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Typological Diversity, Spatial Distribution, Materiality and Physical Condition of Urban Furniture in Nairobi's Central Business District

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Abstract
Public open spaces support social, civic and economic activity, yet evidence on urban furniture in sub-Saharan African cities remains limited. This study evaluated the typological diversity, spatial distribution, materiality and physical condition of urban furniture across Aga Khan Walk, Kencom Bus Stop Corridor, Kwame Nkrumah Avenue and Jeevanjee Gardens in Nairobi's Central Business District. A census audit documented 283 furniture elements using structured observation checklists and photographs, while frequencies, percentages and cross-tabulations summarised the inventory. Findings revealed marked spatial disparities: Aga Khan Walk and Jeevanjee Gardens concentrated most resting amenities, while Kencom had only two benches and Kwame Nkrumah Avenue had none. Metallic hardware and concrete or masonry predominated. Most assets were rated good or fair, although deterioration was concentrated in selected locations. The study recommends climate-resilient materials, systematic asset monitoring, inclusive seating provision and multifunctional furniture that better supports pedestrian comfort, accessibility, maintenance and informal urban activity more equitably.

Keywords: Urban furniture, spatial distribution, materiality, physical condition, public space, Nairobi, Kenya

INTRODUCTION

Urban public spaces serve as the primary arena for social interaction, economic exchange, civic life, and pedestrian movement in contemporary cities. Within these spaces, urban furniture—defined as the collective ensemble of micro-architectural infrastructure, including seating, lighting, protective bollards, waste bins and directional signage—plays a fundamental operational and qualitative role (Carmona, 2019, 2021; Gehl, 2011). Far from being mere passive architectural embellishments, urban furniture elements constitute the critical physical interface between the built environment and human behaviour (Main & Hannah, 2017). They dictate spatial accessibility, influence pedestrian flow, determine lingering durations, and foster social inclusion or exclusion across diverse urban demographics (Francis et al., 2012; Mehta, 2014).

In the Global South, rapid urbanisation, physical congestion, and expanding informal street economies have placed unprecedented operational pressure on public space infrastructure (Gatitha & Kariko, 2020; UN-Habitat, 2020). In sub-Saharan African metropolises such as Nairobi, the Central Business District (CBD) functions as an intense hub of administrative, commercial and transit activity, daily accommodating hundreds of thousands of commuters, traders and visitors (Makworo & Mireri, 2011). However, the provision, spatial distribution, material durability, and maintenance of public micro-infrastructure in Nairobi's urban core have lagged significantly behind the city's growth and foot-traffic demands (Kimani & Musyoka, 2021). Public space planning across the CBD historically prioritised vehicular movement and high-density commercial development over pedestrian comfort, leaving public open spaces visually homogenised and functionally constrained (Nairobi City County, 2018).

While extensive urban planning literature globally emphasises the psychological, social

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and economic benefits of well-designed micro-architectural infrastructure (Whyte, 1980; Gehl & Svarre, 2013; Carmona, 2019), empirical research focusing specifically on the typological diversity, material composition, and physical state of urban furniture in sub-Saharan African CBDs remains sparse. Most existing studies in the region evaluate public space from a macro-spatial or land-use policy perspective, rarely conducting fine-grained physical audits of the micro-elements that directly condition everyday street-level experiences (Gatitha & Kariko, 2020; Makworo & Mireri, 2011). Furthermore, critical questions persist regarding how spatial disparities in furniture provision impact distinct functional typologies—ranging from dedicated pedestrian promenades and historic public parks to high-density transit nodes and commercial corridors.

To address the gap, this study establishes four interconnected research objectives corresponding directly with the major analytical components of typological diversity, spatial distribution, materiality and physical condition:

i. To evaluate the distribution and variety of urban furniture types across the CBD streetscape.
ii. To map the spatial density and allocation of assets relative to commercial zoning patterns.
iii. To identify the dominant structural materials used and assess their susceptibility to wear within high-volume pedestrian environments.
iv. To evaluate the structural and functional state of micro-infrastructure assets using a standardised four-tier condition rating index.

The investigation covered four representative public spaces in Nairobi's CBD: Aga Khan Walk, Kencom Bus Stop, Kwame Nkrumah Avenue and Jeevanjee Gardens. By systematically mapping and auditing 283 urban furniture elements across these contrasting spatial typologies, the paper evaluates public-realm usability and spatial equity. The findings provide empirical insights for urban designers, municipal authorities and infrastructure managers seeking to optimise public-space asset management and enhance human-centred urban environments in rapidly growing African cities.

THEORY

This section reviews the theoretical, conceptual and empirical literature relevant to urban furniture, with particular attention to human behaviour, typological diversity, spatial distribution, materiality, physical condition and maintenance. It also situates the study within African and Nairobi-specific public-space research before presenting the theoretical framework and identifying the research gap.

Theoretical Foundations: Micro-Architecture and Human Behaviour

The relationship between physical space and human behaviour in urban environments is anchored in the foundational work of Whyte (1980) and Gehl (2011). Gehl's seminal taxonomy of outdoor activities categorises urban space usage into necessary activities (compulsory tasks such as commuting or transit waiting), optional activities (discretionary leisure tasks like sitting, reading, or sunbathing), and social activities (communal interactions, conversations, and passive social watching). While necessary activities occur regardless of spatial quality, optional and social activities depend strictly on the physical and environmental quality of the public realm (Gehl, 2011; Carmona, 2021).

Micro-architectural elements—collectively classified as urban furniture—serve as the immediate physical catalyst for optional and social engagement (Main & Hannah, 2017). Benches, edge seating, and street planters provide the physical support required to transform transient walkways into places of prolonged lingering (dwell time) (Mehta, 2014). Whyte (1980) famously identified sitability as the primary determinant of public space success, demonstrating that the presence of comfortable, adaptable seating directly correlates with human density and social vitality. Furthermore, Gehl's Edge Effect theory posits that human beings naturally seek edge environments—such as building facades, planter edges, or clusters of street trees and bollards—that offer psychological protection while allowing observation of the surrounding space (Gehl, 2011; Lang, 2005).

Typological Diversity and Spatial Distribution of Urban Furniture

Urban furniture typologies fulfil distinct operational functions within the public realm (Carmona et al., 2010). These functions can be broadly categorised into: (i) rest and comfort

amenities (including public benches, integrated planter seating, and informal ledges); (ii) protection and spatial enclosure (including traffic bollards, tree grid fences, and pedestrian guardrails); (iii) environmental sanitation (including waste bins, recycling receptacles, and public water fountains); and (iv) wayfinding and illumination (including street light poles, directional signage, and commercial advertising billboards).

