PROJECT REPORT

URBAN RENTAL HOUSING:

The Missing Lever for Climate Action in Kenya

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A RENTAL HOUSING TAXONOMY AND SEQUENCING BLUEPRINT FOR ACTION

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Urban Rental Housing and Climate Resilience Project

THE TEAM

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***Figure 1**: A multistakeholder workshop hosted on 8th – 12th December 2025 that brought together the project team and representatives from government agencies, academia, practitioners, community groups, and housing actors to generate contextual insights and capture institutional perspectives.*

FRONT COVER PHOTO

Contrasting urban housing environments in Nairobi: Kibera, Langata, and Karen. Source: Authors (2026)

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CONFLICTS OF INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper. Any opinions, findings, conclusions, or recommendations expressed in this material are those of the authors and do not necessarily reflect the views of the supporting institutions.

ETHICS APPROVAL

This research was conducted in accordance with institutional guidelines and received ethics approval from the University of Cambridge Faculty of Architecture and History of Art Research Ethics Committee (October 2025). The study also complied with the requirements of the National Commission for Science, Technology and Innovation (NACOSTI), Kenya, under Licence No: NACOSTI/P/25/4181614. Informed consent was obtained from all participants prior to their involvement in the study.

DATA AVAILABILITY

Due to the confidential nature of the data and ethical considerations, the data generated and analysed during this study are not publicly available. Access to the data is restricted in accordance with ethical guidelines and participant consent conditions.

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Executive Summary

A. Context: Urban rental housing and climate resilience in Nairobi

Urban rental housing remains an overlooked lever for climate action. In East African cities such as Nairobi, the rental housing market remains a high-profile area for city interventions, as over 70% of the city's building footprint is housing, and over 90% of households rent. The Urban Rental Housing and Climate Resilience project examines lived climate risks across representative and diverse rental housing typologies in Nairobi and documents how multiple climate risks intersect with tenure structures and landlord-tenant dynamics. These valuable insights position Kenyan urban areas for climate resilience action, acknowledging the sensitive relationship between the rental market, urban inequality, and disproportionate climate change impacts.

The project introduces a mixed-method, participatory research framework that combines primary field-based data collection with structured stakeholder engagement. Empirical data were gathered directly in the Karen–Langata–Kibera case study zone through observation and engagement with residents, as well as household surveys that captured lived conditions and residents' everyday practices. These findings were subsequently complemented through a multistakeholder workshop that brought together participants from policy, academia, professional practice, the development sector and the residence association networks. The workshop provided a platform to collate, validate, and contextualise field data, enabling cross-sector perspectives to inform interpretation and strengthen the relevance of the findings for planning, policy, and implementation. The analysis identified priority reform areas in urban climate action, serving as a basis for an actionable blueprint for climate-resilient responses in Kenya's rental market.

The project report is organised across four key sections. Section 1 presents the research project's scope and the study's background. With 91% of Nairobi households renting, rental housing is not a peripheral market but the city's dominant form of shelter and a critical, under-recognised infrastructure for city climate resilience. Section 2 compiles four evidence streams to triangulate a more complete picture of climate vulnerability in Nairobi's rental housing, drawing on the urban rental housing capture, stakeholder insights, typology taxonomy mapping, and household survey data. Section 3 converges climate resilience decision pathways across two scales: (1) at neighbourhood-level across urban informal settlements, peri-urban rental estates and affluent neighbourhoods with backyarding in six thematic areas; and (2) at typology-level covering new builds, retrofitting, and contextualised neighbourhood interventions. The question in this section shifts from 'what did we find?' to 'what does it mean for decision-makers?' Section 4 synthesises the findings into an integrated change process schedule – the blueprint for action. The blueprint operates across four system levels of policy and regulation, market, institutions and actor strengthening, and investment mechanisms, each sequenced to enable a synchronised national transition.

B. Key Findings

a) Formal and informal typologies cut across high-, middle- and low-income neighbourhoods.

There is significant variation and diversity across the three study neighbourhoods of Kibera, Langata, and Karen. Informal typologies exist in perceived affluent neighbourhoods (e.g., Karen), while formal high-rise buildings are found in informal settlements (e.g., Kibera). This challenges the assumption that climate vulnerability aligns neatly with existing formal versus informal income-strata-based classifications.

b) A climate-resilience-oriented rental housing taxonomy.

This study presents a four (4)-layer classification taxonomy for climate action as the minimum anatomy of a climate-resilient housing description. Using this taxonomy, 20 housing typologies have been identified in Nairobi, including two dominant typologies highlighted below (informal row houses and formal high-rise flats). The typologies span the informal to formal rental housing market.

FORMAL/INFORMAL	CONFIGURATION	MATERIALITY	FORM	Primary Location
Formal No.1 ★	Multi-unit floor	Masonry	Self-contained flat	Karen, Langata, Kibera
Formal No.2	Multi-unit floor	Masonry	Bed-sitter flat	Karen, Kibera
Formal No.3	Stand-alone	Masonry	Maisonette	Karen, Langata,
Formal No.4	Line wall housing	Masonry	Bed-sitter flat	Kibera edges
Informal No.5	Row housing	Rammed Earth	Bedsitter	Kibera
Informal No.6 ★	Row housing	Iron sheet	Bedsitter	Karen, Langata, Kibera
Informal No.7	Row housing	Timber	Bedsitter	Kibera
Informal No.8	Swahili housing	Rammed Earth	Bedsitter	Kibera
Informal No.9	Multi-unit floor	stone/iron sheet	Bed-sitter flat	Langata, Kibera
Formal No.10	Row housing	Masonry	Maisonette	Langata
Formal No.11	Stand-alone	Masonry	Bungalow	Karen, Langata
Informal No.12	Backyard row housing	Rammed Earth	single room	Langata
Informal No.13	Backyard row housing	stone/iron sheet	double-room flat	Kibera
Informal No.14	Multi-unit floor	Iron sheet	Bed-sitter flat	Kibera
Informal No.15	Mtaa U-Courtyard	Iron sheet	Bedsitter	Kibera
Formal No.16	Stand-alone	Masonry	Villa	Karen,
Formal No.17	Student flat	Masonry	Studio flats	Karen,
Informal No.18	Backyard row housing	Masonry	Bedsitter	Karen,
Informal No.19	Row housing	Masonry	Bedsitter	Karen, Kibera
Informal No.20	Backyard row housing	Iron sheet	Bedsitter	Karen, Langata

c) Tenure serves as a 'starting point' for climate resilience.

Households enter climate-resilience pathways from meaningfully different 'starting points'. Each housing market sets a different baseline for what households must manage before any climate shock arrives. The study reveals major disparities in the environmental quality of rental dwellings. In Kibera, 61% report inadequate ventilation/daylight, and 56% want more windows. In Karen, only 25% report ventilation issues and 12.5% daylight deficiencies. These show the need for low-cost, rapid retrofit interventions. Due to tenant-landlord split incentives, rapid-response units sourced locally are needed in priority areas.

d) Tenant burden index.

Daily exposure, maintenance responsibilities, and structural inequalities shape households' capacity to cope with and adapt to climate stressors. A 'tenant burden index' is observed in low-income areas across the three neighbourhoods. For instance, tenant-managed water storage is significantly more prevalent in Kibera (86.4%) than in Langata (31.8%) or Karen (23.1%). Additionally, tenant-managed waste management is 95.5% in Kibera, 31.8% in Langata, and just 3.8% in Karen. By contrast, higher-income areas show a strong 'landlord responsibility index'. In Karen, landlords are responsible for 76.9% of key maintenance, compared to 47.8% in Langata and 4.5% in Kibera. This indicates the need to secure tenant rights and formalise maintenance agreements.

e) Energy access and climate vulnerability.

The survey revealed that household energy systems are not merely technical infrastructures but deeply social systems that shape everyday resilience, health outcomes, environmental exposure, and renters' capacity to adapt to climate uncertainty. From the findings, existing intra-urban energy access inequality is not mainly about whether electricity is available, but about the reliability, safety, and controllability of supply, as well as the cooking fuels households depend on.

f) Water access and climate vulnerability

The analysis makes visible the hidden vulnerabilities of renters in the water supply and use ecosystem. The findings revealed three water access regimes in the renter ecosystem. Kibera has a purely pay-as-you-fetch access, Langata has a mixed supply of municipal-piped, borehole, water bowser delivery and some vendor/kiosk supply. On the other hand, Karen is a borehole and tank assets ecosystem. Resilience is strongly linked to the ability to store water rather than simply access it. A systematically delivered water scarcity resilience would require a shift from private coping mechanisms to regulated approaches so that resilience is not a luxury embedded in rent or bought daily at jerrycan scale.

g) Public spaces as critical climate infrastructure.

Access to open space is uneven: 39% of respondents in Kibera reported access to nearby open space, compared to 31% in Langata and 73% in Karen. In Kibera, open spaces are often small, residual and located along hazard-prone zones such as riverbanks or railways. In crisis, some renters depend entirely on public space for retreat and survival, revealing key inequalities in adaptive capacity. In Langata, they skew toward compound-level courtyards, backyards, or semi-public parking spaces, and in Karen, these range from large public parks and open grounds in the neighbourhood to large private gardens and courtyards.

h) Compounded climate risks are experienced differently across neighbourhoods.

Kibera shows the highest indoor 'compounded risk burden', with almost all households (95%) reporting at least one in-home climate problem and a combined experience of ‘heat and air quality/stuffiness, lack of daylight, dampness’. In Langata, 78% of households report at least one problem caused by dampness, poor ventilation, or a lack of daylight. In comparison, Karen shows a lower average burden, with 61% of households reporting at least one problem. Many households in Karen report no in-house problems, suggesting higher inequality within the area.

i) Renter-centred resilience priorities differ by neighbourhood.

In Kibera, the households prioritise ‘drainage and waste systems’, then 'healthy indoor air, light, heat' retrofits as climate resilience priorities. Additionally, in Kibera, the households most strongly prioritise solid waste collection (68.2%), proper drainage (59.1%), more windows (59.1%), and better ventilation (54.5%). In Langata, the households prioritised dampness mitigation, ventilation, daylight, and thermal comfort. In Karen, the preferred desired measures were more outdoor spaces (50.0%) and trees/green spaces (46.2%),

j) Industry and Policy Stakeholders' climate action priorities, captured during a stakeholder engagement workshop in Nairobi in December 2025:

- Translate typology research into market-ready tools and regulatory-ready instruments and align resilience goals with practical, investable implementation frameworks.
- Centre indoor environmental health.
- Adopt contextual material choices.
- Leverage ongoing urban renewal programs to deliver integrated, climate-resilient rental neighbourhoods through clear roles and partnership models and scale finance-ready resilience frameworks, clarify roles and strengthen cross-sector coordination.
- Integrate rental contracting and management as the backbone of sustainable housing delivery.
- Centre lived experience and community knowledge in addressing a myriad of urban risks and ground resilience in rights-based community accessible knowledge.
- Treat housing as a lens for understanding urban systems and realigning policy with lived realities. Rethink education, ethics, and long-term value.
- Collaboration is the foundation and main principle for effective and scalable action.

C. Sequenced blueprint for climate action, regional replication and global policy impact

So far, climate resilience policy in Kenya has largely focused on building standards, with limited engagement with rental markets and user practices. This study proposes a coordinated implementation framework that accommodates the collective, multi-actor, multi-scale and multi-sector nature of climate resilience building in the urban rental and housing service market. Rather than fragmented recommendations, the study findings are translated into a systemic, sequenced and multi-scalar strategy structured around four interlocking impact pillars:

- Policy, legal and regulatory level reform
- Evidence-based practice
- Housing services, asset management and governance
- Climate resilience financing and economics

This sequenced implementation plan enables scaling of interventions and feedback across systems and positions rental housing as a core lever for urban climate action, shifts the focus from buildings alone to systems, services, and social relations, and provides a replicable model for other rapidly urbanising regions.

IMPACT LEVEL	NATURE OF REFORMS	SEQUENCED RENTAL REFORMS
A **Policy, legislation and regulatory environment**	Foundational policy, legislation and regulatory reforms	1 Strengthen county-level housing and climate policy through targeted additionalities. 2 Develop a coherent urban rental housing and service market policy. 3 Establish a rental market code aligned with lived realities, with phased compliance. 4 Introduce climate resilient rental contracts with clearly defined shared-service obligations. 5 Integrate housing stock adjustment and value capture into planning control, upgrading and change-of-use processes. 6 Establish open climate risk and resilience data systems, supported by public processes and central governance.
B **Evidence-based practice and institutional strengthening**	1 Reforms that strengthen **anticipatory capacity** to climate impacts	1 Shift from prescriptive design manuals to adaptive decision principles informed by future climate intelligence. 2 Develop a renter-focused information and solutions playbook.
	2 Reforms that increase **response capacity** to climate impacts	3 Segment rental markets by starting points and livelihoods. 4 Develop a multi-hazard delivery framework for all renter groups and service contexts. 5 Improve market legibility by clear intervention pathways and investable portfolio rules. 6 Mainstream shock management, contingency planning and long-term adaptation.
C **Actor and asset manager-level strengthening**	Actor-and asset-level strengthening in rental and housing service markets	1 Build community-level participatory capacity. 2 Strengthen governability and coordination of the housing sector to respond to the climate emergency. 3 Expand targeted capacity-building programs.
D **Economic value and return on investment**	Economic value and return on investment reform instruments	1 Establish a robust, evidence-based pipeline and translate multi-hazard climate resilience into a credible investment for rental housing. 2 Design the climate resilience finance market and establish the political economy of who pays. 3 Develop public-private financing mechanisms to deliver climate-resilient rental housing at scale.

Sequenced Blueprint for Climate Resilience Action. Source: Authors (2026)

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SECTION 1 · INTRODUCTION

URBAN RENTAL HOUSING IN A CLIMATE EMERGENCY

Problem Statement, Objectives, and the Nairobi zone research framework.

Guiding principle for this section

Read this section to understand the report's scope and methods before engaging the evidence in Section 2.

With 91% of Nairobi households renting, rental housing is not a peripheral market but the city's dominant form of shelter and a critical, underrecognised urban infrastructure for city climate resilience.

NAVIGATE THIS SECTION

CASE STUDY GEOGRAPHY

The Karen, Langata and Kibera zone under study is representative of Nairobi's formal-to-informal housing spectrum and similar to other housing zones in Kenya's urban areas.

KEY FRAMING CONCEPT

This project aims to develop a building-stock-centred climate action framework for a predominantly rental housing market in Nairobi.

1.1 Problem statement

Today, Nairobi accommodates a hybrid of housing and settlement forms (Figure 2) that range from slums/shacks, informal Settlements, low-income settlements, low-middle-income settlements, high-middle-income settlements, high-income settlements, and 'uber-rich' settlements, which together constitute the collage illustrated in Figure 3. These typologies coexist, with boundaries often defined by income strata.

Figure 2: *Diversity of Nairobi's housing stock, ranging from informal and low-income settlements to middle- and high-income residential developments.* ***a:*** *Typical Informal low-income walk-up tenement flats in Mathare, Nairobi.* ***b:*** *Typical rural housing blocks in Dagoretti, Nairobi.* ***c:*** *Typical high-middle-income housing in Karen, Nairobi.* ***d:*** *informal shacks/slum structures in Mathare, Nairobi.* ***e:*** *Typical uber-rich housing in Nairobi, Lavington area.* ***f:*** *Typical low-to-middle-income flats in Langata, Nairobi. Source: Authors (2026)*

A national outlook on ownership and rental housing occupancy presents a 61% owner-occupied picture in Kenya. However, in urban areas, where housing issues are rife, owner occupancy is significantly lower at 21%, with Nairobi, the capital city, recording the lowest at 9.3% (Kenya National Bureau of Statistics (KNBS), 2019). In Nairobi, approximately 91% of the households rent, across the low-to-middle-to-high income housing strata. That said, a significant research gap exists regarding the classification and mapping of different physical urban rental housing typologies, their tenure structures (both formal and informal), their relationships with public space, and the implications of these key characteristics for effective decision-making. Housing policies, including climate action mainstreaming strategies and various platforms for housing settlement improvements, favour owner-occupied settlement solutions over renter-occupied ones (Sverdlik et al., 2025). The former has received the most attention, perhaps because owner-occupied housing is intrinsically good and has been an endgame outcome of most housing policies established and of the climate mitigation and adaptation frameworks supported.

Figure 3: *Map of Loresho in Nairobi with representative housing settlements illustrated in Figure 2. The red dots indicate approximate locations of some of these typologies. Source: Authors' illustration adapted from Google Maps (2026).*

In the climate resilience action and strategy space, there is extensive and widely used literature sources that separately and jointly present technical specifications and guidelines for addressing climate change-related risks. For overheating risk management plans see IPCC, 2022; World Health Organization, 2022; C40 Cities, 2021; UN-Habitat, 2021; Nicol et al., 2012; Oke, 1987; Emmanuel, 2005, for water scarcity risk management see United Nations, 2023; World Bank, 2016; UNESCO, 2020; Gleick, 2018; African Development Bank, 2022; UN-Habitat, 2020, for flooding risk management planning see IPCC, 2022; World Bank, 2012; UNDRR, 2015; Douglas, 2018; Jha et al., 2012; IUCN, 2020; World Resources Institute, 2019, for energy security planning see International Energy Agency, 2023; International Renewable Energy Agency, 2022; World Bank, 2021; UN-Habitat, 2019; Sovacool, 2011; Goldthau & Witte, 2010; African Development Bank, 2022; UNEP, 2021 and for just climate transition planning see International Labour Organization, 2015; United Nations Development Programme, 2022; IPCC, 2022; Newell & Mulvaney, 2013; Heffron & McCauley, 2018; Schlosberg, 2012; UN-Habitat, 2020; World Resources Institute, 2021; C40 Cities, 2022. In a similar manner, there are various tools and technical guidelines developed in the climate action practice space, demonstrating that there exists a myriad of technical built environment specifications for climate resilience design.

Although it is clear what needs to be done from a technical execution perspective to mainstream climate action in the built environment, the schedule of intriguing questions below for Nairobi's rental housing market remains unclear. These questions served as the basis for the Urban Rental Housing and Climate Resilience Project.

a) What are the priorities for climate resilience solutions in the housing sector?

b) What makes rental-occupied housing fundamentally different, and are there any tangible and 'action-useful' points of departure from owner-occupied housing in the Climate resilience solution space?
c) What is the basis of resilience building in renter housing and settlements?
d) How can a city like Nairobi prepare for climate emergencies when most of its residents are renters?
e) How to navigate the diversity concern in rental housing resilience policy and guidelines in a way that accommodates diversity in housing typology, housing behaviour and occupants' life events?
f) What is the compliance threshold for multi-hazard resilience building in housing? And how do we close this gap in the rental sector?
g) How do we navigate the effects of the adjustment in Nairobi's rental market stock? Shifts, including in a 'backyarding culture', change of use, and short-stay lets, all of which are causing variability and uncertainty in rental housing stock vulnerability?
h) What resilience-building solutions is the renter in full control of, and what is the landlord in full control of, in the space of climate resilience building?
i) How could applying a climate-resilience lens to housing typologies reshape the way we understand and plan for climate resilience?
j) Do households enter climate resilience at fundamentally different starting points? And what does a transition to a fully climate-resilient urban rental market look like? Is it any different for owner-occupied households?
k) Does access to services – water, energy, public open spaces - influence and shape the vulnerability and coping capacity of households?

Even with the above-listed intrigues of Nairobi's rental sector, there is general evidence that housing and settlements have a larger built-environment footprint in Kenya's urban areas, and their prominence in shaping urban patterns cannot be overstated. According to the status of the built environment, the July-Dec 2019 issue of the AAK states that bulk development within the county of Nairobi is residential. 71.56% of building development approvals were for residential buildings, compared with public-use buildings (13.74%), Industrial Buildings (5.21%), Commercial Buildings (5.69%), and mixed-use buildings (2.37%). Climate resilience plans in Nairobi would benefit from a targeted approach to the base capital of the building stock, residential buildings, which are predominantly rental. This project aims to develop a building-stock-centred climate action framework for a predominantly rental housing market in Nairobi.

1.2 Objectives

The Urban Rental Housing and Climate Resilience Project aims to bridge a significant research gap in the classification and mapping of various physical urban rental housing typologies, their tenure structures (both formal and informal), their relationship with public space, and the implications of these key characteristics for effective climate resilience and just transition strategies. These valuable insights should position urban rental value chains in Kenya at the forefront of current debates on mainstreaming climate resilience. Key project objectives are:

a) To collaboratively collate rental market information and develop a coherent system that codifies Nairobi's spectrum of rental housing typologies in a way that reflects both physical form and tenure arrangements across all income strata (Figure 2).
b) To characterise rental demand profiles and household dynamics, including occupancy patterns across different household arrangements, and to capture socio-economic characteristics beyond basic demographics.
c) To establish and assess climate resilience-building measures across Nairobi's rental housing stock, including overheating risk management, water scarcity adaptation, flood risk mitigation, energy security, and pathways toward a just climate transition appropriate to different rental typologies and income groups.
d) To synthesise research findings into a concise, locally accessible policy brief focused on practical policy, regulatory, practice and housing economics pathways for mainstreaming climate resilience in urban rental housing.
e) To develop a blueprint that guides climate resilience action in Nairobi's housing rental market and one that is replicable across various urban areas in Kenya.

f) To position Nairobi's rental housing experience in local and global climate debates.

1.3 Approach

The project adopted a mixed, participatory methodology that combined primary field-based data collection with structured stakeholder engagement. Empirical data were gathered directly in the Karen–Langata–Kibera zone (Figure 5) through observation and engagement with residents, as well as household surveys that captured lived conditions and everyday housing practices. These findings were subsequently complemented through a multistakeholder workshop that brought together participants from policy, academia, professional practice, the development sector and the residence association networks. The workshop provided a platform to collate, validate, and contextualise field data, enabling cross-sector perspectives to inform interpretation and strengthen the relevance of the findings for planning, policy, and implementation. A qualitative and quantitative synthesis was undertaken to identify priority reform areas in the climate action space progressively and to serve as a basis for an actionable blueprint for climate-resilient housing responses in Kenya's urban rental market.

