

Urban Informality and Its Impacts on Sustainable Urbanism: A Review Using Selected Indicators in Kayole Informal Settlement in Nairobi

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Abstract

Sustainable urbanism is a fundamental element of sustainable development as envisaged under the 2030 Agenda for Sustainable Development (SDGs) and the New Urban Agenda (NUA). Among the key bottlenecks to sustainability are urban poverty and informality. These breed developmental ills, including crime, conflicts, pollution, overcrowding, disease and illicit trade practices. Still, studies and policies acknowledge the urban informals (housing, commerce and industry) for safeguarding poor citizens' right to the city, protecting livelihoods and reducing survivalist crimes, especially, in cities of the global South. This paper uses illustrations from Kayole Informal Settlement in Nairobi to examine the impacts of informal urban solid waste management and trade practices and suggest synergies for overcoming them. Guided by sustainable development and sustainable urbanism theories, the descriptive study explores and mitigates select infrastructural, economic, health, environmental and governance indicators affected by informality, and which impact the realization of globally agreed development pathways. Its data was collected through questionnaires, Key Informant Interviews (KIIs), observation, literature review and mapwork (ArcMap and Google Earth). The resulting findings show minimal progress towards sustainability and pinpoint intervention areas Nairobi should work on to lift residents from extreme poverty as opposed to making the city functional and livable for the poor.

Keywords: Poverty, Urban Informality, New Urban Agenda, Urban Governance, Sustainable Urbanism, Nairobi

Background

Informality: Cause, Trends and Negative Impacts

United Nations Department of Economic and Social Affairs (UN DESA, 2018a) reports that 55% of the global population lives in urban areas. By 2050, the figure is projected to hit 68%, pushing the urban population from 4.2 billion in 2018 to 6.7 billion in 2050. The Bank World, (2023) states that Kenya's urban population grew from 24% of the national population in 2010 to 28% (from approximately 9.8 to 14.8 million people) in 2021. 4.9 million of these live in Kenya's capital, Nairobi. In 2018, due to rural-to-urban migration, Nairobi was reported to have an annual population growth rate of 3-5% (UN DESA, 2018b). Other than rural-urban migration, increased birth and low mortality rates in cities contribute to this population growth.

Among the pull factors that attract people to cities like Nairobi include the availability of (or hope for) better jobs and livelihoods, higher wages, superior living conditions, access to greater quality infrastructure, better quality healthcare and premier education services (BBC, 2023; Hutchings, et al., 2022) which are still deemed better in urban slums than in many rural areas. The increasing urban population is expected to result in extreme competition for the same necessities that attract people to cities, including housing, jobs, schools, healthcare, transport, recreation and access to affordable quality clean water and food. The trend will push more people into informal low-cost housing and informal livelihoods and practices like street vending and poor solid waste management to survive (BBC, 2023; Kimega, 2020; Huang, Zhang, & Xue, 2018).

As early as 2008, the United Nations projected that urban population growth would be faster in poor informal settlements and peri-urban areas of the global South, including in Sub-Saharan Africa (UN DESA, 2018a). Today, statistics indicate that 25% and 61% of the global urban population live or work in informal settlements and sectors respectively (Avis, 2016; UN, 2018). Eighty Percent of these live in Asia and Sub-Saharan Africa (Eastern and South-Eastern Asia, 370 million; sub-Saharan Africa, 238 million and Central and Southern Asia, 227 million). The figure is expected to double while those requiring decent affordable housing in cities will hit 3 billion by 2030 (UN, 2019). Already, approximately 90% of urban dwellers in Sudan and the Central African Republic live in informal settlements, and 2 billion people hold informal jobs globally (ILO, 2018). Approximately 70% of Nairobi's population lives in informal settlements that traverse the city (Wanjiru-Mwita, 2021), or work in the informal sector (Murunga *et al*, 2021).

Urban poverty is the key driver of this informality and the increasing tendency of people to live or work in risk-prone areas. Avis (2016) remarks that globally, poverty is becoming an urban and not rural phenomenon but is also contributed to by the poor leaving villages for cities. While people think cities offer better rewarding livelihoods and lifestyles (Peimani & Kamalipour, 2022), their rural-urban migration, and overpopulation worsen urban scourges, including congestion; poor housing; unemployment; oversupply of retail (street) vendors; competition for commercial spaces; a strain on public infrastructure such as water supply, sewer systems, roads, drainages, electricity supply; poor air quality; inequality; poor waste management; environmental destruction; and inaccessibility of balanced diets for some residents. The trend has proved difficult to reverse for many cities (Obioha, 2021; Odongo & Ma, 2021a; Simone, 2020); Mirafab & Kudva, 2014) and may worsen informality.

Prevailing Arguments for Informality

Despite the above challenges associated with informality, Peimani and Kamalipour (2022), Satterthwaite (2021), UN (2017), and Avis (2016) argue that informal settlements and trade are not entirely bad. The two are a vital source of housing and income for the urban poor ($\frac{1}{4}$ to $\frac{1}{3}$ of urban dwellers globally). These cannot, in the short and medium term, afford expensive private accommodation and lifestyles offered in middle-class neighbourhoods in economies where governments struggle to provide dignified livelihoods and adequate affordable and decent housing in all conurbations. Where they exist, state-provided houses are often prohibitively priced, discriminatorily allocated, and may be located far from livelihoods (Obioha, 2021; Agyemang & Morrison, 2018; Bah, Faye, & Geh, 2018; Government of Kenya, 2018). Still, the urban poor, their trades and the settlements they inhabit are important elements of the urban and rural production and consumption value chain. They must be accommodated as the effort to improve their conditions is made. Consequently, Peimani & Kamalipour (2022) and Tonda & Kepe (2016) highlight “the need for sensible urban planning and policy responses that recognise informality as a reality; addressing its potential, and understanding the ordinary’s aspiration for spatial justice and decent livelihoods.”

To some, informal settlements house cheap labour for neighbouring industries, warehouses, estates and other medium-sized, micro and small-scale establishments in their vicinity. They also offer affordable commutes for menial urban labourers (Das & Susantono, 2022; Jones, 2017). Consequently, the settlements safeguard the poor’s access to the city; a fundamental right (Nahar-Lata, 2020; Young, 2018). Moreover, the affordable manpower these settlements house is needed to build and sustain emerging cities such as Nairobi by delivering an inexpensive skilled and experienced workforce over time without resorting to forced and inhumane labour practices that characterised the construction of some of the behemoth megapolis of the global north (National World War II Museum, 2022; Harris, 2018) despite their *indecent* compactness (Campos *et al*, 2022).