Recent spatial planning research emphasises that the typological diversity and spatial layout of these elements dictate street functionality (Francis et al., 2012; Smith & Low, 2013). A monochromatic distribution of furniture, for example, a street equipped solely with security bollards and light poles, promotes continuous pedestrian throughput while discouraging stationary human activities (Mehta, 2014). Conversely, multi-functional urban spaces integrate a high diversity of micro-architectural typologies, creating layered spatial zones that accommodate transit, rest, and informal commerce simultaneously (Németh & Schmidt, 2011; Franck & Stevens, 2007). However, poor spatial placement or over-clustering of furniture can generate physical clutter, restrict universal access for persons with disabilities (PWDs), and impede pedestrian movement along high-density corridors (Aelbrecht, 2019).

Materiality, Physical Condition and Asset Maintenance

The material composition and physical state of urban furniture directly influence its durability, ergonomic comfort and public perception (Main & Hannah, 2017). Material selection in public space design involves a constant trade-off between structural resistance and human comfort as shown in **Table 1**.

According to Wilson and Kelling's Broken Windows Theory, visible signs of physical decay, broken public infrastructure, and unmaintained urban amenities generate a perception of disorder, reducing feelings of safety and discouraging public space occupation (Wilson & Kelling, 1982; Sampson & Raudenbush, 1999). In urban design contexts, degraded or vandalised micro-architecture actively deters user interaction, turning potentially vibrant spaces into neglected zones (Carmona, 2019; Kimani & Musyoka, 2021). Effective municipal asset management systems require continuous inspection and proactive maintenance regimes to preserve both functional utility and visual appeal (UN-Habitat, 2020).

Public Micro-Architecture in Developing and Sub-Saharan African Cities

While urban furniture literature in Western contexts often centres on aesthetic design, smart urban technologies, and placemaking (Carmona, 2021; Aelbrecht, 2019), studies in sub-Saharan Africa highlight fundamental structural challenges related to infrastructure deficit, high pedestrian volumes, and rapid informal street economies (Gatitha & Kariko, 2020; Makworo & Mireri, 2011).

In fast-growing cities like Nairobi, the Central Business District (CBD) experiences intense pedestrian foot traffic alongside limited municipal maintenance budgets (Nairobi City County, 2018). Public spaces frequently become contested domains where formal pedestrian

TABLE 1
Materiality of urban furniture

Material Class	Structural & Maintenance Attributes	Ergonomic & Human Comfort Attributes
Metal (Steel/Cast Iron)	High tensile strength, impact resistance, weather durability	Rigid, minimal thermal comfort (heats in sun, cold in winter)
Concrete & Masonry	Vandalism-resistant, high load capacity, long lifespans	Unyielding surface, non-adjustable ergonomics
Timber & Wood Composites	Moderate maintenance needs, vulnerable to decay/vandalism	High natural aesthetic, superior thermal and tactile comfort
Plastics & Composites	Lightweight, corrosion-resistant, low initial cost	Susceptible to UV degradation, brittle under heavy impact

Source: Authors' synthesis from cited literature, 2026

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infrastructure collides with informal street vending, transport operations, and heavy vehicular traffic (Kamunyori, 2018; Owella et al., 2021). Furthermore, hostile architecture—such as the deliberate omission of seating or the installation of defensive barriers to prevent street trading and lingering—has increasingly characterised modern urban streetscapes in developing cities (Flusty, 1997; Petty, 2016).

Despite these challenges, empirical documentation detailing the exact physical inventory, spatial diversity, material composition, and condition tiers of urban furniture in African CBDs remains severely limited. This literature review establishes the theoretical framework showing that systematic micro-architectural audits are essential for diagnosing public space decay, advancing inclusive urban management, and informing human-centred spatial planning in rapidly evolving metropolises.

Theoretical Framework

Table 2 maps the theoretical perspectives to their operational use in data collection, coding and analysis. **Figure 1** consolidates these perspectives into the study's theoretical framework.

TABLE 2
Operationalisation of theoretical perspectives

Theoretical Perspective	Core Premise	Operationalisation in Study (Data Collection, Coding & Analysis)
Right to the City (Lefebvre, Harvey)	Public space must accommodate non-commercial human presence without structural exclusion.	Coding & Interpretation: Used to code seating scarcity as an indicator of exclusion-by-design, framing asset availability around democratic accessibility rather than mere utility.
Spatial Production / Just City (Fainstein, Soja)	Urban resources and infrastructure should be distributed equitably across space.	Data Collection & Analysis: Guided the spatial mapping of assets across commercial zones to evaluate spatial equity and service deficits in high-density pedestrian corridors.
Broken Windows Theory (Wilson & Kelling)	Visual signs of disorder signal institutional neglect and accelerate physical degradation.	Data Collection & Coding: Informed the 4-tier condition rating index (Excellent to Bad) to evaluate whether asset decay clusters in specific land-use zones.

Source: Authors' synthesis from cited literature, 2026

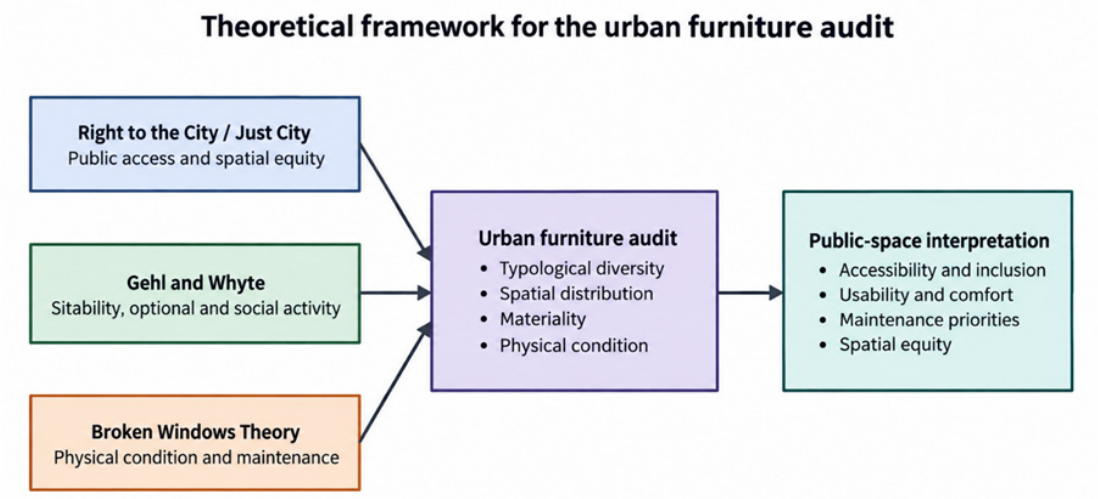


FIGURE 1
Theoretical framework for the urban furniture audit
Source: Authors' conceptualisation, 2026

While Wilson and Kelling's (1982) Broken Windows Theory provides a lens for examining how unmaintained micro-infrastructure signals institutional neglect, its application in urban research requires significant nuance. Critical urban scholars (Sampson & Raudenbush, 1999) argue that the theory oversimplifies complex socio-spatial dynamics by conflating physical decay with social disorder, often leading to punitive management practices or the hyper-surveillance of marginalised populations. In Sub-Saharan African urban contexts, applying order maintenance concepts uncritically risks misinterpreting informal adaptation and spatial resilience as systemic decay. Accordingly, this study does not adopt Broken Windows Theory as a causal model for social behaviour or criminality. Instead, it uses the perspective strictly as a descriptive framework to assess how municipal maintenance schedules—or the lack thereof—manifest as localised physical asset degradation across commercial zones.

