

Planning for Fire Risk Reduction in Informal Settlements

A case study in Special Planning Area Mukuru, Nairobi

Boris Staalenhoef (627165)

Thesis

Supervisor: Dr. P.E. Rabé

2nd Reader: Dr. IF van Meerkerk

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Abstract

Informal settlements in Nairobi, like Mukuru, are characterized by extreme housing density, tenure insecurity and inadequate infrastructure, exposing residents to recurring fire hazards.

This study examines how the Mukuru Special Planning Area (SPA) enables or constrains the integration of fire risk reduction strategies within broader urban redevelopment processes.

It draws on a qualitative case study methodology through quasi-experimental comparison between Viwandani and Kwa Reuben, triangulated with key informant interviews and spatial observations.

The findings show that, in the absence of the SPA, fire risk governance is shaped by incremental, owner-led adaptations, advocacy by community-based organizations (CBOs) and sporadic, top-down government interventions.

The SPA fosters improved stakeholder alignment, participatory planning and incremental spatial interventions that reduce fire vulnerability without large-scale evictions. However, its effectiveness is undermined by barriers including fragmented thematic coordination, the exclusion of key informal stakeholders such as structure owners and informal electricity providers (Mulika Mwizi) and the risk of upgrading-induced displacement.

The study concludes that while the SPA offers significant opportunities for more inclusive and adaptive fire risk governance, its transformative potential depends on the explicit integration of disaster risk management, comprehensive stakeholder engagement and the recognition of incremental upgrading as a legitimate planning strategy. This research contributes to debates on hybrid governance and inclusive planning in informal urban contexts, offering insights for risk reduction in rapidly urbanizing cities of the Global South.

Key words

Fire Risk Management, Informality, Planning, Adaptive governance, Upgrading, Hybrid Governance, Eviction

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Abbreviations

CBO – Community-Based Organization

CBDRT – Community-Based Disaster Response Team

DRR – Disaster Risk Reduction

DRM – Disaster Risk Management

GRO6 – Group of Six (local community-based consortium in Mukuru)

IDRC – International Development Research Centre

MCA – Member of County Assembly

NMS – Nairobi Metropolitan Services

NGO – Non-Governmental Organization

SDI – Slum Dwellers International

SPA – Special Planning Area

UNDRR – United Nations Office for Disaster Risk Reduction

YMR – Young Men's Resilience

Glossary

Baraza – Public Gathering

Nyumba Kumi – Ten Household representatives

Mulika Mwizi – Groups of illegal electricity connectors

Elders – Mediators between community, government and chief

Chapter 1 Problem Statement

This chapter describes the context of the research and rationale behind the research question. The research problem, objectives and research question are presented and the scope and limitations of the research are described.

1.1 Background

The emergence of informal settlements in Nairobi, Kenya, can be traced back to its colonial history. From 1898 to 1948, spatial planning was based on racial segregation, which shaped the city's development. This distinction was later formalized in the 1948 master plan, which categorized areas into "zones for economical residential development" and "workers' housing" (Owuor & Mbatia, 2008). The combination of high territorial segregation, rapid urbanization and increased globalization of trade since the 1950s led to increasingly unequal distribution of essential services. Limited access to transportation, healthcare, education and adequate housing has resulted in persistent socioeconomic challenges, reinforcing the reproduction of poverty and expanding informal development in Mukuru, Mathare and Kibera (Smitha, 2018; Owuor, 2015).

The persistence of informal settlements in Nairobi is driven in part by the absence of clear legal frameworks for land supply and tenure rights and the inadequate enforcement of existing regulations, as exemplified by Mukuru's continued expansion on land originally designated for industrial use (Barake, 2021; Ghetto Foundation & Nencel, 2019; KRCS, 2015). The combination of high urbanization and tenure insecurity has led to extreme population density, housing developments in hazardous areas and the permanent use of temporary building materials (Musembi, 2007). Additionally, these uncertainties have been a source of conflict, with documented cases of deliberate arson (Omoto, 2024; Ghetto Foundation & Nencel, 2019). Together with the lack of affordable options in tenant purchase and site-and-service housing schemes, these factors force many residents into living conditions that leave them highly exposed to fire hazards (Owuor & Mbatia, 2008).

The unplanned process of building informal settlements in Nairobi has increased residents' vulnerability to fire hazards. In Mukuru substandard connection to services lead to improvised electricity connections that easily spark fires and inadequate coverage of water points and roads complicate response (Kamau, 2007; Habitat, 2020; Maina & Ngau, 2020). The high density of

housing in these areas (Habitat, 2020) in combination with residents' inaccessibility to fire retardant building materials, create an environment in which fires spread easily (Omoto et al, 2024; Kamau, 2007). Socio-economic vulnerabilities within these settlements exacerbate the impacts of disasters, resulting in increased loss of life, livelihood insecurity and the reinforcement of poverty cycles (Owuor, 2015; UNDRR, 2024; Ngau, 2020). Research by the Kenya Red Cross Society (2015) shows that in the period from 2011 to 2015 at least 7.5% of fires in Nairobi took place in Mukuru, affecting over 1000 households.

Efforts to mitigate the effects of fire outbreaks have been mainly focused on disaster preparedness, through the development of evacuation plans and fire response training.

Government intervention is limited and although Non-Governmental Organizations (NGOs) have been observed to adopt preventive approaches, their efforts often lack policy continuity and sustained impact (Alai et al., 2016). Community based organisations (CBOs) in Mukuru and Mathare often operate under multi mandate roles, focusing primarily on response rather than prevention (Ghetto Foundation & Nencel, 2019).

Structural mitigation efforts are not being implemented due to several barriers. Conflicting land tenure rights make large-scale replanning difficult, as ownership disputes create resistance to government interventions (Ghetto Foundation & Nencel, 2019). Additionally, many residents lack alternative housing options, making them reluctant to support projects that might lead to evictions without compensation (Muungano, 2021). The absence of legal frameworks for infrastructure development and resettlement further prevents progress. Without addressing these governance and policy gaps, necessary structural changes remain unattainable, leaving informal settlements vulnerable to recurring fire disasters.

To address these complexities, a framework was established through negotiations between Nairobi's City Council and various organizations operating in Mukuru, enabling the designation of Special Planning Areas (SPA). The primary objective of the Mukuru SPA is to develop an integrated development plan that effectively tackles the structural and multifaceted challenges faced by residents. Specifically, the SPA aims to address issues such as evictions, social exclusion, inequitable service provision and barriers to justice (Muungano, 2021).

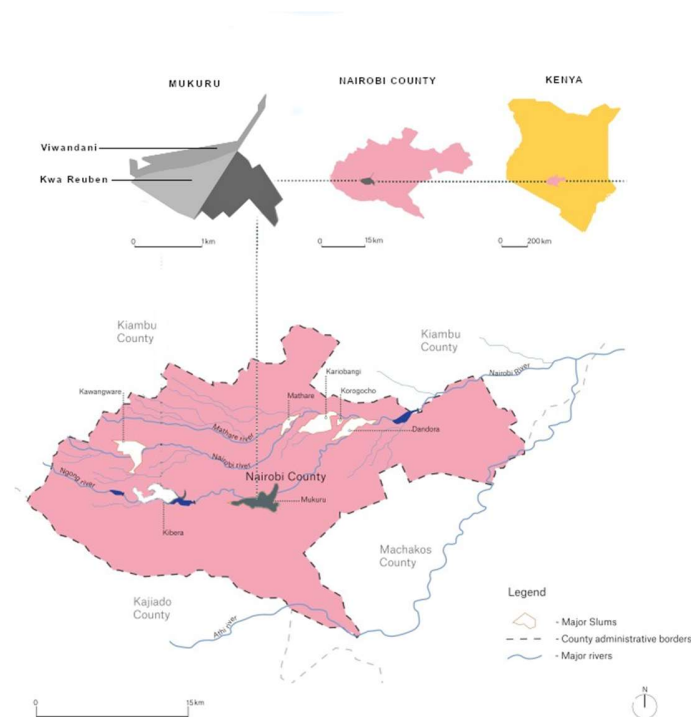


Figure 1: *The location of informal settlement Mukuru and the SPA subareas Viwandani and Kwa Reuben in the context of Nairobi County and Kenya.* (Mulligan et al., 2020)(Adapted)

The SPA framework offers significant opportunities for upgrading informal settlements by allowing special exemptions from conventional planning processes and building regulations, thereby facilitating formal development in highly constrained environments. Planning and implementation under the SPA must align with three key principles:

Participatory Approach: Prioritizing the inclusion of residents in all stages of planning and decision-making, acknowledging their agency and local knowledge as critical for the legitimacy and success of interventions.

Conservative Upgrading: Adopting a planning philosophy that aims to achieve infrastructural improvements with minimal displacement, thus balancing physical upgrading with social continuity.

Multidisciplinary and Collaborative Planning: Involving a wide range of actors, from government agencies to NGOs, CBOs, academic institutions and the residents themselves, to address the interconnected challenges of land tenure, service provision, housing, health and disaster risk reduction (Muungano, 2021).

Despite these progressive goals, research shows that the SPA process in Mukuru has encountered significant limitations that could affect the integration of fire risk management. Studies highlight issues such as a lack of strong political will, fragmented stakeholder coordination and an over-reliance on NGOs and civil society to drive the process in the absence of consistent government leadership (Barake, 2021; Ouma, 2023). Furthermore, while participation has been a cornerstone of the SPA, there are concerns about unequal power dynamics in the participatory platforms and about the incomplete validation of community input, which could undermine the prioritization of fire safety infrastructure during implementation phases. Despite fire risk and DRM's significant impact on life and livelihoods, the SPA consortia did not prioritize them; such neglect of hazards and vulnerabilities by formal actors can undermine development outcomes (Twigg, 2015).

While the SPA provides a formal and legally protected framework to rethink urban development in Mukuru, it remains vulnerable to political pressures, funding constraints, and governance challenges that can delay or dilute integrated DRM (Alai et al, 2016). Structural measures to reduce fire risk, such as wider roads, reliable water networks, fire stations, and enforcement of building standards, depend on strong government commitment, legal clarity on tenure, and sustained financing, all historically fragile in Nairobi's informal settlement upgrading (Alai et al, 2016; Barake, 2021).

This research, therefore, examines the extent to which the SPA framework enables or constrains the systematic integration of fire risk reduction strategies within Mukuru's broader upgrading efforts. It seeks to critically analyze both the opportunities presented by the SPA's governance innovations and the persistent barriers that may limit its transformative potential in reducing fire vulnerabilities in informal settlements.

