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Baffoe, Gideon, Uwayezu, Ernest and Manirakiza, Vincent (2025) COVID-19 livelihood disruptions and hybrid resilience in Kigali's low-income urban neighbourhoods. *Discover Sustainability*. 1300. ISSN: 2662-9984

<https://doi.org/10.1007/s43621-025-02219-0>

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COVID-19 livelihood disruptions and hybrid resilience in Kigali's low-income urban neighbourhoods

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Abstract

The COVID-19 pandemic brought the global economy to its knees, with the urban livelihoods of the poor in the developing world particularly hit hard. Yet, how the pandemic impacted livelihoods in modernizing, mid-sized Global South cities like Kigali, Rwanda, remains underexplored. This study investigates the effects on Kigali's low-income and informal residents by examining livelihood activities and challenges, resilience strategies, and trajectories across pre-, during-, and post-pandemic periods. Drawing on 30 in-depth interviews, the research employs the Sustainable Livelihoods Approach, urban vulnerability, and resilience theory as guiding frameworks to analyse experiences of residents in Kigali city. Findings highlight a dramatic shift from pre-crisis livelihood stability to widespread economic and social disruption during the pandemic, with urban residents, particularly those reliant on daily earnings and informal activities, facing acute job losses and distress. Resilience emerged through a hybrid of government aid, livelihood diversification, community and familial support, enabling some to adapt mid-crisis and others to transform livelihoods long-term. However, the pandemic also left a lingering psychological toll, with many residents reluctant to revisit their experiences, underscoring the enduring human legacy of crisis. Kigali's modernising context offers a novel lens on urban crises, distinct from megacities or rural settings. The study argues that Kigali's experience reframes urban vulnerability as a modernization paradox, where progress heightens precarity. The study advances urban scholarship, particularly in the developing world, by illuminating how modernisation can amplify vulnerability while fostering adaptive potential through blended support systems. The analyses call for policies for economic safety nets, skill development, and mental health support during and post-crisis.

Keywords COVID-19, Livelihood, Resilience, Urban, Kigali

1 Introduction

The COVID-19 pandemic shook the world, particularly exposing the vulnerability of cities. Declared a global health emergency by the World Health Organization (WHO) in March 2020, the pandemic unleashed unprecedented socioeconomic disruptions across



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the globe [1]. The economic fallout disproportionately affected the poor and vulnerable populations, particularly in urban settings in the developing world, where livelihoods are largely informal and unstable activities [2, 3]. Globally, it was estimated that 690 million people were undernourished, with the pandemic pushing an additional 132 million into this situation by the end of 2020 [1]. In Africa, where over 85% of employment is informal, the disruptions brought about a sharp decline in incomes, heightening worker vulnerability [4]. Women were hit hard, owing to increased caregiving responsibilities and limited access to social protection systems [5]. Consequently, many urban dwellers were trapped in perpetual poverty due to livelihood collapse stemming from the lockdowns and social distancing measures [6, 7]. In cities like Kigali, the crises exposed and exacerbated existing vulnerabilities, plunging many people into despair due to the limited social safety nets [8, 9]. This study focuses on understanding how COVID-19 transformed livelihoods among residents of Kigali's poor and low-income neighbourhoods, a critical yet underexplored dimension of the urban crisis narrative.

The COVID-19 crisis highlighted the importance of resilience in urban livelihood strategies. Research has shown the severe consequences of the pandemic on livelihoods with evidence from Nairobi and Johannesburg revealing how movement restrictions and business closures crippled informal economies with a disproportionate impact on the poor [7, 10]. This was accentuated by limited access to healthcare, leaving many already vulnerable populations unable to seek timely medical attention [11]. Although some urban residents managed to adapt through digital platforms, cooperative savings groups, and diversified income sources, the general understanding is that most urban dwellers, especially those living in informal and low-income neighbourhoods, struggled with persistent livelihood insecurity [12]. Understanding these differential experiences is crucial for designing inclusive post-pandemic recovery policies that address structural inequalities while fostering urban resilience [13].

Kigali presents a suitable case for examining the interplay between urban livelihood disruptions, resilience, and policy responses during the COVID-19 pandemic in the urban African context. As a rapidly urbanising city with ambitious urban transformation strategies and agendas [14], Kigali's socioeconomic landscape is shaped by a dual economy, where a formal, regulated sector coexists with a sprawling informal economy that sustains most of the urban poor [15]. Rwanda was lauded for its swift response to the pandemic. However, the various interventions, including the lockdown and other health measures, brought about unintended consequences, particularly for those living and working in the informal sector [16]. Report shows that street vendors, transport operators, and casual labourers were severely affected [17]. Given the increasing frequency of urban crises, understanding resilience-building strategies holds promise for future urban sustainability [18]. By focusing on Kigali, this study provides fresh perspectives to enrich ongoing debates on how cities can build resilient, inclusive, and crisis-ready economies. Modernisation in Kigali refers to state-led efforts to transform the city through infrastructure investments, ICT initiatives such as the Smart Kigali project, and strict urban planning regulations. Unlike many African cities where informal growth dominates, Kigali's strategy has emphasised compact growth and orderliness, creating a distinctive model of urban modernisation. The city's position as an emerging and ambitious city with socioeconomic divides offers lessons that resonate with broader urban Africa.

This study aims to examine how COVID-19 altered livelihood options among residents of poor and low-income neighbourhoods in Kigali. To achieve this, the study pursues four specific objectives: (1) to examine livelihood activities and their associated challenges in low-income neighbourhoods of Kigali before and during the COVID-19 period, capturing the immediate effects of lockdown measures; (2) to identify resilience-building strategies and their effectiveness, such as government aid and community coping mechanisms, in containing the pandemic challenges; (3) to identify the challenges that residents' faced in adapting to new livelihood systems, and (4) to suggest context-specific policy directions for managing future crises in rapidly urbanising developing cities like Kigali. The study makes significant contributions by providing empirical insights into how crises reshape urban economies, particularly in contexts where informality is a dominant feature of employment. By adopting a Sustainable Livelihoods Approach (SLA) and integrating perspectives from urban vulnerability and political economy frameworks, the study offers a multidimensional analysis of how low-income urban residents navigate crises. The findings are relevant for policymakers, development practitioners, and urban planners, as they offer critical lessons that may inform the design of more inclusive social protection systems and crisis-responsive economic policies in developing cities.

For clarity, this paper uses several key terms in specific ways. Modernisation refers to state-led strategies of infrastructural and economic transformation, such as Kigali's Smart City initiatives, that reshape urban space and livelihood opportunities. The term Global South is used to describe low- and middle-income countries in Africa, Asia, and Latin America, while developing world is employed interchangeably. These definitions provide a consistent basis for situating Kigali's experience within broader debates on urban change.

This research paper is structured as follows. The next section reviews relevant literature to set the context. It is followed by theoretical frameworks, providing the needed lenses for the analysis. Section three presents the methodology, while section four delivers the empirical results. Section five discusses the results, with section six concluding the study with implications for policy and future research.

2 Literature review

2.1 Urban livelihood vulnerability, resilience, and post-crisis trajectories

Cities in the developing world are urbanising rapidly but in an unplanned fashion, rendering livelihood streams and residential enclaves highly informal. Urban livelihoods in these settings are increasingly variegated, shaped by a complex interplay of economic structures, social relations, and institutional frameworks [19, 20]. These livelihoods are concentrated in the informal economy, often characterised by precarious work, low wages, and limited social protection [21]. Unlike the formal sector, where livelihoods are stable with constant institutional support, informal livelihoods are characterised by insecurity, income volatility, and weak legal protections [22]. Activities, such as street vending, petty trading, and domestic work, tend to be low-capital investments, highly flexible, and deeply embedded in local social networks [23]. The overreliance on face-to-face interactions and physical delivery of services makes such activities particularly vulnerable to economic disruptions such as those caused by COVID-19 [24]. Yet, the informal sector economy accounts for a significant share of employment, with many

workers engaged in subsistence activities that generate daily income for survival [25]. The sector in Rwanda accounts for about 84% of the total workforce, with the majority of urban workers engaged in petty trade, transport, construction labour, and small-scale services [26]. Unemployment in Kigali is estimated at 13% [27], though underemployment and income volatility are far more pervasive. The informal sector in Rwanda is shaped by close kinship ties and cooperative savings groups, differentiating it from contexts such as Lagos or Accra. The reliance on face-to-face interactions and physical marketplaces makes these livelihoods particularly vulnerable to economic shocks such as those caused by COVID-19 [28].