1.3.1 Case study area

AREA	LOW-INCOME SCALE	MIDDLE-INCOME SCALE	HIGH-INCOME SCALE
Zone 1	A. Githogoro	B. Ruaka	C. Runda
Zone 2	D. Kangemi	E. Mountain view	F. Loresho
Zone 3	G. Mathare	H. Pangani and Eastleigh	I. Muthaiga
Zone 4	J. Kibera	K. Langata	L. Karen

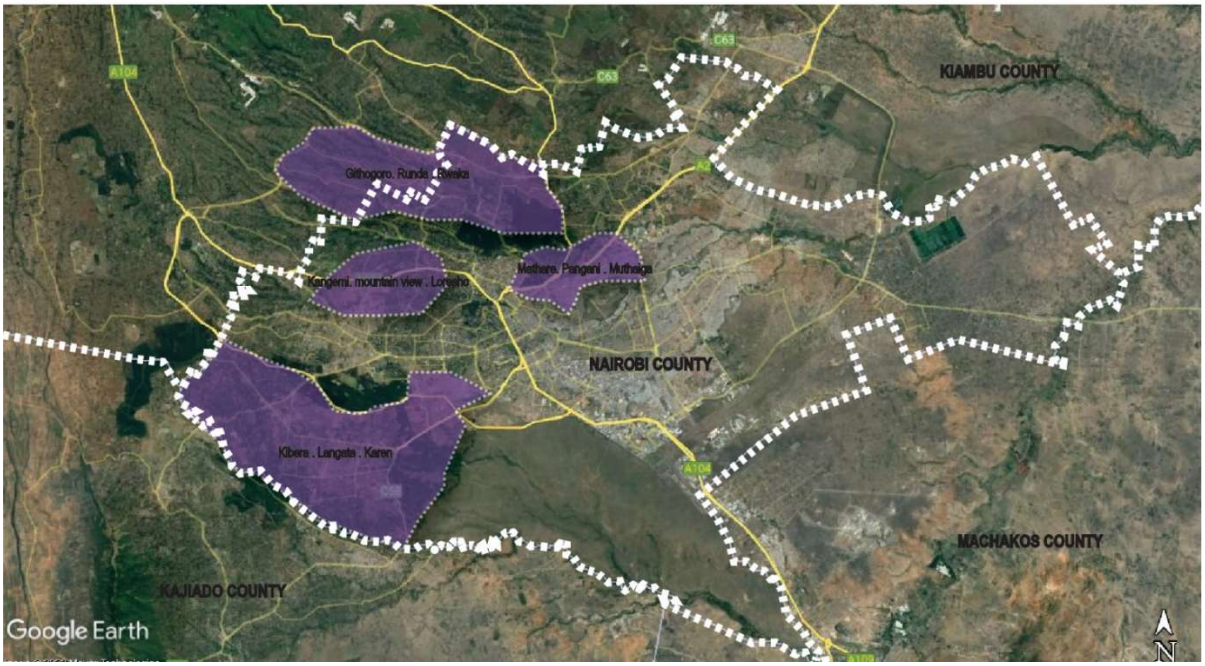


***Figure 4**: Four Sample urban housing zones in Nairobi County. Source: Authors' illustration adapted from Google Maps (2026).*

Figure 4 illustrates four representative housing zones in Nairobi and in most urban areas of Kenya, which host both informal and formal housing and settlements. The spatial forms associated with informality are shanty structures erected without the support of any built environment professionals. At the same time, formal spaces generally manifest levels of geometrical 'purity' both for the built form and the space between buildings. In Nairobi, these forms exist along a gliding scale of an informal–formal continuum representing social-economic strata, ranging from Slums/shacks, informal settlements, low-income settlements, low-middle-income settlements, high-middle-income settlements, high-income settlements, and 'uber-rich' settlements. The Urban Rental Housing and Climate Resilience project based its case study on the Kibera, Langata, and Karen zone (zone 4), whose boundaries are illustrated in Figure 5 below.

1.3.2 Primary data collection (on-site)

An Urban Rental Housing Capture Criteria (see Appendix 1) was developed, which provided a structured basis for identifying, categorising, and mapping rental housing typologies across the selected study area. This criterion enabled the establishment of a clear typology-mapping framework that distinguishes rental stock by settlement context, tenure structure, housing configuration, construction characteristics, and house form (see Appendix 2). Based on this typology mapping, selected housing types were subjected to a themed household survey designed to generate both comparable typology and cross-cutting area-based data. The survey instrument was organised around six core data-collection themes to ensure systematic data collection across social, spatial, environmental, climate-impact, resilience levels, and governance dimensions. Appendix 3 contains the full questionnaire administered in the field, while Appendix 4 provides a sample signed consent form completed by each participating household before engagement. In total, 71 surveys were conducted for 22 households in Kibera, 23 households in Langata and 26 households in Karen.

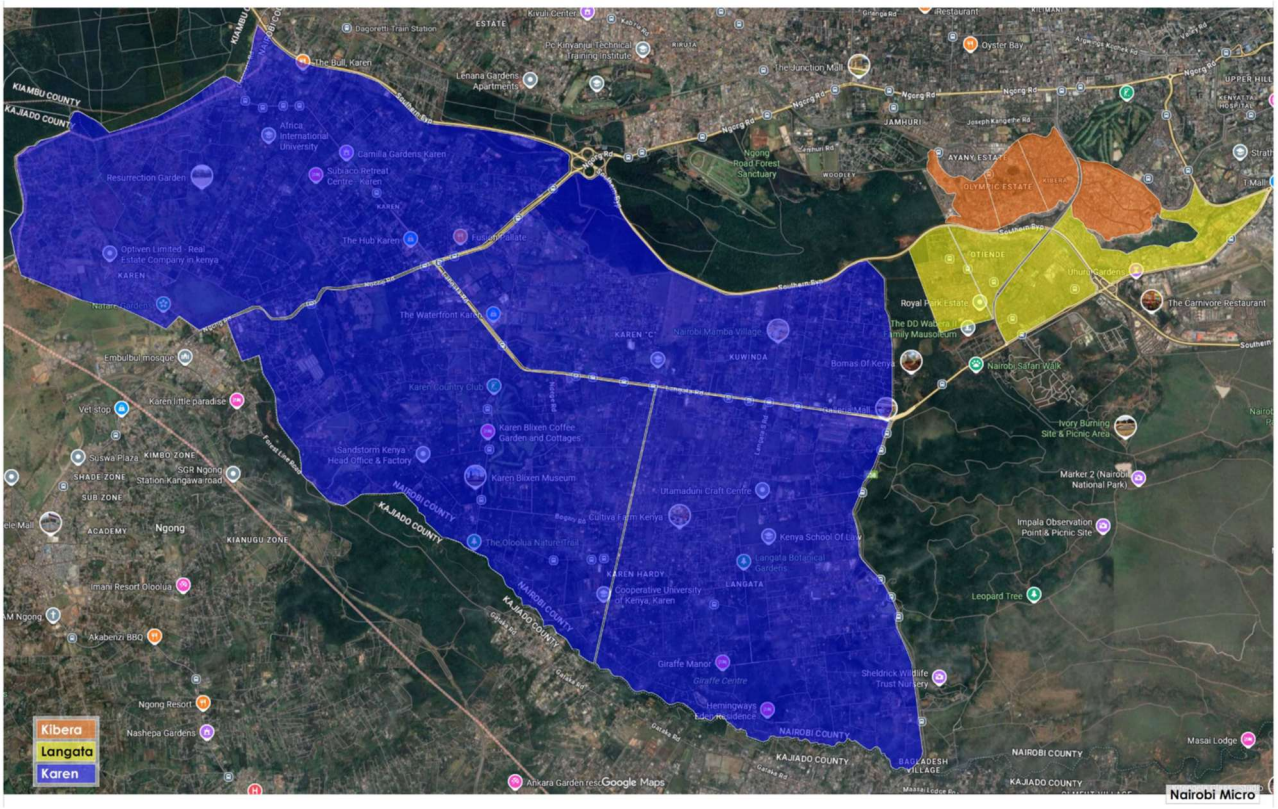


Figure 5: *Kibera – Langata – Karen Case study area. Source: Authors' illustration adapted from Google Maps (2026).*

1.3.3 Participatory data collection: a multistakeholder workshop

Following the primary on-site data collection, the project utilised a multistakeholder workshop as a complementary data collection method. The workshop brought together the full project team of 20 and representatives from government agencies, academia, practitioners, community groups, and housing actors to validate preliminary findings, generate contextual insights, and capture institutional perspectives. This 3-Day workshop (see workshop brief in Appendix 5) was designed to foster multi-sectoral dialogue, bridge academic and policy insights, and co-create actionable climate leadership and policy solutions.

a) Day 1 – Researcher-led debrief and reflection

The opening day focused on engaging students and early-career researchers in reflective dialogue on climate leadership, governance structures, and evidence-based approaches to climate action. The session included presentations of student projects, guided discussions with mentors, and interactive breakout groups to distil key learning points relevant to emerging leaders in climate policy and planning.

b) Day 2 – Industry and policy stakeholder engagement

The second day brought together industry players, government representatives, civil society, and academic experts to share practical experiences, innovations, and case studies in climate resilience, financing, and urban sustainability. Three (3) keynote speakers addressed the sub-topics of mainstreaming climate resilience in urban rental housing, climate justice and the rental economy, and data-driven decision-making for urban policy. All other invited guests were requested to share a 5-10-minute industry insight based on their work in the urban housing and climate action sectors. That way, how the topic of urban rental housing and climate resilience manifested in their fields of work and practice enabled triangulation of household-level data with policy, regulatory, and market viewpoints, thereby strengthening the robustness and relevance of the overall analysis.

c) Day 3 – Policy outputs

The final day focused on consolidating insights from the preceding sessions. The project team conducted a reconnaissance session to review findings, synthesise emerging themes, and outline key recommendations and knowledge outputs from the 3-day engagement.

1.3.4 Analysis

Taken together, the primary on-site data collected and the participatory stakeholder engagement information collated have been discussed in Section 2 around these core evidence themes:

a) Urban rental housing capture of Kibera, Langata, and Karen to review the range and scale of internal housing and settlement diversity, and to distinguish the characteristics of owner-occupied housing from those of renter-occupied households.

b) Multisectoral industry insights as a summary of outcomes based on the 3-Day stakeholder engagement workshop

c) The search for a climate-resilience-oriented rental-housing classification for Nairobi that is upscalable to Kenya's urban areas

d) Urban rental housing household survey analysis.

1.4 Report Structure

SECTION 1	SECTION 2	SECTION 3	SECTION 4
INTRODUCTION diverge ↗	EVIDENCE converge ↘	DECISION SUPPORT scales up ↗	BLUEPRINT
Urban Rental Housing in a Climate Emergency	**Nairobi's Urban Rental Housing Data**	**Moving the Climate Resilience dial**	**A Blueprint for Action**
Problem structuring, context, objectives, and the Nairobi zone framework	*Four divergent lines of evidence from the field*	*Evidence converges into actionable decision pathways*	*A sequenced national framework scalable across Kenya*
ENTRY POINT: single framing thread sets all downstream analysis	**DIVERGE: information expands across four independent streams**	**CONVERGE: four evidence streams synthesise into decision pathways**	**CONVERGE + SCALE: Nairobi evidence becomes a Kenya-wide framework**

SECTION 2 · EVIDENCE

2 NAIROBI'S RENTAL HOUSING DATA

Four divergent lines of evidence from the field.

Guiding principle for this section

Each sub-section (2.1–2.4) is a self-contained evidence stream. Read across all four to understand the full range of findings before moving to the decision pathways presented in Section 3.

The four independent evidence streams triangulate a more complete picture of climate vulnerability in Nairobi's rental housing across the housing capture, typology taxonomy, the household survey data and stakeholder insights.

NAVIGATE THIS SECTION

SECTION'S EVIDENCE STREAMS

This is the report's most extensive, detailed and in-depth section with four parallel and divergent streams of evidence collected through different methods, at different scales, and from different actors.

RECOMMENDED READER

Researchers, policy analysts, and evidence users who want to deep-dive into these four streams: urban housing capture with a climate resilience lens, stakeholder insights, housing typology taxonomy, and the household survey data.

2.1 Urban Rental Housing Capture in Kibera, Langata and Karen

2.1.1 Diversity within Kibera, Langata, and Karen Neighbourhoods

Figure 6: *Contrasting urban housing environments in Nairobi of Kibera, Langata, and Karen. Source: Authors (2026)*

Across the three study neighbourhoods of Kibera, Langata, and Karen, the urban rental housing capture process revealed a pattern that challenges conventional spatial narratives. Rather than reinforcing differences between neighbourhoods, the process exposed significant variation and diversity within them. This internal diversity within these neighbourhoods became one of the most critical empirical findings of the study.

Prevailing perceptions have tended to frame Karen as a uniformly affluent, low-density residential enclave, often aligned with the idealised image of homeowner-occupied villas set in manicured lawns and leafy environments (see Figure 6). Karen is, in fact, the most internally diverse of the three areas, with a wide range of rental housing typologies and asset and rental values (Figure 7, Figure 8, Appendix 6). It has a vibrant rental market, with monthly rents ranging from KES 8,000 to KES 650,000, suggesting a layered, heterogeneous housing market that extends beyond its dominant narrative of exclusivity. Langata, by contrast, broadly conforms to its commonly understood spatial character of organised row housing and planned estates. Yet even within this apparent uniformity, rental values vary substantially, ranging from KES 3,000 to KES 120,000 per month. Similar to Karen, it presents a mix of formal and informal housing arrangements co-existing within the same urban fabric, complicating assumptions of homogeneity. Kibera is frequently characterised as a uniformly low-income informal settlement. However, the urban housing capture data challenge this simplification. The recorded rental range of KES 2,500 to KES 25,000 per month demonstrates a notable degree of economic and spatial differentiation within the settlement. The variation is due to differences in land tenure, structure quality, location within the settlement and incremental slum upgrading processes over the years, all of which continually shape rental values.

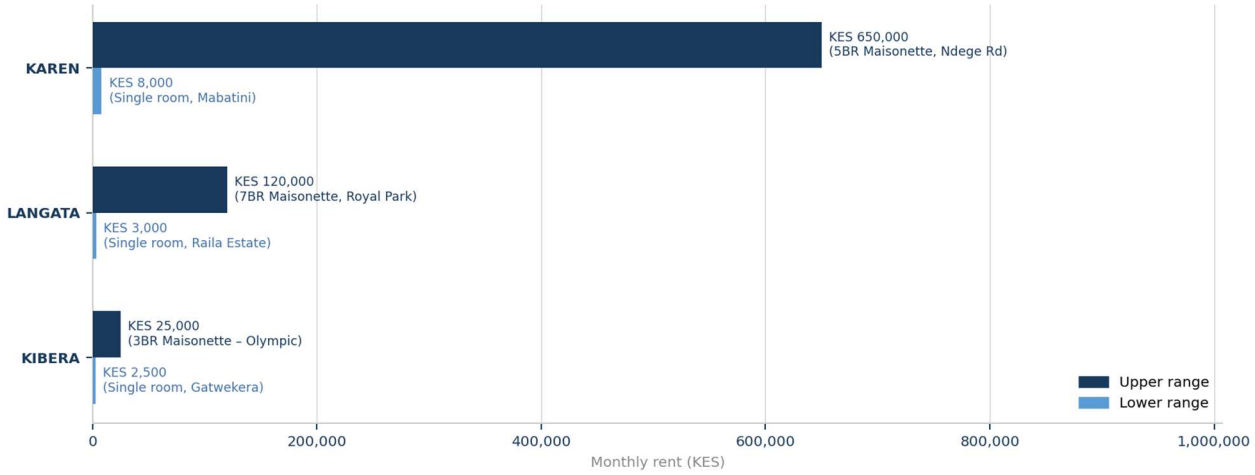


Figure 7: *Rental value ranges in KES in the three neighbourhoods of study. Note: High and low values represent the upper and lower rental bounds captured in the urban rental housing capture sample. KES = Kenyan Shillings. Source: Primary household survey data by the urban rental housing and climate resilience project (2026).*

2.1.2 Understanding rental-occupied housing beyond owner-occupied frameworks in the context of a climate emergency

Given the observed diversity of internal rental housing across the three neighbourhoods, a climate resilience lens was applied throughout the fieldwork to identify distributed climate risks at multiple scales. The set of intriguing questions scheduled in section 1.1 served as a basis for this urban rental housing capture review with a climate lens. An important finding was that urban rental housing in Nairobi operates as a fragmented and stratified system in which climate vulnerability is embedded in both spatial form and tenure arrangements. These intriguing questions were synthesised, calling for a move beyond static neighbourhood classifications towards more granular, typology- and system-based centred approaches to understanding urban resilience.

a) What makes rental-occupied housing different from owner-occupied housing, and are there any tangible and 'action-useful' points of departure in the climate resilience space?

In practice, rental housing is less adaptable in comparison to owner-occupied housing as tenants' agency and incentives to make alterations is limited.

Rental buildings are typically conceived, financed, and delivered as complete architectural products. In a way, once they are complete, they enter the rental market as a priced, income-generating asset for the landlord, which means that the

asset's built form, spatial arrangements, servicing and building systems remain stable for long periods of time. Furthermore, the logic of rental housing is based on the predictability of the product, with pricing tied to it, and therefore reaches 'built form completeness' very early in its lifecycle. On the other hand, owner-occupied housing, especially in the African market, is inherently structurally adaptable. Comparatively, large volumes of planning permissions are submitted for statutory approval for renovation permits for additional rooms, room extensions, verandas enclosed, living rooms expanded, windows enlarged, water tanks added, trees planted, additional units constructed, roofs altered, etc., for homeowner-occupied houses. More often than not, these modifications are not always formally planned at the outset but emerge gradually in response to the owner's everyday lived experience. In this way, the house becomes a flexible framework rather than a static product.

In rental housing, by contrast, tenants have limited authority to make substantial architectural changes, and landlords may be reluctant to invest in upgrades that do not immediately translate into higher rental returns. The result is a relatively architecturally rigid rental market, even within rapidly changing urban and climatic conditions. Owner-occupied housing possesses an embedded capacity for gradual transformation, which serves as the basis for resilience building. In the rental sector, therefore, closer attention must be paid not only to maintenance but also to the initial housing form and the tenure logic in the space of climate action.

b) What is the basis of resilience building in renter housing and settlements? Is it distinct from resilience-building in owner–occupied housing?

In practice, the nature of the housing services market defines resilience-building in renter housing and settlements.

Owner-occupied housing, which has received the most housing policy attention in Kenya, is typically characterised by high occupant permanence, tenure security, stronger place attachment, and relatively higher incentives to remain and invest in their dwellings and neighbourhood conditions. On the other hand, renter-occupied accommodation is seen as inherently rotational, far more fluid with higher household turnover, sometimes with occupation that can change within days, eg, in the case of Airbnb accommodation. Owner-occupied accommodation has seen greater uptake of formal climate action standards. Transient occupancy patterns in rental housing seem to weaken the incentive for long-term resilience investment at the household level and shift how resilience needs to be built.

It was observed that adaptation to climate impacts in these 3 neighbourhood contexts was less about meeting formal building physics-led standards on the physical asset as per the Building Code 2024 and various instruments for mainstreaming climate resilience knowledge (see all references scheduled in section 1.1) and more about community-driven initiatives, solidarity, and local innovation, especially in informal settlements. Even within more formal rental typologies, mobility itself becomes a coping strategy, with tenants adjusting their location rather than upgrading their physical assets as expected. Housing policy in Kenya has tended to prioritise the provision of physical units, largely focusing on supply, ownership, and access to housing assets, while paying far less attention to how housing is actually lived in and used. As a result, climate considerations seem to have largely centred on building performance and technical standards on the asset, with limited engagement with the realities of the rental market as a housing service market where occupancy patterns, user behaviour, and short-term decision-making play a critical role in shaping how resilience is experienced in practice.

c) How do we navigate the housing typology and tenure diversity concerns in the targeted mainstreaming of resilience policy and guidelines?

There is a need to acknowledge the limits of physical, asset-centred approaches and to respond to how spaces are actually occupied and used, moving towards more human-centred policy and regulatory environments.

The study not only found a mix of housing types across Karen, Langata, and Kibera, but also observed how spaces were occupied, ranging from people working from home to those away all day to households with children or elderly residents present throughout. People's habitation needs are constantly shifting as jobs change, families grow or separate, and

priorities evolve. At the same time, the way housing itself is produced to host all these aspects is uneven, from formally built developments to incremental extensions and informal additions. Within this mix, decisions about the home are rarely made in one place or at one time. Tenants and landlords act at different moments, often without coordination, each responding to their own pressures and constraints. This makes it difficult to apply a neat, one-size-fits-all tool and guideline to climate resilience, because what needs to be done and who is able to do it vary from one household to the next and even over time within the same dwelling. A human-centred approach, therefore, that starts from household and settlement asset qualities but extends to capture patterns of space use and everyday constraints, in a way that builds resilience around the latter, is a required shift. Without this shift, policy and guidelines risk being technically sound but practically unworkable unless they align with the realities of how rental housing functions across space and time.

d) What is the compliance threshold for multi-hazard resilience building, and how do we close this gap in the rental sector?

There is an urgent need for a multi-hazard climate resilience rulebook to manage risks flexibly, rather than one at a one-at-a-time risk management plan, and a rulebook that defines what 'climate-safe' housing looks like.

The 2024 National Building Code marks a clear step up from the old 1968 framework, especially in how it addresses safety and indoor comfort standards for the normative climate context. When it comes to climate hazards, no other tool in the market sets compliance thresholds for climate-related risks across the future climate weather in a way that defines the collective point at which living conditions become unacceptable when heat becomes too much, when precipitation levels disrupt daily life, when water scarcity or energy security crosses into real vulnerability to households, etc. Without these thresholds cast for tropical climatic conditions of a developing country context, it becomes difficult to say when a home and its living conditions depart from an agreed threshold.

From the fieldwork, it was observed that across Kibera, Langata, and Karen, climate impacts are not experienced in the same way, and that the risks often overlap and build on one another. Yet current mechanisms for relaying standards treat these risks in isolation and typically focus on impacts on the building's physical structure. There is a need to move away from this narrow view and consider multiple risks together rather than one at a time. This would help shift the focus from simply meeting technical requirements to ensuring that homes remain livable under changing conditions. It also means looking ahead, not just responding to current climate patterns but preparing for future ones. For the rental sector in particular, where conditions and vulnerabilities can change quickly, a more flexible and practical multi-hazard rulebook would make it easier to guide preventative, coping and long-term resilience mechanisms.

e) How can we navigate Nairobi's rental market's stock adjustments, such as backyarding, change of use, and short-stay lets shifts?

Rather than planning for a static housing stock, there is a need to understand and work with this constant housing use adjustment, using better data and sensitivity analysis.

The urban rental housing capture made clear that housing in Nairobi is never a finished product. While policy assumes a completed house serving a single purpose, housing is more fluid, with spaces constantly changing in use: shops turning into rooms for rent, hotels breaking down into single-room units, large family homes subdivided and let out in parts, or converted into short-stay accommodation. Equally, 'backyard dwellings' in the form of units built behind main houses are now commonplace. These are typically poorly constructed, but meet demand that the formal-sector supply cannot. Simultaneously, there is a surge in short-stay Airbnb-type rentals. All of these create a housing system that is in constant motion, with shifting supply, pricing, and occupancy patterns. This level of variability introduces uncertainty of housing use over time, but it also points to where policy needs to catch up. There is a case for recognising what is already happening on the ground by bringing backyard housing into the fold through conditional approvals, setting clearer, more flexible guidelines for change of use, and managing the growth of short-term lets so that long-term housing supply is not squeezed out. Rather than planning for a static housing stock, there is a need to understand and work with this constant adjustment, using better data and sensitivity analysis to track how and why these shifts happen, and to guide more balanced decisions

f) What are the renter and the landlord in full control of?

There is a need to understand design-operations-maintenance stages and designated tenant-landlord structural guidelines, with an allowance for gradual compliance.