Furthermore, some scholars report that informal settlements and associated trade practices like street vending provide a ready market for goods and services (Peimani & Kamalipour, 2022; Malefakis, 2019) and add a unique vivacity to cities (Fainstein, 2016). This attribute compares them to the compact mixed-use settlements that Jane Jacobs advocated for (Fainstein & (eds), 2016; Talbot, 2019). In this regard, like the 15-minute cities (Abdelfattah, Deponte, & Fossa, 2020), the settlements and their trade practices make places where both “*living, working, entertainment and consumption coexist.*” They also tend to be located next to affluent middle or upper-class residential and commercial neighbourhoods as providers of both technical and non-technical labour. Here, they deliver “*the social mixing of genders, ethnicities, classes and nationalities*” necessary for crafting a holistic urban experience (Talbot, 2019; Cities Alliance, 2021; Gorvett, 2019). Without the settlements, cities would be less inclusive, affordable, lively and liveable, even for the upper classes (Peimani & Kamalipour, 2022; Das & Susantono, 2022).

Perhaps, based on the above, NUA considered the upgrading and sustainable governance of informal settlements, in the short- and medium-term, as opposed to their haphazard bulldozing and eradication key to the sustainable growth and development of emerging cities (Satterthwaite, 2021; UN, 2017). Moreover, the informal settlements worldwide cannot just be eliminated in a twitch. Unlike regimes like China and the USA where the government and state-backed private investors uproot entire communities and rebuild them anew during neighbourhood upgrades (Fainstein, 2016), slum upgrades in cities such as Nairobi have

to adopt a gradual approach due to lack of finances, land ownership regimes, legal restrictions and attendant socio-political dynamics. Justifications have similarly been provided for the prevalence of street vending by scholars such as Peimani & Kamalipour (2022) and Kazembe *et al* (2019) despite its challenges and impacts identified by researchers such as Birgen *et al* (2020) and Ghatak & Chatterjee (2018).

Problem Statement

In light of the above ongoing global discourses, this study asks the questions: (i). What are the prevailing land ownership, housing, trade, and solid waste management dynamics in Kayole informal settlement? (ii) How do these affect local drive towards sustainability as indicated by undercurrents in urban flood risk management, environmental protection and the health and social well-being of this community? In particular, the study links informality (settlement and trade) with poor urban solid waste management and flooding. We find this a relevant gap that has not received adequate scholarly attention before, and that needs exploring further, especially in cities of the global south where uncoordinated street vending is still highly prevalent. Ultimately, the study contributes towards a deeper understanding of informality, its enablers and impacts as prevails in Nairobi's Kayole, and presents meaningful findings and discussions that can inform targeted interventions towards improving socio-economic, human and environmental health, and better synergies for sustainable urban governance in similar urban ecosystems.

Theoretical Framework

This study is founded on sustainable development and sustainable urbanism theories. Sustainable development theory is based on the principle that development undertakings should allow the meeting of needs by current generations without denying future generations the ability to do so (UN, 1987; Odongo, 2017). The theory addresses access to resources justice both at intragenerational and intergenerational levels (Odongo, 2017; Shi *et al*, 2019) In ideal sustainable development; rural or urban, the goals must logically justify the means (Shiet *al*, 2019). Informality and associated practices such as street vending, injustice, crime, haphazard dumping, grabbing of reserved lands and environmental pollution work against sustainability. Linked to this principle is the theory of sustainable urbanism which insists on the development of “safe, walkable and transit-served cities integrated with high-performance buildings and other infrastructure.” This entails the integration of sustainability and resilience principles into the design, planning, construction and governance (administration) of cities. It adopts compactness and biophilia as the key values that should guide sustainable urbanism but also insist on the development of sustainable practices in thematic areas of urban living like urban public spaces, housing, commerce, transport, energy, air quality, solid waste management, walkability, and disaster averseness. Accordingly, Roggema (2016) states that achieving these requires the establishment of cities that continually plan and effectively govern their affairs, including by adopting data and technology-driven decisions and solutions to meet the needs of current and future urban dwellers (Roggema, 2016; Bibri, 2020). Kayole would benefit from these.

Methodology

The paper is a product of an applied descriptive survey conducted by researchers in Nairobi between May 2020 and March 2024. The study employed a mixed method to investigate its phenomena wherein both qualitative and quantitative data were collected and relied upon to compile comprehensive findings against a set theoretical base as recommended by Tegan (2023), McGough (2022) and Odongo & Ma (2021b). The

researchers relied on both primary and secondary data that was collected through observation (documented through photography and taking select measurements), Key Informant Interviews (KIIs) of 17 purposively picked officials, simple random issuance of 370 structured questionnaires to residents and street vendors, mapwork (using ArcGIS) and review of both academic and grey literature. Here, both purposive and simple random sampling were used to identify local government officials, NGO/CBO stakeholders, waste management sector workers, street vendors, area residents, and observation spots that contributed to the findings of the study. To determine the actual sample size of the respondents among vendors and residents, the study adopted a 95% confidence level and a 5% margin of error. Other phenomena such as infrastructure, trade, solid waste, drainage and governance practices were observed in situ. SPSS and Microsoft Excel were used to analyse data.

Findings and Discussions

Context- Informality in Nairobi and Kayole

The emergence of informal settlements and trade in Nairobi is largely attributed to colonial legacy. Odongo et al, (2024), Kimari (2023), Wanjiru-Mwita (2021) and report that pre-independence segregation policies (colour bars) restricted blacks from residing in upmarket neighbourhoods or holding certain positions. The racial discriminations of the era birthed and entrenched informality that has refused to go away, instead increasing with sprawl in, spread, proportions and complexity over the years (Renet al, 2020; Otieno, 2021; Muendo, 2017). A good illustration of this would be a brief description of Kayole informal settlement (Figure 1 below), formerly, Embakasi Ranch. Kayole is located in Embakasi Division, spreading across Embakasi Central and Embakasi East Constituencies (Maroko, 2016; Njambi, 2013). Embakasi Central, hosts Kayole North, Kayole Central and Kayole South Wards with populations of 118,728 people, 42,134 people and 76,594 people respectively, while Embakasi East is home to Lower Savanna Ward with a population of 70,959. The cumulative population of 308,415 people is spread across an area of approximately four-square kilometres with a proximate population density averaging 77,104/km²; five times the UN-recommended minimum urban population density of 15,000 people/km² (KNBS, 2019).