Research Gap

International scholarship on urban public space predominantly reflects Global North realities where municipal funding, formal regulatory oversight, and designated public plazas are standard. In contrast, African urbanism scholars (Gatitha & Kariko, 2020; Makworo & Mireri, 2011) emphasize that public space in African metropolises is defined by intense competition, spatial hybridity, and street-level informal economies. In Nairobi specifically, empirical research on streetscapes (Makworo & Mireri, 2011; Nairobi City County, 2018) highlights a persistent planning paradigm that prioritises vehicular transit and commercial density over pedestrian infrastructure. Public furniture within Nairobi's Central Business District exists within this contentious streetscape, where formal municipal provision often clashes with rapid pedestrian growth, street vending, and private commercial encroachment. Grounding this study in Nairobi's urban history ensures that asset distribution and physical condition are evaluated within the structural realities of post-colonial spatial management.

Therefore, while global literature offers robust theoretical frameworks regarding spatial justice and urban asset design, and regional scholarship documents broader streetscape struggles in African cities, there remains a distinct empirical gap concerning the micro-level realities of street furniture within Sub-Saharan African commercial cores. Specifically, existing scholarship lacks systematic field data evaluating how asset typologies, physical materials, maintenance states, and spatial placements intersect within high-density African streetscapes. This study directly addresses this knowledge gap through a systematic audit of Nairobi's CBD, directly informing our four research objectives: mapping typological diversity, analysing spatial placement across land-use zones, evaluating material durability, and quantifying physical condition.

RESEARCH METHODS

This section outlines the procedures used to examine urban furniture across the selected Nairobi CBD public spaces. It describes the research design, study-site selection, data collection procedures, operational definitions, condition-rating approach, data analysis and ethical considerations that guided the field audit.

Research Design

This study adopts a cross-sectional observational design framed within a critical realist philosophical paradigm (Sayer, 2000). Critical realism is particularly suited for built-environment research because it acknowledges both the objective physical reality of urban infrastructure (e.g., material condition, count and spatial coordinates) and the underlying structural mechanisms, such as municipal governance and maintenance regimes, that produce spatial outcomes.

Selection and Context of Study Sites

The study was conducted within the Central Business District (CBD) of Nairobi, Kenya. To ensure spatial and functional representativeness, four public spaces reflecting distinct urban typologies, pedestrian flow characteristics, and functional uses were purposively selected as shown in **Table 3** and **Figure 2**. The research focused on the four targeted study zones within Nairobi's Central Business District (CBD), selected through a stratified spatial sampling approach based on dominant land-use characteristics and pedestrian intensity: high-density transport nodes, primary commercial retail corridors, mixed-use commercial/office zones, and civic/institutional precincts. Selecting these four distinct spatial typologies ensured a broad representation of functional streetscapes within the urban core.

TABLE 3
Description of study sites

Site	Description
Aga Khan Walk	A major north-south pedestrian promenade and public square featuring high foot-traffic volumes, formal landscaping, and civic gathering areas.
Kencom Bus Stop Corridor	A primary multi-modal public transit hub along City Hall Way, characterised by intense pedestrian turnover, commuter queues, and informal street trading.
Kwame Nkrumah Avenue	A commercial street corridor serving mixed-use functions, including financial institutions, retail shops, and administrative offices.
Jeevanjee Gardens	A historic 2.5-acre public park serving as a major passive recreation and civic gathering space within the northern sector of the CBD.

Source: Field survey, 2026

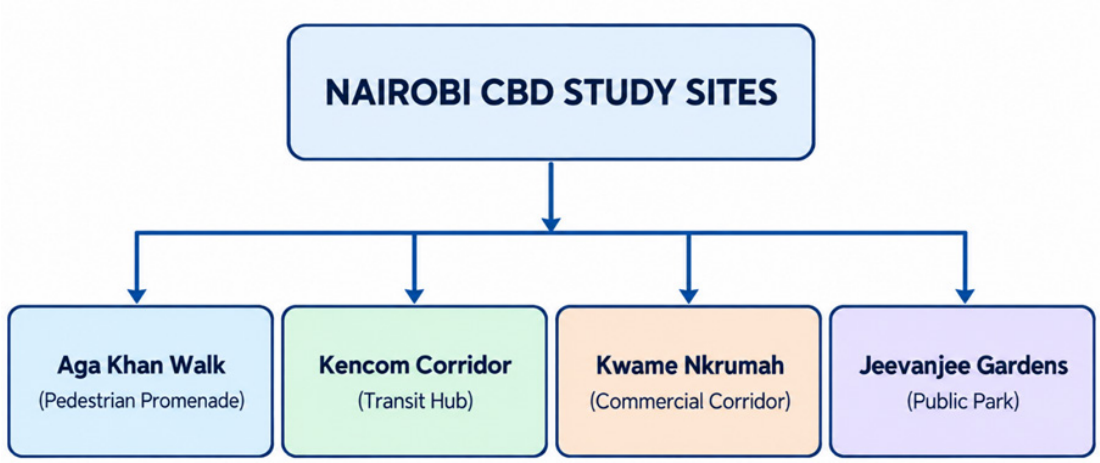


FIGURE 2
Classification of selected study sites
Source: Field survey, 2026

However, because data collection was restricted to these four designated zones rather than a continuous wall-to-wall census of the entire CBD, findings should be interpreted as representative of primary commercial and transit corridors rather than an exhaustive account of every perimeter street across the greater Nairobi metropolitan area.

Data Collection

A comprehensive census audit of all visible urban furniture elements across the four sites was executed over a three-week period between 1st and 23rd March 2025. Urban furniture was operationalised into six main functional typologies as shown in **Table 4**.

Each individual urban furniture item was physically audited using an observation checklist and photographs. For every audited asset, data were logged across the following dimensions: location, materiality and physical condition rating. **Table 5** presents the operational definitions adopted for the urban furniture elements.