Tenants and landlords do not share control over housing in the same way, and this has real implications for how climate resilience can be built. Asset type decisions, such as how the house is designed, its materials, drainage, and construction, sit firmly with the landlord. Tenants, on the other hand, have some control over how the space is used and managed day to day. During maintenance and repairs, the lines are often blurred, and the tenant/landlord responsibility split was seen to play out differently in Karen/Langata compared to Kibera. A common observation across the three neighbourhoods is that landlords hold structural control, while tenants bear much of the day-to-day coping burden, calling for a split tenant coping guidelines regimen separate from a landlord structural guidelines.

Bridging this gap will require more than just guidelines. Landlords will need incentives, eg. through tax relief, small grants, or compliance benefits, to invest in upgrades. At the same time, tenants are likely to need access to flexible financing options that support small-scale improvements, especially in informal settlements. There is also a need to allow for gradual compliance, especially in older or informal housing, so that improvements can happen step by step rather than through unrealistic all-at-once standards. It was observed that stronger tenant groups or estate-level associations can help coordinate decisions where they are otherwise fragmented. In the end, making roles clear, especially around operation and maintenance of housing and settlements, is essential. Without that clarity, responsibility falls through the cracks, and resilience efforts struggle to take hold.

g) There is a need to take stock of diverse self-build and neighbourhood-level resilience housing solutions underway.

There is great potential to leverage existing climate resilience measures by renters.

A range of climate resilience actions has been observed. However, these initiatives remain fragmented, with limited consolidation, mapping, or shared acknowledgement within a coherent citywide resilience framework. There is a need to map out climate resilience activities that i) require appraisal and impact studies, ii) need up-scaling, iii) should be considered by all stakeholders, and iv) are desirable but need further planning, consultation and exploration.

h) There is a need for a full categorisation of the rental housing taxonomy for urban areas in Nairobi.

There is a need to close a critical classification gap by developing a more holistic housing taxonomy.

At the moment, there is no consistent way to classify rental housing typologies and tenure arrangements, which makes it difficult to design interventions that respond to real conditions. A more grounded housing taxonomy would look beyond just the physical form of the house and begin to capture both what housing is and how it is used. This means describing structure types (flats, maisonettes, bungalows), ownership and tenure (formal leases alongside informal rentals), construction materials, unit sizes, and neighbourhood contexts (from Kibera to Langata to Karen) and also recognising patterns of use, such as long-term renting, short-stays, and even hybrid arrangements. Just as important is understanding who occupies these spaces and at what stage of life, because this shapes demand and adaptation in subtle but important ways. Framing housing in this way helps close a critical classification gap, shifting the conversation on climate impact, especially around how space is occupied, serviced, and negotiated within the broader housing services market.

i) What should be the priorities for climate resilience solutions, alongside other built environment priorities?

Climate resilience is rarely a standalone goal in housing. Priority-setting tension sits between lived realities and broader ambitions for the built environment.

What became apparent through the fieldwork is that climate resilience is not the only thing people are optimising for. Rather, everyday decisions about how housing is used are shaped by more immediate concerns like safety, security, and affordability. Issues as simple as whether a window stays open are often less about ventilation and more about fear of theft or privacy. Meaning, if a space does not feel secure, people will override any ventilation or daylight strategy. These

lived realities sit alongside broader ambitions for the built environment, and the two do not always align neatly. Trade-offs were observed among airflow and security, cost and quality, and density and comfort. So rather than treating climate resilience as a standalone goal, it has to be woven into these everyday choices. The most effective solutions will be those that quietly support both.

2.2 Multi-sectoral industry insights

This section summarises the outcomes of the 3-Day stakeholder engagement workshop (Appendix 5). The workshop was used as a participatory method to capture insights from policymakers and the industry.

2.2.1 Mainstreaming Climate Resilience in Urban Rental Housing

The keynote framed urban rental housing as the primary site for achieving climate resilience in Nairobi, rather than a peripheral housing concern. The keynote's intervention linked the physical form of rental stock with the distorted market drivers and persistent policy mismatches to explain why resilience is systematically absent in current urban development outcomes. The rationale underpinning existing ordinances and planning controls was challenged, emphasising the need for firmer, defensible figures (e.g., housing deficit, affordability across demographics, etc.) to ground both policy and investment decisions. On the question of why resilience is not being built, it was pointed to weak incentives, misaligned financing systems, governance gaps, and short-term development cultures that privilege speed and yield over long-term performance and safety. Importantly, climate resilience is not a moral add-on but an economic value proposition. The presentation concluded by calling for clearer tools and levers, establishing the economic value proposition for multi-hazard resilience building in the rental market, and elevating credible local case studies to shift market norms and build a professional culture toward climate-first urban rental development.

2.2.2 Climate Justice and the Rental Economy

The speech powerfully grounded the workshop's climate justice and rental-economy themes by anchoring them in the lived experiences of informal settlement dwellers. The everyday trade-offs faced by low-income renters navigating climate risk and the lived experiences in Mathare slums were shared, including how households spend at least 30%-50% of their income on rent and how affordability is inseparable from questions of safety, dignity, and resilience. For many tenants, immediate security concerns often take precedence over longer-term climate considerations. Poor drainage is a critical and possibly tangible entry point for climate action, directly shaping health and safety and households' capacity to cope with recurrent shocks such as flooding. Central to these reflections was a question of rights: what entitlements, if any, tenants hold within the climate resilience agenda, and how these are articulated, or absent, within current housing and regulatory frameworks. Emphasised further was the need for shock management as part of the resilience journey, recognising that households must be supported not only in future-proofing their homes but also in surviving ongoing disruptions. Finally, the prevailing assumptions about affordability as a standardised technical metric for housing were challenged, arguing instead for approaches that recognise family structures, cultural practices, and social diversity, and that embed climate resilience within the social realities of rental life rather than abstract housing models.

2.2.3 Data-Driven Decision-Making for Urban Policy

The keynote presentation offered a practice-oriented articulation of data-driven urban policy as a necessary shift from abstract planning ideals to evidence-led governance anchored in how housing is actually produced and occupied in Kenyan cities. The question of what data, and in service of what urban policy, was interrogated, arguing that current policy frameworks often assume completed, ownership-led housing models, while the dominant reality is incremental housing, frequently rental, evolving rather than arriving as a finished product. The need for systematic data mining across settlements to capture lifecycle affordability, housing quality, infrastructure access, and risk exposure, rather than one-off snapshots, was emphasised. A key insight was the value-chain perspective, contrasting the often-unexamined costs of brokers, intermediaries, and inefficiencies against the relatively modest but high-impact costs of mainstreaming risk and resilience into housing production. A four-tier design and delivery process that links community co-design, materials

and construction supply chains, finance, and governance, and shows how data can align actors across scales was presented. Additionally, the political economy challenge of cost versus need was presented, noting that outcomes are fundamentally shaped by who pays and who decides. That robust, transparent data is essential to rebalance power, prioritise public value, and enable urban policies that respond to lived realities rather than idealised models.

2.2.4 Industry and Policy Stakeholders' climate action priorities

Alongside the three keynote presentations, the second day of the workshop deliberately created space for industry perspectives to ground the discussions in practice. Each attendee was invited to contribute a short 5-to-10-minute insight that draws directly on their experience in the urban housing and climate action sectors. The intention was to surface how these issues are actually playing out across different fields, what is working, where the gaps are, and how challenges are being navigated in real practice contexts. This format allowed for a rich set of grounded reflections, summarised below as independent speaker views.

a) Translate research into market-ready tools and regulatory-ready instruments.

Resilience research should not only be academically rigorous but also genuinely market-usable at scale, translating evidence into tools, metrics, and insights that practitioners can readily apply. It was emphasised that impact emerges where academic knowledge meets real market incentives, regulatory realities, and delivery constraints, rather than remaining within scholarly or policy silos. Speaking from a developer practice lens, a strong conviction that sustains climate action in urban housing depends on closer, intentional alignment between academia and industry, so that research actively shapes investment decisions, development models, and everyday professional practice.

b) Centre indoor environmental health.

Indoor air quality is a foundational yet often overlooked pillar of climate resilience, and we argue here that safeguarding respiratory and overall health must be treated as a core adaptation priority rather than a secondary co-benefit. Attention was drawn to the uneven distribution of thermal stress within and across buildings, noting that heat exposure disproportionately affects vulnerable households depending on construction type, orientation, and ventilation strategies. The microclimate heterogeneity and variability across urban rental typologies were emphasised, stressing that climate-responsive interventions must be context-specific and evidence-based, reflecting the varied environmental conditions residents experience rather than relying on one-size-fits-all solutions.

c) Prioritise foundational and basic housing services as a basis.

A critical provocation was posed: Can climate resilience be meaningfully discussed when basic services and standards remain unmet? Drawing on a community-driven, pro-poor planning practice grounded in informality, it was argued that resilience strategies must begin with foundational issues, including adequate water, sanitation, drainage, safety, and habitability, without which higher-order climate interventions risk being ineffective or exclusionary. Embedding climate resilience in urban housing requires a sequenced, grounded approach, in which strengthening basic urban systems is recognised as a prerequisite for long-term adaptation and sustainability.

d) Align resilience goals with practical, investable implementation frameworks.

What should serve as the guiding light for climate-resilient urban housing, considering global frameworks such as the SDGs, national instruments such as Kenya's Building Code, and the lived realities of cities where safety, adequacy, and affordability remain aspirational end states? Urban resilience must be clearly linked to existing implementation frameworks, be equally legible to developers and financiers, and be supported by a clear articulation of the return on investment for resilience-aligned decisions. The tension between these ambitions and the reality of fragmented, uncoordinated development delivery was discussed, with the argument for stronger alignment across policy, regulation, and market practice to translate resilience goals into coherent, investable outcomes.

e) Integrate decarbonisation and resilience through context-sensitive housing pathways.

Decarbonising the rental housing market must proceed in parallel with building climate resilience, rather than treating these as separate or competing climate agendas**.** It was emphasised that equitable decarbonisation pathways in rental housing require context-sensitive solutions that balance environmental performance with affordability, habitability, and long-term social value.

f) Adopt evidence-driven, adaptive systems for delivering quality housing at scale.

The primacy of countable, visible evidence in shaping effective housing and climate policy is critical. Meaningful responses in the housing demand and supply space are only possible when conditions are properly measured and understood. A call for dynamic, locally tailored building codes and planning instruments that can guide action rather than merely prescribe standards was made. Framing housing as a multiscalar and holistic system**,** there is a need to align tenure security, industrialised housing production, and the country's affordable housing programme's push for scale with questions of quality, urban form, and integrated planning, rather than treating delivery as a numbers-only exercise.

g) Leverage ongoing urban renewal programs to deliver integrated, climate-resilient rental neighbourhoods through clear roles and partnership models.

The scale of opportunity presented by over 10,000 hectares earmarked for urban renewal in Nairobi was presented, questioning how these areas can be deliberately positioned as climate-resilient, rental neighbourhoods rather than conventional redevelopment projects. The lack of clarity around the private sector's roles and responsibilities in delivering resilience was highlighted, noting that gaps persist in how risk, cost, and long-term value are allocated. Finally, the potential of joint venture models to integrate climate resilience and rental housing into broader urban systems was presented and argued for, with a call for renewal approaches to strengthen climate resilience.

h) Integrate rental contracting and management as the backbone of sustainable housing delivery.

A grounded, implementation-focused perspective on how rental contracting intersects with day-to-day property management was presented, particularly in informal and transitional urban contexts. A working model of a structured rental agreement, aligned with construction typologies and management responsibilities, was demonstrated as central to sustaining affordability, habitability, and investor confidence in dense rental developments. By linking unit design, shared services, and maintenance obligations directly to rental contracts, the model illustrates how operational clarity reduces risk for both tenants and investors, even in the absence of formal land titles. A climate-resilient and socially responsive rental housing is not delivered by design alone, but through integrated contracting and management systems that govern use, upkeep, and long-term performance of housing assets.

i) Ground resilience in rights-based community accessible knowledge.

A personal reflection on how Kibera has significantly changed, alongside the sustained field-based research that has enabled continuous data collection and iterative learning in Kibera over the years, was presented by a village elder. The importance of making synthesised findings accessible and usable to residents themselves was emphasised. Additionally, the inevitability of climate-induced displacement was discussed, calling for workable resettlement action frameworks, greater space for housing cooperatives, deeper academic engagement beyond data collection, and a clearer interpretation of Article 43(1)(b) of the Kenyan Constitution in advancing the right to adequate housing within climate-resilient urban transitions.

j) Centre lived experience and community knowledge in addressing a myriad of urban risks.

The importance of recognising the continuities between a *kijiji* (village) life and informal urban settlements was showcased from an ongoing project lens. The presentation advocated for methodologies that treat local residents as experts in mapping lived experience, everyday risk, and coping strategies. Framing climate resilience as a citizen-led risk management challenge, the layered nature of risk in informal settlements across environmental, social, and mental was

discussed and an argument for responses that address compounded vulnerabilities rather than isolated hazards was presented.

k) Scale finance-ready resilience frameworks.

A national government-led resilience program was showcased, featuring a multi-level, multi-sectoral structure that links community-scale resilience, infrastructure investment, capacity building, and climate finance mobilisation. Altogether in a way that aligns directly with national urban development, housing, and climate commitments. Readiness programmes, pilot implementation, and scalable pipelines provide a practical bridge between local upgrading initiatives and national financing instruments, including climate funds and subnational investment platforms. Overall, the presentation demonstrated how the project's outputs can be operationalised as implementation vehicles for government programmes, translating policy ambitions on urban resilience, housing, and climate adaptation into coordinated, financeable, and replicable action.

l) Treat housing as a lens for understanding urban systems and realigning policy with lived realities.

Housing was framed as a diagnostic lens for understanding Nairobi's urban process, arguing that shifts in form, tenure, and delivery reveal deeper structural dynamics shaping cities. A change in emphasis, from narrow production targets to a broader understanding of housing delivery, was presented, supported by repositioned education and capacity-building efforts that bridge the gap between academic research and practice. Drawing on the breadth of existing research, a more honest engagement with both successful and problematic outcomes in housing is needed. The role of liberalisation in current housing challenges underscores the need to reconnect housing policy and practice with the diverse aspirations, constraints, and lived realities of the population.

m) Adopt contextual material choices.

The importance of construction material choice as a context-specific decision, rooted in climate, culture, and lived practice rather than universal prescriptions, was proposed. This, alongside the productive intersection between vernacular knowledge and contemporary ecological understanding, argues that resilience emerges when local building intelligence is recognised and strengthened. Finally, a caution against overly prescriptive approaches to climate resilience was outlined, advocating instead for empowering frameworks that enable communities, designers, and builders to adapt solutions to their own environmental and social contexts.

n) Rethink education, ethics, and long-term value.

A call for adapting teaching and professional formation to contemporary urban and climate realities was presented, arguing that education must evolve in step with changing risks, markets, and societal needs. A critical ethical and economic question was raised around the duty of care and valuation, challenging false environmental economies driven by land speculation and short-term gains that externalise long-term social and climate costs. Finally, an urge to track trends and outcomes over time was laid out, provocatively asking whether bad architecture truly pays once lifecycle performance, resilience, and public value are factored in.

o) Clarify roles and strengthen cross-sector coordination

Through reflection, decades of housing research work in the country were spotlighted, highlighting how roles and responsibilities across government, the private sector, civil society, and academia have evolved and diverged over time. Emphasis was made for clearer comparative role allocation, noting that effective housing and climate action depend on each actor understanding where their mandate begins and ends. There is a need for deliberate sensitisation and engagement across sectors, arguing that sustained cross-sector collaboration is essential for translating long-term research insights into coordinated, actionable urban housing outcomes.

p) Collaboration is the foundation and main principle for effective and scalable action.

The importance of collaborative structures as the backbone of effective urban housing and climate action was emphasised, noting that no single institution can address these challenges in isolation. Progress depends on actively sharing diverse knowledge perspectives across disciplines, sectors, and communities to build more inclusive and robust solutions. Drawing from architectural practice, structured collaboration transforms fragmented expertise into coordinated action with greater legitimacy, scalability, and long-term impact.

2.3 Urban rental housing taxonomy for climate resilience

Figure 8: *A photomontage of Kibera, Langata and Karen house types and relative neighbourhood access roads. Source: Primary household survey data by the urban rental housing and climate resilience project (2026).*

Nairobi's housing is highly stratified. The images in Figure 8 are a photo montage of each neighbourhood. and, based on the urban housing capture exercise undertaken (Section 2.3), 20 rental housing typology profiles were identified (Appendix 2) across the three neighbourhoods and profiled according to formal/informal social-strata tenure, site-level housing floor plate configuration, building envelope materiality, and housing form as summarised in Table 1 and illustrated in Figure 9.

2.3.1 Climate-resilience-oriented rental housing classification

The Kenya National Building Code 2024 broadly categorises residential housing as **i)** single dwelling units: detached houses, bungalows, maisonettes, townhouses, and **ii)** multi-dwelling units: flats, high-rise residential buildings, low-rise and medium-rise shared housing developments. The code additionally recognises institutional and mixed residential accommodation, such as hostels, boarding houses, student accommodation, workers' housing and dormitory accommodation. An additional categorisation by Kenyan rental and property platforms, such as the buy rent Kenya

platform, further categorises these typologies by **iii)** room counts: eg, 1 Bedroom, 2 Bedroom, 5 bedroom, etc., and by **iv)** length of stay use, such as short lets, long-term rentals, serviced housing, etc.

In the search for a rental housing taxonomy for climate resilience action, it is critically important to link the physical form of residential properties to exposure to climate hazards, sensitivity to them, and the unit's adaptive capacity based on the occupant, rather than merely to these existing market or legal categories. A deliberate effort by the team to build a credible taxonomy that could function in a climate resilience space settled on describing housing typology across four lines to capture:

- The institutional condition of the dwelling that captures the formal-informal social strata aligned with tenure,
- The way the housing unit floorplate occupies land on the site level,
- The climatic behaviour of the housing unit's outer skin by capturing the building envelope's materiality and
- The housing form description capturing its internal organisation of occupancy.

The team has treated these four parameters (Table 1) not as optional descriptors, but as the minimum anatomy of a climate-resilient housing description, and without them, the real built condition of rental stock ceases to be a reliable conduit for resilience decision-making.

a) Formal / Informal social-strata tenure

Formal housing here does not simply mean a visual style that manifests the geometrical 'purity' of the built form and the space between buildings. Formal housing sits within a centrally coordinated and recognised system of ownership, professional support during the design, construction, and use stages of the building, statutory review, and development control approval processes and verification. In contrast, informal housing has serious institutional defects beyond its irregular spatial layouts. Institutionally, informal housing presents with insecure tenure, weak connection to centrally governed connectivity infrastructure and services, and limited compliance, which are preliminary conditions to the adoption of most climate policies. As a first-order resilience variable, social strata tenure is a clear proxy for the degree to which housing is embedded in systems that support prevention, coping, adaptation, maintenance, and recovery strategies.

b) Site-level configuration

The housing floor plate is a second-order variable that explains how the house unit sits on the plot and how the plot performs climatically within the neighbourhood. Research (Oke, 1988; Givoni, 1998; Santamouris, 2013; Oke et al., 2017) shows that urban geometry affects thermal conditions inside and outside buildings, solar radiation access and penetration into the unit, indoor and outdoor wind movement and ventilation within the housing unit, and it additionally affects the microclimate, airflow patterns, air temperature, and radiant temperature around buildings. That is why in resilience terms, the varying floor plate conditions established by the team (Table 1, Figure 9) cannot be treated as physically equivalent, even when they share similar materials or tenure status.

c) Envelope materiality

As a third-order parameter, the housing envelope construction material is the climate interface of the dwelling, as it separates indoor conditions from external weather conditions. More so, the wall material, because roofs often occupy a small surface area in direct contact with the internal house spaces, compared to the external walls.
Recording external wall materiality separately from tenure and form shows how quickly the dwellings heat up or lose heat, how vulnerable they are to flooding conditions and associated dampness, etc.

d) Housing form

Finally, the housing form as a fourth-order parameter must remain distinct. Following the building code and rental market established categories mentioned above, these make the distinct form, internal organisation of living, a visible component of the taxonomy.

Table 1: *A schedule of 20 rental housing typologies identified following the four-tier housing taxonomy developed by the Authors as the minimum anatomy required for climate-resilient housing assessment. Source: Authors (2026)*

Social-strata tenure **FORMAL/INFORMAL**	**Site-level** **CONFIGURATION**	**Envelope** **MATERIALITY**	**Building-level** **HOUSING FORM**
Formal No.1	Multi-unit floor	Masonry	Self-contained flat
Formal No.2	Multi-unit floor	Masonry	Bed-sitter flat
Formal No.3	Stand-alone	Masonry	Maisonette
Formal No.4	Line wall housing	Masonry	Bed-sitter flat
Informal No.5	Row housing	Rammed Earth	Bedsitter
Informal No.6	Row housing	Iron sheet	Bedsitter
Informal No.7	Row housing	Timber	Bedsitter
Informal No.8	Swahili housing	Rammed Earth	Bedsitter
Informal No.9	Multi-unit floor	Multi-material stone/iron sheet	Bed-sitter flat
Formal No.10	Row housing	Masonry	Maisonette
Formal No.11	Stand-alone	Masonry	Bungalow
Informal No.12	Backyard row housing	Rammed Earth	single room
Informal No.13	Backyard row housing	Multi-material stone/iron sheet	double-room flat
Informal No.14	Multi-unit floor	Iron sheet	Bed-sitter flat
Informal No.15	Mtaa U-Courtyard	Iron sheet	Bedsitter
Formal No.16	Stand-alone	Masonry	Villa
Formal No.17	Multi-residential student accommodation	Masonry	Studio flats
Informal No.18	Backyard row housing	Masonry	Bedsitter
Informal No.19	Row housing	Masonry	Bedsitter
Informal No.20	Backyard row housing	Iron sheet	Bedsitter

2.3.2 Twenty key typologies in Nairobi

Taken together, the four-line taxonomy parameters are not only descriptive but are decision-ready. Table 1 presents a summary of the four-line taxonomy used to establish twenty (20) urban rental housing typologies in the study area. Figure 9 and Figure 10 present a visual summary of 20 rental housing typologies identified in the Kibera - Langata - Karen zone, a representative sector of Nairobi housing zones (Figure 4). The four-line taxonomy functions as a minimum viable framework for climate-resilient housing. Remove any of these lines, and the classification becomes too thin. Although it is recognised that occupancy densities, community functions, investment priorities, and several related space-use dimensions are influenced by climate vulnerabilities and resilience considerations, these can be progressively developed from this framework in an expandable, layered manner. Section 2.4 expands on additional climate action observation points.