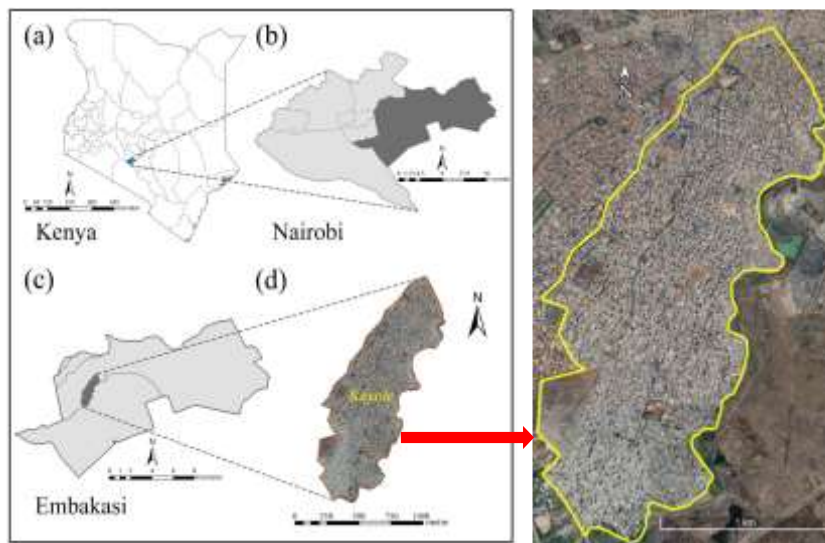


Figure 1: Areal location and density images of Kayole in Nairobi City County in Kenya, East Africa

Started in 1975 (Kinyanjui, 2020a), the settlement originally hosted low-income earners (mostly in informal sectors) relocated from the city's CBD and its neighbourhoods (Njambi, 2013; World Bank, 2020a). Today, Kayole largely provides low-cost casual and artisan labour for Nairobi's industries, businesses, homes and construction sites. Furthermore, it hosts many refugees from the Great Lakes Countries: Congo DRC, Burundi, South Sudan and Rwanda (Kahenya, 2023). Its population is largely semi-illiterate and is physically confined by natural and man-made barriers that limit its geographical expansion. These include Kayole Junction-Quarry Road, the Ngong River, Kayole Spine Road, Jacaranda Estate and Edelvale Schools. Here, monthly rents are relatively low. Single rooms with shared ablution facilities cost approximately 30-50 USD, bed-sitters 40-60 USD, one-bedroomed houses 50-100 USD while a two-bedroomed house cost upwards of 90 USD based on online advertisement statistics in 2023.

Positive Developments

Access To and Use of Land

Landowners in Kayole hold allotment letters. However, the government has been reluctant to convert these into official title deeds over the decades; limiting trade in and proper development of these plots. Investors fear that they may lose their plots and buildings through the repossession of land by the state and the demolition of buildings (Kinyanjui, 2020a). They therefore mostly construct sub-standard shanties and apartments to limit their potential losses. Such structures expose residents to substandard or inadequate amenities and disaster risks associated with accidents and building collapses that Nairobi and this neighbourhood are not new to, defying commitments under the Sendai Framework to reduce risks (UNDRR, 2015) and NUA to better housing (UN, 2017). Moreover, due to informality, property prices here have stagnated over the years compared to neighbouring estates limiting investor incomes and demand as well as attractive prices for land compared to neighboring estates. According to the residents (see Table 1), investors here experience significant frustrations. 50.8% of respondents reported that state officers oversee the slum upgrade. Acquisition and development of land is however still challenging. Furthermore, landowners in Kayole get harassed by state officials who can confiscate these properties and demolish the buildings erected on them. Similarly, land acquisition and development transactions here are highly riddled with corruption due to lack of transparency in government processes (EACC, 2021).

Table 1: Residents' Perceptions (%) on various issues related to land ownership and development

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total
It is possible to legally acquire, own and develop land in this neighbourhood without fear of future property demolitions.	19.58	23.28	14.81	25.93	16.40	100%
My neighbourhood has government offices/official's regularly overseeing the management and/or upgrade of this neighbourhood	13.76	37.04	15.34	20.63	13.23	100%
The National Construction Authority approves construction of privately owned buildings in my neighbourhood.	39.68	32.80	16.40	6.88	4.23	100%
Property owners in my neighbourhood are never harassed by government officials	11.11	29.10	8.47	34.39	16.93	100%
The government is working on improving public infrastructure service delivery to my neighbourhood	40.21	26.46	10.58	12.17	10.58	100%

In 2018, the government started issuing title deeds to plot owners here but that was halted when digitization of land records started in Nairobi (Muhatia, 2019). That each plot owner was to pay approximately 300USD for title-deed processing also proved unaffordable for many (Kinyanjui, 2020a). Still, hoping to finally own their plots legally, some property owners started building higher quality storeyed or non-storeyed buildings. These trends are likely to formalize the settlement, approximately, by 2050. The phenomenon cuts across Nairobi's over 20 informal settlements. However, it was reported that loans for putting up these apartments are still hard to access due to stringent collateral and initial contribution requirements, and high interest rates by local banks. Today though, unlike Mukuru, Mathare and Kibera Slums which significantly feature mud and tin walled shanties and inadequate basic sanitation facilities, over 60% of houses in Kayole are brick-walled substandard long partitioned houses and storeyed apartments sharing toilets and water points (Njambi, 2013; Bird *et al*, 2017). The riverbanks in Kayole feature slum-like shanties from recycled iron sheets.

Access To Basic Infrastructure and Social Services

Stakeholders in Nairobi acknowledged that the installation and maintenance of basic civic conveniences has progressively received more government and private investment through Community Development Funds (CDF) since 2003 and inflow of private capital (see responses in Figure 2 below). Additionally, the World Bank, committed to the realization of the MDGs, SDGs and NUA implemented slum upgrade programmes in Kayole, Kibera, Kariobangi, and other settlements in Nairobi between 2012 and 2018 to improve access to water (for 84,940 people) and sanitation and sewerage services (137,243 people connected) (UN-Habitat, 2020). However, these investments are inadequate considering prevailing needs, only benefitting a marginal population. The existing infrastructure is overwhelmed by overuse and poor usage in the densely populated settlements that feature public vandalism, apathy and defiance. Additionally, the quality and durability of developed infrastructure here are never guaranteed due to the corruption and recklessness involved in their construction and operation. Consequently, some recently built roads, sewer lines and drainages function sub-optimally.

The neighbourhood still has a few overcrowded public schools with poor hygiene and sanitation standards exposing children to diseases. Similarly, public access to state-provided piped water, sewer lines, drainages and markets is strained by undersupply betraying commitments under NUA, Kenya Slum Upgrade Programme (KESUP) and Kenya's Vision 2030. Consequently, private investors cash in on the shortages or poor quality of public services by offering either neglected services, including internet and pay TV connectivity, or insufficient ones such as water supply, quality schools and health facilities, solid waste management, and markets and vending stalls. As a result of the private investments, some Kayole residents (like the rest of Nairobi's slums) have regular access to fast 4G internet services and world-class pay TV services that allow them access to information and behaviour and lifestyle-influencing global content. Their spending on these, however, reduces available cash for other vital family expenses and savings. Several public infrastructure projects across Kayole remained incomplete for many years for various reasons.