1.2 Problem Statement

Informally built settlements in Nairobi, such as Mukuru, are highly vulnerable to fire outbreaks due to extreme housing density, flammable construction materials and unregulated electrical connections (Omoto, 2024). Addressing this vulnerability requires structural changes to the urban fabric, including replanning for safer infrastructure and service delivery. However, conventional planning approaches are hindered by complex land tenure disputes, displacement risks and gaps in governance and legal frameworks (Barake, 2021; Ouma, 2023; Muungano, 2021).

In response to these challenges, the Mukuru Special Planning Area (SPA) was established as a legal and institutional framework designed to enable integrated, participatory and flexible upgrading strategies in informal settlements (Muungano, 2021). However, the SPA's implementation is constrained by political, institutional, and financial barriers that limit its ability to fully integrate fire risk reduction into the upgrading process (Barake, 2021).

1.3 Research Objective & Questions

This study is a descriptive investigation into the challenges and opportunities for replanning informal settlements to reduce fire risk through the Special Planning Area (SPA). It examines how existing governance arrangements manage fire risk in Mukuru, analyzes the SPA's structure and mechanisms, and assesses the extent to which the SPA framework transforms fire risk governance by enabling more coordinated, inclusive, and effective interventions. It does so by systematically addressing sub questions that inform the main research question:

How does the Special Planning Area framework enable or limit the integration of fire risk reduction strategies in Mukuru?

Sub Questions:

1. How are fire risk reduction strategies currently planned and implemented in Mukuru's informal settlements?
2. What are the key features and mechanisms of the Special Planning Area (SPA) framework in Mukuru?
3. How do residents, CBOs and other local actors perceive the SPA to enable or limit fire risk reduction?

1.4 Academic Relevance

This study advances discourse on urban planning in the Global South by analyzing the Special Planning Area's (SPA) unique framework and its implications for DRM governance. It deepens understanding of collaborative governance, particularly in addressing hybrid governance in informal settlements and examines how complex, participatory planning processes with extensive stakeholder engagement operate in these contexts. It highlights the distinctive blend of state-led intervention and community-driven planning shaped by specific political and institutional conditions (Meth, 2010). By engaging with Global South perspectives, it challenges

Eurocentric assumptions and, in the context of converging urban issues, supports re-evaluating planning methods toward locally grounded yet globally relevant solutions (Watson, 2016).

1.5 Limitations

This research faces several limitations that may impact the depth and scope of its findings. Time constraints limit the ability to conduct extensive fieldwork and engage with a wider range of stakeholders, potentially restricting the diversity of perspectives captured. Additionally, the researchers' limited prior knowledge of the local context may affect the interpretation of findings, as informal settlement dynamics are deeply rooted in historical, social and political complexities that require nuanced understanding.

Another key limitation relates to the SPA as an independent variable. As a multi-stage process involving ongoing community and stakeholder engagement over a five-year period, its implementation is difficult to isolate and trace. The direct impact of the SPA may be hard to measure due to overlapping internal developments within Mukuru and external influences. However, its unique approach to planning and upgrading in informal settlements (Johari & TED, 2020) allows for an analysis of its core principles and their contribution to disaster risk mitigation that offers insight into emerging best practices. The recent designation of Mathare as an SPA (Muungano, 2022), where comparable development processes are anticipated, further underscores the relevance of this analysis.

Another key limitation is the sensitivity of certain topics. Ethical considerations must be carefully navigated to ensure that research does not inadvertently expose vulnerable groups to risks. Efforts are made to mitigate these challenges through triangulation of data sources and validation of findings with research participants (Mena & hilhorst, 2022).

Chapter 2 Theoretical Framework

This chapter explores the intersection of informality, governance, and disaster risk management, focusing on fire risk governance in Mukuru. It begins by framing informality and the limits of hybrid governance in this context. The chapter critiques incremental, resident-led adaptations and classical DRR frameworks, before examining adaptive governance and inclusive planning through community participation as more effective alternatives. This informs the analytical lens through which the drivers and barriers shaping fire risk governance in Mukuru are understood.

2.1 Informality and Governance

Contemporary research frames informality in the Global South not as illegality or disorder, but as a functional system that shapes access to housing, services, and livelihoods (Banks, 2019; McFarlane, 2012; Ziervogel, 2016). This view recognizes informality as deeply intertwined with formal systems, benefiting both the state and private actors through cheap labor, administrative flexibility, and low-cost housing (McFarlane, 2012; Brenner, 2011). Rather than confined to the urban poor or the Global South, informal practices, such as unregulated finance and opaque lobbying, are evident globally (Roy, 2005). Informality is contingent; what is informal in one context or period may be formalized in another, especially during crises or redevelopment (Watson, 2007). These shifts reveal informality as a dynamic part of urban governance and city-making, rather than a residual or deviant condition (Roy, 2005).

2.2 Hybrid Governance

Informal settlements are governed through hybrid arrangements, where authority is negotiated among state institutions, community leaders, non-governmental organizations (NGOs), and, at times, illicit actors (Banks, 2019; Miraftab, 2009). In these contexts, access to land, services, and justice is often shaped by informal networks, political patronage, or customary norms rather than by formal legal systems (McFarlane, 2012). As Roy (2005) argues, informality functions not merely as a residual condition awaiting formalization but as a governance mechanism in its own right. While such systems can enable locally responsive, adaptive solutions, particularly in disaster-prone environments, they may also reinforce inequalities and exclusionary power

dynamics (Seeliger & Turok, 2013; Dovey, 2012). Informal settlements thus embody both resilience and vulnerability, where everyday negotiation and collective self-organization constitute important forms of urban governance (Watson, 2009; Twigg, 2015; Mena & Hilhorst, 2022).

Mukuru exemplifies what Ostrom (2010) describes as a polycentric system, multiple, overlapping authorities operating semi-autonomously, but also reflects the hybridity of governance described by Banks (2019) and McFarlane (2012), with blurred boundaries between formal and informal institutions. Although polycentric theory suggests potential for self-organization, Mukuru demonstrates the constraints of such arrangements: informal actors, such as landlords and NGOs, are central to service provision but lack formal mandates, coordination mechanisms, and conflict resolution structures required for sustained risk reduction (Alai et al., 2016; Seeliger & Turok, 2013). As Roy (2005) notes, this leads to “negotiated survival,” a pragmatic but fragmented response that undermines structural transformation. Consequently, cycles of vulnerability and underdevelopment persist despite the activities of multiple actors (Owuor, 2015; UNDRR, 2024).

To address these challenges, the Special Planning Area (SPA) must actively engage with hybrid governance. In contexts where state authority is absent or contested, non-state actors fill governance gaps and often hold locally recognized legitimacy (Meagher, 2012). Residents already interact with community-based organizations (CBOs), religious authorities, and informal leaders as legitimate actors (Meagher, 2014). Recognizing this is essential for building trust and implementing effective interventions. Co-production of authority demonstrates the potential of shared decision-making and institutional coordination to enhance service delivery (Colona & Jaffe, 2016). Indicators of meaningful engagement include institutional recognition of non-state actors, horizontal information sharing and adequate resource delivery for implementation of interventions by local organizations.

However, engagement with hybrid governance requires caution. Functional arrangements may also entrench fragility, obscure accountability, and reproduce elite dominance (Meagher, 2012; Colona & Jaffe, 2016). As Meagher (2014) highlights, public authority is fluid and contested, continuously reshaped through negotiation, coercion, and performance. Effective governance must therefore ensure role clarity, transparent processes, and community awareness of rights.

The complexity of this governance context challenges both resident-led incremental upgrading and state-led disaster risk management, which are often theorized as key pathways for reducing vulnerability, as the following sections explore.

2.3 Incrementalism

Formal urban planning frameworks often fail to engage meaningfully with the lived realities of informal settlements, resulting in exclusionary practices and neglect (Roy, 2005; Watson, 2007). In Mukuru, this disconnect contributed to the emergence of structurally inadequate infrastructure and housing typologies, compelling residents to undertake self-directed upgrading efforts to mitigate vulnerabilities to environmental hazards such as floods and fires (Omoto et al., 2024).

Incrementalism, often observed in the self-built evolution of informal settlements, involves resident-led, micro-scale adaptations, such as extending, attaching, replacing or infilling structures, that collectively shape urban morphologies (Kamalipour & Dovey, 2020). While this process reflects bottom-up ingenuity and adaptability, it is not a substitute for coordinated planning (Kamalipour & Peimani, 2024). Kamalipour and Dovey (2020) identify increments like room-by-room extensions and vertical additions as drivers of densification, which can enhance resilience but also encroach on public space, exacerbating vulnerabilities (e.g., blocked ventilation, narrowed pathways). Informal codes, such as "rights of way", mediate these adaptations (Kamalipour & Dovey, 2020), yet their fluidity often fails to prevent slum conditions, as private interests override communal needs. Without formal oversight, incrementalism risks entrenching systemic hazards, poor drainage, fire-prone materials or inadequate service connections, particularly in hazard-prone areas. Though incremental upgrades affirm *de facto* tenure and livelihood strategies (Kamalipour & Dovey, 2020), they rarely integrate risk-mapping or emergency systems. Thus, while incrementalism underscores the productive capacity of informality, aligning it with inclusive planning remains critical to address disaster risk in underserved urban environments (Kamalipour & Peimani, 2024).

2.4 Classical disaster governance

Classical disaster governance is a centralized, state-led model that emphasizes formal authority, institutional control, and technical management during disasters. As Tierney (2012) explains, it relies on top-down coordination by government agencies and emergency authorities. Rooted in bureaucratic logic, this approach assigns clear responsibilities and adheres to

standardized procedures. It assumes that disasters are best managed through centralized control and technical expertise, often sidelining non-state actors and community participation. Consequently, it can become monolithic and exclusionary, overlooking the social dimensions that shape disaster vulnerability and resilience (Lebel, 2006). Its primary focus remains on hazard response, rather than addressing the underlying socio-economic drivers of risk, thereby perpetuating the social production of vulnerability (Blaikie et al., 2014).

A central feature of classical disaster governance is the separation of phases within the Disaster Risk Management (DRM) cycle. While increasingly critiqued in favour of integrated approaches spanning all phases, this distinction is retained in this thesis as an analytical framework, differentiating between mitigation, reducing hazard exposure through planning and infrastructure interventions and preparedness, focused on community education and emergency response organization (Twigg, 2015).