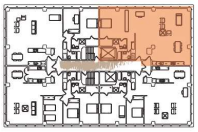
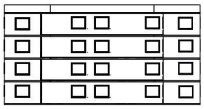
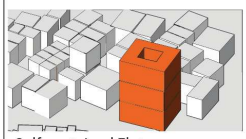
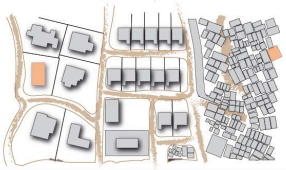
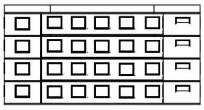
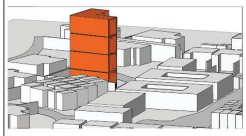
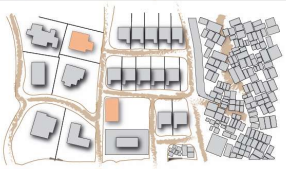
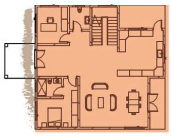
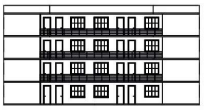
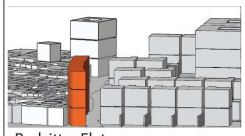
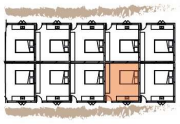
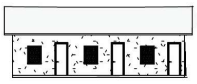
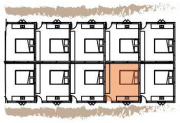
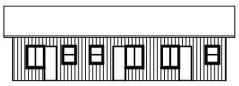
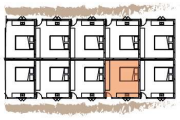
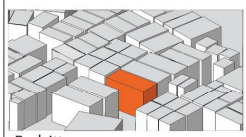
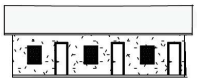
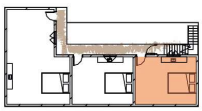
	NEIGHBOURHOOD CONTEXT	FLOOR PLATE CONFIGURATION	WALL ENVELOPE MATERIALITY	HOUSING FORM
TYPOLOGY 1 MULTI-UNIT FLOOR; MASONRY; SELF-CONTAINED FLAT (FORMAL) Primary location: (Karen, Langata, Kibera)		 Multi-unit floor	 Masonry	 Self contained Flat
TYPOLOGY 2 MULTI-UNIT FLOOR; MASONRY; BEDSITTER FLAT (FORMAL) Primary location: (Karen, Kibera)		 Multi-unit floor	 Masonry	 Bedsitter Flat
TYPOLOGY 3 STAND-ALONE; MASONRY; MAISONETTE (FORMAL) Primary location: (Karen, Langata)		 Stand-alone unit	 Stone	 Maisonette
TYPOLOGY 4 LINE-WALL HOUSING; MASONRY; BEDSITTER FLAT (FORMAL) Primary location: (Kibera edges)		 Line wall housing	 Masonry	 Bedsitter Flat
TYPOLOGY 5 ROW HOUSING; RAMMED EARTH; BEDSITTER (INFORMAL) Primary location: (Kibera)		 Row housing	 Rammed earth	 Bedsitter
TYPOLOGY 6 ROW HOUSING; CORRUGATED IRON; BEDSITTER (INFORMAL) Primary location: (Karen, Langata, Kibera)		 Row housing	 Ironsheets	 Bedsitter
TYPOLOGY 7 ROW HOUSING; TIMBER; BEDSITTER (INFORMAL) Primary location: (Kibera)		 Row housing	 Timber	 Bedsitter
TYPOLOGY 8 MTAA U-COURT; RAMMED EARTH; BEDSITTER (INFORMAL) Primary location: (Kibera)		 Mtaa U-court shape	 Rammed earth	 Bedsitter
TYPOLOGY 9 MULTI-UNIT FLOOR; MULTI-MATERIAL STONE/IRON; BEDSITTER FLAT (INFORMAL) Primary location: (Langata, Kibera)		 Multi-unit floor	 Stone / Iron sheets	 Bedsitter flat
TYPOLOGY 10 ROW HOUSING; MASONRY; MAISONETTE (FORMAL) Primary location: (Langata)		 Row housing	 Masonry	 Maisonette

***Figure 9**: An illustration of twenty (20) housing typologies identified across the Kibera, Langata, and Karen areas, representing typical residential forms commonly found with contextual variations across Nairobi and many other urban areas in Kenya. Source: Authors (2026)*

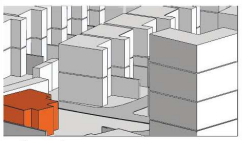
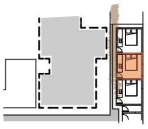
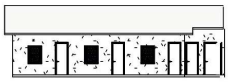
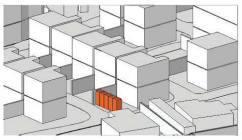
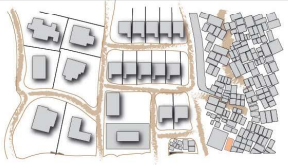
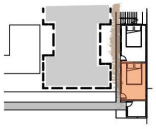
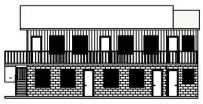
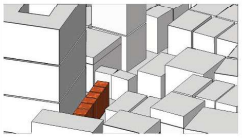
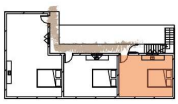
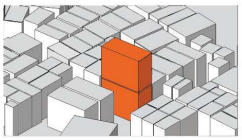
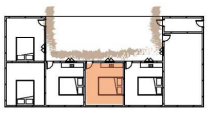
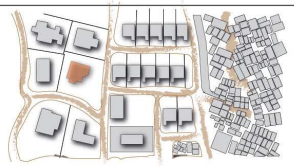
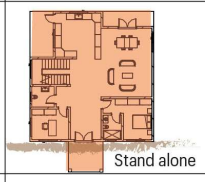
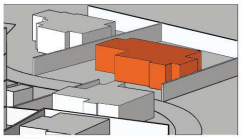
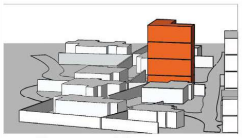
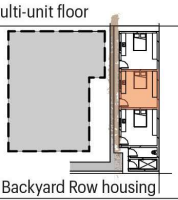
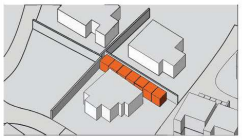
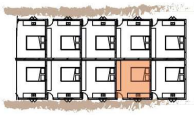
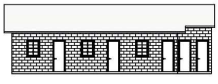
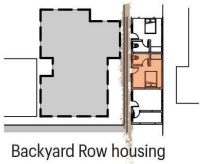
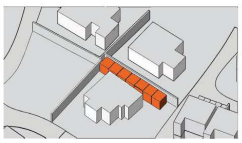
	NEIGHBOURHOOD CONTEXT	FLOOR PLATE CONFIGURATION	WALL ENVELOPE MATERIALITY	HOUSING FORM
TYPOLOGY 11 STAND-ALONE; MASONRY; BUNGALOW (FORMAL) Primary location: (Karen, Langata)		 Stand-alone unit	 Stone	 Bungalow
TYPOLOGY 12 BACKYARD ROW HOUSING; RAMMED EARTH; SINGLE ROOM (INFORMAL) Primary location: (Langata)		 Backyard Row housing	 Rammed earth	 Bedsitter
TYPOLOGY 13 BACKYARDING ROW HOUSING; MULTI-MATERIAL -STONE/IRON (INFORMAL) Primary location: (Kibera)		 Backyard Row housing	 Stone / Iron sheets	 Bedsitter flat
TYPOLOGY 14 MULTI-UNIT FLOOR; IRON SHEET; BEDSITTER FLAT (INFORMAL) Primary location: (Kibera)		 Multi-unit floor	 Iron sheets	 Bedsitter flat
TYPOLOGY 15 SWAHILI COURTYARD; IRON SHEET; BEDSITTER (INFORMAL) Primary location: (Kibera)		 Swahili courtyard layout	 Iron sheets	 Bedsitter
TYPOLOGY 16 STAND-ALONE; MASONRY; VILLA (FORMAL) Primary location: (Karen)		 Stand alone	 Masory	 Villa
TYPOLOGY 17 MULTI-RESIDENTIAL STUDENT ACCOMMODATION; MASONRY; STUDIO FLATS (FORMAL) Primary location: (Karen)		 Multi-unit floor	 Masonry	 Self contained flat
TYPOLOGY 18 BACKYARDING ROW HOUSING; STONE; BEDSITTER (INFORMAL) Primary location: (Karen)		 Backyard Row housing	 Stone	 Bedsitter
TYPOLOGY 19 ROW HOUSING; STONE; BEDSITTER (INFORMAL) Primary location: (Karen, Kibera)		 Row housing	 Stone	 Bedsitter
TYPOLOGY 20 BACKYARDING ROW HOUSING; IRON SHEET; BEDSITTER (INFORMAL) Primary location: (Karen, Langata)		 Backyard Row housing	 Ironsheets	 Bedsitter

***Figure 10**: An illustration of the continuation of twenty (20) housing typologies identified across the Kibera, Langata, and Karen areas, representing typical residential forms commonly found with contextual variations across Nairobi and many other urban areas in Kenya. Source: Authors (2026)*

By description:

a) **Typology 1: Multi-unit Floor; Masonry; Self-contained Flat (Formal)** _ Formal multi-story apartment blocks with self-contained units on every floor.
b) **Typology 2: Multi-unit Floor; Masonry; Bedsitter Flat (Formal)** _Similar to Typology 1, but with smaller bedsitter unit types that are not self-contained; i.e., bathroom and kitchen wet-area facilities are separate and community shared rooms.
c) **Typology 3: Stand-alone; Masonry; Maisonette (Formal)** _ Freestanding two-story houses on relatively small plots of typically quarter acres and below.
d) **Typology 4: Line-Wall Housing; Masonry; Bedsitter Flat (Formal)** _ Linear housing model in which one side serves as a protective wall for infrastructure (e.g., rail infrastructure), while the other side hosts one-sided housing accommodation, forming a buffer zone.
e) **Typology 5: Row Housing; Rammed Earth; Bedsitter (Informal)** _ Single-story informal row houses built with rammed earth walls, each often infilled with single bedsitter units.
f) **Typology 6: Row Housing; Corrugated Iron; Bedsitter (Informal)** _ Similar to Typology 5, but external walls are of corrugated iron sheets.
g) **Typology 7: Row Housing; Timber; Bedsitter (Informal)** _ Similar in layout to typologies 5 and 6, but walls are erected of timber planks.
h) **Typology 8: Mtaa U-Courtyard; Rammed Earth; Bedsitter (Informal)** _ Units arranged around a U-shaped common courtyard and typically single-room units with rammed earth as the main building envelope.
i) **Typology 9: Multi-unit Floor; Multi-material Stone/Iron; Bedsitter Flat (Informal)** _ Informal multi-story blocks built haphazardly, often mixing concrete, stone, and tin.
j) **Typology 10: Row Housing; Masonry; Maisonette (Formal)** _ Row of attached houses (terraced homes), each house set onto two levels (maisonette) with masonry walls.
k) **Typology 11: Stand-alone; Masonry; Bungalow (Formal)** _ Detached single-family houses on small individual plots of typically quarter acres and below.
l) **Typology 12: Backyard Row Housing; Rammed Earth; Single Room (Informal)** _ 'Backyarding' means dwellings constructed in the yards of formal properties. This is a single-room rammed-earth shack typology.
m) **Typology 13: Backyarding Row Housing; Multi-material (Stone/Iron); Flat (Informal)** _ Similar to Typology 12 backyard unit but of slightly higher quality of cement blocks or bricks and sheet roof and in two levels.
n) **Typology 14: Multi-unit Floor; Iron Sheet; Bedsitter Flat (Informal)** _ Low-quality multi-occupancy units often on two stories with iron roofs and tin walls.
o) **Typology 15: Swahili Housing; Iron sheet; Bedsitter (Informal)** _ 'Swahili houses' are a traditional East African housing form often with a courtyard-based organising element. The courtyard is either centrally or slightly offset, with rooms arranged around it, typically with a wider frontage compared to the Mtaa U-Courtyard. In this case, single-room units with iron sheets as the main building envelope.
p) **Typology 16: Stand-alone; Masonry; Villa (Formal)** _ Large detached luxury houses usually on large acreage, typically half-acre properties and above.
q) **Typology 17: Multi-residential Student Accommodation; Masonry; Studio self-contained flats (Formal)** _ Multi-unit residential blocks rented to students or singles and the young working class population.
r) **Typology 18: Backyarding Row Housing; Masonry; Bedsitter (Informal)** _ Similar to Typology 12 and Typology 13, but single-room units in the yards of formal homes of permanent masonry material.
s) **Typology 19: Row Housing; Masonry; Bedsitter (Informal)** _ Single-story informal row houses built with masonry walls
t) **Typology 20: Backyarding Row Housing; Iron Sheet; Bedsitter (Karen – Informal)** _ Multiple tin-roofed and iron sheet walled backyard shacks in a row, in the yards of formal homes.

Overall, the most common typology across all three neighbourhoods (Appendix 2) is Typology 1: Multi-unit Floor; Masonry; Self-contained Flat (Formal) and Typology 6: Row Housing; Corrugated Iron; Bedsitter (Informal).

2.4 Household survey analysis

To augment the urban rental capture observations (section 2.3), the multisectoral industry insights (section 2.4), and the search for a climate-resilience-oriented housing classification system (section 2.6), this section presents the analysis of the household survey (Appendix 4). Appendix 6 summarises the raw household survey data, drawn from 71 responses collected across the three study areas. 22 households in Kibera, 23 in Langata, and 26 in Karen. The survey instrument (Appendix 3) was organised around six core themes, as discussed below.

2.4.1 Demographics and tenure profiles

The questionnaire was designed to surface more than where people live, and is structured to examine the conditions under which they live, their level of economic security and affordability, and how likely they are to stay in their current premises, move, or improve their housing situation. Over and above the typology description (section 2.3.2), this should diagnose their 'starting points' as multi-dimensional physical exposure, economic vulnerability and their adaptive capacity. Survey data was reviewed across:

- Household composition and characteristics
- Rental unit types and space
- Tenure length and stability
- Household income, economic status and rent affordability
- Rent contracts and property ownership
- Mobility and housing aspirations

Drawing on risk theory and related literature, climate risk, according to this equation:

Risk = Hazard x Elements at Risk x Vulnerability (Ale, 2009).

is shaped jointly by hazards, exposure of elements at risk, and vulnerability (Crawford-Brown, 1999; NRC, 1983; ISO 73:2009). In this framework, hazards are understood as expected potential threats arising from changing climatic patterns; elements at risk, in this case, represent a building's technical design aspects and its use, while vulnerability is interpreted as the point beyond which the occupant or housing-space user becomes compromised. The analysis, therefore, highlights how differing socio-spatial and built-environment conditions shape varying levels of climate risk and resilience across the three neighbourhoods. The survey results indicate that households do appear to enter climate-resilience pathways from meaningfully different 'starting points'. The most diagnostic contrasts between Kibera, Langata and Karen households are:

a) **Crowding and space differ strongly.** Kibera has relatively small unit floor areas per household and high crowding, while Langata has much larger unit floor areas per household, signalling lower crowding. On the other hand, Karen has bimodal extremes with small rooms and many very large houses with smaller household sizes.
b) **Built form and materials as proxies for 'elements at risk' and, therefore, sensitivity to climate risk differ.** Sheet-metal roofs and walls dominate Kibera; Langata has a larger share of tiled-roof and masonry buildings; Karen sits between these, with large, high-end material villas and a substantial sheet-metal building envelope.
c) **Tenure length and stability signalling 'length of exposure' as a vulnerability proxy.** Kibera has a relatively long tenure tail, while Langata and Karen have shorter tenures.
d) **Utilities are included in the rent, and payment modes differ sharply.** These factors matter for climate resilience because they affect service reliability, coping capacity, and the practical enforceability of coping, prevention and adaptation decisions.
e) **Mobility, reasons for moving and housing aspirations.** Intentions to relocate differ, with Karen showing the highest 'yes' share and Kibera the lowest. Regarding mobility intent and upgrade aspiration, six themes surfaced as 'mobility logics'. Intention to relocate due to either work/education/livelihood, displacement/shock, search for housing quality, for space, family, safety/sanitation or due to tenure/ownership. By comparison, Karen's relocation was reported overwhelmingly as work/education/livelihood-related and therefore linked to a labour-mobility function. Kibera, on the other hand, indicates a higher share of displacement/shock caused by e.g., demolitions, fires, road

works expansions, etc., and safety/sanitation-linked moves linked to a stress-response function. Langata had a mixed set of labour mobility functions, including the search for space quality.

f) **Assets elsewhere.** Ownership of other property differs. Kibera and Langata show high 'yes' shares, approximately 60:40, and much higher for Karen, 70:30. These multi-local assets can form a fallback strategy, e.g., temporary relocation, rural support networks, influencing how households experience and respond to climate shocks**.**

2.4.2 Housing conditions

This analysis theme examined daily routines, living conditions and the division of responsibilities for housing maintenance, as well as renters' general housing challenges within the renter units surveyed. Survey data was reviewed to accommodate differences in:

- Building material and structure quality
- Building typology, amenities and services
- Daily Schedule and occupancy patterns
- Maintenance responsibilities between landlords and tenants
- Main challenges that renters face in general

The analysis aims to reveal how daily exposure, maintenance responsibilities, and structural inequalities shape households' capacity to cope with and/or adapt to climate stressors, and to help identify where tenants informally absorb resilience and where institutional systems can be strengthened. Based on the survey results (Appendix 6)

a) **A 'tenant burden index' was identified, which is remarkably higher in Kibera** and concentrated in climate-critical functions of water storage and waste management. Tenant-managed water storage (a coping mechanism for unreliable supply) is far more prevalent in Kibera (86.4%) than in Langata (31.8%) or Karen (23.1%). From the same dataset, tenant-managed waste management (a key determinant of drainage blockage and flood contamination risk) is 95.5% in Kibera versus 31.8% in Langata and 3.8% in Karen. The convergence of high 'poor infrastructure' reported in Kibera, high tenant-managed service functions, and the well-documented association of informal settlements with dense, built form and limited utilities support the inference that Kibera households face systematically weaker structural and infrastructural buffers against climate hazards.

b) **The landlord-led maintenance index is higher in Karen.** From the dataset, the landlord's responsibility for leak repairs, drainage clearing and waste management is 76.9% in Karen and 47.8% in Langata, but only 4.5% in Kibera. These patterns imply that Kibera tenants are informally absorbing adaptation functions that buffer flooding risk, sanitation risk and water insecurity. These are areas where institutional systems that include landlord obligations and County service provisioning can be strengthened.

c) **Climate coping capacity seems to be shaped by exposure time, responsibility allocation and the hazard context.** Overall, the tenants in Kibera are informally absorbing resilience through self-managed and self-financed functions that should ideally be supported by durable infrastructure, reliable services and enforceable landlord obligations. Conversely, Karen and Langata are more embedded in an institutionalised maintenance system that could be supported by enabling more coordinated responses.

2.4.3 Energy use

The energy usage analysis made visible how energy access, its reliability, and fuel choices shape vulnerability, coping capacity, and transition pathways across different rental contexts. The following issues were reviewed.

- Electricity access and usage, and whether there is equity in access
- Cooking fuel use patterns
- Lighting energy use
- Power reliability, i.e., outages and backup
- Energy efficiency awareness

The analysis revealed energy use patterns, including both similarities in universal grid electricity access and striking differences in cooking fuel choices, reliability, and backup measures between the low-income/informal and high-income/formal areas. Additionally, the survey revealed that household energy systems are not merely technical infrastructures but deeply social systems that shape everyday resilience, health outcomes, environmental exposure, and renters' capacity to adapt to climate uncertainty. More specifically:

a) **Direct grid access vs mediated power supply.** Across the 71 households, electricity access is effectively universal, in the sense that nearly all (but 1) households reported connection to the national grid operator, Kenya Power and Lighting Company (KPLC). However, the mode of access -direct grid vs mediated access- differs sharply by area. This makes visible an equity gap where urban poor households may have access but have 'unequal terms of access through a broker. Equity is not merely access but quality, control and accountable supply and use chains.

b) **Cooking fuel choice sharply differentiates lived vulnerabilities and transition pathways.** Compared separately, Kibera presents the most diverse and carbon-intensive cooking energy mix, with charcoal and firewood, while Langata and most households in Karen are the most LPG-dominant. Karen also shows internal inequality, as Charcoal and firewood are used in households that also recorded a mediated supply of electricity, again suggesting stratified rental contexts within Karen.

c) **Health vulnerability and climate implications of fuel choice.** The dataset implies differing health vulnerability profiles. In Kibera, where charcoal is common and fuel stacking is frequent, the risk of indoor air pollution is structurally higher, particularly given likely small room sizes and constrained ventilation. In Langata and Karen, high LPG prevalence suggests a closer alignment to cleaner cooking, but the persistence of charcoal indicates an incomplete transition.

d) **Power reliability, outages and coping measures.** With blackout frequency patterns recorded, the dataset's backup energy responses can serve as a useful proxy for 'lighting resilience' during outages. In Kibera, backup is mainly small-scale, low-cost rechargeable lights, a small number of solar lights, and kerosene lamps, which buffer lighting but not broader energy services. In Karen, backup is more capital-intensive, with some using generators and others using renewable solar systems, thereby supporting the continuity of broader services. Langata has limited backup visibility. These coping mechanisms for power outages map what resilience looks like in practice. Generators and solar systems can preserve not only lighting but also refrigeration, communications, and, in some households, productivity or security systems. Rechargeable lights, candles, or kerosene lamps mainly provide basic lighting, often leaving other essential services disrupted.

e) **Vulnerability, coping capacity and transition pathways across rental contexts**. Vulnerability to household energy disruption is shaped not only by outages but also by renters' capacity to absorb them and transition to cleaner systems.

2.4.4 Water use

Water access, its reliability, and use vary greatly across the housing typologies studied, including its cost-effectiveness. The following issues were reviewed from the data set

- water supply source
- water costs and consumption pattern
- reliability and shortages
- backup water storage
- sanitation
- water quality and efficiency

The analysis makes visible the hidden vulnerabilities of renters in the water supply and use ecosystem. The findings revealed:

a) **Three water access regimes in the renter ecosystem.** Kibera has a purely pay-as-you-fetch access, Langata has a mixed supply of municipal-piped, borehole, water bowser delivery and some vendor/kiosk supply. On the other hand, Karen is a borehole and tank assets ecosystem.
b) **How water is paid for sharply differs.** This difference is a form of vulnerability that varies per neighbourhood. Kibera buys water in the smallest quantities for daily use; Langata seems to be bulk-buying to maintain a 3/day buffer stock, while Karen costs remain hidden and depend on the landlords' borehole/stirahe tank/pump system and storage.
c) **Reliability, shortages and system fragility are common across the three neighbourhoods**, with Kibera at 63%, Langata at 78%, and Karen at 61% of reported shortages.
d) **Backup water storage is the most visible 'resilience asset' from the dataset.**
Kibera: 36.4% no backup, 54.5% small containers (drums/jerricans), only 9.1% tanks.
Langata: 52.2% tanks, 21.7% small containers, 13.0% no backup.
Karen: 61.5% tanks, 30.8% small containers, only 3.8% no backup.
e) **Water efficiency and landlord investment.** In the dataset, Kibera recorded 0% alongside water-efficient fittings, Lanagat 4.5%, and Karen at 20%. Goes to show that efficiency is rarely a purely tenant-choice problem, as fittings (e.g., taps, toilets, showerheads) are part of the dwelling's hardware, and upgrades are typically controlled by landlords or building managers.
f) **Resilience is already being purchased.** But unevenly through tanks/pumps/borehole capital assets in Karen and Langata; through unit pricing of tanker/bowser or vendor/jerrican supply in Langata and Kibera, as well as rent premiums in Karen, where water access is included in the rent.