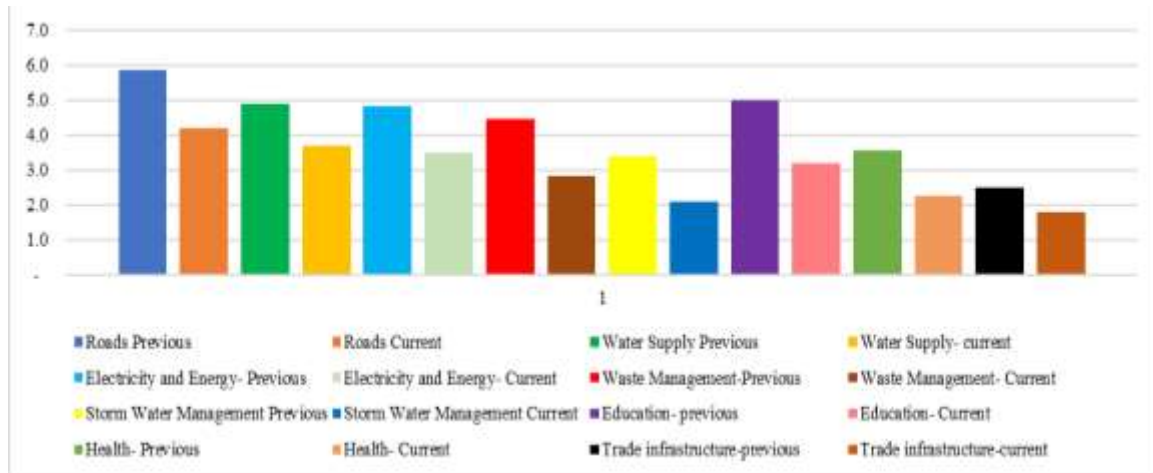


Figure 2: Residents' perceptions of the existent previous and most recent infrastructure developments in Kayole

Finally, we observed that like other informal settlements in Nairobi, Kayole has numerous non-governmental, community and Church-Based Organizations, not-for-profits and profit-based stakeholders that have invested in schools, hospitals and other amenities needed to offer a wide array of vital but still inadequate financial, physical and psycho-social support services to poor slum dwellers who continually have to endure dignity-eroding living conditions, domestic and community violence, and exposure to social ills, namely drug abuse, sex work, vandalism and illicit trades and early exposure to these among children and the youth. Consequently, both adults and children can access affordable basic education, medical, guidance and counselling, conflict resolution and community policing. They also intermittently organize sporting events on undeveloped grounds. These are however largely rudimentary or insufficient to meet the needs of everyone. Still, they fill a gap in sectors where the government has largely underinvested. Opportunities also exist for non-violent agitation and have been handy, although sometimes abused, in facilitating public agenda-setting in government decision-making on infrastructure development. Wholesomely, therefore, Kayole features rudimental but significant investment in physical and social infrastructure needed for enhancing living conditions. More is still required.

Challenge Areas and Their Impacts

The Local Economy

According to the Anti Counterfeit Authority (ACA) (2024; 2021), Kenya's economy features a high prevalence of informal industries and illicit trade practices with 23.86%, 15.24% and 15.36% of industrial products in 2015, 2020 and 2021 being counterfeits respectively. The most counterfeited products are electrical & electronics, textiles, foodstuff, agrochemicals, human medicines, assorted spare parts and beauty products. These products are distributed through retail outlets (31.9%), street vending/hawking (27.6%), via internet-based platforms (20.3%) and through supply chain infiltration (20.6%). Furthermore, a good chunk of them is imported through land ports (53%) such as Busia, Lunga Lunga and Namanga, seaports (36%) like Mombasa and Lamu, and airports (11%). Counterfeiting increases the production cost for manufacturers through investment in expensive technologies and processes to counter the crime and protect the identity of their products. It also reduces their sales and incomes by gobbling a large chunk of their market share and revenues, limiting their production, expansion, operations and consumer trust in

products. This can hence birth a culture of informality that threatens product quality, the development of industries, the formal economy, government taxes, decent jobs and accompanying state-regulated employee rights, privileges and benefits. Moreover, it poses a risk to the quality of consumer products such as food and cosmetics, threatens the environment when substandard agro and industrial chemicals are involved, and reduces Foreign Direct Investments leading to supernormal losses for genuine manufacturers and business operators. The ultimate price is reduced economic growth. The practices are hard to eradicate due to corruption, elite interests and the high prevalence rate of online marketplaces (ACA, 2021).

In Kayole, the lead employers are informal microenterprises such as shops and street vending stalls owned by locals and located within the settlement and neighboring estates and streets. Oftentimes, the source of their products is unknown and unverifiable, but include counterfeiters. These trades employ between 1-4 people each, among them, the business owner. Largely unregulated and lacking economies of scale, the informal employers do not offer social protection to their workers through life and accident insurance, retirement savings, medical covers and union memberships. They sell wares ranging from clothing, fresh farm produce, readymade street food, household items, and tools used by the area residents in their trades. Whereas a good proportion of the industrial goods are manufactured locally, most are imports from Asia, Europe and North America. Such settlements are considered leading dumpsites for used and poor-quality items from these regions (Toye, 2021).

While 32.6% of respondent vendors operated registered businesses (mostly ready-to-eat street food kitchens and stalls which require special permits to operate), 67.4% of them operated illegally, engaged in illegal dumping (81.48%), and lacked a proper solid waste management regime (see Figure 3 below for additional findings). While 53.4% of the street vendors were female, 46.6% of them were male. Additionally, 92.5% of the vendors were aged between 18-41 years and cumulatively, 97.7% reported having operated in the area for less than 15 years. Living in the slum and street vending therefore seems to be a consistent transitional or waithood lifestyle for young people here as they wait to establish themselves in other better careers and neighbourhoods, confirming findings in literature. With increasing informality, population, poverty and unemployment, they face the risk of being stuck in these sectors and neighbourhoods, posing the challenge of entrenching informality further. Moreover, working in the informal sector for 15 years equates to lacking social protection for half of one's working life. We observe that this adds to the risks resulting from the unregulated use of urban ecosystems and infrastructure associated with informal livelihoods and residences as acknowledged here (ACA, 2021). 35.8% of the traders reported that despite not being registered, the state recognized their businesses and premises, and they periodically paid permit fees to the government. KIIs said such recognition reduced street battles over ownership of vending spots in the open streets.