2.5 Disaster Risk Management Governance

The evolution of disaster risk management (DRM) governance reflects a growing influence of resilience thinking. As articulated by Lebel (2006), it is argued that effective governance must be rooted in participation, trust, and institutional complexity to navigate uncertainty and socio-ecological change. Lebel emphasizes that building resilience requires polycentric, multilayered institutions that can adaptively respond across scales while acknowledging competing interests to foster inclusive decision-making. This understanding of governance as dynamic, political, and deeply contextual informs frameworks such as the vision of disaster risk reduction (DRR) presented by Twigg (2015). Twigg outlines a shift away from linear disaster cycles toward holistic, integrated risk governance embedded in everyday institutional practice, as exemplified by the Sendai Framework. This model promotes understanding disasters in the context, strengthening governance and a commitment to building resilience before, during, and after disasters. Satterthwaite (2020) applies these principles to DRM governance in informal settlements, where collaboration between local governments and grassroots organizations is central to co-producing upgrading strategies that are both socially inclusive and climate-resilient. Satterthwaite highlights the importance of decentralized funding, community-led data systems, and multi-scalar planning, showing how governance must operate not only through formal institutions but also through empowered local networks. Across these contributions, governance emerges as a central mechanism for resilience-building, requiring institutional integration,

participatory practice, and the continual negotiation of power and accountability in order to be effective in diverse and evolving risk contexts (Lebel, 2006; Satterthwaite, 2020).

2.5 Adaptive governance

Adaptive governance is increasingly recognized as a fitting approach to risk management in today's dynamic, interconnected and uncertain world (Rijke et al., 2012). Unlike traditional centralized disaster governance models, adaptive governance promotes permeable and flexible systems, emphasizing the importance of nested processes of collaboration, self-organization and continuous learning among a wide range of actors (Yasmin et al., 2020). Organizational theory further extends this notion by emphasizing the sharing of power and responsibility across different communities of interest, government agencies and non-state bodies (Seeliger & Turok, 2013). The term "governance" in this context reflects the shift away from state-centric public administration toward broader collaborative arrangements, including partnerships that focus on managing change and uncertainty in a more open, iterative and responsive manner (Seeliger & Turok, 2013).

In informal settlements, adaptive governance offers particular promise because it accommodates informal and interim solutions, integrating them into broader urban systems through experimentation, adjustment and reassessment (Folke et al., 2005). Rather than rigid top-down planning, adaptive governance supports an iterative, participatory process that enhances the capacity of both informal settlements and formal urban governance structures to absorb shocks, adapt to stresses and transform in response to evolving risks. Building resilience under such a model involves improving both physical systems (such as safer building materials, wider access roads and firebreaks) and social systems (such as community-led firefighting groups and decentralized evacuation plans) (Folke et al., 2005). By encouraging communities to co-produce risk reduction strategies, adaptive governance supports proactive rather than reactive approaches to disaster management.

However, critical perspectives caution against an overly optimistic view of adaptive governance. MacKinnon and Derickson (2013) warn that resilience-based approaches, if poorly implemented, can inadvertently shift responsibility onto vulnerable communities themselves, expecting them to "adapt" without necessarily addressing the underlying structural inequalities that produce vulnerability. In the context of slum upgrading, this critique is especially pertinent: physical improvements may enhance safety but fail to tackle the deeper socio-economic

injustices that leave residents at risk. Without adequate support and resources, the burden of adaptation can deepen rather than alleviate marginalization (Satterthwaite et al., 2020). The mitigation of this risk is addressed in the SPA by inclusive spatial planning and participatory processes.

The operationalization of adaptive governance in disaster risk management has been explored through the establishment of multi-stakeholder platforms, which facilitate dialogue, learning and collective decision-making across different sectors and scales (Djalante, 2012). Watson (2014) emphasizes that these platforms, with comprehensive inclusion of stakeholders, can lead to transformative resilience outcomes, particularly when supported by tools such as community mapping. This demonstrates how adaptive governance can be both a mechanism for immediate risk management and a pathway toward more equitable, transformative urban development.

2.6 Inclusive Spatial Planning and Upgrading

In informal settlements, hazards often escalate into disasters because of deeply entrenched social, economic and spatial vulnerabilities (Blaikie et al., 2014). These vulnerabilities are spatially produced through fragmented and unregulated urban layouts that constrain access, disrupt service provision and concentrate risks in dense, precarious environments (Abunywah et al., 2018). Such spatial conditions are not incidental but are the outcomes of systemic exclusion, stemming from formal planning paradigms like master planning, rigid centralized governance and the selective extension of services and infrastructure (Miraftab, 2009).

Effective disaster risk mitigation relies on anticipatory planning that addresses underlying vulnerabilities before hazards turn into disasters (Twigg, 2015). In the context of informal settlements, this involves adapting planning processes to existing spatial configurations by incorporating strategies such as firebreaks, reblocking, improved circulation networks, and infrastructure upgrades like drainage and water access (Alai et al., 2016; KRCS, 2015). Rather than erasing informality, mitigation-oriented planning should work within it, strengthening what exists through risk-informed interventions that enhance safety while preserving livelihoods (Kamalipour & Dovey, 2020; UNDRR, 2024). As Alai et al. (2016) observe, in such contexts complete ignition prevention is often unrealistic given high exposure to hazards such as faulty wiring, ageing gas canisters, heating coils, and arson; mitigation should therefore focus on containing fire spread and preventing escalation into disasters (Twigg, 2015).

Inclusive planning, as described by Abbott (2002), emphasizes genuine partnerships between communities and governments, ensuring that upgrading initiatives respond to the lived realities and priorities of residents. By integrating local knowledge, participatory planning and flexible spatial strategies, inclusive approaches can transform informal settlements into more cohesive and resilient components of the urban landscape. Collaborative practices such as community-driven mapping and enumeration provide critical foundations for equitable upgrading strategies (Seeliger & Turok, 2013). These forms of local knowledge production not only improve technical outcomes but also challenge political marginalization (Patel, 2015). International experience has shown that, where communities are actively involved, substantial physical restructuring, such as land parcel consolidation, land use readjustment and new street layouts, can be achieved without undermining social cohesion (Seeliger & Turok, 2013). Supporting community organizations to collaborate with local governments on upgrading programs is shown to be an effective and sustainable method of building resilience to disasters (Satterthwaite et al., 2020).

However, critical perspectives caution that participatory upgrading must carefully guard against unintended consequences. Replanning processes, even when community-driven, can lead to physical displacement, while socio-economic shifts after upgrading may price out the most vulnerable residents (Huchzermeyer, 2006). Effective upgrading must therefore not only mitigate physical risks but also tackle social exclusion through coordinated, cross-sectoral planning that respects the diverse scales of community needs (Abbott, 2002). Additionally, while upgrading may not ensure full compliance with formal regulatory standards, it can prompt governments to accept more appropriate, context-sensitive standards, such as smaller plot sizes or even catalyze reforms in housing regulation to lower costs (Satterthwaite et al., 2020).

Infrastructure provision and spatial development are inherently political processes, capable of either supporting or undermining residents' livelihoods depending on who controls decision-making (Roy, 2005). As Watson (2007) argues, a truly inclusive planning approach requires planners to shift their roles from leading to following community-based and informal service providers. Genuine participation thus demands more than consultation; it requires redistributing power to those most affected by risk and exclusion.

2.7 Community Involvement and Participatory Processes

Effective disaster risk mitigation in informal settlements requires more than technical interventions, it demands participatory processes that recognize communities as key actors in shaping safer environments. Community-based disaster risk reduction and management (CBDRM) frameworks highlight that the principal resource for mitigating disasters is the people themselves, their local knowledge, lived experience and organizing capacity (Twigg, 2015). Participation must therefore move beyond treating slum residents as passive beneficiaries and instead position them as active partners in data collection, design and decision-making.

Community engagement is central to building disaster preparedness, especially in informal settlements where residents and local community-based organizations (CBOs) often serve as the first, and sometimes only, responders during emergencies (Twigg, 2015; Alai et al, 2016). Preparedness efforts that include strategies such as training community members, strengthening local response networks, and formally integrating CBOs into emergency planning can significantly improve response effectiveness and resilience at the neighborhood level (Ryan et al, 2020).

Building on the earlier discussion of inclusive spatial planning, community-driven practices such as mapping and enumeration create political visibility and justice for marginalized residents (Patel, 2015). In various successful upgrading initiatives, municipalities worked alongside trained community members to collect reliable local data, demonstrating how co-production can bridge gaps between formal governance structures and grassroots knowledge (Seeliger & Turok, 2013). However, for such participatory processes to be meaningful, they must be grounded in principles of transparency, trust and time. Communities need full information about the risks and benefits of interventions, sustained engagement to build relationships with external actors and long-term ownership over outcomes (Ryan et al., 2020; Twigg, 2015).

Critically, participation must be institutionalized within urban governance systems, rather than limited to isolated projects. The UN-Habitat Participatory Slum Upgrading Program stresses that engagement should be embedded across the entire policy cycle, including implementation and evaluation phases, to ensure continuity and accountability. Without structural commitments, participation risks becoming episodic and fragile. Moreover, as Miraftab (2009) warns, not all participatory spaces are genuinely empowering; "invited spaces" often reproduce external control and exclude the most vulnerable groups through bureaucratic and institutional barriers.

Truly inclusive participatory governance must therefore confront internal community hierarchies, ensure the broadest possible inclusion and protect the agency of marginalized residents.

Ultimately, participatory processes that support disaster risk reduction are not just about gathering information or delivering services. They are about reshaping the relationships between communities and institutions, embedding local expertise into governance frameworks and promoting social and spatial justice. Without a critical commitment to deep participation, interventions risk reinforcing the very vulnerabilities they aim to address (Seeliger & Turok, 2013; Patel, 2015).

2.8 Summary

To effectively reduce fire vulnerability in Mukuru, a framework like the SPA must go beyond conventional planning or DRM and engage with the complexities of informality and hybrid governance. It must enable inclusive spatial planning that reshapes the built environment, widening access roads, regulating densities, and promoting safer construction, while minimizing evictions. Adaptive governance is central: fostering flexibility, iterative learning, and cross-sector coordination, and treating risk governance as a continuous process rather than a one-off intervention. Engagement with informal actors, landlords, CBOs, and local leaders is essential to bridging formal and informal systems of authority and service delivery. Finally, meaningful community participation must be institutionalized not just through consultation but through co-production, capacity-building, and shared decision-making. These interlinked elements underpin the SPA's approach, informing its emphasis on coordination, resourcing, adaptability, participatory processes, and spatial interventions, all necessary to address the persistent structural vulnerabilities that drive fire risk in Mukuru.

Chapter 3 Methodology

This chapter outlines the approach utilized for conducting the research. It details the methods employed for data collection, provides a description of the gathered data and explains the techniques used for data analysis. Additionally, the concepts introduced in the conceptual framework are defined and structured into a table, facilitating a clearer understanding of how they are operationalized to address the research question. Lastly, the validity and reliability of the study are examined, along with a discussion of its limitations (van Thiel, 2014).