2.4.5 Public spaces

This theme examines the nature and form of access to public spaces, as well as renters' use of public and open spaces within their neighbourhoods. Public open spaces are often the primary settings where nature-based solutions, such as urban trees, shaded walkways, and community landscapes, are experienced as urban adaptation options for heat-risk reduction and broader wellbeing. The following issues were analysed from the data set:

- Nature of access and use of public realms
- Eviction threats
- Insecurity and safety when using public spaces
- Community and planning inputs into public arenas
- Playground management
- The insecurity/use of the public realm nexus
- Community organisation around access to public spaces

Comparative interpretation across the public-space climate resilience chain reveals:

a) **Proximity to public/open spaces differs sharply.** In Kibera, 39% of the responses report access to ‘some space nearby’ while Langata recorded 31% and 73% in Karen.
b) **The use of open spaces is highly dependent on their existence**. In all three areas, once a household reports ‘a nearby space’, it is typically used, indicating that, for renters, perceived public-space deficits are likely a supply/access constraint, not a preference constraint.
c) **The 'publicness', size, nature, and climate functionality of open spaces diverge**. In Kibera, open spaces are mainly small open grounds, sometimes on or near the hazardous edges of the river or railway line infrastructure. In Langata, the open spaces skew toward compound-level courtyards, backyards or semi-public parking, with only a small signal of larger public green space in Uhuru Gardens. In Karen, spaces range from large parks and nature areas to large private gardens and courtyards, as well as open grounds in the neighbourhood.
d) **Access, insecurity and the 'open public realm nexus'.** In Kibera, security responses are paired with physical access control measures in public realms, such as manned access gates. In Langata, compound gating is a broader

neighbourhood safety measure to secure cluster-living models, and in Karen, insecurity is flagged on streets and certain routes, leading to mobility access barriers on the roads.

e) **Eviction threats as destabilisers of climate resilience.** Open spaces and hazard edges reported in Kibera, along the river and rail lines, can become sites where climate risk management and displacement pressure intersect. Flood response can lead to livelihood and housing displacement, disproportionately affecting vulnerable renters, creating a negative resilience loop.

f) **Renters' resilience is often constrained at the building-unit/parcel level in the three areas.** In Kibera, many households have no nearby space, and when space exists, it is often small and heavily used. In Langata and Karen, 'space' frequently takes the form of courtyards, private gardens, and gated compounds, which may provide micro-climate relief but do not automatically translate into an inclusive neighbourhood public realm.

2.4.6 Climate-related risks and resilience: neighbourhood scale

Alongside the above observation points summarised in Sections 2.4.1 – 2.4.5, this theme explores the actual climate-related risks faced by the households interviewed, their exposure and preparedness, and the measures they use to build resilience, to reveal perceptions of climate risk, its impacts, and coping capabilities at the neighbourhood level. The following issues were analysed from the dataset.

- Sensitivity of climate issues affecting households
- The most impacted household members
- In-home climate problems and their multiple overlapping issues
- The frequency of climate impacts
- Any damage and loss reported from extreme events
- Coping strategies and the ways people cope
- Emergency information and preparedness
- Desired resilience measures

The findings reveal that

a) **Perceptions of climate risk and exposure vary per neighbourhood.** Overall, thermal discomfort (overheating and underheating) and flooding are climate impacts that affect the three areas the most (Figure 11). Separately, however, Kibera has a combined heat+flood+sewer overflow risk signature, whereas in Langata thermal discomfort is more salient, with overheating at 39% dominant and undereating at 22% dominant. Karen, on the other hand, underheating is the leading perceived climate issue at 50%, with overheating at 27%.

b) **Where the risk is felt and overlapping issues affecting health, productivity and household assets.** Patterns of combined in-house challenges (Figure 12) of poor ventilation, dampness & mould, poor natural light, extreme indoor heat, poor drainage around the house, flooding inside the unit, leaking roof, and noise indicate that each neighbourhood has varying sensitivities. Kibera shows the highest indoor 'compounded risk burden' as almost all households (95%) report at least one in-home climate problem and a combined experience of heat+air quality/stuffiness+daylight+dampness. Langata reports 78% of households reporting at least one problem driven by dampness, ventilation, or daylight. In comparison, Karen shows a lower average burden of 61% of households reporting at least one in-home problem. Many households in Karen report no in-house problems, suggesting higher inequality in the area.

c) **Vulnerability to climate risk varies.** The frequency of climate impacts varies slightly across households that answer 'very often': 31% in Kibera, 13% in Langata, and 38% in Karen.

d) **Children are frequently identified as most impacted** in Kibera and Langata, while Karen more often identifies the adult tenant.

e) **Damage and loss from extreme events and cascading multi-hazard risk.** Households that report loss and damage (18% in Kibera, 4% in Langata, and 19% in Karen) also report far higher counts of in-home climate problems. Extreme event loss seems to be occurring in homes already experiencing multiple chronic stresses, a form of cascading risk that is often underestimated when focusing only on single hazards.

f) **Coping strategies and what households reported doing when problems occur** predominantly involve low-cost, immediate strategies, with limited evidence of sustained structural fixes. This is consistent with renters' constrained ability to change housing fabric.

g) **Renter-centred resilience priorities differ by neighbourhood**. (See Figure 13)

- Kibera households prioritise drainage + waste systems, then 'healthy indoor air + light + heat' retrofits. Kibera households most strongly prioritise solid waste collection (68.2%), proper drainage (59.1%), more windows (59.1%), and better ventilation (54.5%), presenting a coherent problem-solution match.
- Langata prioritised a focus on dampness mitigation, ventilation, daylight, and thermal comfort; more about improving indoor environmental quality.
- Karen's top desired measures are outdoor spaces (50.0%) and trees/green spaces (46.2%), which align with an adaptation logic widely promoted for cities. At the same time, Karen's leading perceived climate issue is underheating (50.0%), which presents as a problem-solution match.

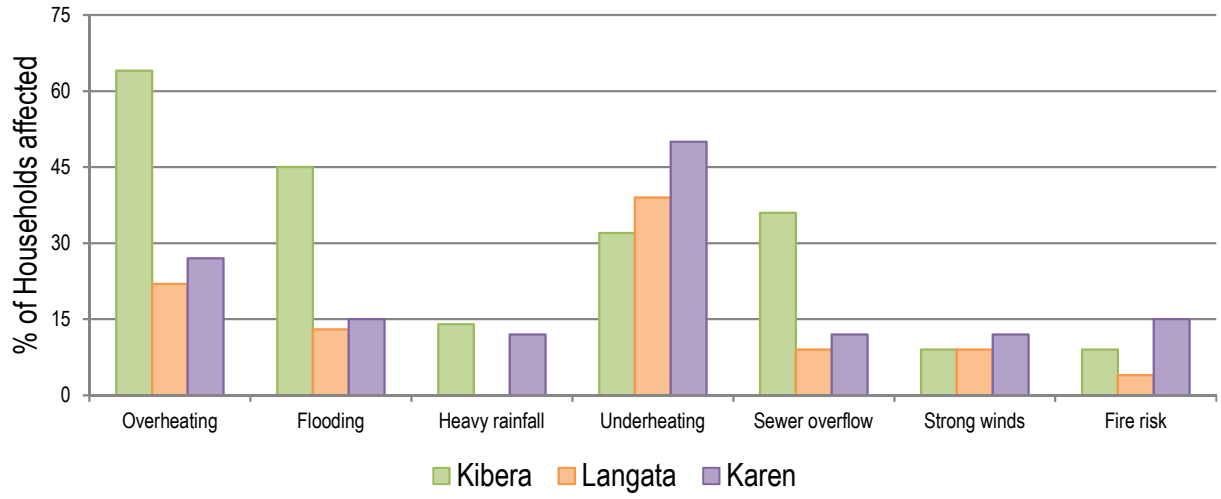


Figure 11: *Area climate hazards by neighbourhood. Percentages indicate proportions of respondents reporting each hazard within their neighbourhood. Source: Primary household survey data by the urban rental housing and climate resilience project (2026).*

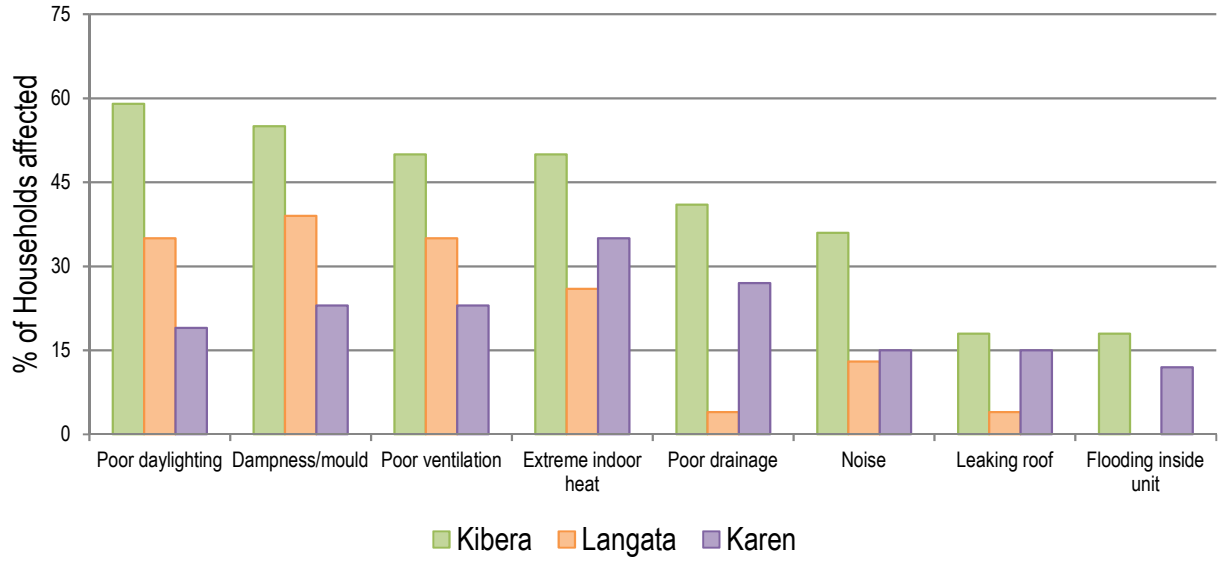


Figure 12: *Indoor housing conditions experienced by the neighbourhood. Conditions reported as currently experienced in the respondent's rental unit. Source: Primary household survey data by the urban rental housing and climate resilience project (2026).*

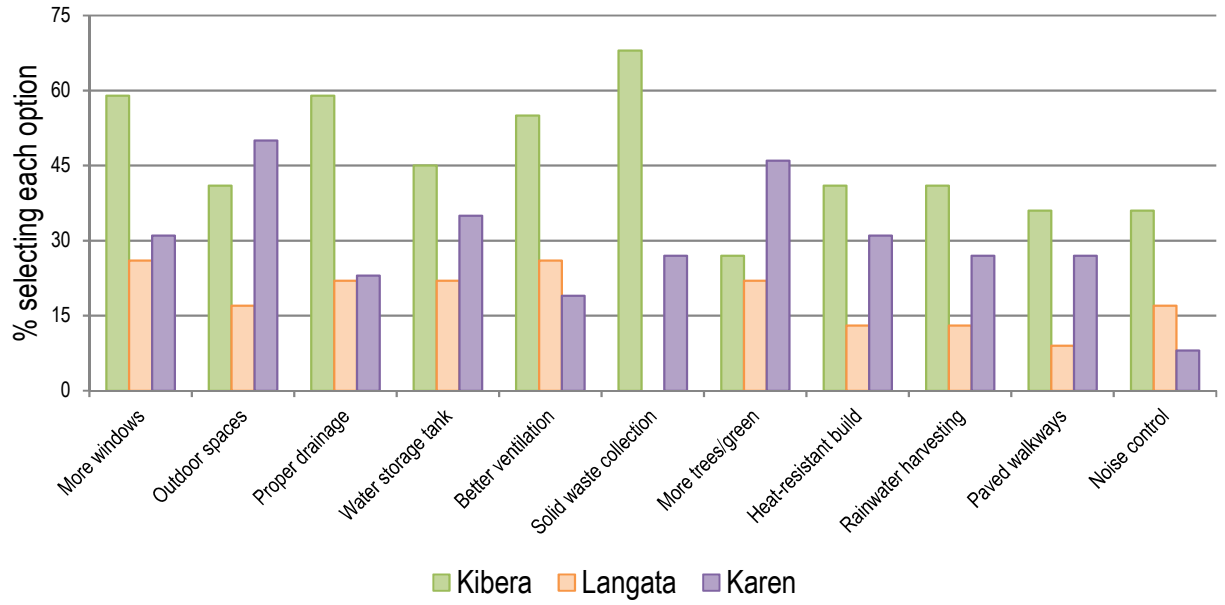


Figure 13: *Desired climate resilience interventions as proposed by the households. Respondents selected all interventions they considered important for climate resilience in their unit. Source: Primary household survey data by the urban rental housing and climate resilience project (2026).*

2.4.7 Climate-related risks and resilience: typologies and building-scale

Shifting attention away from a neighbourhood-based (Karen-Langata-Kibera) climate risk analysis, this section considered each of the 20 typologies (section 2.3.2) as lived, independent lived environments. Each typology carries a distinct set of structural properties that shape how climate risk is produced, experienced, and managed at the household level. This analysis theme examines whether vulnerability is uniformly distributed across the surveyed stock's neighbourhood level or concentrated in specific combinations of location, tenure, material, and configuration at the unit level. The analysis examines each typology individually and comparatively, drawing out patterns of climate exposure, overlapping physical deficiencies, coping capacity, and the structural conditions that either enable or foreclose resilience at the renter level. Two AI-based language models, OpenAI ChatGPT and OpenAI Claude, were used to undertake multilevel climate risk analysis across the 20 typologies in this section. All AI-assisted graphic outputs (Figures 14, Figure and Table 2) were reviewed, validated, and interpreted by the authors before inclusion in the project report.

a) Climate risk score by typology based on 8 multiple hazards

The first composite climate risk model identified maximum structural exposure across eight climate exposures: leaking roof, flooding inside the unit, poor ventilation/stuffy rooms, extreme indoor heat, dampness/mould, poor drainage around the house, poor day lighting, and noise. Figure 14 presents the full vulnerability matrix, showing the vulnerability scores for these multiple hazards, and Figure 15 summarises the composite risk scores.

- **Highest sensitivity: INo.5, INo.6, INo.7, INo.8, INo.9 (primary locations - Kibera informal):** These five typologies carry the maximum structural exposure across nearly all eight hazards simultaneously.
- **High sensitivity: INo.12, INo.13, INo.14, INo.20 (primary locations – Langata informal and Karen informal):** These four typologies are backyard configurations and units built at the rear of plots, typically with reduced daylight access, limited natural cross-flow ventilation, and interrupted services
- **Moderate sensitivity: INo.15, INo.18, INo.19 (primary locations – Langata informal and Karen informal):** These typologies have a better envelope material base of masonry, which is more thermally stable, structurally sound, and moisture-resistant. However, their row and backyarding configurations still constrain ventilation and daylighting.

- **Lower sensitivity: FNo.1, FNo.2, FNo.4, FNo.17 (primary locations – Kibera formal and Karen formal):** Masonry multi-floor formal typologies that share a structural advantage, but their density creates overlapping exposures and ventilation issues.
- **Lowest sensitivity: FNo.3, FNo.10, FNo.11, FNo.16 (Primary locations – Kibera, Langata, Karen formal)** Stand-alone masonry typologies have the most favourable structural climate profiles. FNo.10's masonry row maisonette retains this structural advantage while operating at higher density.

TYPOLOGY	AREA	RENT	DAMP	LIGHT	HEAT	DRAIN	FLOOD	NOISE	SCORE
FNo.1	Karen	H	M	M	M	M		M	10
FNo.2	Karen	H	M	M	M	M		M	12
FNo.3	Karen	M				M			8
FNo.4	Kibera	H	M		M	M	M		12
INo.5	Kibera		M	M	M	M	M		16
INo.6	Kibera		H	M	H	H	H	M	16
INo.7	Kibera		H	M	H	H	M	M	15
INo.8	Kibera		H	M	H	M	M	M	15
INo.9	Kibera	M	H	M	H	H	M	M	16
FNo.10	Langata	M	M		M				8
FNo.11	Langata	M							8
INo.12	Langata		H	M	M	M	M	M	15
INo.13	Langata	M	H	M	M	M	M	M	15
INo.14	Kibera		H	H	H	H	M	M	16
INo.15	Kibera		H	M	H	H	M	M	15
FNo.16	Karen	M							8
FNo.17	Karen	H	M	M				M	11
INo.18	Karen	M	H	M	M	M	M		12
INo.19	Langata	M	H	M	M	M	M		12
INo.20	Karen		H	M	H	M	M	M	15

Figure 14: *Full vulnerability matrix of all 20 house typologies. Note: H = High exposure, M = Moderate. Blank = low or no exposure. Score = total vulnerability out of 16. Formal typologies prefixed F; Informal prefixed I. Derived from structured assessment across 8 climate issue dimensions. Source: Primary household survey data by the urban rental housing and climate resilience project (2026); visualisation developed with assistance from Claude (OpenAI).*

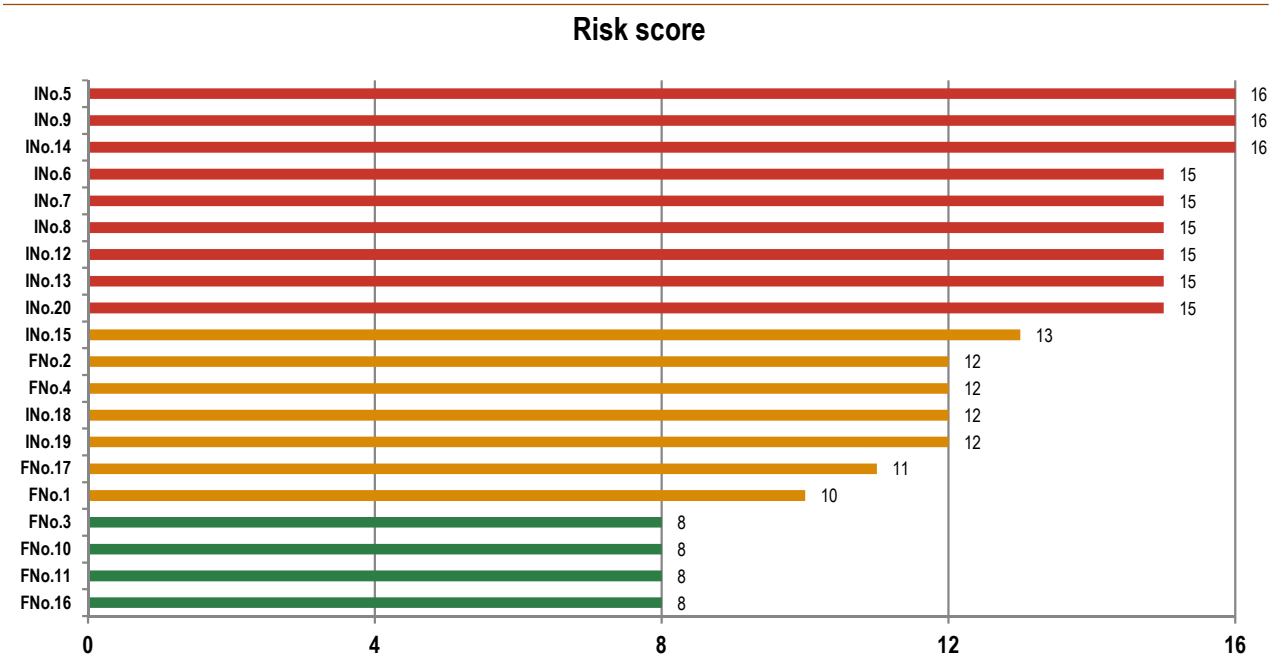


Figure 15: *composite climate risk score by typology. Informal typologies (I) consistently score higher than formal (F). Scores derived from aggregated vulnerability assessment across RENT, DAMP, LIGHT, HEAT, DRAIN, FLOOD, NOISE DIMENSIONS (Figure 14). Source: Primary household survey data by the urban rental housing and climate resilience project (2026).*

b) Climate risk burden and capacity to respond

Table 2: The burden and capacity index modelled around five renter-centred components: i) area hazard exposure, ii) in-home problem burden, iii) frequency of impacts, iv) reported loss or damage, and v) lack of preparedness. Primary household survey data by the urban rental housing and climate resilience project (2026); composite modelling developed with assistance from ChatGPT (OpenAI).

Typology	Composite risk score	Risk band
INo.6	67.9	Very high
INo.14	60.7	Very high
INo.5	56.6	Very high
INo.8	55.8	Very high
INo.7	54.7	High
INo.15	53.7	High
INo.12	48.7	High
INo.19	40.9	High
INo.13	40.9	High
INo.9	40.8	High

Typology	Composite risk score	Risk band
INo.20	38.7	Moderate
FNo.2	34.8	Moderate
FNo.3	34.6	Moderate
FNo.1	31.0	Moderate
INo.18	30.1	Moderate
FNo.10	28.6	Low
FNo.4	19.9	Low
FNo.16	15.5	Low
FNo.11	13.7	Very low
FNo.17	3.3	Very low

The burden and capacity index was modelled around five renter-centred components: i) area hazard exposure, ii) in-home problem burden, iii) frequency of impacts, iv) reported loss or damage, and v) lack of preparedness. The analysis (Table 2) presents a transparent burden-and-capacity index that shows where renters actually feel climate risk. Based on the analysis,

- By social strata tenure, informal typologies carry a far higher felt climate risk than formal typologies. The informal type composite risk score is 48.5, while the formal type score is 22.7.
- By housing floor plate configuration, the highest robust average appears in row housing at 49.7, followed by multi-unit floor at 41.8; stand-alone forms are much lower at 21.3.

- By building envelope materiality, the burden is highest in rammed earth (56.6), iron sheet (55.3), and timber (54.7), while masonry averages 25.2.
- By housing form, bedsitters carry the heaviest burden at 49.0, far above bungalows, villas, and studio flats.