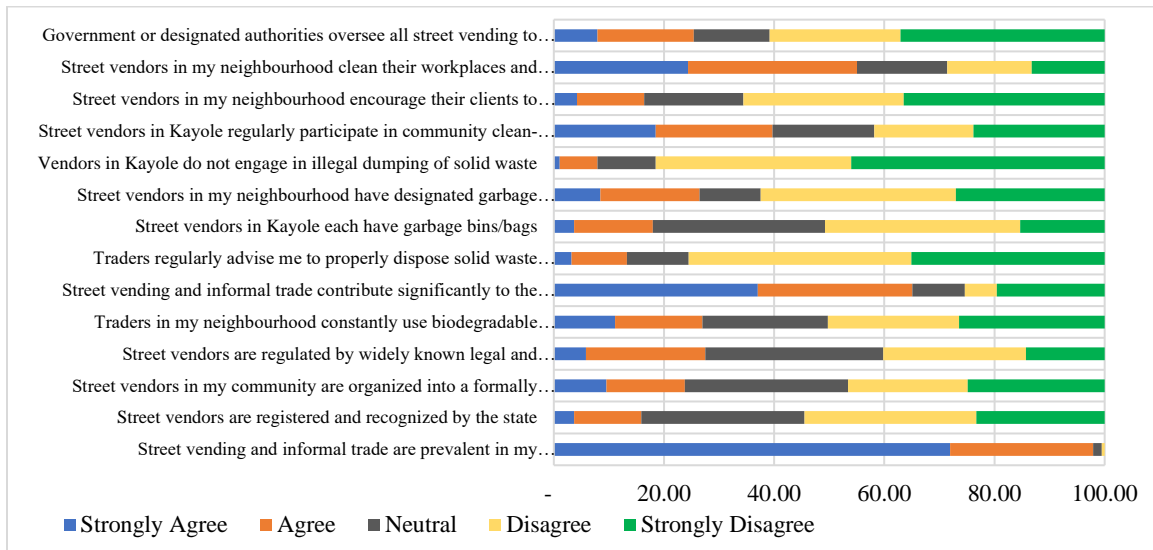


Figure 3: Street Vendors' Views on Government Support of Their Work

As evidenced by our findings in Figures 3 and 4, the researchers observed a poor relationship between street vendors, local physical and administrative infrastructure, and the surrounding environment. The neighbourhood featured excessive illegal land occupation through shop extensions, street vending in unauthorized areas, illegal dumping of solid waste, illiteracy regarding best practices, non-involvement by vendors in area management, and trade in substandard, polluting, contaminated, expired, unapproved or uninspected, harmful and tax evading products; including food, consistent with reports by the regulators (Anticounterfeit Authority, 2024; 2021). Furthermore, most of the traders displayed their wares in unsafe and unhygienic areas. This is a major nonconformity with local and international occupational, public health and safety standards (Fig. 4 below). The practices not only choke the growth potential of the neighbourhood but also pose risks to the traders, their families, clients, the environment and the community that hosts them. They are thus working against Nairobi's commitments to achieve sustainability as envisaged under the 2030 Agenda. In this regard, informality raises risks of future emergence and recurrence of epidemics and pandemics. Moreover, it perpetuates the entrenchment of informal trade and settlements across cities as informal settlements and hawking become the untidy urban subculture it now is in Nairobi.

While local government officials we interviewed confirmed their willingness to address the challenges associated with vending, they stated their laxity to fully implement the law. They said evicting vendors from illegally occupied land will kill livelihoods for many poor urban dwellers, making it hard for them to afford their basic needs and realize their long-term personal survival and development goals as acknowledged by WIEGO (2021), and Singh (2020). They said such evictions' direct impacts include increased violence and crime, poor living conditions and the city's inability to deliver on her SDG, NUA, Addis Ababa Agenda, Kenya's Vision 2030, the Nairobi Integrated Urban Development Master Plan (NIUPLAN 2014-2030) and the Street Vendors (Protection of Livelihood) Bill (2023) commitments. Accordingly, Nairobi seems committed to realizing sustainability and inclusivity but using informality-perpetuating instruments that logically beat the intent of long-term empowerment. While the NUA emphasized the need to provisionally accommodate informal settlements and trade as formal alternatives are sought, Nairobi's government was not building any new local markets in Kayole to house informal

traders. It was also not fast-tracking the formalization of businesses through registration, financing and infrastructure support despite policy pronouncements to that effect



Figure 4: Vending Stalls and Shop extensions along roads and on infrastructure wayleaves in Kayole

The KIs further remarked that cutting informal livelihoods will increase maternal, and infant mortality rates in settlements where the infant mortality rate is already double the national average (Avis, 2016). Other poverty-enabled vices like domestic violence and violence against women and children will also rise. This goes against the (NIUPLAN), for instance, whose principles include (i) integration, (ii) inclusivity, (iii) social sustainability, (iv) environmental sustainability, (v) compactness, (vi) mixed-use development and (vii) self-regulation. The NIUPLAN's ambitions also align with NUA's agenda of delivering (i) inclusivity, (ii) equal access to and enjoyment of rights and opportunities in cities and settlements, (iii) adequate and non-discriminative access to housing and high standards of living, and (v) the achievement of gender equality and empowerment of all women and girls, children and youth, persons with disabilities, people living with HIV/AIDS, older persons, indigenous peoples and local communities, slum and informal-settlement dwellers, homeless people, workers, refugees, returnees, internally displaced persons and migrants, who form a big chunk of the vulnerable population of Kayole and equivalent informal settlements world-over. Over 80% of street vendors felt exposed to poor living and working conditions, and harassment by bribe soliciting government officials. Incidences were also reported where government overseers solicit bribes (financial or otherwise) through intimidation, harassment and threats of closing businesses and revoking trading licenses. Through this, authorities diminish the growth potential of local investments, and the spending power of businesses, traders and households, making it hard for them to accumulate enough capital, formally register their businesses and fairly fight their way out of poverty.

Finally, non-interference is also influenced by cartels and gangs. It was reported by the local administrators that certain pockets of the informal settlement belong to gangs and cartels who control space allocation for the construction of shanties and shop extensions in riparian riverbanks and infrastructure corridors along streets, garbage management, regulate trade activities, and bar government officials from meddling (Muindi *et al*, 2022). Consequently, the administrators said they would not want to meddle for the sake of their safety and security. The cartels and gangs therefore buy or intimidate their way into undertaking and protecting illegal business activities against NUA's commitments to rid slums of crime, violence, gender-based and sex abuses, and terrorism. These challenges cut across the management and protection of land and property transactions, infrastructure, local trade, and the environment (Omulo, 2021; Omulo, 2020) as

real threats to sustainability. We conclude this section by stating our observation that informality in commerce and industry breeds the grabbing of public spaces, opaque land transactions, evasion of government inspections, taxes and regulations, and trade in poor quality products that, if not checked, have the potential to seriously harm the residents and ecosystems of similarly administered neighbourhoods.