In the pre-pandemic days, cities like Nairobi (in Kenya) and Lagos (in Nigeria) thrived on diverse informal activities [29]. COVID-19, however, unleashed widespread disruption, disproportionately affecting the informal sector. Evidence shows that Nairobi's informal sector experienced significant income losses due to lockdowns and mobility restrictions [30]. Similarly, Lagos faced market closures and supply chain breakdowns, pushing daily earners into precarity [31]. These patterns echo [32] urban vulnerability framework, where structural factors—dense populations, limited savings, and cash dependence—amplify shock impacts. In Rwanda, pre-COVID evidence depicts the informal livelihoods playing a significant role in sustaining urban residents amidst modernisation strategies by the government [33]. In megacities like Dhaka (in Bangladesh), studies have documented exacerbated vulnerability due to overcrowding, with low-income groups losing access to basic needs [34].

Resilience strategies in urban developing contexts vary widely, often encompassing state interventions with community and philanthropic efforts. Yet post-crisis trajectories show uneven recovery. In Kenya, the government deployed cash transfers to cushion urban informal workers, though reach and sustainability lagged [30]. Elsewhere in Jakarta (in Indonesia), slums relied on communal networks—food sharing, mutual aid—to weather climate and health shocks [35]. The Philippines adopted a hybrid approach by integrating state and community resources post-COVID to support short-term recovery [36]. In Dhaka, low-income residents relied on informal ties to achieve a partial economic rebound amid persistent social isolation [34]. These cases reflect multi-scalar resilience, where adaptive capacity spans scales [37], yet hybrid models remain rare. This highlights the need for more studies that have the potential to deepen our understanding of hybrid resilience models, particularly in vulnerable communities.

In the post-crisis, trajectories from developing cities diverge. For instance, in Manila (Philippines), urban poor are known to have resurrected livelihoods through community-driven efforts, though economic instability remained an issue [36]. This is not the case in Accra (Ghana), where the youth faced prolonged mental strain and job scarcity, underscoring a psychological legacy rarely prioritized [38]. Holling [39] points out that resilience hinges on adaptability, yet urban studies often focus on economic recovery, undermining human impacts like fatigue or social fracture [29]. In the context of Kigali, centralised governance and communal ties suggest a potential hybrid resilience, blending state aid with local solidarity. The dual gap of hybrid resilience and human legacies in mid-sized, modernising cities positions Kigali as a critical case, extending beyond megacity and rural-focused resilience literature. Recent empirical analyses in Accra, Ghana, have advanced understanding of how COVID-19-related support mechanisms interact with urban livelihood capitals. [40] Studied differential socio-demographic impacts,

while [41] explore the moderating role of support systems in shaping resilience outcomes. These works underscore the importance of multi-scalar and hybrid approaches—where state, community, and individual actors co-produce resilience. Our study builds on these insights by examining how Kigali's unique modernisation trajectory and governance structures mediate similar dynamics, offering a mid-sized city perspective that complements the suburban Accra context.

2.2 Theoretical frameworks

The transformative effects of the COVID-19 pandemic were enormous and dire in developing cities like Kigali. In unpacking these effects, nuanced theoretical lenses are needed. This study examines the dynamics by drawing on three complementary frameworks: the Sustainable Livelihoods Approach (SLA), which maps asset dynamics; the urban vulnerability and political economy, which contextualises structural risks; and resilience theory, which assesses adaptive capacities. The frameworks are not employed in isolation but as an integrated analytical lens. The SLA provides a micro-level view of household assets and coping strategies, the urban vulnerability and political economy perspective situates these within structural constraints of Kigali's modernisation, and resilience theory captures adaptive capacities and long-term recovery trajectories. In combination, this multi-layered lens enables us to examine how individual and community assets intersect with structural inequalities and governance dynamics to shape differential resilience outcomes.

The SLA provides the analytical foundation to understand how COVID-19 impacted livelihoods in Kigali. The SLA frames livelihoods as a system comprising assets – human (e.g., skills, health), social (e.g., group networks), financial (e.g., income), physical (e.g., housing), and natural (e.g., land resources), and shaped by internal and external shocks and existing institutions, including policies, norms, and governance structures [42, 43]. In informal and low-income neighbourhoods of Kigali city, livelihood assets tend to be delicate [44], hence, severely impacted during the pandemic period. The COVID-19 lockdowns and other social distancing measures significantly disrupted livelihood systems by halting earnings, straining social networks, and rendering most physical assets unusable [45]. One major value of the SLA is its focus on coping strategies, including diversifying income, leveraging community support, and accessing aid [42]. This provides a framework to understand how low-income residents in Kigali adopted before, during, and after the COVID-19 period.

Rapid urbanisation exacerbates urban vulnerabilities, rendering cities highly vulnerable spaces. The theory of urban vulnerability highlights how structural factors, including unequal resource access, exclusion from urban planning, and reliance on informal economies, accentuate risk during crises [32]. The asset vulnerability framework reveals that the urban poor, with minimal asset endowment, face disproportionate losses when assets are disrupted [46], as exemplified by the income collapse in Kigali during the COVID-19 pandemic [17]. Resilience theory, on the other hand, provides the foundational tool for understanding how residents and institutions in Kigali responded to COVID-19's disruptions. Resilience is having the capacity to bounce back after going through perturbations. Urban resilience, according to [37], is the capacity to adapt, maintain essential functions, and recover from various shocks. This theory is widely applied to unpack the nuances of COVID-19, particularly in developing cities. In Kigali, evidence on how

resilience manifested during the pandemic is not only scarce but also diverse and varied in effectiveness. For instance, while the government enabled swift action, aid often failed to reach the most marginalised, revealing gaps between policy and practice [47]. [48] Differentiate two forms of resilience: specified resilience – targeted responses to specific threats, and general resilience – broad adaptability, a dualism evident in Kigali's mix of top-down and bottom-up strategies. Together with SLA and vulnerability theories, these frameworks help to situate Kigali's experience within the broader debates on crisis and urbanisation in the Global South, providing a suitable theoretical foundation for the study's empirical analysis.

3 Methods

This study adopts a qualitative approach, drawing on SLA, urban vulnerability, and resilience theory as theoretical frameworks. A qualitative approach was adopted to enhance the breadth in addressing the research objectives. Importantly, qualitative methods emphasise lived experiences, providing a nuanced insight into livelihood challenges and resilience strategies [49]. A qualitative approach is particularly critical in understanding the “how” and “why” of livelihood shifts in Kigali's informal and low-income neighbourhoods.

3.1 Case study city

The study focuses on Kigali, the capital city of Rwanda, as the case study. The city, which is home to about 1.5 million people, has undergone rapid urbanisation, underscored by modern infrastructure and stringent urban planning rules and strategies [50]. Kigali's population expanded from about 600,000 in 2002 to 1.6 million in 2022 [26], alongside rapid spatial expansion and industrialisation. The city's Master Plan enforces zoning, density control, and relocation of informal settlements, reflecting a highly regulated form of urbanisation. However, the transformation has resulted in unintended consequences, typified by rising high cost of living (according to Numbeo data, the monthly cost of living for a family of four in Kigali is estimated at RWF 2,261,260 (USD 1,559), excluding rent, a figure higher than the national average income of around RWF 150,000 (USD 130) per worker), enforced regulations that are not conducive to many informal activities, leading to loss of employment opportunities for poor and low-income groups, and informal and low-income neighbourhoods' development outside the urbanised areas. Many of these neighbourhoods lack critical resources and largely rely on informal livelihoods (e.g., vending, casual labour). It is estimated that as of 2018, approximately 60% of Kigali's population were living in unplanned informal settlements without secure tenure and access to basic services [51]. This contrasts many other Global South cities, where informal settlement rates typically range between 30 and 50% [52], underscoring Kigali's uniqueness as a case study city.