Altogether, risk is not spread evenly across the sample: it concentrates in informal, small-unit, non-masonry housing, especially row-housing bedsitters.

c) Current coping strategies as reported by the surveyed households

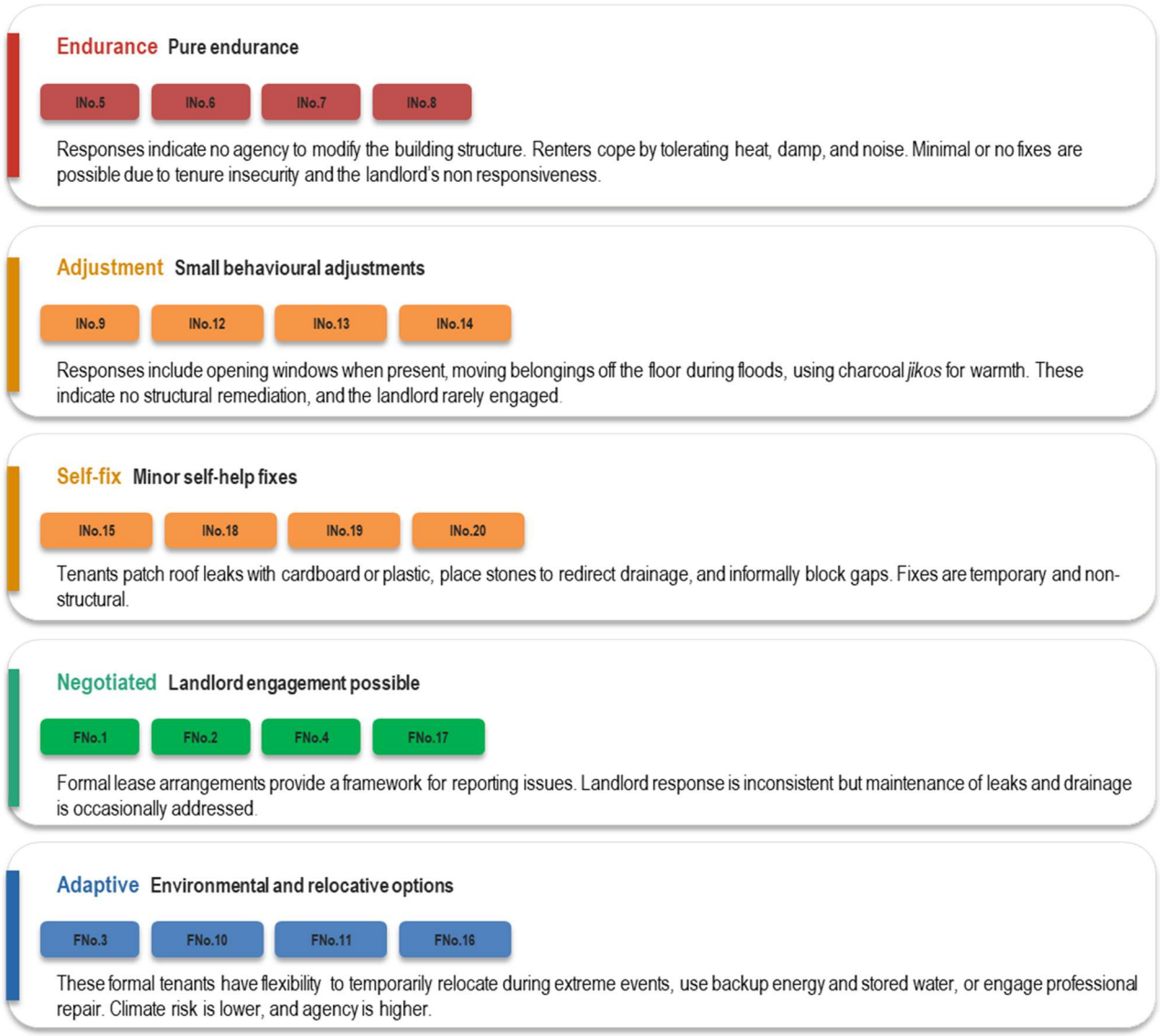


Figure 16: *Typology-based coping strategies. Coping typology reflects structural agency available to occupants, not individual behaviour. These range from passive endurance to active environmental adaptation. Source: Primary household survey data by the urban rental housing and climate resilience project (2026).*

The interactive widget (Figure 16) summarises five distinct coping mechanisms households reported for climate-related impacts across the 20 typologies surveyed. Note that the households with the worst climate exposure have the least coping agency. They are not underperforming resilience, but they are structurally excluded from it. Endurance is not a strategy, but rather an absence of one. Data from INo.5, INo.6, INo.7, and INo.8 suggest that the dominant response to heat, damp, and leaking roofs is simply tolerating them, not because renters have adapted, but because no other option exists within their tenure and economic position.

d) Preferred resilience measures by the surveyed households

Figure 17 presents the interactive desired interventions proposed by households, clustered by priority tier. From the analysis, the most vulnerable typologies require material and infrastructural interventions, not behavioural interventions, e.g., roof replacement or lining, proper drainage, and damp-proofing, to address the root structural causes shared across all eight climate issues simultaneously. Behavioural and awareness-based interventions are necessary but insufficient for typologies whose buildings are the primary source of risk.

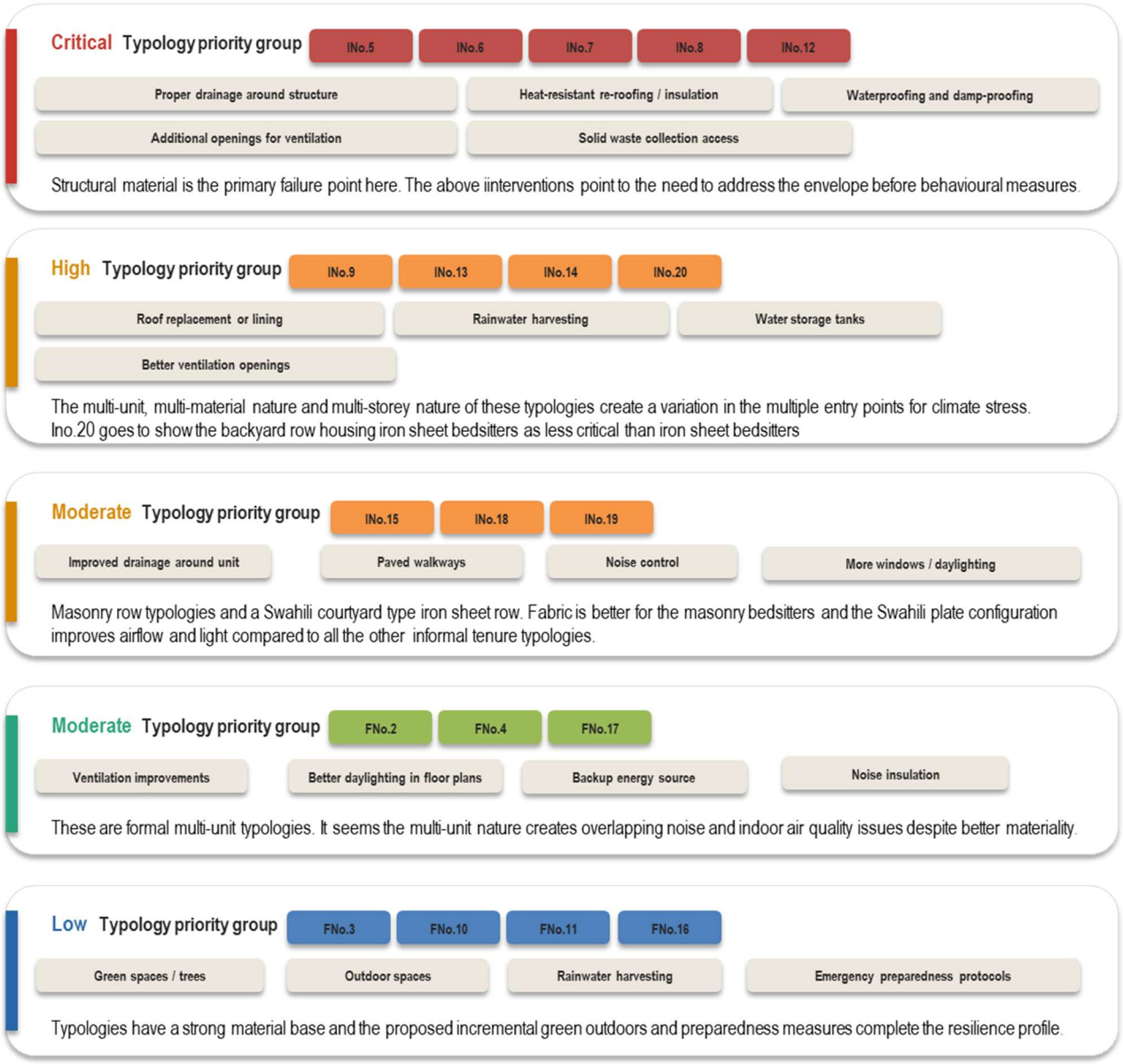


Figure 17: *Priority interventions as proposed by the renters. Priority level reflects urgency derived from the structural risk score and nature of identified gaps. Source: Primary household survey data by the urban rental housing and climate resilience project (2026).*

This means that the same climate event lands differently depending on what the building is made of, how it sits on the plot, and what the occupant can and cannot do about it. For instance, a flood warning prepared for a Karen villa tenant (FNo.16) is not the same as one needed for a Kibera rammed-earth bedsitter tenant (INo.5). Interventions designed at that granularity are the ones that would actually move the resilience dial.

SECTION 3 · DECISION PATHWAYS

3 MOVING THE CLIMATE RESILIENCE DIAL IN RENTAL HOUSING

Evidence converges into actionable decision pathways.

Guiding principle for this section

Actors with specific neighbourhood- or site-, or building-specific decision mandates should prioritise this section. Use the subsection map below to navigate directly to your decision context.

Decision pathways are organised across two scales: (1) neighbourhood-level across urban informal settlements, peri-urban rental estates and affluent neighbourhoods with backyarding; across six thematic areas; and (2) typology-level covering new builds, retrofitting, and contextualised neighbourhood interventions.

NAVIGATE THIS SECTION

SECTION'S ROLE

Section 2's four evidence streams begin to converge here. The question shifts from 'what did we find?' to 'what does it mean for decision-makers?' It is structured around neighbourhood-level and typology-level decision-making processes, as well as cross-cutting decision-making principles.

RECOMMENDED READER

Landlords, tenants, architects, planners, real estate experts, county government, property managers, developers, the National Government Administration Officers (NGAO), federation, rotating credit groups, e.g. *chamas*, informal lenders, grassroots federations, housing cooperatives, etc

3.1 Neighbourhood-level climate resilience decision pathways

Based on the findings summarised in section 2.4, each of the three neighbourhoods presents a different baseline for climate resilience. Kibera, a representative urban informal settlement; Langata, a representative peri-urban rental estate; and Karen, a typical affluent neighbourhood with informal backyarding, require distinct climate resilience starting points, distinct entry mechanisms, and distinct climate action packages. This section provides neighbourhood-specific decision insights across six thematic areas of action.

3.1.1 Demographics and tenure forms as starting points

Resilience does not begin from the same place in Kibera, Langata, and Karen because each housing market sets a different baseline for what households must manage before any shock even arrives.

DIMENSION	KIBERA urban informal settlement	LANAGTA peri-urban rental estate	KAREN affluent with backyarding
Baseline resilience	Resilience starts in a built environment shaped by crowding, smaller spaces, lighter materials, and services that are often paid for separately, meaning heat, flooding, and utility price swings are felt immediately and intensely.	The resilience starting point is more mixed. Stronger masonry housing and somewhat better service inclusion can reduce everyday exposure.	Resilience begins from the most divided position. Some renters occupy constrained, lower-space units not unlike other rental markets, while others live in large homes with far greater room to absorb shocks, access services, or relocate if needed.

DIMENSION	KIBERA urban informal settlement	LANAGTA peri-urban rental estate	KAREN affluent with backyarding
The current meaning of resilience	Coping often seems rooted in endurance, neighbour networks, and incremental improvements rather than moving elsewhere.	Higher rents create their own pressure, so resilience depends as much on managing monthly costs as on the quality of physical shelter.	That split means resilience here is less about one shared neighbourhood condition and more about unequal access to choice.
Climate resilience decision entry points	Strengthen in-situ neighbourhood-wide resilience with low-cost, high-return measures, e.g.: • Community-landlord coordination, first-responder hubs, etc. • Adopt simple building envelope upgrades that landlords can adopt at scale, and tenants therefore benefit quickly. • Adopt mobility-aware resilience. Information on what a 'resilient move pathway' is needs to be crafted beyond in-unit retrofits.	The starting point is more about building-level resilience through building governance and efficiency, e.g.: • Planned building-level maintenance. • Affordability protection.	A single intervention model risks failing to match household needs. • For small-unit /low-income renters, prioritise rent-service transparency, in-unit retrofits, basic service reliability, and protection against displacement shocks. • For high-end renters/landlords, integrate requirements into property management practices. • Adopt mobility-aware resilience to accommodate the 'high planning to relocate' and second-home concepts.

3.1.2 Housing conditions and household tenant burden index

What stands out in the dataset and findings summarised in section 2.4.2 is that tenants in Kibera appear to be carrying a higher tenant burden index as they informally absorb everyday risk through climate-critical infrastructure and services, such as household water storage, arranging or paying for waste handling themselves, and, at times, taking part in drainage improvements. These are tasks that, if better coordinated, would be backed by durable infrastructure, dependable services, and clear landlord responsibility. In Karen and, to a lesser extent, Langata, the pattern looks different. In these two neighbourhoods, resilience is more often built into formal maintenance arrangements, in which landlords, owners, or contracted providers take on a greater share of the work. This shifts the burden away from households, reduces the daily labour of coping, and makes it easier to respond in a more organised and reliable way when pressure comes.

DIMENSION	KIBERA urban informal settlement	LANAGTA peri-urban rental estate	KAREN affluent with backyarding
Tenant-managed water storage	86.4%	31.8%	23.1%
Tenant-managed waste management	95.5%	32%	3.8%
Landlord-led maintenance share	4.5%	47.8%	76.9%

Actionable climate resilience directions for all actors:

a) Enforce landlord repair and habitability obligations in rental markets. Including standard lease clauses, proactive inspection for rentals and a pathway to climate resilience dispute resolutions

b) Socialise rental-housing adaptation upgrades, as rental housing is more likely to remain fixed in its original design and technical configuration, even when conditions suggest a need for adaptation (section 2.1.2)

c) Introduce a minimum habitability resilience package for all rental typologies, with clear duty bearers and actors, and enforceable accountability.

3.1.3 Energy access and climate resilience

The dataset and findings discussed in section 2.4.3 support an energy-justice insight that intra-urban inequality is not mainly about whether electricity exists, but about the reliability, safety, and controllability of supply, as well as the cooking fuels households depend on. The unequal energy realities revealed beneath an often-stated uniformity in access suggest that interventions are needed in the different urban rental contexts with distinct energy vulnerability landscapes.

DIMENSION	KIBERA urban informal settlement	LANAGTA peri-urban rental estate	KAREN affluent with backyarding
Electricity access mode	Mediated supply.	Mixed and predominantly formal.	Direct connections are dominant in formal units.
Cooking fuel	Charcoal/firewood dominant.	LPG dominant.	LPG is dominant in formal units; solid fuels persist in informal backyard units.
Outage coping capacity	Rechargeable lights, small solar units, kerosene for basic lighting only.	Limited visible backup.	Generators, solar systems.
Decision entry points	Prioritise clean cooking transitions, affordable and accountable access to electricity, ventilation improvements in rental units, and decentralised renewable energy systems suited to dense informal settlements.	Prioritise improved grid energy reliability and the gradual uptake of energy-efficient systems.	Address the hidden energy access inequalities, accelerate the transition to renewable energy while strengthening its integration across formal/informal spatial scales, and promote the adoption of energy-efficient systems.

3.1.4 Water access and renter vulnerability

Based on the findings summarised in section 2.4.4, resilience is strongly linked to the ability to store water rather than simply access it. A systematically delivered water scarcity resilience would require a shift from private coping to regulated approaches so that resilience is not a luxury good embedded in rent or bought daily at jerrycan scale.

DIMENSION	KIBERA urban informal settlement	LANAGTA peri-urban rental estate	KAREN affluent with backyarding
Access mode	Pay-as-you-fetch access.	Mixed supply of municipal-piped, borehole, water bowsery delivery and some vendor/kiosk supply.	Borehole and tank assets ecosystem.
Water costs vulnerability	Buying water in the smallest quantities for daily use, on demand.	Bulk-buying to maintain a 3/day buffer stock	Costs remain hidden and depend on the landlords' borehole/stirahe tank/pump system and storage.
Back up storage as 'resilience assets'	36.4% no backup.	13.0% no backup.	3.8% no backup.

DIMENSION	KIBERA urban informal settlement	LANAGTA peri-urban rental estate	KAREN affluent with backyarding
Decision priorities	• Reduce vendor dependency. • Scale regulated, transparent community kiosks and digital dispensing. • Make safe water storage an enforceable renter right. • Protect renters from exploitative pricing during shortages.	• Introduce landlord incentives for water-efficient fittings. • Strengthen county-level coordination. • Promote rainwater harvesting and greywater reuse. • Enforce hours of supply as renter protection.	• Govern groundwater as a shared resilience resource. • Regulate borehole extraction. • Address inequalities in backyard informal units.

Actionable recommendations for all actors include:

a) Production expansion of the water supply and distribution systems should be paired with distribution integrity.

b) Treat hours of water supply and water quality as enforceable renter protections.

c) Scale regulated, transparent low-income water delivery models, where community kiosks and digital dispensing and vending models can be delivered in informal settlements with governance and infrastructure, are designed for that setting.

d) Make safe water storage an enforceable renter right.

e) Govern groundwater as a shared resilience resource.

3.1.5 Public space planning and climate resilience

DIMENSION	KIBERA urban informal settlement	LANAGTA peri-urban rental estate	KAREN affluent with backyarding
Proximity to public open spaces	39% of the responses report access to 'some space nearby'.	31% of the responses report access to 'some space nearby'.	73% of the responses report access to 'some space nearby'.
size, nature, and climate functionality of open spaces	Mainly small open grounds, sometimes on or near the hazardous edges of the river or railway line infrastructure.	Open spaces skew toward compound-level courtyards, backyards or semi-public parking.	Spaces range from large parks and nature areas to large private gardens and courtyards, as well as open grounds in the neighbourhood.
insecurity and the open public realm nexus	Security responses are paired with physical access control measures in public realms, such as manned access gates.	Compound gating is a broader neighbourhood safety measure to secure cluster-living models.	Insecurity is flagged on streets and certain routes, leading to mobility access barriers on the roads.
Decision priorities	• Increase the quantity and quality of accessible public open space • Protect hazard-edge spaces of riverbanks and rail corridors from eviction-driven clearance.	• Protect courtyards and semi-public spaces from conversion to parking. • Promote pedestrian connectivity and shared open space as a tenant right.	• Connect private green assets to wider public ecological systems. • Ensure lower-income and informal rental segments have access to green space.

Findings discussed in section 2.4.5 indicate that a renter-centred resilience approach needs a multi-scalar planning logic.

a) In multi-family rental plots, ensure tenants have the right to use shared open space.
b) At street and block scale, there is a need to prioritise walking connectivity to parks, improve lighting, and enhance passive surveillance rather than only gating.
c) At the neighbourhood scale, infrastructure wayleaves, river riparian and biodiversity corridors can be treated as resilience networks co-designed with communities to avoid adaptation by displacement.
d) The most impactful interventions are those that connect parcel-level and neighbourhood-scale systems without displacing the renters the infrastructure is meant to protect.

3.1.6 Climate-related risks and resilience: neighbourhood-centred action

The analytical results discussed in section 2.4.6 describe climate risk as emerging from interactions between climate hazards and social and infrastructural conditions that shape exposure and vulnerability. Taken together, the results show where climate risk is actually felt (inside the unit and immediately around it), who bears it (often children), and what renters want (drainage/waste services, adequate operable windows/ventilation, and comfort protections). Outcomes presented renter-centred protective effects beyond generic resilience.

DIMENSION	KIBERA urban informal settlement	LANAGTA peri-urban rental estate	KAREN affluent with backyarding
Climate risk and exposure signature	Overheating + flooding +sewer overflow.	thermal discomfort overheating at 39% + undereating at 22%.	thermal discomfort overheating at 27% + undereating at 50% .
Frequency of climate impacts	'very often': 31%	'very often': 13%	'very often': 38%
Renter-centred resilience priorities	Prioritise drainage + waste systems, then 'healthy indoor air + light + heat' retrofits.	Focus on dampness mitigation, ventilation, daylight, and thermal comfort.	Increase outdoor spaces (50.0%) and have trees/green spaces (46.2%).
Decision priorities	Split between • Site and infrastructure services requiring county service provider interventions and • Building envelope upgrades that require landlord participation, local authority inspection, or incentive mechanisms.	Indoor environmental quality solutions to manage: • dampness, • ventilation for indoor air quality, • daylighting, and • thermal comfort.	• Mainstream neighbourhood comfort measures of green spaces, outdoor shading, and • Targeted identification of vulnerable backyard renters.

Cross-cutting actionable recommendations include:

a) Bundled interventions matter. Several problems cluster prominently within each zone, meaning a single well-chosen housing intervention can reduce multiple harms simultaneously.
b) The need for a habitability resilience 'minimum package' for rentals
c) The need for clear duty bearers and accountable decision bearers, actors and enforcement that is aligned to tenancy realities, interventions that renters can feel immediately
d) Explore financing incentives to address the landlord-tenant split risk, especially when tenants' discomfort requires landlord investment (e.g., windows, ventilation upgrades, heat-resilient retrofits).

3.2 Typology-based decision pathways

The twenty (20) identified rental typologies across the three neighbourhoods differ by socio-economic strata, configuration, materiality, and housing form, each generating a distinct climate resilience profile. This section focuses on decision-making actions around two anchor typologies that are both prevalent and represent opposite ends of the performance spectrum: Typology F No.1 (formal masonry apartment) and Typology I No.6 (informal corrugated iron row housing). The two typologies will serve as reference points for examining how climate resilience decision-making priorities differ under new-build circumstances.