3.1 Research Strategy

This study adopts a qualitative case study approach with embedded units (Scholz and Tietje, 2002), focusing on the Mukuru Special Planning Area (SPA). The strategy follows a quasi-experimental comparison structure examining differences in governance outcomes, such as increased stakeholder coordination, spatial interventions and equal representation in participation, between SPA-upgraded and non-upgraded areas. These outcome-based insights are informed by semi-structured interviews with residents from both areas and triangulated with key informant interviews and spatial observations.

3.2 Data Collection Methods

This study adopts a mixed-methods approach, combining semi-structured interviews, spatial observations, and open key informant interviews to capture both qualitative and semi-quantitative insights. Two embedded units were selected based on the stage of SPA intervention implementation, allowing for an assessment of impact and a comparison of drivers and barriers. Primary data is collected from two respondent groups: residents of SPA-upgraded and non-upgraded areas in Mukuru and key informants involved in fire management and SPA planning. Resident interviews explored perceptions of spatial change, participation, and preparedness, while key informants provided insights into institutional roles, planning procedures, and stakeholder coordination. Spatial observations in both areas examined the

physical interventions for fire risk mitigation and served to triangulate residents' accounts of change.

3.3 Sample Selection

Purposive sampling ensured the selection of residents based on the subcases and includes a diverse range of CBO/NGO members from different organizations, as well as some unaffiliated residents (Table 1). Additionally, a selection was made based on gender, age, household size and time in area to improve representative and comparable insights with a relatively small sample size (Appendix 1.1).

Key informants are selected based on their involvement with CBO's that engage in disaster mitigation efforts and participation in the planning process of the SPA. This to ensure relevant knowledge with regards to both the independent- and dependent variables of the research.

RESPONDENT	AREA/SUBCASE	CBO/NGO
RESPONDENT 1	Viwandani	Sinai Unified
RESPONDENT 2	Viwandani	Kenya Red Cross
RESPONDENT 3	Viwandani	YMR / Kenya Red Cross
RESPONDENT 4	Viwandani	-
RESPONDENT 5	Viwandani	-
RESPONDENT 6	Viwandani	Sinai Unified
RESPONDENT 7	Kwa Reuben	Kenya Red Cross, MHPSS
RESPONDENT 8	Kwa Reuben	Multiple; MYI, KRC, HOPE center
RESPONDENT 9	Kwa Reuben	Biupe Innovators
RESPONDENT 10	Kwa Reuben	CBDRT - Kenya Red Cross
RESPONDENT 11	Kwa Reuben	-
RESPONDENT 12	Kwa Reuben	-
KEY INFORMANT 1	Viwandani	GRO6 - Sinai Unified
KEY INFORMANT 2	Kwa Reuben	GRO6 - CBDRT

Table 1: *Respondents and their functions*

The study focused exclusively on slum residents and key informants from community-based organizations who work within the settlement on a daily basis. This sampling strategy was chosen to generate in-depth understanding of residents' lived experiences and priorities and to

ensure that local knowledge informed the analysis (Cornwall & Jewkes, 1995). By concentrating on those directly embedded in the community, the study aimed to capture the perspectives of actors who navigate and negotiate urban informality in their everyday lives (Roy, 2005).

3.4 Data Analysis Method

The analysis follows the logic of a quasi-experimental comparison, embedded within a qualitative case study framework. To analyze the data collected through 12 semi-structured interviews and additional key informant interviews, a hybrid coding strategy is adopted that combines both deductive and inductive approaches, following recommendations for managing analytical complexity in qualitative research (Belotto, 2018).

The deductive coding phase is guided by the indicators formulated in the operationalization (Table: 2). These indicators were made measurable and comparable using Likert-scale gradations (Appendix: 2.2), allowing for semi-quantitative comparison by creating average scores of respondents' answers between the two research areas. The structured categories, based on theory regarding the practical implementation of the indicators, were used to code interview passages, enabling comparison between both sub-cases.

Inductive coding was applied to capture emergent themes outside of the operationalized indicators. This allowed for deeper insight into the social and contextual factors influencing the relation between the independent and dependent variable and provided practical explanations for the scores on deductive indicators.

Both key informant interviews were coded inductively, using an open-ended format to capture broader reflections on governance, implementation challenges, and contextual nuances.

This combined approach allowed for both structured analysis and theoretical flexibility, balancing clarity of comparison as part of the quasi-experiment with responsiveness to the lived realities of participants (Belotto, 2018; Mena & Hilhorst, 2022).

3.5 Operationalization

The operationalization was informed by the theoretical framework and operational definitions of the research key concepts: SPA, Informal Settlements, Planning, Upgrading, Disaster Risk Management and Adaptive Governance (Appendix: 2.1).

The table below (2) presents the operationalization of variables and indicators used to assess the domains in which drivers and barriers for effective planning for disaster risk reduction in informal settlements are formed.

VARIABLE	INDICATORS	SOURCE
1. STAKEHOLDER COORDINATION	- Clear assignment of responsibility for fire risk mitigation among existing actors.	(Ostrom, 2010; Colona & Jaffe, 2016)
	- Effectiveness of coordination between fire-related stakeholders.	(Seeliger & Turok, 2013; Colona & Jaffe, 2016)
	- Perceived effectiveness of information sharing across institutions	(Yasmin et al., 2020; Colona & Jaffe, 2016)
	- Perceived influence of CBOs in inter-institutional decision-making	(Folke et al., 2005; Djalante, 2012)
2. RESOURCE ALLOCATION	- Clarity of mandate overlap or duplication among actors	(Seeliger & Turok, 2013; Twigg, 2015)
	- Adequacy of funding allocated to fire risk-related interventions	(Owuor, 2015; Satterthwaite et al., 2020)
	- Flexibility of budget use across sectors for fire risk actions	(Satterthwaite et al., 2020)
3. FLEXIBILITY AND SUSTAINABILITY	- Sufficiency of resources available for implementation at local level	(Owuor, 2015)
	- Adaptability of fire safety strategies to changing settlement conditions	(Yasmin et al., 2020; Satterthwaite et al., 2020)
	- Presence of long-term planning mechanisms for fire safety	(Ostrom, 2010; Twigg, 2015)
4. BARRIERS FOR FIRE RISK INTEGRATION	- Perceived strength and continuity of CBOs involved in fire risk	(Yasmin et al., 2020; Lebel, 2006)
	- Perceived political will to prioritize fire safety	(McFarlane, 2012; UNDRR, 2024)
	- Degree to which technical expertise is available for fire safety planning	(Tierney, 2012)
5. PARTICIPATORY PROCESS	- Extent to which competing priorities hinder fire risk integration	(UNDRR, 2024; Lebel et al., 2006)
	- Perceived level of community involvement in fire safety planning	(Folke et al., 2005; Djalante, 2012; Ryan et al., 2020)
	- Extent to which residents feel heard in SPA decision-making	(Djalante, 2012; Meagher, 2014; Ryan et al., 2020)
	- Clarity of communication about fire risks and plans	(Lebel, 2006; Ryan et al., 2020)
	- Perceived transparency of decision-making processes	(Djalante, 2012; Twigg, 2015; Meagher, 2014)
	- Inclusion of marginalized groups in participatory spaces	(Miraftab, 2009; Patel, 2015)
6. SPATIAL INTERVENTIONS	- Resident awareness of roles and rights in planning processes	(Meagher, 2014; Patel, 2015)
	- Presence of adequate separation between buildings	(Alai et al., 2016; Maina & Ngau, 2020)
	- Accessibility of roads for emergency response	(Maina & Ngau, 2020; Kamau, 2007)
	- Amount of stone built housing	(Alai et al., 2016; Kamau, 2007)
	- Presence gas tank in house	(Alai et al., 2016; KRCS, 2015)
	- Safety of electrical wiring and connections	(Alai et al., 2016; KRCS, 2015)
7. PERCEIVED SIGNIFICANCE OF FIRE RISK	- Availability of nearby water points	(Maina & Ngau, 2020; Kamau, 2007)
	- Perceived severity of fire outbreaks	-
	- Perceived importance of fire risk compared to other hazards, housing or economic challenges	-

Table 2: Operationalization of Variables and Indicators

3.6 Validity and Reliability

The validity and reliability of scientific research depend on the methodological approach, with validity referring to how well the research is operationalized and the extent to which findings are generalizable, and reliability concerning the precision, consistency, and reproducibility of its methods (Thiel, 2014).

The adoption of a case study strategy ensures a higher level of internal validity, though the potential for external validity is necessarily limited due to the specificities of the context. Internal validity was enhanced through the application of methodological triangulation. Specifically, through the verification of data through open interviews with key informants and spatial observations combining deductive and inductive approaches. The integration of diverse data sources facilitated cross-verification of the initial findings (Thiel, 2014).

To increase the external validity of the research, findings were presented to an audience of residents from Mukuru and other informal settlements in Nairobi in the form of a validation session (Figure: 3). This session included a participatory workshop format, in which community members were invited to confirm, challenge or extend the results. The feedback provided served to validate the key themes identified and contributed additional insights and contextual nuances that were incorporated into the final analysis, conclusions and recommendations.

In terms of reliability, the transparency of the research design adds to the replicability of the study. The case study strategy, interview protocols, coding procedures and spatial observation methods are all documented to ensure methodological clarity. While the contextual nature of field access and participant interaction in Nairobi's informal settlements constrains the possibility of full replication, the overall approach, particularly the triangulation methodology and the validation process, can be adapted for use in studies examining governance and risk in comparable urban environments.

3.7 Ethical considerations

Given the structural vulnerabilities and governance complexities in Mukuru, this research embedded ethical reflection throughout all stages of the research cycle, from design to dissemination (Mena & Hilhorst, 2022). The research aims and questions were co-developed

with local partners from the Nuvoni Research Center, GRO6 and Kenyan fire safety expert Beatrice Hati Gitundu. Field engagement began with participation in community-based fire safety activities to build contextual understanding (Figure 2). Methodological decisions were made collaboratively with CBO members and findings were validated with participants (Figure 3) and presented to stakeholders including SDI Kenya and the University of Nairobi.

Informed consent was secured through a bilingual (English–Swahili) form (Appendix 5) developed with the research assistant, ensuring voluntary participation and secure, anonymized data handling (Denscombe, 2025). Recognizing that documentation of vulnerabilities could increase risks of surveillance or displacement, special care was taken in anonymizing and storing data (Kamalipour & Peimani, 2023). At the close of interviews, participants reflected on the research process and discussed potential community contributions; this resulted in the researcher designing a community center in Mathare.

Throughout, positionality was critically engaged through ongoing literature review (Bourke, 2014) and by ensuring that analytical indicators were grounded in lived experience through guided, participant-centered questioning. The study aimed not to extract knowledge, but to amplify local agency and contribute to more equitable disaster risk governance (Mena & Hilhorst, 2022).



