ugly*. Institute for Public Policy Research; 2011.
66. Mbiggo I, Ssemwogerere K. *An Investigation into Fire Safety Measures in Kampala Slums-A Case of Katanga-Wandegeya*. Civil and Environmental Research. 2018; 10: 30-4.
67. Obbo D. *Kampala Central Slum Settlement Profile*. Ask Your Government Uganda; 2014.
68. Shema AI. Rethinking Architecture and Urban Form in the Context of Power Discourse: Case Study Nicosia, North Cyprus. *Journal of Asian and African Studies*. 2019; 54(8): 1227-1246. doi: 10.1177/0021909619865570
69. Wyckoff MA. Definition of placemaking: Four different types. *Planning & Zoning News*. 2014; 32(3): 1.
70. McFarlane C. *Urban Poverty in the Global South: Scale and Nature*, By Diana Mitlin and David Satterthwaite *Reducing Urban Poverty in the Global South*, By David Satterthwaite and Diana Mitlin. *The Journal of Development Studies*. 2016; 52(12): 1827-1829. doi: 10.1080/00220388.2016.1202886