Notwithstanding, the informal sector plays a critical role in livelihoods, especially for women [53]. Initiatives, such as the “Smart Kigali” project, which aims to modernise infrastructure and enhance service delivery (e.g., introduced free Wi-Fi hotspots, digital services, and smart transport solutions, including e-bikes, but benefits remain uneven), although it has been instrumental in shaping the city, present challenges in addressing housing deficits and inequality [54]. While modernising infrastructure, the policy has done little, particularly in addressing rising cost of living, with many low-income groups

displaced from central areas. Kigali was lauded for its effective management of the COVID-19 pandemic, with swift measures, including nationwide lockdowns, mass testing, and contact tracing, demonstrating effectiveness in controlling the virus's spread. The deployment of robots for temperature screening and drones for public awareness campaigns was unique and highly effective as well [55]. These strategies, coupled with a robust vaccination campaign, positioned Kigali as a model for pandemic response in the African region [56]. However, how these measures shaped the livelihood conditions in the informal and low-income neighbourhoods remains underexplored. Understanding the livelihood nuances (before, during, and post-COVID-19) holds promise for developing effective future management and resilience livelihood strategies for Global South cities like Kigali.

3.2 Data collection and analysis

Semi-structured in-depth interviews were used to gather data from 30 residents across Kigali's three districts (Gasabo, Kicukiro, and Nyarugenge), with 10 participants from each district. These three districts were selected because they represent diverse socio-economic profiles: Nyarugenge is the historic core with high density and informal settlements. Gasabo contains rapidly urbanising peri-urban zones, while Kicukiro is a mixed district with middle-income growth alongside informal pockets. The participants were selected purposively to reflect the diverse livelihood activities (e.g., small retailers, motorcycle riders, labourers, and domestic workers) but also gender and age. The sample size of 30 respondents was considered sufficient for this study and aligns with qualitative research conventions where 20–30 interviews are often sufficient to reach saturation [57]. Key inclusion criteria included having lived in Kigali for five years and above, engaged in informal trade, and experienced the COVID-19 restrictions in Kigali city. We also employed snowball sampling to identify additional respondents within each district. With respect to gender distribution, 13 participants were females while 17 were males. The interviews lasted 35–45 min each and focused on exploring pre-COVID livelihoods, pandemic disruptions, coping strategies, and internal and external support mechanisms. The interview was conducted in Kinyarwanda (local language) and later transcribed into English by a trained research assistant. Data collection took place in August 2023 for three weeks.

The interview data were transcribed verbatim and analysed following the thematic approach. It involved the application of Braun and Clarke's (2006) six-step process, consisting of: familiarisation, coding (e.g., "income loss," "community support"), theme generation (e.g., "economic disruption"), review, definition, and reporting. Data analysis was conducted in Microsoft Excel. The study followed strict ethical regulations, including informed consent verbally and in writing (in Kinyarwanda and English), voluntary participation, right to withdraw, and assurance of confidentiality to protect the identities of participants. Final ethical approval was sought from the University of Rwanda and the Kigali City Office. While the study focused on residents' perspectives, future research should also incorporate insights from community leaders and organisations that mediated pandemic responses.

4 Results

4.1 Livelihoods in the pre-COVID-19 period

Interviews with study participants from Kigali's low-income neighbourhoods reveal a diverse and relatively stable portfolio of livelihood activities before the COVID-19 pandemic. The data show that the respondents leveraged varied income sources to navigate daily needs in the informal sector. Prior to the pandemic, all 30 respondents reported consistent income streams, with notable diversity across formal and informal sectors (see Fig. 1). Eight respondents were relying on regular monthly salaries – an indication of the presence of formal employment and application of human assets, albeit limited. Of these, three supplemented their earnings with part-time ventures – shopkeeping, student coaching alongside studies, and small business operations – signifying a proactive diversification of livelihood activities. Others reported being landlords, underscoring the conversion of physical assets like housing into rental income, which appears to be a lucrative and stable strategy in Kigali's competitive urban land market. Skilled trades supported two respondents via carpentry, while three operated transport businesses as motorcycle drivers and a bicyclist. This suggests the critical role of physical, human, and financial assets in making a living in the pre-COVID-19 period.

The remaining 14 respondents were engaged in a broad spectrum of informal and entrepreneurial activities, portraying the heterogeneity of pre-COVID livelihoods. These include receiving grants, likely through social or institutional networks, working

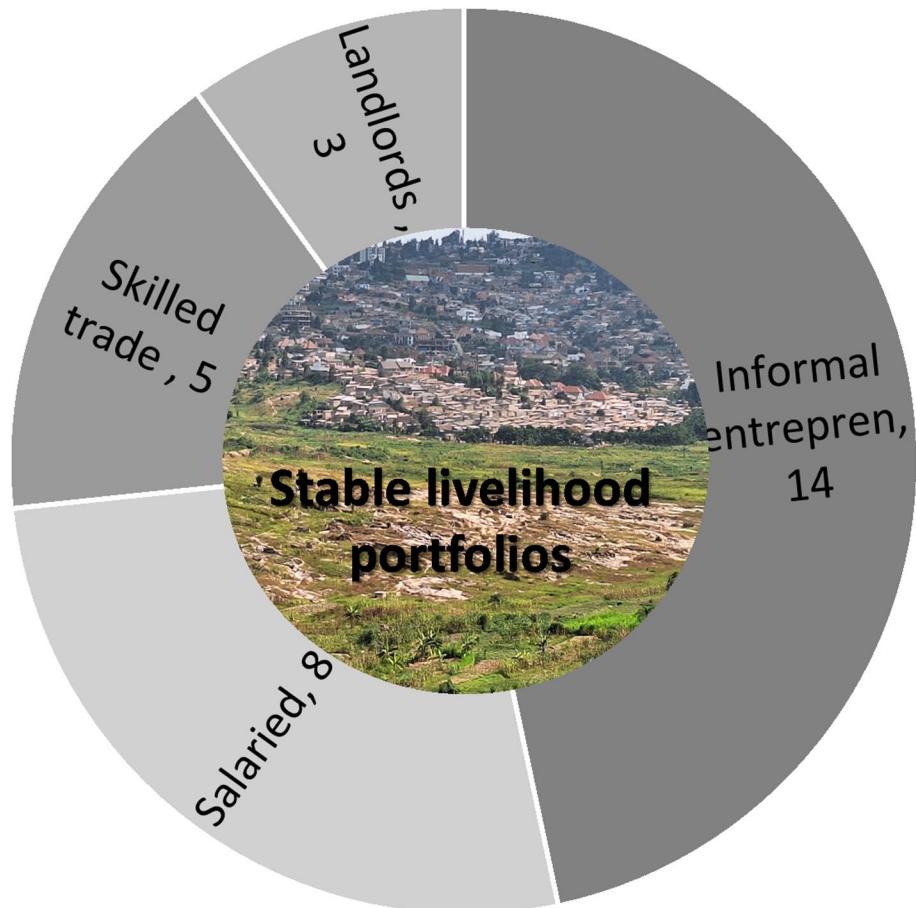


Fig. 1 Pre-COVID-19 livelihood ecosystem in Kigali's low-income and informal neighbourhoods

in formal organisations (a reflection of specialised human capital), and working in the construction sector, which is tied to the road development surge. The majority, however, were engaged in small-scale enterprises and daily labour, including operating small shops, selling daily consumables (e.g., selling of bread, avocados, and fruits and vegetables), repair work, and casual work, but also engaging in urban agriculture. While the pre-COVID livelihood landscape suggests a relatively stable and diverse portfolio of activities, these insights should be viewed as indicative patterns drawn from a small sample rather than generalisable findings for all of Kigali. Respondents' reliance on multiple streams of livelihoods illustrates adaptive capacity within the SLA framework. Their ability to balance human skills, social networks, and physical resources to eke out a living echoes a critical livelihood resilience strategy. Although not immune to shocks, these livelihoods provided economic stability, where people thrived amid all the urban chaos.

4.2 Livelihood challenges during the pandemic period

Well-meaning measures (e.g., lockdowns, business closures, and social distancing) that were meant to contain the pandemic, although they did work, resulted in stalled economic activity across Kigali city. The interviews highlighted how these measures reshaped income sources, with varying degrees of impact and adaptation strategies. Almost all the participants reported that their livelihoods were adversely affected by the pandemic. They stressed the uneasiness in moving around, let alone engaging in their various trades. A landlord who made a living renting out rooms lamented how his rental business was impacted:

"I was leasing my house for income before the pandemic. When COVID-19 hit, tenants couldn't pay rent because they lost jobs during the lockdown and business closures. I didn't demand payment" (Interviewee A).

A female respondent whose husband worked as a motorist echoed this economic strain:

"There was no work. My husband couldn't earn, so we had no money at home" (Interviewee B).