Figure 2, 3: *The researcher participating in a firefighting demonstration organized by GRO6 and CBOs; The researcher in a validation session of findings with key informants.*

3.8 Operational limitations

A key limitation of this study relates to the influence of the researcher's positionality (Sultana, 2007). This research was conducted by a white, Dutch male affiliated with the IHS and the ESSB and an academic background in architecture and spatial planning. My academic and socioeconomic background shaped how participants perceived me, often as a technical expert, which may have led them to emphasize practical over emotional or relational aspects of fire safety.

Efforts were made to build trust, but I remained an outsider. The presence of my local research assistant, affiliated with a prominent CBO, further influenced dynamics. Respondents appeared less inclined to criticize the organization and may have overstated approval of its activities.

Ethical procedures were followed, though dilemmas, such as negotiating compensation, required situational judgment (Sultana, 2007). To reduce bias and center participant voices, I used an inductive approach, allowing local experiences to shape the analysis. For example, many participants prioritized fire response training over spatial upgrading, challenging my initial assumptions about effective risk mitigation (Davis & Ramírez-Andreotta, 2021).

Rather than viewing positionality as a barrier, I used it to stay accountable to context, regularly cross-checking with local informants and being transparent about the study's limits. While this research does not claim neutrality, it aims to offer an ethically grounded account of fire risk governance in Nairobi's informal settlements (Bourke, 2014).

Another key limitation concerns the small sample size: six interviews per area. While purposive sampling aimed to capture diverse experiences (Appendix 1.1), the findings are not representative of settlements with populations nearing 100,000 and highly varied lived realities. Most respondents were from neighborhoods near Sinai or Rurie, potentially skewing perceptions of risk and priority.

Participant access was mediated through local research assistants affiliated with Sinai Unified and the CBDRT. While this facilitated trust, it introduced selection bias, as respondents were likely engaged with or supportive of these organizations. As noted, the presence of gatekeepers may have further encouraged socially desirable responses or alignment with dominant narratives.

Finally, the study does not include perspectives from other key stakeholders, such as government officials, NGOs external to the community or private sector actors. This limits insight into institutional viewpoints and the broader policy dynamics shaping fire risk governance.

Chapter 4 Research Findings and Analysis

This chapter presents the research findings in four stages. First, a timeline illustrates the implementation status of Viwandani (baseline) and Kwa Reuben (control). Second, the first sub question is addressed using insights from resident and key informant interviews. Third, results from the deductive quasi-experimental Likert scale comparison are analyzed by variable. Fourth, the inductive research findings are examined by variable.

4.1 SPA Implementation Phase

The Special Planning Area (SPA) initiative in Mukuru seeks to address social, economic and spatial vulnerabilities through a participatory upgrading process. Resident involvement encompassed the collection and analysis of situational data, community consultations, the solicitation of feedback on draft proposals and the development of solutions that integrated community knowledge and aspirations with financial, legal and spatial considerations (Muungano, 2020). Viwandani (baseline measurement) was included in community engagement processes of the SPA, while in Kwa Reuben (control) planned interventions also have been implemented (Figure 4). This distinction forms the basis of the comparative findings.

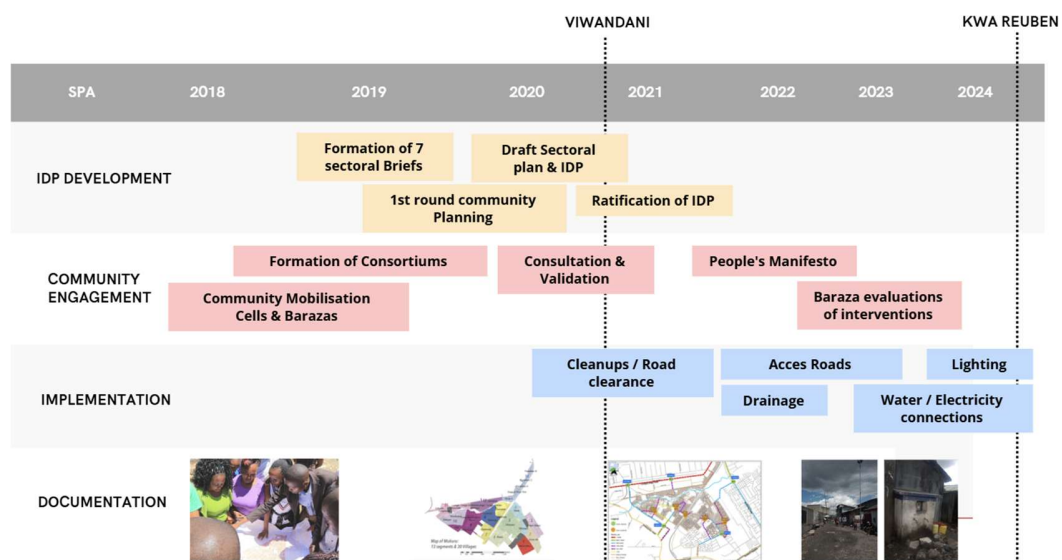


Figure 4: *Broad overview of SPA development and implementation by Integral Development plan, Community engagement efforts and Implementation of spatial interventions. Own Work (Muungano, 2020; Horn et al., 2020).*

4.1 Current Fire risk management

Resident- and key informant interviews give insight in current fire risk management in order to answer the first sub question.

1. How are fire risk reduction strategies currently planned and implemented in Mukuru's informal settlements?

Fire risk reduction strategies in Mukuru's informal settlements are currently planned and implemented with a predominant focus on preparedness and response rather than on the proactive mitigation of fire risk. Key activities include sensitization efforts led by Community-Based Organizations (CBOs), sometimes in collaboration with the county fire department, aimed at raising community awareness about fire hazards and appropriate responses. Coordination between community members, CBOs and water vendors ensures access to water during fires. Additionally, CBO members receive training in response measures, including cutting electrical wiring, implementing evacuation plans and administering first aid. In Jamaica, the YMR group has effectively served as first responders thanks to Red Cross training, though this work depends on unstable external funding highlighting one of the risks formulated in theory on structural marginalisation (Roy, 2005).

Beyond these response-oriented strategies, incremental upgrading measures, such as increasing building separations, widening access roads and promoting the use of fire-resistant construction materials (e.g., stone), constitute important elements of risk reduction in informal settlements. Such incremental interventions are typically catalyzed by severe fire events, with community-based organizations (CBOs) and residents engaging in advocacy towards structure owners to implement spatial and material improvements. Spatial observations (Appendix 3.2) and a key informant confirmed these incremental upgrades:

"It is usually after fire outbreaks that the community is putting pressure on structure owners, they urge to 'build back better', either by leaving more space or not building a second floor. But this is not enough, especially because then it happens only for this landlords' [Structure owner] structures, not the whole area" Key Informant Viwandani

Formal governance actors in Mukuru's informal settlements, including local chiefs and elders, primarily function as intermediaries, facilitating communication of state policies or mediating local disputes, rather than exercising a mandate for addressing structural vulnerabilities to fire

risk. The Member of County Assembly (MCA), while positioned to represent community interests and advocate for spatial upgrading, typically engages reactively during post-fire recovery efforts, offering basic relief or temporary shelter. Advocacy for long-term risk reduction measures tends to be sporadic and often coincides with electoral cycles, highlighting fragmented political accountability and the absence of sustained, pro-poor urban governance frameworks addressing fire risk in informal settlements (Watson, 2007; Satterthwaite, 2020) . Outside the SPA framework, upgrading processes in informal settlements are predominantly characterized by top-down, state-led interventions, whereby the county government implements spatial restructuring measures that, while delivering public goods, often result in development-induced displacement or disruption of local governance systems.

4.2 Deductive coding analysis

Deductive coding, quantified via Likert-scale validation (Appendix 2.2), identified themes where the Special Planning Area (SPA) had the greatest impact. The analysis focuses on explaining differing outcomes based on respondents' answers, SPA documentation and insights from key informants to inform an answer to the second question:

2. What are the key features and mechanisms of the Special Planning Area (SPA) framework in Mukuru?

The ratings derived from interviews with respondents in Kwa Reuben are consistently higher across almost all variables (Appendix 3.1). This can be largely attributed to SPA implementation and the intensified NGO presence, which strengthened multi-level governance, resource flows and participatory communication structures. The overall score for each variable is discussed in relation to the individual indicator scores with alternative explanations reflected upon where relevant.

4.2.1 Stakeholder coordination

Stakeholder coordination is rated significantly higher in the SPA-developed area, particularly in relation to coordination between NGOs, community-based organizations (CBOs), the county government and the sharing of information between institutions (Figure 5). This reflects sustained multi-stakeholder engagement during SPA planning and implementation. An alternative explanation is the greater presence of NGOs in Kwa Reuben, which in line with theory by Twigg (2015) is contributing to the development of stronger communication networks and enhanced information sharing by gradually building trust. Regarding mandate and responsibility, the difference between the two areas is less pronounced but still notable (Figure 5). Importantly, CBO respondents in Viwandani cited lack of institutional mandate as a barrier to mitigation, where coordination imperatives for mitigation are weaker than in response phases:

“There is a problem, me and colleagues know what to do, to remove obstructing materials and to clear access will reduce the severity [of fire], but we do not feel like it is our place, only when there is already a fire we are allowed to act.” Viwandani active CBO Member

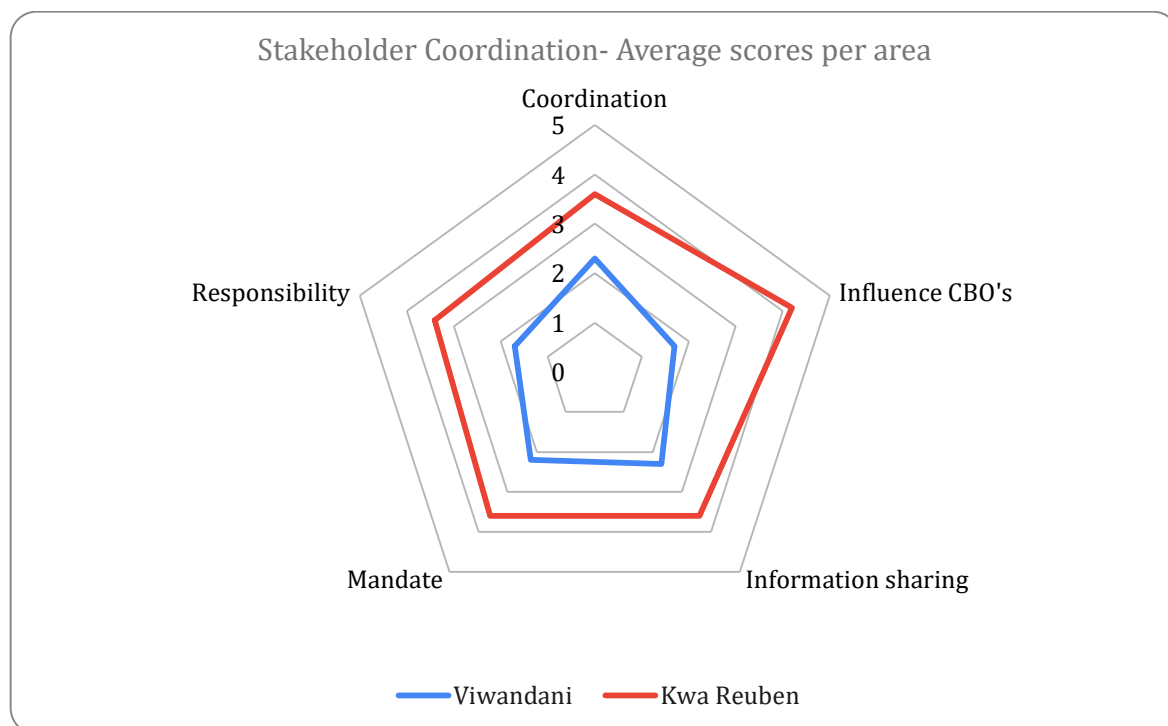


Figure 5: Average scores for Indicators of Stakeholder coordination between Viwandani and Kwa Reuben.