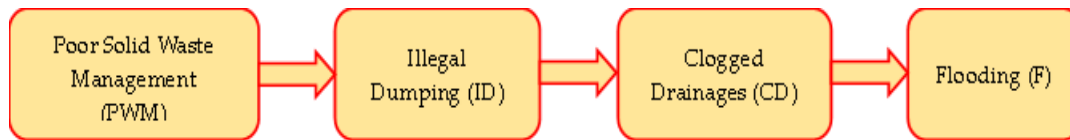
Informality and Environmental Management and Protection

In recent times, air pollution through the emission of greenhouse gases from human activities has dominated scholarly and development debates. Purely attributable to the current age of consumption, industrialization and high appetite for development, the emissions are blamed for global warming and increasingly common erratic climate patterns resulting from climate change. In cities, their impact includes undersupply of industrial inputs, job cuts, limited amount and type of foods and their exorbitant pricing, and increased risk of urban flooding, heat and droughts. These disproportionately harm the poor who dwell or work in unsafe and insecure informal settlements and sectors more. Characteristically too, oftentimes, the informal sectors and communities are treated as victims of pollution as opposed to being its agents. Consequently, the study investigated the relationship between informal settlements, street vending, solid waste management and urban flood risk reduction in Nairobi obtaining the feedback shown in Table 2. Here, we ask, is there a link between street vending and poor solid waste management? How does this affect local flash flooding patterns? We note the aridity of previous studies linking street vending and urban flooding. From our findings, 98.9% of respondents said street vending leads to flooding with 61.7%, 20.2% and 17% saying it has very major, major and minor contributions respectively.

S/No	Question Regarding the local neighborhood	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree	Total (%)
1	Residents in my neighbourhood strictly restrain from illegal dumping.	2.1	9.0	32.3	34.4	22.2	100%
2	Local/ national government control solid waste management here	15.3	19.6	38.6	15.3	11.1	100%
3	Private investors control solid waste management here	55.6	30.2	9.5	2.6	2.1	100%
4	Garbage collection points are regularly cleared and maintained	10.6	7.4	13.8	33.3	34.9	100%
5	Regular public health awareness on solid waste and community health exists	7.9	14.8	27.0	19.6	30.7	100%
6	A working solid waste, transportation, treatment, disposal and incineration exists	6.9	9.5	18.0	25.9	39.7	100%
7	Effective public participation in solid waste management in public spaces exists	8.5	13.2	24.3	27.0	27.0	100%
8	Institutional mechanism for reporting and/or penalizing illegal dumpers exists	10.1	30.2	15.3	15.9	28.6	100%
9	Street vending and informal trade are prevalent in my neighbourhood.	72.0	25.9	1.6	0.5	-	100%
10	Street vendors in my community are organized into a formally recognized outfit.	9.5	14.3	29.6	21.7	24.9	100%
11	Traders here constantly use biodegradable packaging bags as required by law	11.1	15.9	22.8	23.8	26.5	100%
12	Street vending & informal trade generate & accumulate of garbage on streets	37.0	28.0	9.5	5.8	19.6	100%
13	Traders regularly advise me to properly dispose solid waste from their products	3.2	10.1	11.2	40.4	35.1	100%
14	Street vendors here have designated garbage collection points/persons	8.5	18.0	11.1	35.4	27.0	100%
15	Vendors in Kayole do not engage in illegal dumping of solid waste	1.1	6.9	10.6	35.4	46.0	100%
16	Government oversees street vending for compliance (sanitation & health standards)	7.9	17.5	13.8	23.8	37.0	100%
17	My neighbourhood (or Kayole Slums) experiences flooding	48.7	27.5	2.6	14.8	6.3	100%
18	My neighbourhood (or Kayole Slums) has high risk of future flooding	50.3	39.2	6.3	3.2	1.1	100%
19	My neighbourhood has enough well distributed drainages	5.3	7.9	15.9	50.8	20.1	100%
20	Drainages in my neighbourhood are regularly dredged of debris for smooth flow	3.2	2.6	16.9	40.2	37.0	100%
21	Poor solid waste management contributes to flood risks in my neighbourhood	55.0	33.3	2.6	5.3	3.7	100%
	Question	Very Major	Major	Minor	Very Minor	None	Total
22	What are the (likely) contributions of solid wastes to flooding in the neighbourhood?	75.5	22.9	1.6	-	-	100%
23	What are the (likely) contributions of street vendors to flooding in the neighbourhood?	61.7	20.2	17.0	1.1	-	100%

Accordingly, residents (65.6%) confirmed lacking a comprehensive solid waste management regime. Only 18% said they have regularly maintained central garbage points in their neighbourhood while 68.2% said they do not, instead resorting to illegal dumping. 11.1% of the interviewed residents stated that their community members refrain from illegally dumping while 56.6% confirmed that residents dump their waste

illegally. The findings were confirmed by the chief environment officer, the ward administrators and the chiefs who reported that illegal dumping of solid waste is prevalent among residents and traders in Nairobi, but mostly in informal settlements and markets. Stakeholders therein are not adequately trained to handle garbage and its associated public health risks. Whereas we observed the existence storm stormwater drainages, their poor management made them ineffective in flood risk reduction. Here, therefore:



Where street vending (SV) contributes to poor solid waste management as described in the study's findings (future mathematical, statistical or engineering models can test this relationship), then clearly:



Nairobi's and Kayole's domestic and hawkers' garbage is managed by supposedly formal but often informal private investors to whom waste generators pay between 2-4 USD a month. This is done through a government-introduced franchise system. They collect this waste under state-regulated terms (including frequency of waste collection and provision of garbage bags) which the waste collectors largely violate. To many street vendors and slum dwellers, these hefty fees eat into constrained budgets and necessitate illegal dumping as a coping mechanism. The garbage is hence dumped haphazardly in areas such as near or inside rivers and drainages, on the open streets or in fenced-off and unused plots and buildings (See Figure 5 below). Other reported places for waste disposal include county-allocated dumpsites, abandoned mine pits along the nearby Ngong River, within Ngong River, handing garbage to local youth groups (or gangs like *Mungiki* and *Gaza*) who formally or informally operate as franchisees to dispose of it as described by Muindi *et al* (Muindi *et al*, 2022) or feeding it to farmed animals (goats, cows, donkeys, pigs, sheep etc.).