These point to the immediate impact of restricted mobility. The fact that people were prevented from moving around suggests that all activities came to a standstill, rendering physical, social, and human assets ineffective.

Similar difficulties were reported by other respondents across the livelihood spectrum. A female respondent reliant on her husband's monthly salary highlighted how the husband who was working in the private sector was unpaid during the period: "During the pandemic, my husband was not paid, and it was difficult for us" (Interviewee C). This was shared by a self-employed tailor who described broader consequences as:

"Lockdowns stopped my work. Food became scarce, leading to hunger in my family. I couldn't save—tailoring doesn't pay well, and I have children's schooling and daily needs to meet" (Interviewee D).

The majority of the respondents alluded that the pandemic induced the loss of their primary income source, with no immediate alternative. This, it emerged, plunged many households into deprivation, with their plight exacerbated by their inability to visit friends and family members for support. People who were engaged in petty trading,

including the selling of fresh fruits and vegetables, were particularly hit hard, as their products perished and ran into debt, suggesting an additional burden. Both formal and informal workers were affected, although with varying impacts. A pharmacy worker explained: "I wasn't working during the pandemic, so I couldn't generate money" (Interviewee E). An agricultural worker added: "I had no job. I was compelled to stay home, inactive" (Interviewee F), and a respondent dependent on casual jobs noted: "There were no opportunities for paid work, so I couldn't make any earning" (Interviewee G). These accounts reflect a widespread cessation of income-generating activities, particularly among low-income groups.

As already indicated, there were various impacts on the livelihoods of Kigali City inhabitants. A small group of respondents reported continuity in livelihood activities despite the widespread disruption. However, it emerged that this group was the privileged (few) salary workers whom the government continued to pay throughout the pandemic. One stated: "There was no critical effect. My livelihood didn't change" (Interviewee H). Another observed: "The salary remained the same, and basic goods' prices didn't spike much" (Interviewee I). The stability of this group's income contrasts sharply with the majority, highlighting a divide between formal and informal income sources during the crisis. It points to job security, which can be enhanced through the development of the human asset base through, for instance, higher education and specialised training programmes.

Despite the widespread impacts and hardships, however, Kigali City inhabitants managed to adopt various ingenious ways to stay afloat. From the analysis, livelihood diversification became a norm, particularly among the informal workers. By shifting and adapting to new income sources, the poor, especially, were able to build resilience, albeit marginally. A construction worker recounted, "Roadwork stopped during COVID-19. I started buying vegetables at the market and selling them within my neighbourhood, earning enough for food" (Interviewee J). A bread seller adjusted similarly: "Customers dropped during the pandemic. I rented peri-urban land to farm for future food security" (Interviewee K). A female vendor of bananas and avocados shared, "Business slowed, so I stopped. I made jewellery and worked in a neighbour's garden, earning around 1.5 USD daily for subsistence" (Interviewee L). These shifts demonstrate a capacity to pivot under pressure, though often to minimal survival levels. Additional survival strategies involved reliance on household or relational support. One explained, "My business stopped, but my salary continued, keeping us afloat" (Interviewee M), indicating resilience through dual-income households. A shopkeeper added, "My business shut down, but my wife's salary sustained us" (Interviewee N). This reliance on partners' or relatives' income provided a buffer for some, contrasting with those fully dependent on disrupted livelihoods.

Clearly, the pandemic's effects varied across individuals, shaped by their pre-existing economic status and sector of activity. Figure 2 shows a breakdown of the livelihood spectrum. The majority who faced disruptions experienced income loss, food insecurity, and inactivity, with a sizable number losing all means of generation without recovery during the period. Meanwhile, there were some who remained stable and benefited from salaried continuity. Those who adapted, alongside those relationally supported, reflect diverse responses to the crisis. These findings illustrate the breadth of challenges and coping mechanisms in Kigali's low-income neighbourhoods.

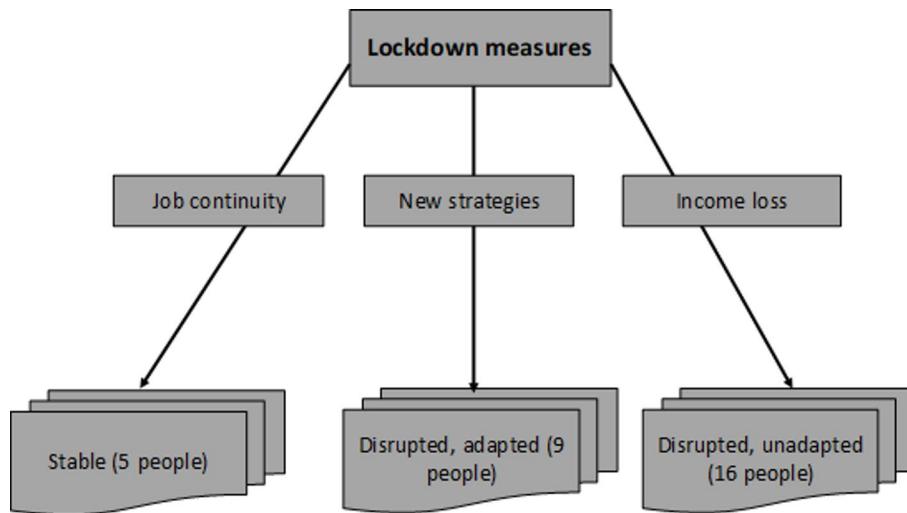


Fig. 2 COVID-19 pandemic impact spectrum

The typology distinguishes four pathways: (A) Continuity—stable salaried income with limited disruption; (B) Relationally buffered adaptation—loss of one income offset by partner/kin support; (C) Adaptive pivots—temporary diversification to low-entry activities enabled by portable skills/tools or small working capital; (D) Distress/inactivity—loss of income without recovery options due to minimal assets, weaker networks, and mobility constraints. The pathways reflect indicative patterns from the sample rather than population-wide estimates.

4.2.1 Categories of challenges faced during the pandemic period

The COVID-19 pandemic imposed a wide range of challenges on Kigali's low-income residents, disrupting both their social and economic lives. The interview revealed two primary categories of challenges during this period: social and economic. There were a few respondents who reported not facing any significant issues. Social challenges encompassed disruptions to general well-being and community life, including issues such as food scarcity, psychological distress, restricted movement, and strained social interactions. A teacher captured the emotional toll:

"There were psychological challenges. Staying home, thinking I should be at work, was hard. We worried about not getting paid without producing. Even after payment, we feared the money would run out soon. We heard some students who were trapped into prostitution practices, and some colleagues died from COVID-19" (Interviewee A).

This account highlights a mix of anxiety, isolation, and grief, compounded by indirect effects on others in their network. Other respondents similarly noted depression among youth, prolonged confinement, and a lack of freedom to connect, painting a picture of diminished social fabric in Kigali's low-income and informal neighbourhoods during the lockdowns.

Economic challenges centred on financial instability and resource pressures, with job loss emerging as the dominant issue. A shoemaker and repairer stated: *"Losing my job was the first challenge—life stopped. I couldn't earn anything. People stayed home, so I couldn't serve even my neighbours"* (Interviewee B). This reflects a paralysis

of income-generating activities tied to reduced demand and mobility. Another economic burden that many respondents alluded to was increased consumption of water and energy due to constant home stays, rising prices of basic goods like food, and high expenses without production. The loss of regular income emerged as a shared thread, often triggering secondary social problems like hunger, illustrating the cascading effects of economic disruption. The few who reported no significant issues can be attributed to the external support and alternative opportunities, as explained in the previous section. Interestingly, a good number of respondents declined to discuss their experience in depth by showing limited interest in revisiting the pandemic difficulties. This suggests lingering fatigue, trauma, and or detachment. These categories—social, economic, and none—frame the crisis's breadth, with disinterest adding a psychological layer.

The interview data also highlight an urban–rural divide in adaptive capacity. Several respondents contrasted Kigali's challenges with rural resilience. One noted, “*In urban areas, especially Kigali, people suffered from hunger— as there are no lands to cultivate but just markets, they couldn't afford. Motorists, carpenters, and daily earners begged for food. In rural areas, people farmed and had sweet potatoes or cassava*” (Interviewee M). Another echoed, “*COVID-19 hit urban areas harder. In Kigali, tight conditions and high transmission risks made life tough, while rural people moved freely and grew food*” (Interviewee N). This disparity underscores Kigali's cash-dependent urban economy as a vulnerability, with rural land access offering a buffer absent in the city. Table 1 presents a summary of this analysis.