Multi-functional or ambiguous structures encountered during the field inventory were classified according to their primary structural design intent. For instance, raised concrete planter ledges that exhibited clear dual utility (retaining vegetation while serving as pedestrian seating) were assigned a primary code based on physical characteristics: if equipped with flat, finished seating surfaces, they were logged as seating micro-infrastructure with secondary planter attributes recorded in the field notes.

To evaluate physical state and maintenance urgency, a standardised 4-point rating scale

TABLE 4
Typologies of urban furniture

Typology	Urban furniture elements
Seating Amenities	Benches, integrated planter ledges, and masonry retaining walls used for resting
Waste Management	Public trash bins, recycling receptacles, and waste enclosures
Access control and safety	Vehicle bollards, pedestrian guardrails, and tree grid protectors
Lighting and utility	Street light poles, high-mast floodlights, and utility distribution boxes
Wayfinding and information	Directional signage, street maps, and public notice boards
Informal/Commercial Structures	Kiosks, permanent vending stands, and bus shelter structures

Source: Authors' operationalisation, 2026

TABLE 5
Operational definition

Furniture Typology	Operational Definition	Field Inclusion / Exclusion Criteria
Waste Receptacles	Fixed or semi-fixed containers designed for public refuse collection.	Includes municipal bins, private commercial bins anchored to public footpaths, and bollard-integrated receptacles. Excludes temporary loose trash bags or informal piles.
Public Seating	Built structures or anchored furniture intended for pedestrian resting or dwell.	Includes public benches, stone ledges integrated into streetscape borders, and planter retaining walls explicitly designed at seating height (0.4" m"-0.5" m"). Excludes private outdoor restaurant seating restricted to paying customers.
Bollards & Barriers	Post-like structures or low fences erected to restrict vehicle access or guide pedestrian flows.	Includes concrete, metallic, or flexible post barriers along curbs. Excludes temporary traffic cones or construction hazard tape.
Planters & Micro-Greening	Fixed containers or raised beds containing vegetation installed in the public right-of-way.	Includes municipal planter boxes and permanent sidewalk tree guards. Excludes movable potted plants placed temporarily by private shop owners.

Source: Authors' operationalisation, 2026

adapted from municipal asset management frameworks was applied as shown in **Table 6.**

Data Analysis
Descriptive statistics, including frequencies, percentages and cross-tabulations, were computed to summarise furniture typologies, physical condition ratings and accessibility features.

Ethical Considerations
The study involved non-intrusive observation and photographic documentation of urban furniture in public open spaces. Ethical procedures therefore focused on minimising interference with public activity, protecting incidental personal identifiers in photographs, securing field records and obtaining the relevant institutional and administrative approvals.

Observational Ethics and Spatial Anonymity
i. *Non-interference*: Observers remained passive and positioned at unobtrusive vantage points so that normal public-space activity was not disrupted by the field audit.

TABLE 6
Physical condition rating scale

Tier	Description/Operationalisation	Action Required
Excellent	Structurally pristine, newly installed or recently restored, fully functional, and visually appealing without wear or vandalism.	Routine cleaning only.
Good	Fully functional and structurally sound, exhibiting minor superficial wear (e.g., slight paint fading or minor weathering) that does not compromise usability.	Minor preventative maintenance.
Fair	Functional but displaying noticeable physical degradation, surface rust, minor cracking, or cleanliness issues requiring routine maintenance.	Major repair or component replacement.
Bad/	Rarely (n=10)	Moderately accessible 2 (20%); accessible 7 (70%); very accessible 1 (10%)
Dilapidated	Structurally compromised, broken, hazardous, severely vandalised, or non-functional, actively discouraging user interaction.	Immediate removal or full replacement.

Source: Authors' operationalisation, 2026

Confidentiality, Anonymity and Data Security

i. Hard-copy field observation sheets were securely stored in locked files accessible only to the principal researcher.
ii. Digital datasets and statistical files were stored on password-protected systems. Records were retained in accordance with the applicable institutional research requirements.

Photographic Documentation and Image Privacy

Photographic evidence documented urban furniture typologies, physical defects, material conditions, placement layouts and environmental surroundings.

i. Photographs focused specifically on the micro-architectural elements, furniture materials, placement layouts, and environmental surroundings rather than individual human faces.
ii. Where members of the public were inadvertently captured in field photographs, identifying facial features and other personal identifiers were obscured before inclusion in the manuscript.

Institutional Approval and Research Licensing

Prior to commencing fieldwork in the Nairobi CBD, official ethical clearance and administrative approvals were secured. Ethical approval was obtained from the University's Institutional Ethics Review Committee (IERC). A research permit was secured from the National Commission for Science, Technology and Innovation (NACOSTI). Administrative clearance and permission to conduct observational mapping within the city's public realm were obtained from the Nairobi City County Government (NCCG).

RESULTS

The types of urban furniture in the selected public open spaces of Nairobi Central Business District were listed for the four sampled locations. An inventory of micro-architectural infrastructure across Aga Khan Walk, Kencom Bus Stop, Kwame Nkrumah Avenue and Jeevanjee Gardens identified a total of 283 urban furniture elements. The recorded typologies comprised benches, bollards, light poles, pots/planters, waste receptacles, directional signage, clocks, electric box systems, manholes and protective grid fences.

Urban Furniture Inventory

An audit of physical micro-architectural elements reveals severe spatial disparities in seating infrastructure and public amenities across the Nairobi CBD. Results presented in **Figures 3** and **4** reveal that Aga Khan Walk is the most extensively equipped urban promenade, holding