Figure 5: Prevalence of illegal and unsustainable municipal solid waste management practices in Nairobi's informal Settlements as observed in Kayole Informal Settlement

While the county government is mandated with clearing waste from public spaces such as roads, drainages and along the rivers which traverse the landscape, it rarely undertakes this mandate because the sub-county environment unit is underfunded, understaffed and ill-equipped despite legal ringfencing of needed resources like centralized holding areas for garbage and adequate personnel and equipment for waste relocation. The KIs reported that the informal franchisees (gangs and cartels) undertake territorialization of waste-generating neighbourhoods where they forcefully demand payment for waste collection from clients, dump garbage into non-paying clients' establishments as punishment or physically harm them. Cartels harass residents and traders to pay garbage collection fees. These cartels also get harassed by other bigger gangs at the main dumpsite to pay waste disposal and protection fees for their operating bases (neighbourhoods), and control or fight over material recovery of recyclables from each lorry that brings garbage to the main dumpsite hence leading to illegal dumping. Muindi *et al* (2022) established the existence of white-collar cartels controlled by powerful individuals who dominate private waste management at homes and in franchises, and either bribe or intimidate state officers to stand aside.

Once dumped, the waste loads are often pounced on by human scavengers who rummage through every bit of them for valuables and recyclable materials. The rest of the wastes (mostly plastics, cloth and organic matter) are pushed into the river, roads and drainages where waiting marabou stocks, pigs, goats, dogs, rats and other birds scavenge on them further before they are carried downstream by storm or river water (Figures 6, 7). Burning was observed to be another method of waste management. Others reported that scavenging by humans significantly resulted in vandalism of infrastructure (guardrails, electricity masts, signposts, roofs, billboards, railway lines, fences, vehicles etc.) to recover recyclables (Agutu, 2022; Kamau, 2022).



Figure 6: Animals scavenging on uncollected garbage. Illegal Dumping presents massive health risks

The environment officer and waste sector workers confirmed that scavenging informally supports livelihoods for many poor people (mostly single mothers and youths) who each earn between 3-8 USD daily from collecting and selling recyclables (including metals, glass, plastics, paper, food and other such waste items) across Kayole and depended on the cash to feed, house, clothe and educate their families. It also helps limit the amount of hazardous waste that is likely to end up in and pollute the Ngong River. The KIs reported that waste scavenging and recycling is a multi-billion industry in Nairobi that the county has not interfered with because of its dual role (but mostly as a livelihood stream- also witnessed with street vending above) and fear of involved gangs. Scavenging on waste, however, resulted in massive pollution of the Ngong River as all undesired items (mostly plastic) were pushed down the stream (See Figure 7 below), and offered a life stream for city gangs that will grow stronger with increasing earnings.



Figure 7: Illegal dumping of garbage along Ngong River pollutes the river, eats up green spaces and poses flood risks

Finally, apart from the ordinary garbage originating from homes, shops and vending stalls, the study established an increasing tendency by lorries to dump excavated soil from construction sites into the river (see Figure 8) blocking its course. Consequently, the water is forced to change course in an aggressive and well-orchestrated land reclamation undertaking by greedy grabber gangs that claim and construct shanties on the left-over plots. This way, land grabbing eats into supposed public spaces and sensitive urban ecosystems wherein they increase risks of urban flooding and lower the quality of urban environments for the poor. This contradicts SDG11.7, NUA and the Sendai Framework's call for increased provision of open public spaces and investment in Disaster Risk Reduction to deliver safe and habitable urban neighbourhoods for all. Within the estates, similar land grabs make flood water flow on open streets hence damaging roads and keeping the city government in a vicious cycle of road construction and repairs.



Figure 8: Illegal land reclamation through illegal dumping. The reduced carrying capacity of the river resulting from this blocking can result in catastrophic floods if dams upriver in areas such as Kibera and Ngong were to burst

Discussions

This study's findings on the ongoing efforts to upgrade the Kayole informal settlement in Nairobi. It has reported that a mix of interventions have been put in place across sectors with varying outcomes. While increased investment in physical infrastructure seems to incrementally change the physical outlook of the neighbourhood, underinvestment in instilling best practices among stakeholders in trade and solid waste management, coupled with unbalanced investment in infrastructure across sectors (See Figure 2) results in risks that perpetuate informality. Informal practices across trade, solid waste management and other sectors are preferred because they lower the cost of doing business for the perpetrators such as street vendors and franchisees, but deny the government control of neighbourhoods and income from economic activities. Similarly, it kills investment in formal business streams by eroding investor confidence (including through Foreign Direct Investment) as gangs entrench themselves as lords of the streets. To survive, even the capital class operate through cartels that bribe their way into providing important services such as solid waste management, purely with a profit maximization motive. These trends work against the sustainable

development of urban neighbourhoods and may limit the realization of SDG, NUA, Africa's Agenda 2063 East African Community's Vision 2050 and Kenya's Vision 2030 Ambitions.

Scholars such as Peimani & Kamalipour (2022), Das & Susantono (2022), Jones (2017), Nahar Lata (2020), Young (2018) and Lidigu (2023) stated that informal settlements and trade are a bag of roses with positive and negative contributions to lived experiences in cities where they exist. Shanty towns, street vending and informal markets are linked to major risks of land grabbing, commercial crimes, fire outbreaks, the spread of communicable diseases, trade in counterfeit, expired, illegal and addictive substances, tax evasion, conflicts between hawkers and registered businesses whose front yards are invaded by competing vendors, and environmental pollution through illegal dumping and spewing of dust through increased uncoordinated economic activities as confirmed in Kayole above. Furthermore, globally, the informal economy is characterised as constituting "small or undefined workplaces; unsafe and unhealthy working conditions; low levels of skills and productivity; low or irregular incomes; long working hours; and lack of access to information, markets, finance, training, and technology". These point to the informals creating unsafe, unfriendly and unsatisfying work-live-places without safe environments, opportunities for further education, various forms of insurance, recreation spaces and labour protection. They deny urban dwellers a chance at consistent, sustainable and dependably gratifying lives and livelihoods as evidenced by data in Kayole. They hence get rights to the city without accessing rights to the joys and privileges of urbanization.

In places such as Nairobi's Central Business District, Gikomba and Eastleigh Markets, hawking is increasingly becoming more favourable than owning a shop (Ojeda & Pino, 2019; Lata, Walters, & Roitman, 2019; Tawodzera, 2019) because the vendors don't incur standard operation costs (rent, insurance, standard rates, inspection fees, infrastructure costs, registration and licence renewal permits, standard wages and employee benefits, electricity, water etc.). This is despite occupying the most prime streets with heavy human traffic and therefore potentially reporting higher sales and profits than those who own registered shops on the 1st or 20th floor of a business complex. This denies owners of city buildings potential tenants, and genuine businesses, potential sales. It is a major source of conflicts between legitimate and predatory businesses (Kimani, Gachigua, & Kariuki, 2020; Hove, Ndawana, & Ndemera). Moreover, these traders leave garbage behind every evening after lining up wares on the streets for impulsive pedestrians to buy. The waste consists of unwanted items and packaging materials that colossally strain urban solid waste management, and complicate urban public spaces' cleaning and beautification efforts.