FORMAL/INFORMAL	CONFIGURATION	MATERIALITY	FORM	Primary Location
Formal No.1 ★	Multi-unit floor	Masonry	Self-contained flat	Karen, Langata, Kibera
Formal No.2	Multi-unit floor	Masonry	Bed-sitter flat	Karen, Kibera
Formal No.3	Stand-alone	Masonry	Maisonette	Karen, Langata, Kibera
Formal No.4	Line wall housing	Masonry	Bed-sitter flat	Kibera edges
Informal No.5	Row housing	Rammed Earth	Bedsitter	Kibera
Informal No.6 ★	Row housing	Iron sheet	Bedsitter	Karen, Langata, Kibera
Informal No.7	Row housing	Timber	Bedsitter	Kibera
Informal No.8	Swahili housing	Rammed Earth	Bedsitter	Kibera
Informal No.9	Multi-unit floor	stone/iron sheet	Bed-sitter flat	Langata, Kibera
Formal No.10	Row housing	Masonry	Maisonette	Langata
Formal No.11	Stand-alone	Masonry	Bungalow	Karen, Langata
Informal No.12	Backyard row housing	Rammed Earth	single room	Langata
Informal No.13	Backyard row housing	stone/iron sheet	double-room flat	Kibera
Informal No.14	Multi-unit floor	Iron sheet	Bed-sitter flat	Kibera
Informal No.15	Mtaa U-Courtyard	Iron sheet	Bedsitter	Kibera
Formal No.16	Stand-alone	Masonry	Villa	Karen,
Formal No.17	Student flat	Masonry	Studio flats	Karen,
Informal No.18	Backyard row housing	Masonry	Bedsitter	Karen,
Informal No.19	Row housing	Masonry	Bedsitter	Karen, Kibera
Informal No.20	Backyard row housing	Iron sheet	Bedsitter	Karen, Langata

3.2.1 New build rental units

New rental units offer the most complete opportunity to embed climate resilience from the start. The tables below map climate resilience considerations for each stage for both the Formal sector[1] market (Table 3) and the informal sector[1] (Table 4) market decision actors across these proposed rental housing lifecycle stages.

i. Market intelligence and rental housing demand formation
ii. Climate-responsive design and development planning
iii. Financing, statutory approvals, and unit delivery structuring
iv. Construction and incremental delivery
v. Defects Liability Period (DLP), post-construction operationalisation and preparation for occupancy
vi. Leasing, tenant onboarding, and rental activation
vii. Occupancy, service delivery, and housing operations
viii. Climate shock response, recovery, and adaptation
ix. Tenant exit, unit turnover, and reoccupation
x. Long-term asset climate risk transition, upgrading, or redevelopment

1 Formal housing typologies here means a visual style that manifests the geometrical 'purity' of the built form and the space between buildings and additionally sits within a centrally coordinated and recognised system of ownership, professional support during the design, construction, and use stages of the building, statutory review, and development control approval processes and verification. In contrast and institutionally, informal housing presents with insecure tenure, weak connection to centrally governed connectivity infrastructure and services, and limited statutory compliance

a) Key climate resilience considerations across the lifecycle of new rental housing in the Formal sector

Table 3: *Key climate resilience considerations across the lifecycle of formal-sector rental housing development, highlighting critical activities, decision points, and actors involved from project conception through occupation and management. Source: Authors (2026)*

Rental housing lifecycle Stage	Key Activities	Climate resilience issues for consideration	Main Actors
1. Market intelligence and housing demand formation.	Housing demand analysis, renter profiling, affordability mapping, livelihood assessment, typology suitability analysis.	Anticipate flood exposure, overheating risk, infrastructure capacity, energy reliability, water security, and climate vulnerability of target populations.	• Developers • Urban economists • Planners • Researchers • Community • Landowners
2. Climate-responsive design and development planning.	Site planning, housing design, infrastructure integration, environmental design, shared-service planning.	Environmentally responsive design that ensures free ventilation and IAQ, passive cooling, storm drainage, flood mitigation, sanitation, fire safety, durable materials, waste management, etc.	• Architects • Engineers • Dvelopers • Environmental specialists, • community representatives
3. Financing, approvals, and delivery structuring.	Investment structuring, statutory approvals, procurement, housing delivery phasing, contractor mobilisation, insurance arrangements.	Climate finance eligibility, long-term maintenance funding, affordability safeguards, etc.	• Investors • Developers • financial institutions • regulators • County government
4. Construction and incremental delivery.	Site preparation, utility installation, housing construction.	Construction quality, flood-safe construction, weather-sensitive sequencing, safe utility installation, durable systems.	• Contractors • Developers • Utility providers, • Labour
5. Defects Liability Period (DLP), post-construction operationalisation and occupancy preparation.	System testing, service activation, safety inspections, maintenance plan and setup, operational readiness checks.	Drainage readiness, sanitation functionality, infrastructure and service systems readiness and functionality, heat performance, utility reliability.	• Property managers • Contractors and developers • Service providers • County government
6. Leasing, tenant onboarding, and rental activation.	Tenant selection, lease agreements, utility registration, occupancy orientation, rental activation.	Tenant awareness of emergency systems, shared-service responsibilities, safe occupancy practices, water and energy use behavior.	• Landlords • Property managers, tenants, community organisations
7. Occupancy, service delivery, and housing operations.	Rent collection, maintenance, repairs, utility management, drainage clearing, and tenant relations management.	Climate risk management, infrastructure deterioration, energy reliability, waste management, operational resilience.	• Agents and brokers • Tenants • Landlords • Service providers • County agencies
8. Climate shock response, recovery, and adaptation.	Emergency response, repair works, temporary relocation, recovery financing, adaptive retrofitting.	Climate risk recovery, infrastructure resilience, livelihood continuity, social protection systems, recovery speed monitoring.	• Tenants • Government agencies • NGO and knowledge banks • Landlords • Community groups • Emergency actors
9. Tenant exit, unit turnover, and reoccupation.	Tenant offboarding, inspections, maintenance, refurbishment, re-leasing, and onboarding new tenants.	Maintenance cycles, infrastructure wear, resilience retrofitting opportunities, and occupancy management.	• Property managers • Landlords • Old tenant • Maintenance teams • Incoming tenants
10. Long-term rental asset transition, upgrading, or redevelopment.	Retrofitting, densification, redevelopment, infrastructure replacement, asset repositioning and refinancing.	Future climate adaptation, decarbonisation-aligned adaptation, infrastructure upgrading, affordability preservation, urban regeneration.	• Developers • National/sub- governments • Investors • Community • Housing agencies

b) Key climate resilience considerations across the lifecycle of new rental housing in the Informal sector

Table 4: *Table 3: Key climate resilience considerations across the lifecycle of informal-sector rental housing development, highlighting critical activities, decision points, and actors involved from project conception through occupation and management. Source: Authors (2026)*

Rental housing lifecycle Stage	Key Activities	Climate resilience issues for consideration	Main Actors
1. Housing demand formation.	Housing demand analysis, renter profiling, affordability mapping, livelihood assessment, parcel distribution, gathering risk data and articulating housing needs.	Flood exposure, overheating risk, energy security, water security, and climate vulnerability of target populations.	• Informal land market actors and brokers • community leaders • Settlement executive committees • Chiefs • CBOs • NGO-led planners
2. Climate-responsive design and development planning.	Settlement mapping, inclusive site planning, housing design, shared-service planning.	Ventilation and IAQ, passive cooling, storm drainage, flood mitigation, sanitation, fire safety, durable materials, waste management, etc.	• Architects and Engineers embedded in NGOs • CBOs • Environmental specialists, • community representatives • Volunteers
3. Financing, approvals, and delivery structuring.	Construction loan structuring, negotiating with the chief on building approvals, phasing and contractor mobilisation.	Climate finance eligibility and affordability safeguards.	• Rotating credit groups, e.g. chamas • Informal lenders • Grassroot federations • Housing cooperatives
4. Construction	Site preparation, labour provision, skills training, construction materials on demand and housing construction.	Flood-safe construction, weather-sensitive construction, and durable systems.	• Local builders • Local service vendors
5. Post-construction and occupancy preparation.	Organising for utility connections.	Drainage readiness, sanitation functionality, infrastructure and service systems readiness and functionality, heat performance, utility reliability.	• Settlement executive committees • Chief • Residents' associations • Informal Service providers
6. Leasing and tenant onboarding.	Rent out rooms, sharing any useful contacts.	Tenant awareness of emergency systems, shared-service responsibilities, safe occupancy practices, water and energy use behavior.	• Landlords • Tenants
7. Occupancy and housing operations.	Rent collection and maintaining living conditions.	Climate risk management, energy reliability, waste management, operational resilience.	• Service providers (water vendors, sanitation crews) • Community health workers • Nyumba kumi elders • Security group patrols
8. Climate shock response.	Emergency aid response and recovery share adaptation practices.	Climate risk recovery, housing resilience, livelihood continuity, social protection systems, recovery speed.	• Community volunteers • Faith-based organisations • CBOs • NGO and knowledge banks • Informal savings groups • Community groups • grassroots federations
9. Tenant exit, unit turnover, and reoccupation.	Tenant off-boarding, mediating disputes mostly on forced evictions, and onboarding new tenants.	Maintenance cycles, infrastructure wear, resilience retrofitting opportunities, and occupancy management.	• Landlords • Brokers • Old tenant • SECs • Chief
10. Redevelopment.	Lobby for in-situ upgrading and improved housing.	Future climate adaptation, aligned decarbonisation, infrastructure upgrading, affordability, preservation, urban regeneration.	• CBOs,NGOs • Federations • Savings groups • Community leaders

3.2.2 Retrofitting the existing rental stock

RETROFIT DIMENSION	TYPOLOGY _ FNo. 1 Multi-unit Floor; Masonry; Self-contained Flat (Formal)	TYPOLOGY_ INo. 6 Row Housing; Corrugated Iron; Bedsitter (Informal)

Based on the existing vulnerability risk score (Figure 14).
 	
Vulnerability score
FNo.1 10/16 (Lower sensitivity)
INo.6 16/16 (Highest sensitivity)
	• The unit presents low sensitivity to leaking roof, flooding inside the unit, poor ventilation/stuffy rooms, extreme indoor heat, dampness/mould, poor drainage around the house, poor day lighting, and noise.
	• The unit shares a structural advantage, but spatial density creates overlapping lighting, noise and ventilation issues despite better materiality.
	• Interventions must address:
	  • ventilation improvements
	  • Dampness remediation
	  • Daylighting in floor plans
	  • Backup energy source
	  • Noise insulation
		• The unit presents the highest sensitivity to leaking roofs, flooding inside the unit, poor ventilation/stuffy rooms, extreme indoor heat, dampness/mould, poor drainage around the house, poor daylighting, and noise.
		• The typology's structural material is the primary failure point. Retrofitting interventions for climate resilience must address the building envelope before behavioural measures. Interventions must address:
		  • Poor drainage around the structure
		  • Heat-resistant re-roofing or insulation
		  • waterproofing and damp proofing of the walls
		  • additional openings for ventilation
		  • solid waste collection and its management

Based on the climate risk burden and capacity index score (Table 2)
 	
Composite risk score
FNo.1 31 (Moderate)
INo.6 68 (Very high)
	• The unit presents low sensitivity (31%) and moderate climate risks, but persistent indoor air quality underperformance.
	• Alongside the above-named improvements, it could benefit from:
	  • Behavioural measures for stronger preparedness
		• The unit presents the highest sensitivity, with a score of 68%, and the highest sustained climate burden, with an expected 77.8% of loss and damage.
		• Coping has been seen to be mostly reactive, e.g., waiting for the rain to stop, finding temporary shelter, temporary flight, etc. Moderate climate risks, but with persistent indoor air quality underperformance.
		• Alongside the above-named improvements, it could benefit from:
		  • All existing typology _ INo.6 should be prioritised in any emergency response plans.
		  • Climate financing and especially loss and damage should be prioritised for this typology.

Retrofit brief based on tenancy starting points	• Tenants have some formal channels for reporting defects and requesting maintenance. • Formal lease structures create some predictability and accountability. • Inconsistent but existing landlord maintenance response systems. • Building-level refurbishment and asset management reforms can operate within a formal structure. • Performance-oriented resilience upgrading will be well received. • Solutions can utilise formal tenant-management systems and structured reporting pipelines. • Private landlord investment and phased refurbishment strategies are feasible. • The main barrier to a successful climate resilience upgrade is likely to be weak enforcement of maintenance obligations and inconsistent landlord investment behaviour.	• Tenants mainly endure with limited power to influence the structure or services. • High tenure insecurity and informal occupation arrangements. • Minimal or absent landlord responsiveness. • As a first step in refurbishment, community-level or settlement-scale interventions may be required before unit-level improvements become effective. • Livelihood management and survival-oriented resilience interventions will be well received. • The solution must rely heavily on the collective participation of tenants, NGOs, and community structures, as well as negotiated upgrading pathways. • Investment logics will rely on public support, subsidies, and incremental upgrading finance. • The main barrier to a successful climate resilience upgrade is likely to be a lack of agency, insecure tenure, fragmented responsibility, and weak landlord incentives.

3.2.3 Neighbourhood-level, contextualised retrofitting strategies for typologies

LOCATION	TYPOLOGY _ FNo. 1 Multi-unit Floor; Masonry; Self-contained Flat (Formal)	TYPOLOGY_ INo. 6 Row Housing; Corrugated Iron; Bedsitter (Informal)
KIBERA urban informal settlement	**Provision of climate-smart infrastructure and services based on Kibera's general tenure starting points, tenant-burden index and landlord-led maintenance index, consider:** • Prioritising neighbourhood-wide resilience with low-cost, high-return measures. • The hazard context in Kibera is already met by a shortfall in climate-critical services, including water storage (to manage water scarcity risk), waste management, and drainage management (to manage flood risk). durable infrastructure, reliable services. • Enforce landlord obligations to reduce the tenant-burden index. • Strengthen County service and infrastructure provision. **Energy security management based on energy access equity, energy use patterns and energy reliability for energy security:** • Shift energy policy focus from mere electricity access to equitable, reliable, accountable and affordable energy. • Formalise and regulate mediated electricity supply systems to protect tenants. • Accelerate the clean cooking transition. • Prioritise indoor air quality and ventilation improvements in rental units. **Water security management based on water access, costs, reliability and ability to store it:** • Reduce dependence on expensive pay-as-you-fetch vendor systems and expand communal and household water storage infrastructure for low-income renters. • Protect low-income renters from exploitative water pricing during shortages. • Integrate water resilience into informal settlement upgrading programmes. • Treat hours of supply and water quality as enforceable renter protections. • Scale regulated and transparent water delivery/dispensing and vending models. • Make building-level water storage a minimum service standard for renter typologies. **Nature-based solutions (NbS) multi-scalar planning logic of open spaces and nature-based solutions to resilience:** • Increase the quantity and quality of accessible public open spaces. • Protect and upgrade river corridors, railway edges, and infrastructure wayleaves as community resilience spaces rather than eviction zones. • Avoid climate adaptation approaches that trigger the displacement of vulnerable renters. • Improve safety in public spaces. • Strengthen walking connectivity to public spaces.	
LANGATA peri-urban rental estate	**Provision of climate-smart infrastructure and services based on Langata's tenure starting points, every tenant-burden index and landlord-led maintenance index, consider:** • Prioritising building-level resilience through building governance and efficiency. • The existing maintenance system needs to adopt climate resilience. • Clear landlord responsibility on rental housing adaptation strategies, baked in already built-in formal maintenance arrangements. **Energy security management based on energy access equity, energy use patterns and energy reliability for energy security:** • Strengthen the reliability of household energy systems. • Incentivise energy-efficient retrofits in existing rental housing to reduce lighting energy demands. • Support the rental market uptake of renewable energy to augment frequent power blackouts. **Water security management based on water access, costs, reliability and ability to store it:** • Introduce landlord-focused incentives for basic water-efficient fittings and plumbing upgrades. • Strengthen the reliability of mixed water supply systems through improved municipal coordination. • Promote rainwater harvesting and greywater reuse systems in rental units. • Treat hours of supply and water quality as enforceable renter protections. • Scale regulated and transparent water delivery/dispensing and vending models. • Make building-level water storage a minimum service standard for renter typologies. • Govern groundwater as a shared resilience resource.	

<table>
<tr><th>LOCATION</th><th>TYPOLOGY _ FNo. 1
Multi-unit Floor; Masonry; Self-contained Flat (Formal)</th><th>TYPOLOGY_ INo. 6
Row Housing; Corrugated Iron; Bedsitter (Informal)</th></tr>
<tr><td></td><td colspan="2">Nature-based solutions (NbS) multi-scalar planning logic of open spaces and nature-based solutions to resilience:
• Protect courtyards and semi-public shared spaces from being fully converted into parking or built-up areas.
• Improve pedestrian connectivity to green spaces.
• Prioritise safe, walkable, and shaded street networks rather than relying solely on gated compounds.
• Include accessible, functional shared open spaces for tenants as tenant rights.
• Promote neighbourhood-level public space planning that balances security with openness and social interaction.</td></tr>
<tr><td rowspan="4">KAREN
affluent with backyarding</td><td>For SMALL-UNIT/LOW-INCOME RENTERS</td><td>For HIGH-END RENTERS</td></tr>
<tr><td>Provision of climate-smart infrastructure and services based on tenure starting points, tenant-burden index and landlord-led maintenance index, consider:
• Prioritising rent-service transparency, in-unit retrofits, basic service reliability, and protection against displacement shocks.
• Enforce landlord obligations to reduce the tenant-burden index.
• Present clear landlord responsibility on rental housing adaptation strategies.</td><td>Provision of climate-smart infrastructure and services based on tenure starting points, tenant-burden index and landlord-led maintenance index, consider:
• integrating requirements into property management practices.
• Adopt mobility-aware resilience to accommodate the ‘high planning to relocate’.
• Craft place-based information on what a 'resilient move pathways' needs to be crafted.
• The existing maintenance system needs to adopt climate resilience.
• Clear landlord responsibility on rental housing adaptation strategies, baked into already built-in formal maintenance arrangements.</td></tr>
<tr><td>Energy security management based on energy access equity, energy use patterns and energy reliability for energy security:
• Address hidden inequalities and extend the clean cooking transition, ensuring equitable, reliable, accountable, and affordable energy and climate-resilient, energy-efficient retrofits for informal and lower-income rental segments.</td><td>Energy security management based on energy access equity, energy use patterns and energy reliability for energy security:
• Transition from generator-dependent backup systems toward renewable energy systems.
• Incentivise climate-resilient and energy-efficient retrofits.</td></tr>
<tr><td colspan="2">Water security management based on water access, costs, reliability and ability to store it:
• Shift the resilience strategy from reliance on private boreholes toward sustainable water management systems.
• Regulate groundwater extraction and promote long-term aquifer sustainability.
• Address hidden inequalities within lower-income and informal rental segments in Karen.
• Treat hours of supply and water quality as enforceable renter protections.
• Scale regulated and transparent water delivery/dispensing and vending models.
• Make building-level water storage a minimum service standard for renter typologies.
• Govern groundwater as a shared resilience resource.

Nature-based solutions (NbS) multi-scalar planning logic of open spaces and nature-based solutions to resilience
• Improve safety and walkability along streets and mobility routes to reduce public-space exclusion caused by insecurity.
• Preserve ecological corridors, river systems, and open landscapes from fragmentation.
• Encourage climate-responsive neighbourhood planning that links private green assets to wider public ecological systems.
• Ensure that lower-income and informal rental segments within Karen also have access to green and public spaces.</td></tr>
</table>

3.3 Principles for structuring resilience action in rental housing

The preceding sections 3.1 and 3.2 above demonstrate that climate resilience does not emerge from a single measure, is not carried out by a single actor, nor is it undertaken at a single spatial scale or time. Rather, it is produced and equally constrained by several interactions that ought to be considered simultaneously to achieve equitable, durable, and scalable climate resilience outcomes. The principles outlined below are not intended to replace the neighbourhood-level and typology-level pathways discussed above. Rather, these collective observations provide an overarching lens through which differentiated pathways can be understood and interpreted, capturing some cross-cutting considerations so far.

a) **Thinking spatially, place-specifically and relationally.** There is evidence that the same rental typology, e.g., FNo.1 Flat, produces different climate outcomes depending on its neighbourhood location, existing services, who manages it, and how tenants and landlords relate. A city-wide climate resilience mainstreaming program that does not differentiate by location, typology, social context and its relational asymmetries is likely to miss the mark. Relational asymmetries must be identified and addressed directly through regulation, incentive structures, and duty-bearer accountabilities.

b) **Dismantle existing analytical income and administrative classification binaries**. Evidently, binaries such as formal versus informal, renter versus owner, and rich versus poor do not sufficiently predict where climate vulnerabilities lie. Policy frameworks built on these binaries are likely to end up targeting the wrong population and miss actual vulnerabilities.

c) **Apply adaptive and transformative measures simultaneously.** Evidently, from the preceding sections, Typology No. 6, situated in Kibera, for instance, is not just facing an adaptive problem. No amount of window-to-wall ratio passive design strategy can address the deeper system dynamics at play in overheating risk management. Adaptive measures must be designed in parallel, with clear timelines, assigned duty bearers, and financing. (Table 5)

Table 5: *Framework of adaptive and transformational pathways for strengthening climate resilience in rental housing systems. Source: Authors (2006).*

Level	Adaptive measures	Transformational measures
Rental stock/building scale (materials, form)	Incremental retrofitting of rental units (e.g. improved ventilation/daylight, heat-reflective roofing, raised floors).	Upgrading policies: integration of climate-resilient design standards.
Energy systems	Formal energy provision and electricity tariffs for tenants, regulation of informal providers, support for shared solar and clean cooking.	Decentralised and diversified energy systems (e.g. solar micro-grids) embedded in settlement upgrading and climate plans
Water systems	Formal water provision and control of prices, communal water storage and rainwater.	City-scale water planning that prioritises storage (e.g. watershed approach), collective access in informal areas
Land regulation and planning	Flood-risk mapping and targeted infrastructure improvements in dense urban rental areas, protection of existing shared public/green spaces (e.g. for shading and cooling) in all urban areas.	Planning frameworks that accept informality as permanent and invest in local climate resilience measures rather than displacement, expansion of public/green infrastructure (trees, squares, green corridors, permeable surfaces) as a public commodity in all urban areas, including informal settlements.
Rental policies and rental governance	Model rental contracts that, e.g. ensure tenant rights and clarify maintenance responsibilities, and provide incentives for private sector landlords to invest (without passing full costs to tenants).	Full recognition of rental housing as public infrastructure in housing, climate and land governance frameworks.
Household capacities	Increasing community-based preparedness, early warnings, mutual aid/support systems, targeted support for specific climate measures (e.g., heat-- and flood-related preparedness).	Inclusion of private rental households and tenants as officially recognised stakeholders in climate adaptation planning and decision-making.

3.4 From fragmented decision pathways to a coordinated national implementation structure

This section pulls together how climate resilience ought to be structured at the levels of individual typology interventions, neighbourhood considerations, and general decision-making principles in a renter market. However, their full impact cannot be realised through fragmented, sector-by-sector, project-by-project implementation. There is a need for a holistic county-level coordination and implementation structure that accommodates the multi-actor, multi-scale, and multi-sector nature of climate resilience building in the urban rental housing and service market. Such a holistic framework will need to operate across these functions:

a) Policy and standards coherence
b) Investments and finance coordination
c) Evidence and knowledge management-based practice
d) Actor capacity and governance and
e) A mechanism of monitoring, learning, adaptation and resilience building

SECTION 4 · BLUEPRINT

4 A BLUEPRINT FOR ACTION

A sequenced national framework for scalable action across Kenya.

Guiding principle for this section

National and sub-national (e.g. county government) actors, investors, and development finance institutions should prioritise this section. The sequenced blueprint (4.3) is the single most actionable output in the report.

The blueprint operates across four system levels of policy and regulation, market practice, institutions and actor strengthening, and investment mechanisms, each sequenced to enable a synchronised national transition.

NAVIGATE THIS SECTION

SECTION'S ROLE

All evidence from Sections 2 and 3 converges into a single sequenced blueprint; a strategic roadmap for a synchronised transition to climate resilience in urban rental housing, scalable beyond Nairobi.