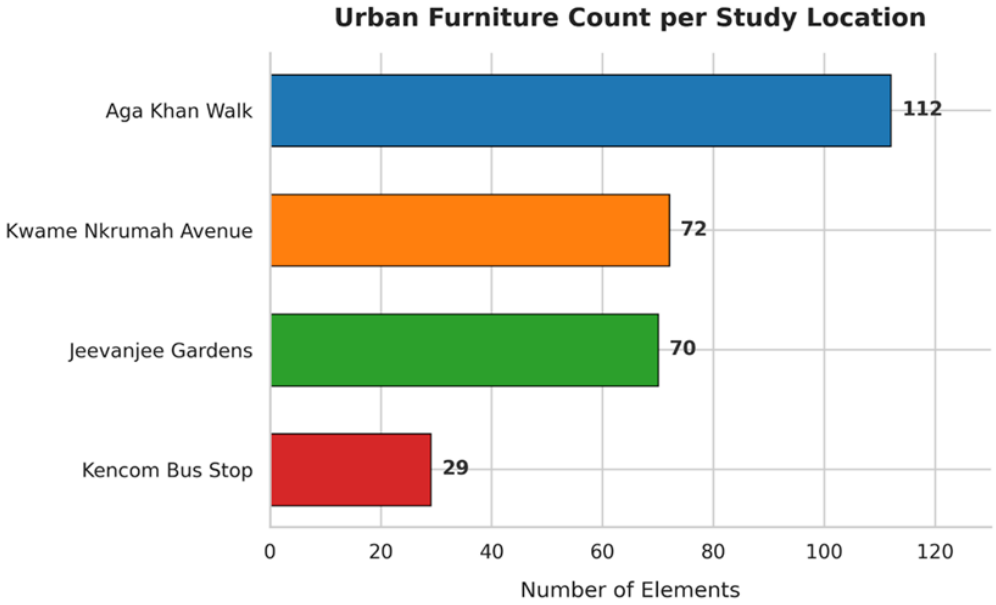


FIGURE 3
Urban furniture count per location
Source: Field survey, 2026

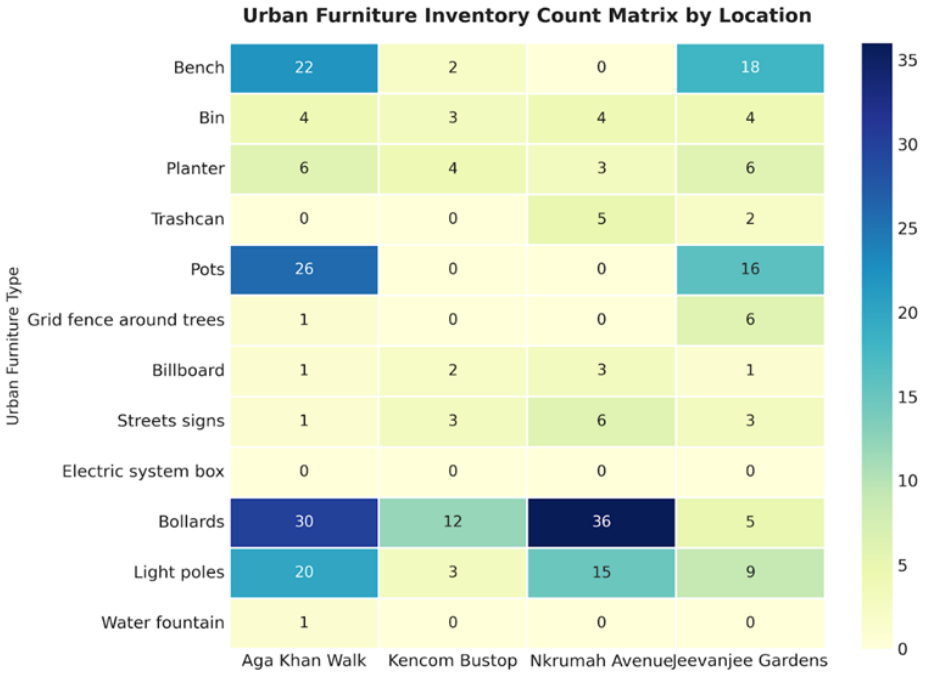


FIGURE 4
Density matrix of urban furniture
Source: Field survey, 2026

112 furniture elements, including 22 benches in Excellent condition, 30 bollards, 26 pots, and 20 light poles. Nkrumah Avenue has 72 items, but no public benches were recorded. Jeevanjee Gardens possesses 70 elements, including 18 benches and 16 pots. Kencom Bus Stop is relatively under-equipped (29 items), with only two benches.

Design and Materiality

The design character of urban furniture across the CBD is predominantly utilitarian, prioritising structural resistance over ergonomic adaptation or civic aesthetic alignment. Structural material analysis reveals two dominant material types. According to results presented in **Tables 7** and **8**

and **Figure 5**, metallic hardware (56.67%) forms the majority of elements, primarily cast steel and iron used for light poles, traffic bollards, transit seating frames, and protective tree grids. Concrete and masonry (38.33%) comprise pre-cast concrete blocks used for linear promenade benches, heavy retaining planters, and utility bases. Organic and plant elements (2.22%) included integrated

TABLE 7
Urban furniture material inventory matrix by location

Location	Typology	Count	Primary Materiality & Functional Assessment
Aga Khan Walk	Benches	22	Pre-cast concrete & timber; pristine structural state.
	Pots / Planters	32	High aesthetic finish; integrated greenery.
	Bollards & Light Poles	50	Steel/cast metal; intact collision protection.
	Bins / Fountains	5	Water fountain functional; minor mineral staining.
	Signage	3	Directional signage intact.
Kencom Bus Stop	Benches	2	Metallic transit seating; heavy surface wear.
	Bollards & Light Poles	15	High-impact protection along loading bays.
	Bins & Planters	7	High utilisation; requires frequent clearing.
	Transit Signage	5	Clear transit directional signage.
Nkrumah Avenue	Bollards & Light Poles	51	Intact vehicular-pedestrian separation.
	Waste Bins	9	Functional surface-mounted receptacles.
	Planters & Signage	12	Active commercial edge.
	Public Benches	0	Complete absence of seating infrastructure.
Jeevanjee Gardens	Benches	18	Timber & masonry; well-shaded, heavy physical wear.
	Pots, Planters & Grids	28	Protective tree grids intact; active garden edge.
	Light Poles & Bins	13	Waste receptacles show structural wear from park over-use.
	Signage	4	Park regulation and historical signage intact.
	Location Subtotal	70	High social usage; condition varies from good to bad.

Source: Authors' operationalisation, 2026

TABLE 8
Material composition of urban furniture per study location

Element Type	Material Category	Aga Khan Walk	Kwame Nkrumah Ave	Jeevanjee Gardens	Kencom Bus Stop	Total Count	% of Total
Bollards	Metal/ Steel	30	36	5	12	83	29.33%
Light Poles	Metal/ Steel	20	15	9	3	47	16.61%
Benches	Concrete/ Timber/ Metal	22	0	18	2	42	14.84%
Pots	Concrete/ Terracotta	26	0	16	0	42	14.84%
Planters	Concrete/ Masonry	6	3	6	4	19	6.71%
Bins	Plastic/ Metal	4	4	4	3	15	5.30%

Element Type	Material Category	Aga Khan Walk	Kwame Nkrumah Ave	Jeevanjee Gardens	Kencom Bus Stop	Total Count	% of Total
Street Signs	Metal/ Aluminium	1	6	3	3	13	4.59%
Grid Fence	Metal/ Steel	1	0	6	0	7	2.47%
Trashcans	Metal/ Plastic	0	5	2	0	7	2.47%
Billboards	Metal/ Composite	1	3	1	2	7	2.47%
Water Fountain	Concrete/ Stone	1	0	0	0	1	0.35%
Total Elements		**112**	**72**	**70**	**29**	**283**	**100%**