4.3 Challenges in adapting new livelihood strategies

The pandemic and associated preventive measures forced low-income and informal residents in Kigali to adapt their livelihoods, often with significant difficulties. Most of the respondents reported facing significant challenges in shifting to new livelihood strategies. While some lacked the knowledge base to navigate their way around effectively, others mentioned the difficulty in accessing critical resources for new ventures. A daily wage worker lamented: “There was no work, no transport to find new opportunities. Learning something different was tough without resources” (Interviewee A). A street vendor echoed this, noting, “I couldn't sell as before. Starting something new meant finding buyers, but lockdowns kept everyone home” (Interviewee B). Skill gaps compounded the issue: a pharmacy worker said, “Switching to another job wasn't easy—private companies cut staff, and I had no training for anything else” (Interviewee C). Financial hurdles also emerged, as a businesswoman explained, “I tried a new trade, but my bank loan default blocked credit for start-up costs” (Interviewee D). These accounts

Table 1 Distribution of reported challenges during the COVID-19 pandemic.

Source: Interview data, 2023

Challenge type	Count	Examples	Insight
Economic challenges	14	Job loss, rising costs	Shared hunger/stress with social challenges
Social challenges	7	Psychological stress, food scarcity	Some are caused by income loss
No challenges	8	“We are okay”, coping well	None
Avoided discussion	10	No detail given, reluctance to respond	Includes possible hidden distress
Overlap: Income loss effects	–	Hunger due to job loss (cross-cutting experience)	Occurs in both economic and social categories

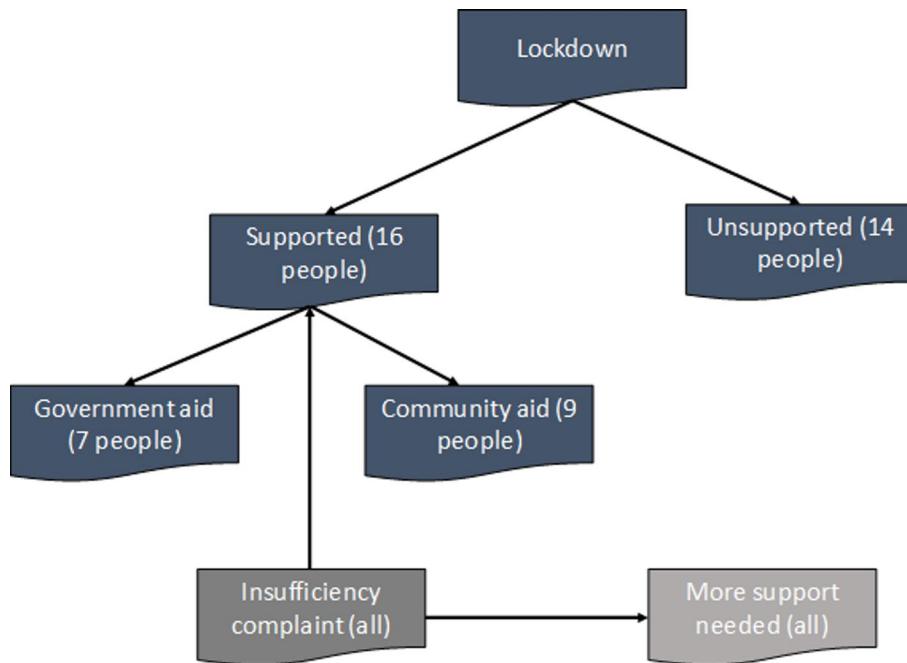


Fig. 3 Support and resilience dynamics during the COVID-19 pandemic

pinpoint mobility limits, lack of training, and capital shortages as key barriers, intensified by urban Kigali's dense, cash-reliant setting.

Conversely, some respondents adapted more smoothly, often leveraging existing skills and or external aid. One simplified living: "It wasn't very bad. We used no soap for clothes, just basics" (Interviewee E). A banana seller turned health advisor noted, "There was no job, but I started advising neighbours for small pay, and government food helped" (Interviewee F). Government aid proved a lifeline for some people, albeit being insufficient. A tailor added:

"I got support from the members of my family, and the government gave food to fight hunger. I also sewed clothes at home with my machine. My approach was patience—what mattered was surviving, not making much money" (Interviewee G).

These successes highlight resourcefulness and support as enablers, contrasting with the majority's struggles. For the majority, new working conditions—remote work, reduced staffing, or alternative trades—proved elusive, with urban Kigali's resource scarcity amplifying the challenge. The minority's success hinged on external resources (government provisions, family help) or resilience through subsistence adjustments, offering a counterpoint to the predominant narrative of hardship. These findings illuminate the varied capacity to shift livelihoods during the pandemic. Figure 3 illustrates the support dynamics.

The differentiation across trajectories reflected variations in asset endowments and external supports. Those with formal employment or dual-income households were more likely to maintain stability, while individuals with access to kinship networks or government aid managed partial adaptation. By contrast, casual labourers with limited skills or savings were pushed into prolonged inactivity and distress. These patterns suggest that livelihood outcomes were mediated not only by sector of work but also by household composition, access to support networks, and pre-existing asset portfolios.

4.4 Local resilience building and policy directions

The COVID-19 pandemic prompted the necessity of local resilience building. Respondents reported building resilience primarily through external and familial support, and livelihood diversification. Among those unsupported, some maintained their income sources because of being salary workers, as one explained: "No support was given because I was receiving a salary" (Interviewee H). The "unsupported" group largely consisted of salaried workers (teachers, health staff, local administrators) who continued to receive wages and thus were not targeted for aid. The supported group was largely individuals whose livelihoods—daily jobs like motorist work, construction assistance, or informal trades like street vending—collapsed under lockdown measures. Support came from government initiatives, often supplemented by the private sector, civil society, churches, and social networks. The nature of support varied but centred on food provisions. One respondent detailed, "The government gave us maize flour, rice, beans, and porridge flour. The Catholic Church, family members, and others added Irish potatoes, rice, beans, maize flour, clothes, and nuts" (Interviewee B). This view was shared by several other respondents. Importantly, community solidarity emerged alongside state efforts. A respondent noted:

"Individuals with better financial standing supported their families and friends. I got maize flour, beans, and cooking oil from the government, plus money, beans, rice, and oil from the family" (Interviewee D).

Despite widespread aid, concerns about quality and fairness dominated responses. Respondents expressed dissatisfaction. One said, "The government provided support, but it wasn't enough. Food lasted about a week. Some got it, others didn't" (Interviewee F). Another added, "We got a few items—rice and beans—only once a week" (Interviewee G). Distribution flaws drew criticism: "It wasn't effective. Those with means, like house owners, got food, while the worst-off got little. The government should've announced clear criteria on the radio" (Interviewee H). A contrasting view acknowledged effort amid flaws: "The government did its best, but its support didn't reach everyone. Some who didn't need it got it due to unfair distributors. The idea was good, but it needs improvement" (Interviewee I). Suggestions for better interventions emerged. One stated, "The government should have provided enough support—maize flour came without salt or charcoal" (Interviewee J), while another urged, "Things should've been well organized so everyone with low income got food—not all did" (Interviewee K). A third echoed, "More support was needed—bigger quantities of beans and maize flour" (Interviewee L). Some respondents noted that food aid was targeted primarily at registered low-income households, which meant that informal tenants or casual workers without registration were sometimes excluded. Thus, the supported group critiqued insufficient quantities (e.g., weekly rations), inconsistent delivery, and inequitable targeting. A rare positive note came from one respondent: "Given the resources were limited, I can't blame anyone. The crisis hit suddenly with no plan" (Interviewee M), suggesting acceptance of limitations.

The data revealed broader resilience-building ideas. One proposed, "Prevention comes first—precautions keep people firm. Low-income people need financial support and training, or they forget skills" (Interviewee N). Another suggested, "Support should include cash for flexibility, not just food" (Interviewee O). A third added, "Community

education on savings could help next time" (Interviewee P). These insights reflect a desire for proactive, multifaceted strategies beyond immediate aid. Thus, long-term resilience must be integrated, combining prevention, training, financial aid and savings.

5 Discussion

The results reveal profound economic and social disruptions alongside varied adaptive responses. In this part, we interpret the findings through three prominent themes: urban asset vulnerability in a modernising city, hybrid resilience and post-crisis transformation, and the post-pandemic psychological and social legacy. Drawing on the SLA [42], urban vulnerability [32], and resilience theory [37], the discussion situates Kigali's experience within broader urban crisis scholarship.