4.2.2 Resource Allocation

The results for resources (Appendix 3.1) do not indicate a significant difference between the two areas. This is primarily because the inflow of resources for spatial development or community support is highly irregular, with respondents referring to resource allocation mainly in the context of specific projects. Nevertheless, the planning and implementation of the SPA were cited as among the most significant financial investments in Kwa Reuben, not only through infrastructure development but also by generating employment and facilitating the connection of water and legal electricity supplies. A limitation of the research regarding resource allocation is that respondents not engaged in CBOs or NGOs tended to have less insight on this matter; additional information on resources was gathered through interviews with key informants and is discussed in the inductive section of the results chapter.

4.2.3 Flexibility & Sustainability

Flexibility and continuity were primarily mentioned in relation to other variables. Kwa Reuben respondents saw the SPA as adaptive, noting it managed the exit of NMS effectively by resetting aims and timelines. The most pronounced difference between the two areas lies in the

perception of long-term planning: while respondents in Viwandani felt that planning processes, though present, are non-binding and vulnerable to future reversal, all respondents in Kwa Reuben viewed long-term planning as a key driver of change, particularly for the sense of security it provides to CBOs, structure owners, and tenants. However, in both areas respondents expressed skepticism about the consistency of future community involvement efforts:

“The meetings from Muungano gave us the chance to choose what is important for now and they implement this as well, but in the future the MCA will decide again or county government will come with new plans for the area, I don’t think it will be always like the community can participate.” - Kwa Reuben Resident

Theory suggests that to effectively redistribute power and establish sustainable, iterative upgrading, participatory processes must extend beyond the project's duration (Watson, 2007). The UN-Habitat Participatory Slum Upgrading Programme (2020) warns that reverting to previous practices of top-down governance risks undermining progress.

This was exemplified by the breach of planning agreements through mass evictions and house demolitions along the Ngong River following the 2024 floods. These evictions have undermined residents' sense of security, eroded trust in the county government, and generated conflict between Muungano and government actors. While framed as a disaster mitigation measure, the evictions were implemented in ways that contradicted contemporary approaches to reducing vulnerability. A key negative consequence mentioned was increased residential density, as many displaced residents moved in with relatives, exacerbating pressure on already overstretched services.

“The evictions after the floods diminished a lot of our progress, people lost the security and the trust in organisations, they [evicted residents] even thought we helped them [County Government] to do it” CBO member Kwa Reuben

“Awareness of justice and the right to save and secure housing among community members has been growing and the SPA contributed to that, but because these principles were not incorporated in the National Slum Upgrading and Prevention Strategy, the blow of the evictions was even bigger” Key Informant Kwa Reuben

Verification against the National Slum Upgrading and Prevention Strategy documents (SD Housing & Urban Development, 2024) indicates alignment with the objectives of the SPA.

However, the eviction of the strip was carried out by the Ministry of Interior and National Administration (AMT, 2025), possibly without reference to or consultation of the slum upgrading report. DRM theory highlights organizational breakdown during disasters or coercive interventions as a key risk to collaborative disaster governance (Twigg, 2015; Watson, 2007).

4.2.4 Barriers for fire risk integration

Among the barriers to fire risk management in informal settlements, what emerges most clearly is that respondents from Viwandani strongly perceive political will as the limiting factor for change (Appendix: 3.5). By contrast, respondents from Kwa Reuben did not identify political will as a significant factor. According to one key informant, the divergence can be explained by the perception in Viwandani that other areas are prioritized for development due to land ownership dynamics. In Viwandani, the land is not formally owned, which was also cited as one of the reasons SPA implementation began in Kwa Reuben. A more direct explanation for this difference may be that residents of Kwa Reuben have witnessed tangible improvements in fire safety mitigation in recent years, while residents of Viwandani have not. Technical expertise was not considered a relevant barrier, as none of the respondents mentioned it. The level of mitigation strategies required to meaningfully enhance fire safety does not appear to exceed the technical capacity available within Mukuru. The indicator based on theory by Tierney (2012) might apply for more structural redevelopment.

4.2.5 Participatory Process

Based on the interviews, there is no significant difference in perceived participation between the two areas. However, communication and community involvement were rated higher in Kwa Reuben. The relatively limited impact of the SPA on participation may be due to the infrequent nature of planning events and the fact that not all respondents had participated; those who did often reported feeling little connection to the process, primarily because of perceived shortcomings in transparency regarding the outcomes of these meetings. Folke et al. (2005) would argue that hereby a valuable by-product of the co-production process is lost, because it reduces sustained community engagement with DRM.

Finally, respondents in Kwa Reuben attached greater importance to their own roles and rights in local decision-making. According to Meagher (2012) this is an essential outcome of the SPA process that supports effective hybrid governance through increasing informal accountability of non-state actors.

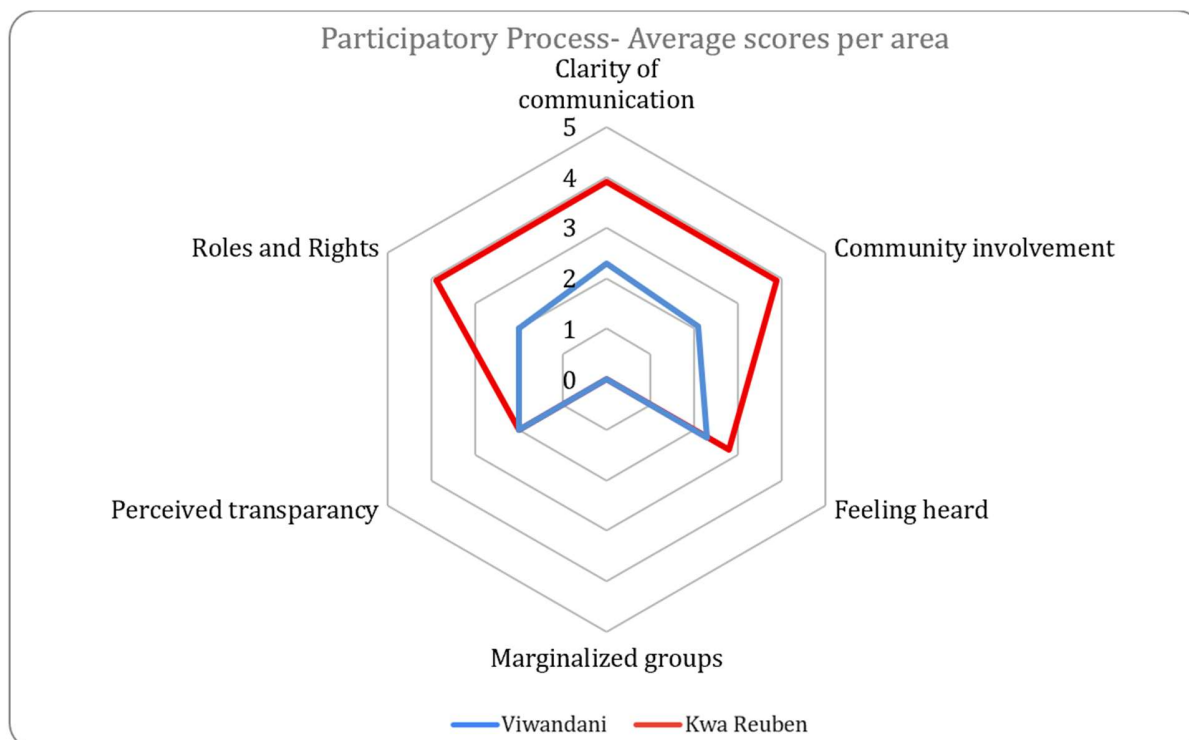


Figure 6: Average scores for Indicators of Participatory Process between Viwandani and Kwa Reuben.

4.2.6 Spatial Interventions

The most notable infrastructure improvements cited were the construction of access roads and water points. Respondents in Kwa Reuben consistently rated access for fire trucks as adequate, whereas in Viwandani respondents consistently report that fire trucks were unable to approach during fire incidents. Additionally, the implementation of the water token system has significantly enhanced access to water for fire response:

“Since the token system, everyone has a full bucket in the house, so everyone becomes a potential firefighter” Kwa Reuben Resident

SPA implementation has had less impact on increasing building separations, connections to legal electricity and the presence of gas tanks within homes, factors that were repeatedly identified in interviews as key causes of fire ignition and spread. The prevalence of stone housing construction did not differ significantly between the two areas, as it turned out to be largely dependent on the financial capacity of structure owners, which in turn is dependent on access to credit. This highlights both the need for local saving and credit schemes and reflects

critiques of incrementalism where private interests override communal needs (Satterthwaithe et al., 2020; Kamalipour & Dovey, 2020). Both key informants mentioned that SPA may facilitate greater access to loans over the long term in Kwa Reuben.