Source: Fieldwork, 2026

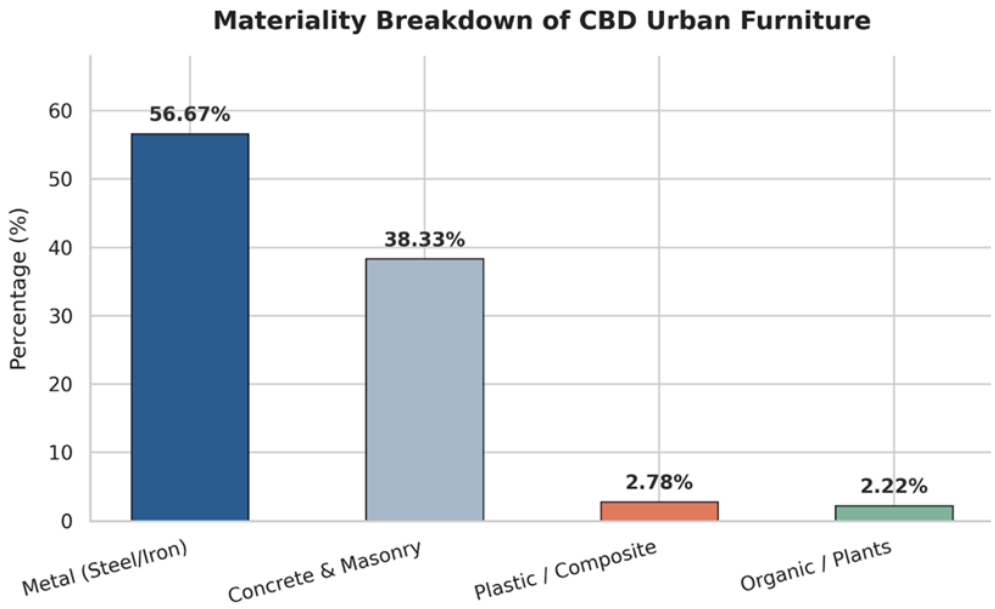


FIGURE 5
Percentage of materials used for urban furniture
Source: Field survey, 2026

vegetative planters and bio-swale borders, while plastic and composite materials (2.78%) included surface-mounted waste bins and signage backings.

While concrete and steel offer high physical durability against heavy public use and urban weathering, their unyielding surfaces provide minimal ergonomic comfort during extended dwell periods. Furthermore, few furniture elements reflect Nairobi's cultural identity or respond to contextual architectural character, creating a visual homogenization across the urban landscape.

Condition and Maintenance

To systematically evaluate the state of infrastructure across the Nairobi Central Business District (CBD), the physical condition of each mapped furniture element was classified during fieldwork as described in the methodology. Field inventory audits across Aga Khan Walk, Kencom Bus Stop, Nkrumah Avenue and Jeevanjee Gardens identified 283 urban furniture elements. As shown in **Tables 9** and **10** and **Figure 6**, the physical condition assessment reveals clear differences among the four sampled locations. Across the total inventory, 99 elements (35.0%) were classified as good, 97 (34.3%) as fair, 49 (17.3%) as excellent

TABLE 9
Condition assessment of urban furniture (overall)

Tier	Description/Operationalisation	Count	%age
Excellent	Structurally pristine, newly installed or recently restored, fully functional, and visually appealing without wear or vandalism.	49	17.3%
Good	Fully functional and structurally sound, exhibiting minor superficial wear (e.g., slight paint fading or minor weathering) that does not compromise usability.	99	35%
Fair	Functional but displaying noticeable physical degradation, surface rust, minor cracking, or cleanliness issues requiring routine maintenance.	97	34.3%
Bad/ Dilapidated	Structurally compromised, broken, hazardous, severely vandalised, or non-functional, actively discouraging user interaction.	38	13.4%

Source: Fieldwork, 2026

TABLE 10
Urban furniture condition matrix by location

Element Type	Aga Khan Walk	Kwame Nkrumah Ave	Jeevanjee Gardens	Kencom Bus Stop	Overall Dominant Condition
Bollards	Good (30)	Fair (36)	Good (5)	Fair (12)	Fair
Light Poles	Good (20)	Good (15)	Good (9)	Fair (3)	Good
Benches	Excellent (22)	None (0)	Bad (18)	Fair (2)	Excellent/Bad
Pots	Excellent (26)	None (0)	Fair (16)	None (0)	Excellent
Planters	Good (6)	Fair (3)	Bad (6)	Bad (4)	Bad
Bins	Good (4)	Bad (4)	Fair (4)	Fair (3)	Fair/ Good / Bad
Street Signs	Bad (1)	Fair (6)	Fair (3)	Good (3)	Fair
Grid Fence	Excellent (1)	None (0)	Fair (6)	None (0)	Fair
Trashcans	None (0)	Bad (5)	Fair (2)	None (0)	Bad
Billboards	Good (1)	Good (3)	Good (1)	Good (2)	Good
Water Fountain	Fair (1)	None (0)	None (0)	None (0)	Fair
Total Condition Profile	E=49, G=61, F=1, B=1	G=18, F=45, B=9	G=15, F=31, B=24	G=5, F=20, B=4	E=49, G=99, F=97 B=38
E=Excellent, G=Good, F=Fair, B=Bad					

Source: Fieldwork, 2026

and 38 (13.4%) as bad/dilapidated.

A contextual comparison across the study sites demonstrates spatial differences in maintenance and asset preservation. Aga Khan Walk exhibits the highest overall quality profile across the sampled CBD locations. Out of its 112 documented elements, 54.46% (61 units) are in good condition and 43.75% (49 units) are in excellent condition. All 49 elements classified as excellent across the study area are situated along this pedestrianised promenade. One element (0.89%) was rated fair and one element (0.89%) was rated bad.