RECOMMENDED READER

National/county government, investors, development finance, policymakers

4.1 Operationalising climate resilience in Kenya's urban rental market

An emerging thread across the preceding Section 2 and Section 3 positions rental housing at the centre of climate resilience delivery enhancement in Kenya, and so far, climate resilience action has commonly been reduced to meeting building physics-led construction standards. There has been limited engagement with the realities of the rental market and housing services market's user behaviour, which play a critical role in shaping how climate resilience is experienced, and this has led to weak climate resilience outcomes, fragmented action, and unresolved tenant risk exposures. Urban housing resilience is a system reform and not a construction program.

Another major contribution by the project team was the ability to pool, synthesise and structurally thread together findings from the entire research process into an integrated change process schedule presented in sections 4.2, 4.3, 4.4 and 4.5. Change process under the four key pillars of **i)** policy, legal and institutional additionalities, **ii)** evidence-based rental and service market practice, **iii)** housing services, asset management, tenant protection and governance strengthening, and **iv)** climate resilience financing investment and market enablement mechanisms. Rather than presenting fragmented recommendations across the four pillars, the study translates the multiple layers of analysis into a coordinated implementation structure that enables long-term systemic change. Change processes have been framed here as 'interlocking building blocks' rather than isolated measures, arguing that a sequenced but concurrent rollout of these accelerates the climate resilience impact of the predominantly rental base capital of Kenyan urban areas. This strategic sequencing presents a holistic roadmap for urban rental housing resilience, enabling a synchronised transition to climate resilience.

4.2 A roadmap for urban rental housing resilience

4.2.1 Sequenced policy, legislation and regulatory environment additionalities

1. **County-level Housing policy and Climate policy additionalities[2]**
   - Develop a comprehensive county housing policy framework that fully operationalises legal and constitutional obligations[2] and one that appreciates city-level housing as safe, decent, affordable, resilient, livable, and socio-economically balanced.
   - The housing policy framework must explicitly define the housing rights and entitlements of renters and homeowner occupiers across various housing paradigms within the county.
   - Fully domesticate the Climate Change Act of Kenya (2016), which allows counties to enact legislation defining how climate obligations will be implemented across sectors; in this case, the housing sector, which is 91% renter-occupied.
   - Develop a multi-hazard rental housing rulebook and a climate resilience rights charter derived from existing constitutional and climate duties. The rule book will translate climate action not as a moral add-on but into enforceable constitutional entitlements and duties.
2. **Develop an urban rental housing and service market policy.**
   - An umbrella instrument that defines rental housing not only as a building structure requirement or a tenancy management, but as a compound service arrangement. One that covers built-form shelter scales, sanitation, drainage, electricity, water, waste management, caretaker functions, landlord obligations, tenants' safety, shared-space maintenance, and climate-risk disclosures, at a minimum across the whole building-use lifecycle.
   - It should expressly cover the full life cycle of the rental and housing service market, from:
     i. Market intelligence and rental housing demand formation
     ii. Climate-responsive design and development planning
     iii. Financing, statutory approvals, and unit delivery structuring
     iv. Construction and incremental delivery
     v. DLP, post-construction operationalisation and preparation for occupancy
     vi. Leasing, tenant onboarding, and rental activation
     vii. Occupancy, service delivery, and housing operations
     viii. Climate shock response, recovery, and adaptation
     ix. Tenant exit, unit turnover, and reoccupation
     x. Long-term asset climate risk transition, upgrading, or redevelopment
   - The policy will host the official rental housing taxonomy.
3. **Develop a rental market operating code and standards aligned to rental housing lived realities and with gradual compliance levels.**
   - The National Building Code 2024 already includes strong passive building design provisions, but it remains primarily a building code, not a rental operating code.
   - Adopt the National Building Code outline and development to outline rental-specific standards and schedules that translate those technical requirements into realistic thresholds for occupied rental units and shared services.
   - Compliance must be phased by risk.
4. **A schedule of climate resilience-aligned rental contracts with clear shared-service obligations and operational clarity.**
   - Link rental agreements to typology unit design and shared-service maintenance
   - Synchronise these rental contracts wiyj with sectional-property and common-property rules where relevant, so that owners cannot transfer every operational burden downward to tenants.

2 Kenya's constitutional order establishes strong legal and functional grounds requiring County Governments to develop housing policies (Constitution of Kenya, 2010; County Governments Act, 2012; Physical and Land Use Planning Act, 2019; Urban Areas and Cities Act, 2011; National Housing Policy, 2016). In practice, constitutional housing obligations cannot be implemented without county-level policy frameworks. To date, June 2026, Nairobi City County does not have a single consolidated county housing policy but operates multiple housing and sectoral initiatives through its Housing and Urban Renewal Department and Affordable housing frameworks cascaded from the National Affordable housing act of 2024.

- The multi-hazard rulebook above should distinguish responsibilities across all actors and be mainstreamed at the rental contract level.

5. **Housing stock adjustment capture alongside planning control, incremental upgrading, and change-of-use rationalisation.**
   - Update outdated ordinances and planning assumptions on housing stock adjustment.
   - Present clear rules for incremental additions (vertical or horizontal), room subdivision, plot intensification, residential-commercial mixing, live-work conversion, and short-stay conversion.
   - Present different area-based and typology-level thresholds.
6. **Climate risk and resilience open data, public process, and central governance.**
   - The Urban Areas and Cities Act, 2011, already requires urban boards to maintain a comprehensive database and information system that provides public access, and to build on this for the rental and service sectors.
   - Data and information must cover building classes, tenancy type, hazard status, compliance schedule, inspection outcomes, service complaints, and neighbourhood risk maps, etc.

In summary,

A IMPACT LEVEL A. FOUNDATION
Policy, legislation and regulatory environment

Sequenced policy, legislation and regulatory additionalities	
1. County-level Housing policy and Climate policy additionalities 2. Develop an Urban rental housing and service market policy. 3. Develop a rental market operating code and standards aligned to rental housing lived realities and with gradual compliance levels. 4. Assemble a schedule of climate resilience-aligned rental contracts with clear shared-service obligations and operational clarity. 5. Assemble a housing stock adjustment capture alongside planning control, incremental upgrading, and change-of-use rationalisation. 6. Climate risk and resilience open data, public process, and central governance.	**NATURE OF CLIMATE RESILIENCE DELIVERY ENHANCEMENT** The regulatory environment is the enabling layer for all other impact levels. Without clear policy, standards, and legislative additionalities, market practice, actor capacity, and investment lack a foundational basis.

4.2.2 Sequenced evidence-based rental housing and service market practice and institutional strengthening

STRENGTHENING ANTICIPATORY CAPACITY TO CLIMATE RESILIENCE

1. **From design manuals to decision principles that follow future climate intelligence.**
   - Future County-level climate mapping and downscaling across multiple futures.
   - Develop pathway-based decision rules.
   - Pool all rental and service market climate intelligence references in one space.
   - A case study reference document structured as an evidence bank and classified by what works for which 'starting point' conditions, under which hazard or multiple hazards, at what cost and with what institutional prerequisites.
2. **Develop a renter-focused information and solutions playbook**
   - Assemble a structured info bank based on policy additionality issues and anticipatory climate intelligence.
   - Assemble all data and disclosure tools, e.g., hazard mapping, localised risk disclosure, rental registries, household enumeration and monitoring portals.
   - Assemble asset and service upgrade strategies that manage flood, overheating/underheating, water scarcity, energy security, and just transition risks.
   - Assemble all policies, regulatory tools and contracts.
   - Assemble all finance incentives aligned to climate resilience mainstreaming in the rental and housing service market.
   - Assemble renter resettlement guidelines and livelihood safeguards for varying contexts.

STRENGTHENING CLIMATE RESILIENCE RESPONSE CAPACITY

3. Segment the renter and housing service market by starting points and livelihoods.

- Develop rational 'stating points' for archetypes based on the rental housing typology as established by the climate-resilience-oriented taxonomy, and expand them to accommodate occupant densities, utility payment structure, tenure duration, rent burden, fallback dwelling, mobility plan, etc.
- Develop climate resilience implementation guidelines based on the above-established archetypes.

4. Develop a multi-hazard delivery architecture for everyday renters and service market choices.

- Identify hazard compounds and an aligned multisector, multi-actor approach.
- Bundle interventions to manage multiple hazards simultaneously.
- Use data to rebalance power and prioritise value.

5. Present market legibility of climate risk interventions and investable portfolio rules.

- By this point, we have translated climate risk space into repeatable asset archetypes, and based on this strategy, it can be expressed in real estate 'market language'.
- Legibility for developers, lenders and investors will require scheduling these according to OECD[3] frameworks to:
  - Create measurable pathways for climate resilience: performance standards, mandatory disclosure, hazard-sensitive zoning and updated building codes.
  - Real-estate risk assessment requirements: past and forward-looking hazard data to produce market-useful information.
  - ROI planning: maintenance needs, insurance constraints, capex and opex implications, occupancy risk, vacancy and turnover, etc.
- Establish climate resilience and economic value clarity in the rental market space.
- Establish resilience benefits between landlords, tenants, service providers and public agencies.

6. Mainstream shock management, contingency planning and long-term adaptation.

- Develop shock-management protocols and the prerequisites for long-term adaptation.
- Keep the renter resettlement action plan ready as a contingency instrument.

In summary,

B IMPACT LEVEL B. EVIDENCE-BASED PRACTICE

Evidence-based rental housing and service market practice

Sequenced evidence-based rental housing and service market practice and institutional strengthening

Strengthen anticipatory capacity

1. From design manuals to decision principles that follow future climate intelligence.
2. Develop a renter-focused information and solutions playbook.

Strengthen response capacity

3. Segment the renter and housing service market by starting points and livelihoods.
4. Develop a multi-hazard delivery architecture for everyday renters and service market choices.
5. Present market legibility of interventions and investable portfolio rules.
6. Mainstream shock management, contingency planning and long-term adaptation.

NATURE OF CLIMATE RESILIENCE DELIVERY ENHANCEMENT

With a strengthened regulatory foundation, decision-makers can get closer to 100% capacity to anticipate the impacts of climate change in their individual decision space. Additionally, actors will benefit from having full capacity to respond without overproviding or underproviding across the various starting points and livelihoods of existing renters and service market actors.

[3] OECD frameworks relevant to climate-resilient urban development and investment governance include: Organisation for Economic Co-operation and Development (OECD). (2020). Building Climate-Resilience for Future Risks and Shocks; and OECD. (2023). OECD Urban Studies: Enhancing Climate Resilience of Cities. These frameworks emphasise measurable resilience pathways, climate-risk disclosure, governance coordination, resilience financing, infrastructure adaptation, and integration of climate risk into investment and urban planning systems.

4.2.3 Sequenced rental and housing service market actor-level and asset management strengthening

1. **Build community-level participatory capacity.**
   - Establish the reform mandate based on policy, prepare a fresh stakeholder register that includes, at the very least, national-level decision makers/actors and enablers, County-level decision makers/actors and enablers, Service and rental market actors, design and development delivery experts, financiers, community accountability frameworks, and all the demand-side actors as tenants and landlords.
   - Set up the rental community associations before doing the maps.
   - Convert tenant concerns into an official place-based housing outcomes charter.
2. **Establish governability and coordination of the housing in a climate emergency reforms sector.**
   - Define roles, responsibilities and functional assignments to all stakeholders.
   - Build the multi-sector, multi-level link with place-based communities.
3. **Develop and activate capacity building programs.**
   - Institutionalise climate action practice.
   - Institutionalise a professional culture centred on climate-first houses.
   - Operationalise climate-smart portfolio management, exclusions, transition engagement rules, climate-risk disclosure, tenant-sensitive housing screens, and other criteria generated.
   - Undertake targeted capacity building along the following lines: technical capacity building, behavioural capacity building, and functional capacity building.

In summary,

C IMPACT LEVEL C. ACTORS AND ASSET MANAGEMENT
Actor and asset manager-level strengthening

Sequenced rental and housing service market actor-level and asset management strengthening	
1. Build community-level participatory capacity. 2. Establish governability and coordination of the housing sector in a climate emergency reforms sector. 3. Define and activate capacity building programs.	**NATURE OF CLIMATE RESILIENCE DELIVERY ENHANCEMENT** With a strengthened regulatory foundation (A) and with evidence-based market practice (B) established, this impact level builds on the human, institutional and governance capacity to carry it out; at the community level, at the sector and asset management level.

4.2.4 Sequenced climate resilience investment and rental housing market enablement mechanisms

1. **Establish a robust evidence-based pipeline for climate-resilient rental housing investment.**
   - Define hazard exposure and the hidden cost stack of mainstreaming climate resilience.
   - Define who pays for what in the county-level t rental value chain.
   - Produce a rental market balance sheet for each asset archetype (section 4.2.2 above).
   - Price the sequenced process up to this point.
2. **Convert multi-hazard climate resilience into a priced housing product and an investment case.**
   - Establish the economic value proposition for multi-hazard climate-resilient housing.
   - Establish the cost of a climate-safe house.
   - Translate resilience into market-ready tools and the return on investment for resilience-aligned decisions.
   - Use a life-cycle model to structure returns on investment, not just capital costs.

3. **Design the climate resilience finance market and establish the political economy of who pays.**
   - Actively expand existing owner-occupied incentives into rental markets.
   - Manage the political economy of cost versus need split across tenants, landlords and the public sector
   - Establish genuine incentives.
   - Establish renter-side and landlord-side financing.
   - Actively correct the owner-occupation bias in Kenyan housing finance.
4. **Develop and scale public-private financing structures for climate-resilient rental housing.**
   - Develop a rental resilience project preparation facility.
   - Restructure housing finance to include renters.
   - Pilot financing models and structure to scale.

In summary,

D

IMPACT LEVEL D. ECONOMIC VALUE & RETURN ON INVESTMENT

Economic value and return on investment

Sequenced climate resilience investment and rental housing market enablement mechanisms	
1. Establish a robust evidence-based pipeline for climate-resilient rental housing investment. 2. Convert multi-hazard climate resilience into a priced housing product and an investment case. 3. Design the climate resilience finance market and establish the political economy of who pays. 4. Develop and scale public-private financing structures for climate-resilient rental housing.	**NATURE OF CLIMATE RESILIENCE DELIVERY ENHANCEMENT** A converging impact level, reachable once the preceding levels A, B, and C have established the enabling conditions for pricing, financing, and scaling climate resilience across the rental housing service market.

4.3 A proposed mechanism for positioning for action – A SEQUENCED BLUEPRINT FOR CLIMATE-RESILIENT ACTION

Sequenced from Foundation (A) upward through Evidence (B), Actors (C), to Investment (D)

D. Sequenced climate resilience investment and rental housing market enablement mechanisms

1. Establish a robust evidence-based pipeline for climate-resilient rental housing investment.
2. Convert multi-hazard climate resilience into a priced housing product and an investment case.
3. Design the climate resilience finance market and establish the political economy of who pays.
4. Develop and scale public-private financing structures for climate-resilient rental housing.

IMPACT LEVEL D. ECONOMIC VALUE & RETURN ON INVESTMENT

A converging impact level reachable once the preceding levels A, B, C have built the enabling conditions in a way that climate resilience can be priced, financed and scaled across the rental housing service market.

C. Sequenced rental and housing service market actor-level and asset management strengthening

1. Build community-level participatory capacity.
2. Establish governability and coordination of the housing sector in a climate emergency reforms sector.
3. Develop and activate capacity building programs.

IMPACT LEVEL C. ACTORS & ASSET MANAGEMENT

With a strengthened regulatory foundation (A) and evidence-based market practice (B) established, this impact level builds on human, institutional, and governance capacity to carry it out at the community, sector, and asset management levels.

B. Sequenced evidence-based rental housing and service market practice and institutional strengthening

Strengthen anticipatory capacity

1. From design manuals to decision principles that follow future climate intelligence.
2. Develop a renter-focused information and solutions playbook.

Strengthen response capacity

1. Segment the renter and housing service market by starting points and livelihoods.
2. Develop a multi-hazard delivery architecture for everyday renters and service market choices.
3. Present market legibility of interventions and investable portfolio rules.
4. Mainstream shock management, contingency planning and long-term adaptation.

IMPACT LEVEL B. EVIDENCE-BASED PRACTICE

With a strengthened regulatory foundation, decision-makers can get closer to 100% capacity to anticipate the impacts of climate change in their individual decision space. Additionally, actors will benefit from having full capacity to respond without overproviding or underproviding across the various starting points and livelihoods of existing renters and service market actors.

A. Sequenced policy, legislation and regulatory additionalities

1. County-level Housing policy and Climate policy additionalities.
2. Develop an Urban rental housing and service market policy.
3. Develop a rental market operating code and standards aligned to rental housing lived realities and with gradual compliance levels.
4. Assemble a schedule of climate resilience-aligned rental contracts with clear shared-service obligations and operational clarity.
5. Assemble a housing stock adjustment capture alongside planning control, incremental upgrading, and change-of-use rationalisation.
6. Climate risk and resilience open data, public process, and central governance.

IMPACT LEVEL A. FOUNDATION

The regulatory environment is the enabling layer for all other impact levels. Without clear policy, standards, and legislative additionalities, market practice, actor capacity, and investment lack a foundational basis.

Figure 18: *Sequenced Blueprint for Climate Resilience Action. Source: Authors (2026)*

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Appendix

Appendix 1 – The Urban Rental Housing Capture Criteria

Appendix 1 _ The Urban rental housing

Appendix 2 – Typology mapping framework

Appendix 2 _ Typologies captured i

Appendix 2 _ Typology mapping fra

Appendix 3 – Household survey instrument

Appendix 3 _ Household survey Cor

Appendix 3 _ Household survey Qu

Appendix 4 – Sample filled questionnaire and signed household consent form

Appendix 4 _ Sample filled consent form an

Appendix 5 – Urban Rental Housing and Climate resilience project 3-Day Workshop brief

Appendix 5 _ Urban Rental Housing Projec

Appendix 6 – Raw household survey data drawn from 71 responses across Kibera, Langata and Karen areas

Appendix 6 _ Raw household survey dat

Project team

RESEARCH LEADERSHIP BIOS:

Dr. Nkatha Gichuyia

Dr Nkatha is a Lecturer at the University of Nairobi's Department of Architecture and specialises in Environmental design, as well as building and urban physics subject areas. Dr Nkatha's research and teaching portfolio spans architectural design, environmental design, climate change management, ESG and climate-resilient building economics, as well as urban development. Her work explores the intersection of climate resilience, housing systems, rural-urban dichotomies and the resultant built environments in African cities.

Arch. Musau Kimeu

An award-winning architect and environmental design expert, Musau Kimeu has over 25 years working experience as a practicing architect and university lecturer. He is particularly interested in addressing environmental design issues in architecture. His research activities are centred on the environmental performance of tropical buildings, Swahili architecture, acoustics design and natural ventilation. He is the immediate former Chairman of Department of Architecture (1 July 2015 - 30 July 2025), University of Nairobi, Kenya where he teaches Environmental/Sustainable Design and Architectural design. His projects include the award-winning Learning Resource Centre (LRC) at the Catholic University of Eastern Africa in Nairobi, a world class environmentally designed project.

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Minna Sunikka-Blank is Professor of Architecture and Environmental Policy at the University of Cambridge and Fellow of Churchill College. Her research explores sustainable urban development and social equity, with particular focus on women's energy transitions and lived experiences in low-income housing. She has led research projects in India, South Africa and Ethiopia, examining the intersection of gender, energy and housing. She co-directs the Behaviour and Building Performance (BBP) research group and the Global Energy Nexus in Urban Settlements (GENUS) network.

Dr. Irit Katz

Irit Katz is Associate Professor of Architecture and Urban Studies at the University of Cambridge and Fellow of Christ's College. Her work focuses on built environments shaped in extreme conditions, including spaces of displacement, conflict, and environmental changes, in historic and contemporary contexts. Her research incorporates spatial ethnography, participatory methods, and a strong engagement with cultural and political theories, and has won numerous recognitions, including the RIBA President's Award for Research and the John Urry Mobilities Prize. Her latest publications include The Common Camp: Architecture of Power and Resistance in Israel-Palestine (University of Minnesota Press, 2022).

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Arch. Aketche is a tutor in the Architecture Department at Jomo Kenyatta University of Agriculture and Technology, with seven years of professional practice and four years in academia. He focuses on sustainable urban development, exploring how urban informalities affect spatial, environmental, social, and economic sustainability in planned neighbourhoods. He has also participated in design competitions, earning Best Design Project awards in DesignNext Africa 2018 and the East Africa Institute of Architects' final-year project award in 2019.

Reinhard Njenga

Reinhard Njenga is a Nairobi-based graduate Architect and Tutorial Fellow at the Technical University of Kenya, specialising in sustainable design, urban planning, and community-driven development. He has contributed to climate-responsive buildings and housing improvement initiatives through roles with organisations such as Tectura International and SDI-Kenya. Skilled in BIM, digital visualisation, and AI-enhanced design tools, Reinhard blends creativity with technical precision. He is passionate about innovative, contextually relevant design that addresses community needs and delivers thoughtful, high-quality architectural solutions.

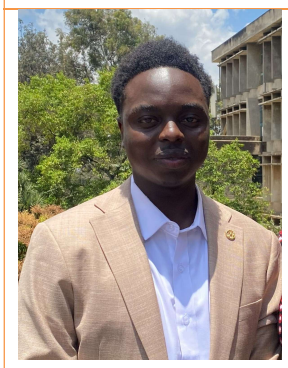
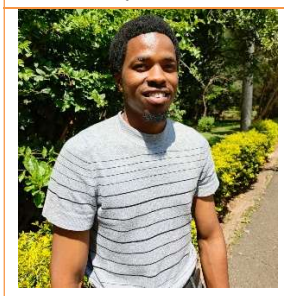
Regina Wango Kasau

A Landscape Architect and Tutorial Fellow at Kenyatta University, Department of Architecture & Interior Design. With a robust academic foundation in both Architecture (Environmental Design option) and Landscape Architecture, she conveys a profound understanding of how built and natural environments interact to influence ecological and human wellbeing. Her research spans conservation of cultural landscapes, outdoor thermal comfort, and environmental psychology in correctional facilities.

Arch. Daniel Too

Daniel Too is a registered architect and tutorial fellow at the University of Nairobi, Department of Architecture. He is an Environmental Design Expert focusing on sustainable, climate-responsive, and energy-efficient built environments. He has specialised in acoustic design, integrating advanced sound design principles into architectural solutions to enhance user comfort and spatial quality. Currently a PhD candidate, he is focusing on Smart Acoustic solutions for large gathering spaces exploring the intersection of environmental acoustic performance, occupant well-being, and innovative design methodologies. He is an EDGE Expert advocating for resource-efficient building practices supporting project teams in achieving green building standards.

RESEARCH ASSISTANTS _ 5th YEAR ARCHITECTURE STUDENTS (2025/2026)

University of Nairobi	JKUAT University	Kenyatta University	Technical University of Kenya
 Ernest Koyoo	 Kimberly Obuya	 Hussein Sudi	 Edwin Odari
 Flandars Mutange	 Mark Brenson	 Emmanuel Yego	 Joseck Momanyi
 Grace Kifue	 Banza Mwepu Verra	 Grace Kavata	 Britney Ndili