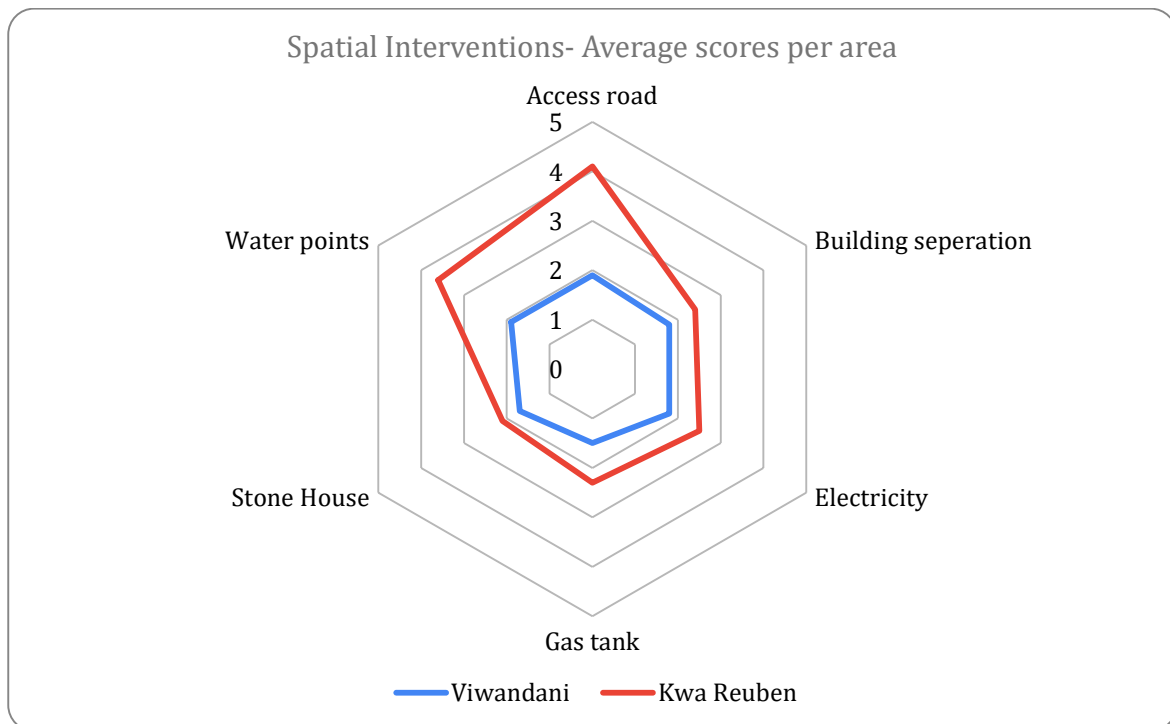


Figure 7: Average scores for Indicators of Spatial Interventions between Viwandani and Kwa Reuben.

4.2.7 Perceived fire risk Significance

Perceived fire risk functioned as a dependent variable of the identified mechanisms and was lower in SPA-developed Kwa Reuben than in Viwandani. Respondents attributed this to fewer outbreaks, faster fire department response, and a lower ranking of fire as a threat compared to hazards such as cholera or flooding; in Viwandani, fire remained among the most serious threats:

“It’s hard to say how often, but it happens a lot. In our ward and in Jamaica fire is part of our daily lives, you go to bed thinking about fire and when you wake up you are grateful.” Viwandani respondent

“There used to be a lot of fires in the past. Now, not so much, maybe once in a while and then we coordinate with the fire department. There’s been a big change.” Kwa Reuben Respondent

4.3 Inductive coding analysis

Recurring themes that emerged beyond the predefined indicators were coded and subsequently organized thematically as drivers or barriers associated with the operationalised variables. This inductive analysis provides deeper insight into the drivers and barriers influencing the effectiveness of the SPA in fire prevention, as perceived by residents and key informants to provide an answer to the third question:

3. How do residents, CBOs and other local actors perceive the SPA to enable or limit fire risk reduction?

4.3.1 Stakeholder Coordination

A key driver identified in relation to stakeholder coordination is the increase in information sharing facilitated by the SPA. Participatory mapping and community meetings enhanced relationships between residents, CBOs, NGOs and government actors, fostering trust that persisted beyond the project's implementation and enabled sustained information exchange. This is in line with the theory by Djalante (2012) that these multi-stakeholder platforms increase effective collaboration between different sectors and scales. It has led to both practical improvements, such as residents having direct access to fire agency contact details and structural benefits, including greater capacity among community members to articulate their needs to CBOs and local leaders. Several respondents indicated that the SPA development process helped them to better recognize the causes of fires and floods, enabling preemptive action, especially in Kwa Reuben.

The most significant barrier in stakeholder coordination was the resistance from structure owners to SPA implementation. Structure owners represent a distinct stakeholder group within informal settlements: while lacking formal land ownership rights, they exercise control through semi-formal agreements with local chiefs, enabling them to own and rent out housing units. During SPA implementation, many structure owners were required to demolish or reduce structures to make way for roads and water points. While most tenants accepted these changes, due to careful communication and participatory decision-making (Appendix 1.4), structure owners viewed the loss of rental units as uncompensated capital loss. This led to considerable resistance, including formal complaints to local authorities and, in some instances,

outright refusal to comply with demolition orders, which ultimately necessitated forced evictions, an outcome the SPA was explicitly designed to avoid (Muungano, 2021). Although structure owners participated in barazas and planning sessions, SPA policy documents do not explicitly acknowledge them as key actors, nor grant them rights in negotiating interventions. The role of structure owners in upgrading is crucial and could be beneficial. As one respondent noted:

Another barrier relates to the role of *mulika mwizi* (illegal electricity connectors). While the SPA introduced a legal, token-based electricity connection system explicitly aimed at reducing fire hazards, spatial observations (Appendix 2.1) revealed that only one of eight houses visited maintained a legal connection. Respondents suggested that *mulika mwizi* groups, whose livelihoods depend on illegal wiring, actively sabotaged or tapped into legal connections, undermining their reliability. Given that illegal connections are widely cited as a primary cause of fires, the impact of the SPA on fire safety is significantly constrained by this dynamic.

The SPA's failure to explicitly acknowledge informal actors such as structure owners and *mulika mwizi* groups highlights a key shortcoming in its approach to hybrid governance. These actors possess local legitimacy and play functional roles in service provision, yet in line with theory their exclusion from formal coordination structures limits the effectiveness of interventions (Miraftab, 2009; Banks, 2019). While respondents recognized integrating them into governance processes also carries risks, especially that of entrenchment of informal authority or elite capture. (Meagher, 2012; Colona & Jaffe, 2016), their unaddressed influence has already constrained fire risk reduction efforts. Without clear mandates and negotiated roles these actors undermine sustained risk reduction (Alai et al., 2016; Seeliger & Turok, 2013).

4.3.2 Resource Allocation

The SPA facilitated notable resource allocation for interventions aimed at mitigating fire risk. The area's unique legal status and innovative upgrading approach attracted support from the county government, the International Development Research Centre and SDI Kenya. Major infrastructure investments including the construction of access roads, water points and drainage improvements were implemented through the Nairobi Metropolitan Services (NMS). However, the dissolution of the NMS in 2022 has emerged as a critical barrier, limiting implementation largely to Kwa Reuben. Both key informants emphasized that SPA progress remains overly reliant on county government investment, leaving it vulnerable to shifts in political priorities. This dependency was also highlighted as a key barrier by Roy (2015) and the UNDRR (2024).

Inconsistent service delivery further undermines resource-related interventions. Although respondents highlighted the construction of water points and the token system as key measures for fire risk mitigation, irregular water supply, often limited to three days per week, minimizes the intervention's overall impact on fire safety and broader livelihood improvements. Limited service provision by county governments necessitates that slum upgrading programs address gaps by, for example, mapping areas with private water providers or prioritizing zones with heightened infrastructure vulnerability and essential water needs (Seeliger & Turok, 2013). A more integrated approach of DRR in the SPA could have mitigated the effects of selective service delivery.

An additional barrier concerns the limited financial capacity of residents to absorb higher rents. Many respondents expressed concern that upgrading could displace vulnerable groups. Structure owners reportedly determine rents based on structure size, proximity to infrastructure and building materials, but rents also vary across Mukuru. One respondent noted that the frequency of fires in certain areas (e.g., Paradise A, B and C) contributed to lower rents, suggesting that upgraded areas may, over time, become affordable only to specific population groups, pushing others into more hazard-prone locations. In line with respondents' experiences, theory highlights displacement of marginalized groups as a key risk of slum upgrading (Huchzermeyer, 2006; Satterthwaithe et al., 2020). Mitigation strategies such as the enumeration of vulnerable residents (Seeliger & Turok, 2013) were neither mentioned nor included in the documentation of SPA development.

4.3.3 Flexibility and Sustainability

A key driver of SPA progress has been the longstanding trust built between communities and Muungano. Respondents from both areas emphasized that Muungano's sustained engagement and collaboration with CBOs fostered strong relationships, encouraging community participation and confidence in planning processes. A key informant highlighted that Muungano's presence at meetings with government officials and barazas was instrumental in securing community trust. This exemplifies the need for sustained community engagement to establish strong relationships and foster ownership of outcomes, as defined by Twigg (2015).

Sustained community engagement through the SPA also provided CBOs and Nyumba Kumi (ten-household representatives) with mandate and a sense of responsibility through support for development initiatives and the maintenance of improvements. The SPA has contributed to greater community trust in Kwa Reuben by aligning CBO and Nyumba Kumi activities with a

broader, coordinated development plan. In Viwandani, however, respondents noted that CBOs often struggle to operate effectively in the absence of clear community understanding of their intentions. Combined with the sporadic nature of spatial interventions, this has eroded trust.

“Since the SPA, Nyumba Kumi are taking more responsibility, because they were in the barazas and know what is necessary for the neighborhood, they know how to tackle the problems” CBO member Kwa Reuben

4.3.4 Barriers to Fire Risk Integration

A central challenge in fire risk management in informal settlements is the negotiation required when living space must be given up. The SPA was explicitly designed to minimize necessary demolitions and promote participatory decision-making to ensure more informed interventions. Respondents across both study areas expressed a wide range of views regarding evictions associated with road construction and building separation (Appendix 1.2). According to one key informant, these views are largely shaped by respondents’ level of community engagement and involvement in public affairs. While the sample does not allow for testing such correlations, it is notable that SPA implementation does not appear to significantly influence perceptions of eviction for upgrading purposes.

Nearly all respondents acknowledged the necessity of demolishing structures to prevent the spread of fires. In the event of fire outbreaks, residents often voluntarily dismantle their homes to contain spreading. Interviews with key informants concluded that sustained sensitization and effective communication are essential to convincing residents to embrace demolition as a preemptive mitigation measure rather than as an emergency response.

Both these findings support theory on the importance of community engagement in informal settlements. Developing residents’ understanding of the factors contributing to the severity of disaster outbreaks, as well as the mitigation strategies that prevent loss of life and livelihood, is essential for creating willingness to challenge and adapt the vulnerability-producing status quo (Ryan, 2020; Twigg, 2015).