5.1 Urban asset vulnerability in a modernising city

The pre-COVID livelihood stability of Kigali's low-income residents changed rapidly during the pandemic, with the majority of the respondents citing economic challenges like job loss and hiked prices. The SLA emphasises asset vulnerability to either internal or external shock. The pandemic presented an external shock that disrupted all facets of life, with key livelihood assets such as human (e.g., skills, labour) and financial (e.g., income) assets eroded under lockdown measures. This finding resonates with many studies in the developing world that report asset disruption during the pandemic. For instance, in their large-scale multi-country study, Egger et al., [58] found that the COVID-19 pandemic led to significant losses in income, employment, and food security, with severe consequences on human assets owing to interrupted schooling and reduced access to health services. Unlike in the rural areas, where people developed land-based livelihood options like farming, Kigali's urban density and cash-dependent economy amplified the fragility, as many people struggled to adapt to new strategies. The city's compact growth strategy, while effective for infrastructure efficiency, limited land availability for backyard or community farming—strategies that mitigated food insecurity in other cities. This deepened urban residents' dependence on cash economies. This aligns with the argument that the poor, particularly in low-income urban neighbourhoods, struggle to adjust their livelihood during crises because of their limited asset endowment [6, 59]. The urban–rural disparity highlights [32] the argument that structural factors—here, Kigali's rapid modernisation and informal–heavy workforce – heighten vulnerability in cities.

Although other informal sectors in other countries faced similar losses, Kigali's context diverges due to its state-led urban planning and smaller scale. For instance, while Nairobi's sprawl dilutes density effects [60], Kigali city tends to be compact and the regulated spatial growth concentrates risk, leaving daily earners (e.g., motorists, shoemakers) without viable options. Unlike larger cities with diverse safety nets, Kigali's modernisation appears to prioritise infrastructure with little attention paid to social protection [50], exposing a major gap in livelihood and wellbeing. This vulnerability echoes the asset framework, where minimal options (e.g., savings) collapse under crisis [46]. However, Kigali's case adds novelty as a modernising, mid-sized African city rather than a rural or megacity focus typical in SLA studies. Clearly, urban policy in rapidly modernising cities like Kigali must address asset fragility beyond physical upgrades. Participants signalled a need for broader safety nets—cash transfers, skill programs—tailored to

cash-reliant urban poor, a lesson extensible to other urbanising African contexts facing future shocks. Kigali's experience thus reframes urban vulnerability as a modernisation paradox, where progress heightens precarity. These findings resonate with recent findings in Accra that highlights the role of multi-scalar support systems in shaping urban resilience. [40] demonstrate how socio-demographic factors mediate access to livelihood capitals, while [41] emphasise the moderating effect of COVID-19-related support on resilience outcomes. The present study extends these analyses by showing how Kigali's centralised governance and modernisation agenda produce a distinct form of hybrid resilience—one that blends state-led infrastructural upgrades with community-level coping strategies but also introduces new vulnerabilities through uneven formalisation and displacement pressures. This comparative lens underscores the importance of context-specific governance arrangements in shaping resilience trajectories. While Accra's suburban settlements rely heavily on informal networks and external aid, Kigali's peri-urban zones are increasingly shaped by state-driven planning logics. The modernisation paradox observed in our study—where formal upgrades coexist with livelihood erosion—adds nuance to the hybrid resilience discourse and calls for more granular, city-specific analyses in African urban scholarship.

These findings show how different SLA capitals shaped vulnerability: loss of access to markets curtailed physical capital; kinship and community networks functioned as critical social capital; housing ownership offered a buffer compared to tenants, while financial capital remained scarce. Formal workers with stable contracts generally maintained income continuity, while informal workers experienced acute losses due to reliance on daily earnings. However, the informal sector also demonstrated flexibility through adaptive pivots, while the formal sector highlighted resilience via wage security. Urban vulnerability theory underscores how Kigali's modernisation intensified reliance on fragile informal work, amplifying risks. Resilience theory helps distinguish between adaptive strategies (temporary pivots) and transformative ones (permanent livelihood shifts), showing how hybrid resilience emerged through state–community intersections.

5.2 Hybrid resilience and post-crisis transformation

Kigali's low-income residents navigated COVID-19 with varied resilience strategies. This hybrid resilience—merging state intervention with community networks—contrasts with rural SLA reliance on informal assets [61] and top-down models elsewhere [39]. Rwanda's centralised yet community-integrated response [50] fostered this, though some respondents deemed aid insufficient and critiqued its inequity. Recent analyses from the developing world enrich this narrative. In Jakarta's slums, [35] found communal practices bolstered resilience against climate shocks, echoing Kigali's family aid but highlighting individualism's modern erosion—a tension less acute in Kigali's kinship-driven context. [36] Noted that Philippine local governments blended state and community efforts post-COVID yet lacked Kigali's transformative scale. In Dhaka, [34] observed resilience via informal networks in hyper-urbanised settings, but Kigali's state-community synergy and urbanising frame add a distinct hybrid layer absent in Dhaka's chaos. Unlike Kenya's state-heavy cash transfers [30], Kigali's model aligns with multi-scalar resilience [37] offering a novel blueprint. This hybrid approach suggests urbanising cities can leverage formal-informal synergies for resilience, a lesson for developing contexts [29]. Thus, Kigali's experience reframes resilience as a dynamic, hybrid process, distinct

in its modernising African setting. We describe the Kigali experience as “hybrid resilience” not because they led to thriving, but because they represent a blend of state provisions and community/family support that enabled survival and limited adaptation. This resilience was partial and uneven, sustaining livelihoods at subsistence levels rather than fostering prosperity.

Importantly, the analysis distinguishes between adaptive responses, such as temporary diversification or subsistence adjustments, and transformative responses that involved permanent livelihood reorientation. For instance, some respondents transitioned from construction work to farming or counselling, reflecting long-term transformations catalysed by crisis. This differentiation underscores the hybrid resilience of Kigali’s low-income neighbourhoods, where kinship networks and state interventions intersect to shape divergent livelihood trajectories. The study’s unique contribution lies in reframing resilience in modernising African cities as a hybrid process—where progress simultaneously amplifies vulnerability and creates opportunities for transformative adaptation.

5.3 The post-pandemic psychological and social legacy

The crises left a lasting psychological and social imprint on Kigali’s low-income residents, with a significant number of respondents avoiding discussion of its aftermath. This is an indication of fatigue or trauma, aligning with resilience theory’s view of emotional capacity as a recovery limiter [37]. Recent advances in developing cities contextualise this. In Accra, [38] found post-COVID mental strain persisted among urban youth, mirroring Kigali’s situation but tied to job scarcity rather than fatigue. [34] Noted that Dhaka’s low-income residents faced social isolation, yet Kigali’s unique distress (e.g., student prostitution) reflects its modernising, education-focused urban fabric. Unlike Manila’s community-driven recovery [36], Kigali’s passive case suggests a resilience gap, possibly deepened by urban density. This legacy diverges from economic-focused studies [30], offering a novel human-centred angle in urbanising Africa. Kigali’s experience implies urban policy must address psychological and social repair alongside economic aid. The respondents who expressed disinterest in discussing their experience highlight the need for mental health support and community rebuilding, lessons applicable for dense, modernising cities facing future crises.

6 Conclusion

This study aimed to investigate the effects of the COVID-19 pandemic on low-income and informal residents in Kigali. While the crisis disrupted livelihood streams and exposed the fragility of informal economies, it also revealed the adaptive capacities of residents navigating constrained conditions. Resilience emerged through hybrid mechanisms – government aid, community and familial support, and livelihood diversification – though these were unevenly distributed and often temporary. Beyond economic impacts, the pandemic left a lasting psychological imprint, with many residents experiencing distress, uncertainty, and social fragmentation. Kigali’s experience reframes urban vulnerability as a modernisation paradox: state-led progress and infrastructural transformation can inadvertently heighten precarity for those excluded from formal systems. This insight contributes to urban scholarship by highlighting how modernisation and resilience co-evolve in complex, sometimes contradictory ways in mid-sized African cities.