Kwame Nkrumah Avenue is dominated by elements in fair condition, comprising 62.50% (45 units) of its 72 total inventory items. These consist largely of steel bollards and street signs displaying moderate surface corrosion, paint peeling, or minor impact damage. While 25.00% (18 units)

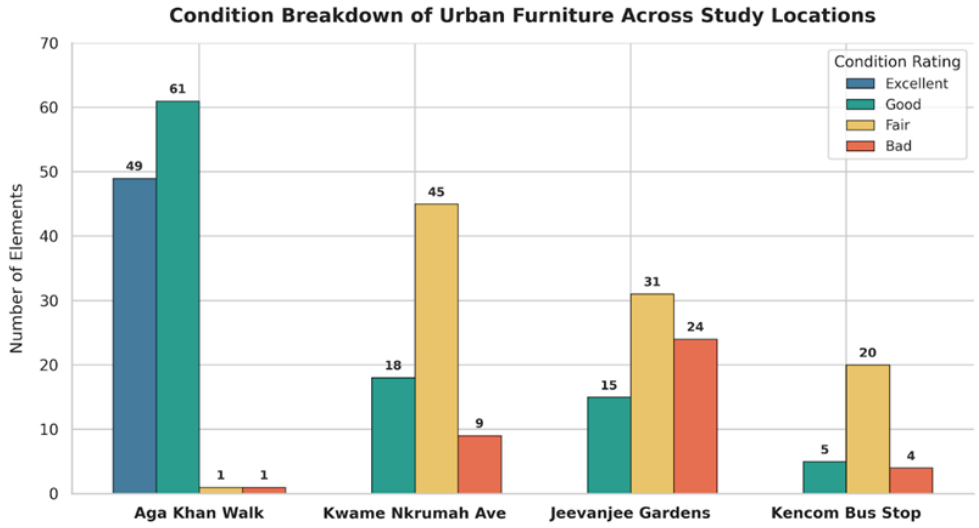


FIGURE 6
Urban furniture condition tier proportions by location
Source: Field survey, 2026

maintain a good condition rating (principally light poles and billboards), 12.50% (9 units) suffer from severe deterioration, including broken waste receptacles.

Jeevanjee Gardens recorded the highest absolute level of infrastructure degradation among all sampled sites. Of the 70 total elements catalogued within the public park, 34.29% (24 units) are in bad condition. This degradation is most severe among public seating infrastructure, where 18 timber and concrete benches exhibit severe structural damage, missing slats, or complete decay. An additional 44.29% (31 units) are rated as fair, leaving only 21.43% (15 units) in good working order.

Kencom Bus Stop represents a high-wear vehicular and pedestrian transit node containing 29 urban furniture elements. Reflecting intense daily operational pressure, 68.97% (20 units) are in fair condition and 13.79% (4 units) are in bad condition. Only 17.24% (5 units) remain in good condition, consisting primarily of commercial advertising billboards.

Evaluating condition by typology highlights specific vulnerability profiles across different element categories. Regarding illumination and spatial enclosure, light poles (rated good or fair across sites) and billboards display the highest structural resilience due to elevated positioning and commercial maintenance regimes. Regarding pedestrian seating and waste infrastructure, public benches and waste bins exhibit the most accelerated rate of deterioration. Benches show extreme spatial variance, ranging from excellent along Aga Khan Walk to widespread structural failure (Bad) in Jeevanjee Gardens. Trash cans and bins across Kwame Nkrumah Avenue and Kencom suffer disproportionately from corrosion, structural deformation, and lack of routine servicing.

Figures 7-9 further visualise how physical upkeep varies across the four study settings.

The physical state, structural integrity and upkeep of urban furniture are important conditions associated with public-space usability, perceived safety and comfort. Damaged, weathered or poorly maintained micro-architectural elements may discourage use, whereas well-maintained and structurally sound installations are more supportive of comfortable public-space occupation.

Where urban furniture was rated fair or bad, common observed issues included broken seating, faded signage, non-functional lighting and vandalism. These conditions indicate reduced functional quality and a need for maintenance attention.

Placement and Accessibility

Furniture placement frequently overlooked accessibility principles. Limited provision



FIGURE 7
Good condition of urban furniture at Aga Khan Walk
Source: Field survey, 2026



FIGURE 8
Poor condition of urban furniture at Jeevanjee Gardens
Source: Field survey, 2026



FIGURE 9
Poor condition of urban furniture at Kwame Nkrumah Avenue
Source: Field survey, 2026

existed for persons with disabilities, the elderly, or children. Seating was often exposed to direct sunlight, with minimal consideration for shade, orientation, or social interaction.

Figures 10-12 show representative examples of




FIGURE 10
Sampled urban furniture at Aga Khan Walk
Source: Field survey, 2026




FIGURE 11
Sampled urban furniture at Jeevanjee Gardens
Source: Field survey, 2026




FIGURE 12
Sampled urban furniture at Kencom bus stop
Source: Field survey, 2026

sampled urban furniture across Aga Khan Walk, Jeevanjee Gardens and Kencom Bus Stop.

DISCUSSION

The empirical findings of this study offer insights into the typological distribution, materiality and physical condition of public micro-infrastructure within Nairobi's Central Business District (CBD). By auditing 283 urban furniture assets across four contrasting spatial typologies—Aga Khan Walk, Kencom Bus Stop Corridor, Kwame

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Nkrumah Avenue and Jeevanjee Gardens—the study identifies spatial disparities, material vulnerabilities and maintenance differences associated with public-realm conditions.

Micro-Spatial Disparities and Functional Diversity

The distribution of urban furniture across Nairobi's CBD exhibits marked spatial variation, confirming Carmona's (2019, 2021) assertions that public space management in rapidly expanding metropolises often produces fragmented spatial outcomes. Pedestrian-oriented environments like Aga Khan Walk and dedicated green spaces like Jeevanjee Gardens concentrate the vast majority of rest amenities (benches, retaining ledges). Conversely, high-volume transit and commercial corridors such as Kencom and Kwame Nkrumah Avenue display a striking functional monoculture dominated almost exclusively by vehicular control mechanisms (bollards, guardrails) and light poles, with no public benches on Kwame Nkrumah Avenue and only two at Kencom Bus Stop.

This spatial arrangement aligns with historical municipal planning paradigms in Nairobi that prioritise vehicular throughput and high-density commercial activity over pedestrian comfort (Makworo & Mireri, 2011; Nairobi City County, 2018). However, from a Gehlian perspective, stripping transit hubs like Kencom of rest amenities ignores the fundamental reality of urban necessity: thousands of commuters daily undergo prolonged waiting times without basic physical support (Gehl, 2011; Mehta, 2014). The limited provision of sitable micro-architecture along these high-density corridors can be interpreted through debates on defensive or interdictory design (Flusty, 1997; Petty, 2016); however, this study did not directly investigate municipal design intentions. Limited seating may nevertheless constrain accessibility and comfort for elderly, disabled and pregnant pedestrians (Francis et al., 2012).

Material Performance and Environmental Vulnerability

The material audit reveals a sharp divide between structural durability and ergonomic utility. Reinforced concrete and masonry elements—predominantly found in Jeevanjee Gardens and Aga Khan Walk—demonstrated the highest structural resilience, remaining overwhelmingly within excellent and good condition ratings. In contrast, metallic infrastructure (steel bollards, iron trash receptacles, light poles) and timber installations showed accelerated physical decay, shifting heavily into fair and deplorable status.