It is also challenging to account for the taxes and levies street vendors pay because their number is undefined. Oftentimes, their taxes are collected by gangs that levy protection fees. They hence finance and facilitate urban crimes clothed as social mobilization, through SACCOS and welfare groups (Muindi *et al*, 2022; Omulo, 2021; Omulo, 2020) as seen in Nairobi while denying national and local governments revenue. These can be used to hide criminal activities such as infiltration of cities with illegal goods, tax evasion by industrialists and counterfeiters (Anticounterfeit Authority, 2024; 2021) who get a wide illicit distributor network in them and defeat of the justice systems when they, through associations, demonstrate and demand for the release of lawbreakers from city prisons, or mobilize the required bail money and free criminals to terrorise city residents. We foresee these issues becoming more prevalent in cities as informality picks pace, especially in emerging cities in Sub-Saharan Africa where urbanization is fast picking pace and will exacerbate secondary risks such as urban flooding. The urban gangs informally create risk compromising city and national security, especially in unstable democracies. Already informal sector

stakeholders in Nairobi (Anticounterfeit Authority, 2021; Muindi *et al*, 2022) hold state and city administrators at ransom through bribes and intimidation to pave the way for their illegal activities as applies to the waste management franchisees in Kayole. Claims of price manipulation, harassment of residents, theft, vandalism, smuggling and resale of city resources as recyclable materials have also been levelled against informal sector traders in cities like Nairobi and Kampala where informal trade in scrap metals has grown root and threaten sustainable investment in urban development.

We acknowledge observations by scholars such as Peimani & Kamalipour (2022) and Tonda and Kepe (2016) who highlight “the need for sensible urban planning and policy responses that recognise informality as a reality, addressing its potential, and understanding the ordinary’s aspiration for spatial justice and decent livelihoods”. However, we also observe that sustainably providing these rights comes with economic, social, administrative and environmental consequences that cities and their stakeholders must address. The solution to urbanization problems in the global south does not lie in perpetuating labour malpractices, illegal land tenure systems, informality-inflicted corruption, poverty, untidiness, indecent living and working conditions, disease, environmental pollution, disaster risks and crimes as seen in Kayole above. Efforts should hence be put towards pushing city administrators and other stakeholders to provide decent and affordable formal options to the urban poor to uplift them from poverty and informalism, afford or access standard waste bags, garbage bins and waste management services for instance, and not be left behind in sustainable management of urban spaces. Based on our findings here, poverty and resulting informal survival options are a shortcut for law-violating upper-class commercial and industrial wealth aggregators (see cartels and gangs) to increasingly operate outside the law and dodge their responsibilities to the city and her poor labourers and consumers, consequently straining the governance and development of cities where they provide substandard housing, waste management services, consumer goods and infrastructure.

Conclusions and Recommendations

In this paper, we have examined the progress being made towards managing informality (settlements, trade and solid waste management) in Nairobi’s Kayole Informal Settlement as envisaged in policy, the challenges this is facing and their impacts on people, the local economy, governance, the city and the environment. We have also shed light on the likely long-term impacts of prevailing undercurrents on sustainable development and the transformation of the neighbourhood into a functional low-cost residential area. Using this evidence, we have argued that the ongoing accommodation of informality as a tool for containing and eradicating urban poverty in this ecosystem is unsustainable and will perpetuate urban informality, poverty and the associated ills that we have discussed. Characterizations of informality as a saviour for the urban poor and a facilitator of access to rights to the city are hence herein challenged. In its stead, we report that whereas being sympathetic to protecting law-breaking livelihoods and practices in poor neighbourhoods is good in the meantime, it puts many lives and ecosystems at risk, and will build a culture in placemaking that perpetuates lawlessness, gang culture, informality and untidiness. It should hence be progressively but urgently stopped. In particular, we have explained how the toleration of street vending contributes to urban flood risks in this ecosystem. The floods consequently damage infrastructure, and lower property values which then makes the area unattractive for investors in a zero-sum practice. This link between street vending, flooding and stagnation of neighbourhoods was missing in previous studies.

Consequent to the above, we note that city administrators should adapt fast and take the necessary action to formalize the livelihoods, processes, economies and neighbourhoods of cities to ensure that local, national, regional and global development aspirations are met and that as many as possible progressively transition into having decent, meaningful and sustainable livelihoods and lifestyles that protect the environment and enhance human and ecosystem resilience to disaster risks, through streamlining production, trade, and consumption patterns, and managing solid waste footprints resulting from the goods and services traded within the informal sectors and neighbourhoods. This is especially necessary for a world that is constantly afraid of when the next global catastrophe will hit, as it struggles to eliminate COVID-19 and amend the damages the pandemic occasioned.

The study recommends that city administrators and like-minded stakeholders should continuously offer required adult and resource (city) use education, awareness creation programmes and engagement of residents in neighbourhood maintenance activities through which they can acquire experiential skills needed to lead fulfilling, sustainable and eco-conscious lives. These should transcend both residential, commercial and recreational spaces, especially within informal sectors. A random check on how many dwellers of these informal sectors know about and align their lives and livelihoods to local, national and global policies showed that they do not, despite the policies committing to ameliorating their conditions. Additionally, cities should expand their spending on public infrastructure, increase transparency in governance processes, and augment the resourcing of city administration in informal sectors with laws, space, equipment and personnel to undertake day-to-day operations such as cleaning up the streets, relocating garbage to landfills, having adequate carrying capacity for landfills closer to waste sources, as well as arresting and prosecuting lawbreakers. The study found the need to fully entrench the administration of the urban informals on the rule of law without fear or favour as they are quickly and urgently transitioned into formal establishments and practices.

If street vending is preferred, building owners should consider having the first/ground floors of city buildings as demarcated open street markets where tenants with shops in the buildings can display and sell their wares on scheduled days during peak pedestrian traffic hours in CBDs, for instance. This creates a subculture that ensures formal businesses engage in responsible business practices, and provide convenient shopping for urban folks while keeping track of and controlling their social and environmental footprints. Seen this way, open street markets will enhance sales for genuine businesses and bring legitimate goods and services to the people, hence satisfying all stakeholders. Furthermore, the shifting of goods from shops to open spaces, and the operation of both shops and stalls by registered businesses that are mandated to treat employees well under labour laws will ensure everyone earns a decent wage under decent working conditions. Similarly, that traders cluster around registered buildings where they pay rent will not only enhance urban growth but also ensure people engage in legal practices in environments that guarantee safety and security for all. The researchers find no circumstances under which informal settlements and markets should be perceived as empowering to the urban poor. Instead, these will further illegal South-North migration by educated, poor and jobless youth, including from Sub-Saharan Africa.

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