To strengthen resilience and promote equitable recovery, three policy priorities are critical. First, economic safety nets must be expanded to include informal and unregistered workers, ensuring that crisis responses reach those most affected. Second, urban planning should integrate livelihood resilience by recognising land, housing, and mobility as essential capitals for survival and adaptation. Third, psychosocial support must be scaled up to address the mental health legacies of crisis, which are often overlooked in post-pandemic recovery strategies. These measures should be embedded within inclusive governance frameworks that anticipate future shocks and foster long-term resilience. As urban crises become more frequent, cities like Kigali must move beyond reactive interventions toward proactive, equity-driven resilience planning. Future research should examine how modernisation trajectories can be recalibrated to support inclusive adaptation, particularly in rapidly urbanising contexts across the Global South.

Acknowledgements

We would like to thank all the study participants who took time out of their busy schedules to be interviewed. Without them, this study would not have been possible.

Author contributions

Gideon Baffoe: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Writing—original draft, Visualization. Vincent Manirakiza: Conceptualization, Data curation, Formal analysis, Writing—review & editing, Investigation, Validation. Ernest Uwayezu: Conceptualization, Data curation, Formal analysis, Writing—review & editing, Investigation, Validation.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability

All data analysed for this study is available and will be provided upon request.

Declarations

Ethics approval and Consent to participate

The study was approved by the University of Rwanda research ethics committee and the Kigali City Office. We certify that the study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments. Standards.

Consent to publication

Study participants consented to the publication of the data on the condition that they remain anonymous.

Competing interests

The authors declare no competing interests.

Informed consent

Informed consent was obtained from all study participants before data collection commenced.

Received: 9 July 2025 / Accepted: 31 October 2025

Published online: 24 November 2025

References

1. World Health Organization. (2020). WHO director-general's opening remarks at the media briefing on COVID-19 – 11 March 2020. WHO. <https://www.who.int/director-general/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19---11-march-2020>
2. Onyishi CJ, Ejike-Alieji AUP, Ajaero CK, Mbaegbu CC, Ezeibe C, Onyebueke V, et al. COVID-19 pandemic and informal urban governance in Africa: a political economy perspective. *J Asian Afr Stud.* 2020;56(6):1226–50. <https://doi.org/10.1177/002109620960163>.
3. Webb A, McQuaid R, Rand S. Employment in the informal economy: implications of the COVID-19 pandemic. *Int J Sociol Soc Policy.* 2020;40(9/10):1005–19. <https://doi.org/10.1108/ijssp-08-2020-0371>.
4. Nguimkeu, P. and Okou, C. (2020). A Tale of Africa Today: Balancing the Lives and Livelihoods of Informal Workers During the COVID-19 Pandemic (English). Africa Knowledge in Time Policy Brief, 1 (3). Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/798701601482469323/A-Tale-of-Africa-Today-Balancing-the-Lives-and-Livelihoods-of-Informal-Workers-During-the-COVID-19-Pandemic>
5. Power K. The COVID-19 pandemic has increased the care burden of women and families. *Sustainability Sci Pract Policy.* 2020;16(1):67–73. <https://doi.org/10.1080/15487733.2020.1776561>.

6. Wilkinson A, Ali H, Bedford J, Boonyabancha S, Connolly C, Conteh A, et al. Local response in health emergencies: key considerations for addressing the COVID-19 pandemic in informal urban settlements. *Environ Urban*. 2020;32(2):503–22. <https://doi.org/10.1177/0956247820922843>.
7. Schotte S, Zizzamia R. The livelihood impacts of COVID-19 in urban South Africa: a view from below. *Soc Indic Res*. 2022;165(1):1–30. <https://doi.org/10.1007/s11205-022-02978-7>.
8. McGuirk P, Dowling R, Maalsen S, Baker T. Urban governance innovation and COVID-19. *Geograph Res*. 2021;59(2):188–95. <https://doi.org/10.1111/1745-5871.12456>.
9. Khambule I. COVID-19 and the informal economy in a small-town in South Africa: governance implications in the post-COVID era. *Cogent Soc Sci*. 2022. <https://doi.org/10.1080/23311886.2022.2078528>.
10. Kimani J, Steege R, Makau J, Nyambuga K, Wairutu J, Tolhurst R. Building forward better: inclusive livelihood support in Nairobi's informal settlements. *IDS Bull*. 2021. <https://doi.org/10.19088/1968-2021.104>.
11. Aditya B, Amri I. Rethinking informal economy resilience during crisis: experience from COVID-19 pandemic. *Indian J Labour Econ*. 2023;66(3):711–37. <https://doi.org/10.1007/s41027-023-00458-1>.
12. Chigbu UE, Onyebueke V. The COVID-19 pandemic in informal settlements: (re)considering urban planning interventions. *Town Plann Rev*. 2021;92(1):115–21. <https://doi.org/10.3828/tpr.2020.74>.
13. Leach M, MacGregor H, Scoones I, Wilkinson A. Post-pandemic transformations: how and why COVID-19 requires us to rethink development. *World Dev*. 2021;138:105233. <https://doi.org/10.1016/j.worlddev.2020.105233>.
14. Baffoe G, Ahmad S, Bhandari R. The road to sustainable Kigali: a contextualized analysis of the challenges. *Cities*. 2020. <https://doi.org/10.1016/j.cities.2020.102838>.
15. Jaganyi D, Njunwa K, Nzayirambaho M, Rutayisire PC, Manirakiza V, Nsabimana A, Nduwayezu G. Rwanda: National Urban policies and city profiles for Kigali and Huye. 79. Glasgow: The GCRF centre for sustainable, healthy and learning cities and neighbourhoods (SHLC). (2018)
16. Aragie E, Diao X, Robinson S, Rosenbach G, Spielman DJ, Thurlow J. Assessing the economywide impacts of COVID-19 on Rwanda's economy, agri-food system, and poverty: a social accounting matrix (SAM) multiplier approach (Vol. 1). IFPRI. (2021).
17. Uwimana A, Mukamana L, Ruranga C, Nzabanita J, Jansen S, Masabo E, et al. Assessment of the socioeconomic impact of COVID-19 in Rwanda: findings from a country-wide community survey, preliminary analysis to inform further global research. *Res Glob*. 2024;8:100230. <https://doi.org/10.1016/j.resglo.2024.100230>.
18. Partidário, M. R., & Pereira, P. Cities and sustainability assessment: Resilience and sustainability thinking about the future of cities. In *Handbook of Sustainability Assessment* (pp. 183–212). Edward Elgar Publishing. (2015)
19. Chen M, Roever S, Skinner C. Editorial: Urban livelihoods: reframing theory and policy. *Environ Urban*. 2016;28(2):331–42. <https://doi.org/10.1177/0956247816662405>.
20. Cattaneo A, Adukia A, Brown DL, Christiaensen L, et al. Economic and social development along the urban-rural continuum: New opportunities to inform policy. *World Bank Policy Research Working Paper* 9756. (2021). <https://documents1.worldbank.org/curated/en/460501629739802690/pdf/Economic-and-Social-Development-along-the-Urban-Rural-Continuum-New-Opportunities-to-Inform-Policy.pdf>
21. Siegmann KA, Schiphorst F. Understanding the globalizing precariat: from informal sector to precarious work. *Prog Dev Stud*. 2016;16(2):111–23. <https://doi.org/10.1177/1464993415623118>.
22. Nzeadibe TC, Mbah PO. Beyond urban vulnerability: interrogating the social sustainability of a livelihood in the informal economy of Nigerian cities. *Rev Afr Polit Econ*. 2015;42(144):279–98. <https://doi.org/10.1080/03056244.2014.997692>.
23. Navarrete-Hernández P, Alford M, Toro F. Inclusive informal-to-informal trade: the poverty alleviation potential of street vendors' trade networks in Santiago de Chile. *Third World Q*. 2023;44(8):1844–64. <https://doi.org/10.1080/01436597.2023.208060>.
24. Amankwah-Amoah J, Khan Z, Wood G, Knight G. COVID-19 and digitalization: the great acceleration. *J Bus Res*. 2021;136:602–11. <https://doi.org/10.1016/j.jbusres.2021.08.011>.
25. Chaudhuri S. Livelihood patterns and survival strategies of the poor in Kolkata. *Soc Change*. 2018;48(3):345–66.
26. National Institute of Statistics of Rwanda (NISR). Rwanda statistical yearbook 2022. Kigali: NISR. (2022). <https://statistics.gov.rw/sites/default/files/documents/2025-02/Rwanda%20Statistical%20YearBook%202022.pdf> (Accessed September 9, 2025).
27. ILO. World employment and social outlook: Trends 2021. Geneva: ILO. (2021). <https://www.ilo.org/publications/world-employment-and-social-outlook-trends-2021> (Accessed September 9, 2025).
28. Thanh PT, Duong PB. The COVID-19 pandemic and the livelihood of a vulnerable population: evidence from women street vendors in urban Vietnam. *Cities*. 2022;130:103879.
29. United Nations. World urbanization prospects: The 2018 revision. Department of Economic and Social Affairs. (2019). <https://population.un.org/wup/assets/WUP2018-Report.pdf>
30. World Bank. (2020). Kenya Economic Update, November 2020: Navigating the Pandemic. World Bank. <http://hdl.handle.net/10986/34819>
31. Bakare G. O. Urban renewal and the livelihoods of the urban poor in the slum community of Makoko, Lagos Nigeria. Doctoral dissertation, University of Glasgow.(2024).
32. Pelling M. The vulnerability of cities: Natural disasters and social resilience. *Earthscan* (2003).
33. Kevin K. K. Effect of Covid-19 on Performance of Small and Medium Enterprises in Rwanda (Master's dissertation, University of Rwanda, Rwanda. (2023). <http://repository.ulr.ac.rw:8080/xmlui/bitstream/handle/123456789/121/EFFECT%20OF%20COVID-19%20ON%20PERFORMANCE.pdf?sequence=1&isAllowed=true>
34. Manzoor F, Alam W, Hossain I, Farnaz N, et al. Social capital and accessing services and support during COVID-19 in informal settlements of Dhaka, Bangladesh: a cross-sectional study. *Lancet Glob Health*. 2022;10:S9. [https://doi.org/10.1016/S214-109X\(22\)00138-3](https://doi.org/10.1016/S214-109X(22)00138-3).
35. Zahra NF, Rahadin P. Facing climate change and potential disaster: lessons from Jakarta slums and the impact of modern-day individualism. *ASEAN Nat Disaster Mitigation Educ J*. 2025;2(2):114–28. <https://doi.org/10.61511/andmej.v2i2.2025.1477>.
36. Maquiling K. S. M., Languyan K. A., Aying J. A. Post-pandemic urban resilience imperatives: Examining practices of Philippine local governments. In *Rethinking cities for resilience and growth in the post-COVID-19 world* (pp. 25–40). Asian Development Bank.(2023).