In the high-humidity, high-pollution tropical environment of Nairobi's CBD, untreated timber suffers rapid biological degradation and termite infestation, while exposed ferrous metals undergo intense oxidation and rust (Kimani & Musyoka, 2021). Furthermore, high-density pedestrian corridors expose lightweight metallic fixtures to severe mechanical wear, vehicular impact, and structural deformation. These findings indicate that municipal material specifications have historically failed to balance environmental durability with human ergonomics (Main & Hannah, 2017). While concrete offers long-term vandal-resistance, its thermal rigidity limits long-duration seating comfort (Carmona et al., 2010); conversely, high-comfort materials like timber require proactive maintenance regimes that current municipal asset management budgets in sub-Saharan Africa cannot sustain (Gatitha & Kariko, 2020; UN-Habitat, 2020).

The Broken Windows Perspective and Asset Management Deficits

The presence of degraded or non-functional urban furniture across the CBD is consistent with aspects of Wilson and Kelling's (1982) Broken Windows Theory when used here as a descriptive lens for visible physical disorder. Broken waste receptacles, bent security bollards, unmaintained lighting posts and damaged seating ledges were observed alongside localised littering and other signs of physical deterioration. The cross-sectional audit does not establish that one condition caused the other.

These observations point to limitations in reactive asset management within Nairobi City County (Kimani & Musyoka, 2021). Urban micro-architecture in African CBDs is frequently treated as a one-time capital investment during major urban renewal projects rather than an ongoing maintenance obligation (Bhardwaj, 2019). Without structured, digital asset tracking systems (e.g., GIS-based condition monitoring), minor cosmetic defects may develop into more serious structural deterioration, forcing costly complete replacements rather than low-cost routine repairs (UN-Habitat, 2020).

Contested Spaces: Micro-Architecture and the Informal Economy

Finally, the findings highlight how urban furniture in Nairobi's CBD functions as a primary battleground between formal municipal control and informal street economies (Kamunyori, 2018; Owella et al., 2021). In the absence of dedicated commercial micro-infrastructure (such as structured kiosks or regulated display stalls), informal vendors repurpose existing public furniture—using bollards, tree grid fences, and planter walls as improvised display racks and storage facilities.

While municipal authorities often view this spatial appropriation as a misuse of public infrastructure leading to physical wear and spatial congestion (Nairobi City County, 2018), critical urban theory recognises it as an adaptive survival tactic within high-density Global South cities (Franck & Stevens, 2007; Smith & Low, 2013). Rather than deploying hostile architecture to clear informal traders, inclusive urban design must integrate multi-functional micro-architecture that co-accommodates pedestrian circulation, rest, and structured informal micro-enterprise (Aelbrecht, 2019; Kamunyori, 2018).

Study Limitations and Future Research

The study is limited to four purposively selected public spaces and a cross-sectional physical audit; the findings therefore do not represent every street in Nairobi's CBD or establish temporal and causal relationships. Future research should extend the spatial coverage, undertake longitudinal maintenance audits and directly measure user behaviour and accessibility outcomes where these are central to the research questions.

CONCLUSION

This study provided an empirical evaluation of public micro-infrastructure across four distinct urban typologies within Nairobi's Central Business District (CBD): Aga Khan Walk, Kencom Bus Stop Corridor, Kwame Nkrumah Avenue, and Jeevanjee Gardens. Through a systematic audit of 283 urban furniture assets across their spatial distribution, materiality, and physical condition, several key conclusions emerge.

Micro-Spatial Inequity and Functional Diversity: Urban furniture in Nairobi's CBD is unevenly distributed. Pedestrian promenades and public parks concentrate rest amenities, whereas high-volume transit and commercial corridors are dominated by vehicular-control barriers and light poles. Kwame Nkrumah Avenue recorded no public benches, while Kencom Bus Stop had only two.

Material Performance Mismatch: Material selection is associated with differing observed condition profiles. Reinforced concrete and masonry elements demonstrate high structural resilience and resistance to vandalism, remaining largely in optimal condition. Conversely, metallic and timber installations suffer rapid physical and environmental degradation due to moisture, mechanical impact, and minimal surface maintenance, and were prominent among degraded and non-functional assets.

Asset Management and Deterioration: Unmaintained, broken or vandalised micro-infrastructure was observed alongside other signs of physical deterioration. Interpreted through the Broken Windows perspective, these patterns indicate the value of proactive asset monitoring and routine maintenance; the cross-sectional design does not establish a causal deterioration cycle.

Informal Street Dynamics: Public micro-architecture remains a contested interface between formal municipal regulation and informal street economies. In the absence of integrated commercial micro-infrastructure, informal traders adaptively appropriate bollards, planter walls, and fences, highlighting the need for inclusive, multi-functional design solutions.

RECOMMENDATIONS

Based on the study findings, the following recommendations are proposed to improve the distribution, durability, maintenance, accessibility and multifunctional use of urban furniture in Nairobi's Central Business District and comparable African urban centres.

i. *Mandate Sitability along Transit Corridors:* Nairobi City County's urban planning authorities should revise street design guidelines to mandate integrated, human-centred rest amenities along high-density pedestrian corridors and public

transit hubs like Kencom Corridor.

ii. *Universal Design Integration:* All newly installed micro-architecture should comply with applicable universal-accessibility and street-design standards, including appropriate unobstructed sidewalk clearances and accessible approaches to seating and wayfinding elements for persons with disabilities (PWDs).

iii. *Adopt Hybrid Material Standards:* Municipal procurement frameworks should transition toward hybrid asset designs that combine the structural longevity of reinforced concrete bases with ergonomic, weather-treated composite timber or corrosion-resistant galvanised steel for human-touch surfaces.

iv. *Protective Surface Treatments:* Metallic infrastructure installed in high-density areas must receive heavy-duty anti-corrosion galvanisation and powder coating to resist tropical humidity and mechanical wear.

v. *Establish a GIS-Based Asset Inventory:* Nairobi City County Government should consider a centralised GIS-based asset registry to log, track and periodically monitor the physical condition of public-space infrastructure.

vi. *Implement Preventative Maintenance Schedules*: Municipal asset management should shift from predominantly reactive replacement toward structured preventative maintenance cycles, including periodic repainting, bolt tightening and structural re-anchoring, to address minor wear before more serious deterioration occurs.

vii. *Co-Design Multi-Functional Infrastructure*: Rather than deploying hostile architecture to deter informal trade, urban designers should co-create multi-functional street furniture that incorporates designated display ledges, shaded seating, and waste disposal units tailored to accommodate both pedestrian movement and regulated informal micro-enterprise.

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