37. Meerow S, Newell JP, Stults M. Defining urban resilience: a review. *Landsc Urban Plann*. 2016;147:38–49. <https://doi.org/10.1016/j.landurbplan.2015.11.011>.
38. Dauda S, Jaha Imoro R. Ghana and COVID-19: perspectives on livelihoods, health and living conditions of internal migrants in Accra. *Cogent Soc Sci*. 2022. <https://doi.org/10.1080/23311886.2022.2072060>.
39. Holling CS. Understanding the complexity of economic, ecological, and social systems. *Ecosystems*. 2001;4(5):390–405. <https://doi.org/10.1007/s10021-001-0101-5>.
40. Frimpong LK, Mensah SL, Okyere SA, Abunyewah M, Diko SK, Amankwaa G. Assessing differential socio-demographic impacts of the COVID-19 pandemic on urban livelihood capitals in suburban Accra. *Ghana Socio-Ecol Pract Res*. 2024;6(1):69–86. <https://doi.org/10.1007/s42532-023-00173-7>.
41. Okyere SA, Frimpong LK, Abunyewah M, Diko SK, Fatemi MN, Mensah SL, et al. The moderating role of Covid-19-related support on urban livelihood capitals: evidence from suburban Accra. *Urban Governance*. 2023;3(3):228–42. <https://doi.org/10.1016/j.ug.2023.03.003>.
42. Chambers, R., & Conway, G. Sustainable rural livelihoods: Practical concepts for the 21st century. Institute of Development Studies. (1992). <https://www.ids.ac.uk/publications/sustainable-rural-livelihoods-practical-concepts-for-the-21st-century/>
43. Baffoe G, Matsuda H. An empirical assessment of rural livelihood assets from gender perspective: evidence from Ghana. *Sustain Sci*. 2017;12(3):815–28.
44. Baffoe G, Manirakiza V, Uwayezu E. Two sides of the coin: unveiling the socioeconomic impacts of land expropriation on Kigali residents. *Urban Forum*. 2025;36:17–42. <https://doi.org/10.1007/s12132-024-09516-3>.
45. World Bank. Rwanda Economic Update, January 2022, Edition No. 18: Boosting Regional Integration in the Post-COVID Era. World Bank. (2022). <http://hdl.handle.net/10986/36928>
46. Moser CON. The asset vulnerability framework: reassessing urban poverty reduction strategies. *World Dev*. 1998;26(1):1–19. [https://doi.org/10.1016/S0305-750X\(97\)10015-8](https://doi.org/10.1016/S0305-750X(97)10015-8).
47. Louis EF, Ingabire W, Isano S, Eugene D, Blanc J. Rwanda's response during COVID-19. *Psychol Trauma Theory Res Pract Policy*. 2020;12(5):565–6. <https://doi.org/10.1037/tra0000801>.
48. Folke C, Carpenter SR, Walker B, Scheffer M, Chapin T, Rockström J. Resilience thinking: integrating resilience, adaptability and transformability. *Ecol Soc*. 2010;15(4):20. <https://doi.org/10.5751/ES-03610-150420>.
49. Creswell, J. W., & Plano Clark, V. L. (2018). Designing and conducting mixed methods research (3rd ed.). SAGE Publications.
50. Goodfellow T, Smith A. From urban catastrophe to 'Model' City? politics, security and development in post-conflict Kigali. *Urban Stud*. 2013;50(15):3185–202. <https://doi.org/10.1177/0042098013487776>.
51. Hitayezu P, Rajashekhar A, & Stoelinga D. The dynamics of unplanned settlements in the City of Kigali (IGC Final Report No. C-38312-RWA-1). International Growth Centre. (2018). <https://www.theigc.org/sites/default/files/2019/02/Hitayezu-et-al-2018-final-report-v2.pdf> (Accessed September 5, 2025).
52. Boanada-Fuchs A, Kuffer M, Samper J. A global estimate of the size and location of informal settlements. *Urban Sci*. 2024;8(1):18. <https://doi.org/10.3390/urbansci8010018>.
53. ICR Facility. Study of Kigali's informal economy: Action plan to improve resilience for informal operators. (2022). https://www.icr-facility.eu/wp-content/uploads/2023/11/Study_of_kigali_s_informal_economy_action_plan_2021.pdf
54. Manirakiza V, Malonza J, Mugabe L, Nsabimana A, Rutayisire PC, Nzayirambaho M, et al. Kigali: the rapid urban growth and neighbourhood dynamics of a prosperous city. *SHLC Res Rep Univ of Glasgow*. 2020. <https://doi.org/10.13140/RG.2.2.31003.69923>.
55. Habinshuti M, Butera Y, Nyamwasa D, Musanabaganwa C, Ndishimye P, et al. COVID-19 Rwanda response updates. *Rwanda Public Health Bull*. 2020;2(2):18–23.
56. Gashema P, Musafiri T, Ndhimana F, Iradukunda H, Saramba E, et al. Mpox in East Africa: learning from COVID-19 and Ebola to strengthen public health responses. *Viruses*. 2024;16(10):1578. <https://doi.org/10.3390/v16101578>.
57. Guest G, Bunce A, Johnson L. How many interviews are enough? An experiment with data saturation and variability. *Field Methods*. 2006;18(1):59–82. <https://doi.org/10.1177/1525822X05279903>.
58. Egger D, Miguel E, Warren SS, Shenoy A, Collins E, Karlan D, et al. Falling living standards during the COVID-19 crisis: quantitative evidence from nine developing countries. *Sci Adv*. 2021;7(6):eabe0997. <https://doi.org/10.1126/sciadv.abe0997>.
59. Fox S. The political economy of slums: theory and evidence from Sub-Saharan Africa. *World Dev*. 2014;54:191–203. <https://doi.org/10.1016/j.worlddev.2013.08.005>.
60. UN-Habitat. The state of African cities 2020: The geography of African investment. Nairobi: United Nations Human Settlements Programme. (2020).
61. Scoones I. Livelihoods perspectives and rural development. *J Peasant Stud*. 2009;36(1):171–96. <https://doi.org/10.1080/0306150902820503>.

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