4.3.5 Participatory Process

A notable driver of community engagement in fire risk management has been the development of the SPA-related People’s Manifesto in Kwa Reuben. The manifesto serves not only to bind public servants and politicians to the key objectives for improving the area, but also to raise

residents' awareness of political responsibility, including in relation to fire mitigation, response and recovery. The manifesto has contributed to fostering a sense of entitlement among residents to hold those in positions of power accountable for safeguarding their well-being. Several respondents from Kwa Reuben indicated that the People's Manifesto significantly influenced their perception of fire, not as an inevitable event, but as a consequence of governance decisions. Through the formation of this manifesto the SPA contributed to increased accountability of local state- and informal actors that is essential for effectively managing hybrid governance (Meagher, 2012; Colona & Jaffe, 2016).

A key barrier to the integration of fire safety within the participatory process, as identified by key informants, was the establishment of thematic consortia. Although disaster management, including flood and fire safety, is a central concern in residents' daily lives, these issues did not fall explicitly under any of the seven designated thematic areas. As a result, they were often absent from meeting agendas and not directly addressed in planning discussions. This led to missed opportunities throughout the process: fire safety was not central to stakeholder coordination; resource allocation or participatory planning and spatial interventions did not systematically incorporate disaster risk mitigation. Low cost, high impact measures suggested by respondents, but not implemented, were the formal designation of evacuation points, the installation of alarm systems, the construction of a local fire station and the installation of fire hydrants. This loss of opportunity could have been prevented through a more integrated approach to DRM, as advocated for by Twigg (2015), either within each of the relevant consortia or by addressing it as a distinct strategic focus area.

4.3.6 Spatial Interventions

An unexpected driver of fire risk mitigation within the SPA planning process has been the influence of long-term planning on the construction of stone housing in both areas. Public development plans enhanced tenure security perceptions, incentivizing structure owners to invest in durable and disaster resistant housing.

"It [SPA Planning] has been an opportunity for structure owners and therefore the community, because it allows them to build better housing, because they know it will be allowed to stay if it's in line with the roads and the minimum separation." Key informant Viwandani

This finding lies beyond the scope of the planning theory applied in this thesis; however, McFarlane (2012) supports the premise that early communication of planned interventions

fosters greater alignment in incremental upgrading. As an interesting outcome of this comparative research, the finding would require testing across multiple cases.

4.3.7 Legal Framework

An unanticipated finding is that the legal framework underpinning the SPA, particularly the legal exemptions for building regulations and the formulation of the development plan, was not recognized as significant by either respondents or key informants. Despite its prominence in SPA policy, this legal foundation had little visibility or relevance for respondents. It can therefore be concluded that the methodology employed did not adequately capture this dimension and that further research, specifically through engagement with key informants from the county government, Muungano and SDI Kenya, is required to better understand the interaction between the legal framework and other variables.

4.3.8 Emergent

An unexpected, but key finding is that all respondents, independent of their area of residence, consistently prioritized training for disaster response over mitigation strategies. According to one key informant, this preference reflects the community's strong emphasis on self-reliance. Given that service provision and structural improvements seldom reach informal settlements, residents, often with the support of CBOs and NGOs, seek to address these gaps themselves. When provided with opportunities for capacity building, residents expressed a clear preference for acquiring skills that enable them to organize and respond to disasters independently. This finding reflects, to some extent, Roy's (2005) notion of "negotiated survival," in which residents' low trust in structural transformation leads them to prefer fragmented yet pragmatic responses.

Chapter 5: Conclusion & Reflection

This chapter reflects on the key findings in relation to the theoretical framework to address the research question. It then presents recommendations derived from these findings and offers a critical evaluation of the research methodology and theoretical approach.

5.1 Conclusion

This research has examined how the Mukuru Special Planning Area (SPA) enables or constrains the integration of fire risk reduction strategies within broader upgrading efforts in Nairobi's informal settlements. Its methodology was based on a qualitative quasi-experiment, that used interviews with residents, triangulated with key informants and spatial observation in order to answer the research questions:

How does the Special Planning Area framework enable or limit the integration of fire risk reduction strategies in Mukuru?

5.1.1 How are fire risk reduction strategies currently planned and implemented in Mukuru's informal settlements?

To answer the first question, the findings show that, in the absence of the SPA, fire disaster mitigation is primarily shaped by incremental improvements led by structure owners, often driven by advocacy from community-based organizations (CBOs) and residents. Government interventions are sporadic, top-down and frequently disruptive, particularly where evictions accompany spatial interventions. Formal authorities play a limited role, with the Member of County Assembly (MCA) largely engaged in post-disaster recovery and chiefs and elders lacking a clear mandate for proactive fire risk reduction. CBOs and NGOs focus predominantly on preparedness and response measures, a reflection of residents' inclination toward self-reliance in the face of structural exclusion from formal development and service delivery systems.

These findings align with governance and DRM theory on informal settlements, reflecting the diffuse effects of hybrid governance. Showing how informal and formal actors often lack mandates and coordination mechanisms (Seeliger & Turok, 2013; Colona & Jaffe, 2016), but retain locally recognized legitimacy (Meagher, 2012). The emphasis on response-oriented DRM

and incremental upgrading illustrates the structural exclusion of informal settlements from development and service provision (Roy, 2005; Watson, 2007; Twigg, 2015).

5.1.2 What are the key features and mechanisms of the Special Planning Area (SPA) framework in Mukuru?

Regarding the second question, four key mechanisms shaped fire risk management under the SPA.

First, community engagement and participation enhanced awareness of roles and rights, particularly through the People's Manifesto. This strengthened coordination for disaster preparedness, accountability of CBO's and government and long-term ownership of outcomes. The outcomes are consistent with Twigg's (2015) emphasis on sustained engagement and align with Meagher (2012) and Colona & Jaffe (2016), who stress that effective governance in informal settlements requires role clarity, transparency, and rights awareness.

Second, community mapping and information sharing reframed infrastructure as a source of vulnerability while enabling context-specific adaptations, echoing Seeliger & Turok's (2013) view that collaborative, community-led mapping is fundamental to equitable upgrading. This process also reduced backlash against development-related evictions, increasing community trust and support for long-term outcomes.

Third, while the formation of thematic consortia improved coordination on key issues, the exclusion of DRM led to missed opportunities for infrastructure provision. This reinforces Folke et al.'s (2005) and Twigg's (2015) argument that DRM should be embedded within broader urban systems and integrated throughout the entire policy cycle.

Finally, the spatial interventions, such as access roads and water points, proved effective in mitigating fire outbreaks, even if not explicitly designed for fire risk reduction, demonstrating the indirect yet significant protective benefits of inclusive urban upgrading (Kamalipour & Peimani, 2024).

5.1.3 How do residents, CBOs and other local actors perceive the SPA to enable or limit fire risk reduction?

The answer to question three draws on key drivers and barriers identified by residents and key informants.

Driver

Long-term planning under the SPA has supported incremental upgrading by providing structure owners with investment security and empowering CBOs to maintain rights of way and prevent densification. This security contributes to vulnerability reduction and demonstrates the potential of inclusive planning and co-produced mitigation strategies beyond the theoretical framework of this research.

Barriers

Trust in sustained community participation is undermined by two factors: evictions along the Ngong River and reliance on government funding and service provision. Theory identifies resource dependency as a core barrier to slum upgrading (Roy, 2015) but suggests mitigation through community mapping and selective service delivery (Seeliger & Turok, 2013). To prevent regression, like through the clearance of the Ngong river, projects should embed policy requirements that extend beyond their duration (UN-Habitat, 2020).

Informal actors, particularly structure owners and *mulika mwizi* groups, were insufficiently included in the SPA process, leading to resistance and sabotage that weakened fire risk reduction outcomes. This reflects critiques of hybrid governance, where excluding locally legitimate actors from coordination structures limits effectiveness (Miraftab, 2009; Banks, 2019). While integration carries risks of reinforcing informal authority (Meagher, 2012; Colona & Jaffe, 2016), theory underscores the need for clear mandates and negotiated roles to sustain risk reduction (Alai et al., 2016; Seeliger & Turok, 2013).

Upgrading also risks raising rents, potentially displacing vulnerable groups into more hazard-prone areas. This supports theoretical critiques that upgrading can inadvertently marginalize residents (Huchzermeyer, 2006; Satterthwaithe et al., 2020). Recommended safeguards, such as enumerating vulnerable households (Seeliger & Turok, 2013), were absent from SPA planning, but a longitudinal study is needed to confirm actual displacement.

5.1.4 How does the Special Planning Area framework enable or limit the integration of fire risk reduction strategies in Mukuru?

The SPA framework has enabled fire risk reduction in Mukuru by strengthening community engagement, clarifying roles and rights, and fostering coordinated preparedness through mechanisms such as the People's Manifesto, community mapping, and participatory spatial upgrading. Infrastructure improvements, notably access roads and water points, indirectly

reduced fire risk despite not being explicitly designed for this purpose. However, the exclusion of DRM from thematic consortia, limited inclusion of informal actors such as structure owners and *mulika mwizi* groups, and reliance on irregular government funding have constrained its effectiveness. Evictions and the potential for upgrading to increase rents risk undermining trust, participation, and equity in outcomes. Overall, while the SPA demonstrates the potential of inclusive, co-produced planning to address fire risk, its long-term impact depends on sustained participation, integration of informal actors, and safeguards against displacement.

5.2 Recommendations

Drawing on the analysis of findings in relation to the literature and feedback from residents and key informants during the validation session, four recommendations were developed to enhance fire risk management through the SPA:

I. Recognize incremental upgrading in planning

Planning processes should explicitly acknowledge and support incremental upgrading as a legitimate and valuable strategy for improving safety and resilience in informal settlements (Kamalipour & Dovey, 2020). This includes accommodating the small-scale, resident-led spatial adaptations that can contribute to fire risk reduction when aligned with broader planning goals.

II. Integrate disaster and fire risk management explicitly within upgrading strategies

Disaster and fire risk management should be fully embedded in both the planning and implementation phases of informal settlement upgrading. This would strengthen advocacy efforts, improve the design and optimization of spatial interventions and ensure reciprocal accountability between communities and formal institutions (Satterthwaite, 2020).

III. Ensure exhaustive and explicit stakeholder engagement

Upgrading efforts must engage all relevant stakeholders systematically, including informal actors such as structure owners, informal service providers (e.g., Mulika Mwizi), elders and chiefs. Such inclusive engagement is essential to address the complexities of hybrid governance and to build shared ownership of fire risk reduction measures (Meagher, 2012; Colona & Jaffe, 2016).

IV. Employ community mapping and enumeration to safeguard vulnerable residents. These groups should be explicitly included in development processes, including participatory planning and validation sessions, to ensure that upgrading initiatives do not exacerbate social exclusion or inadvertently increase vulnerability (Patel, 2015; Satterthwaite et al., 2020).

5.3 Discussion

This discussion reflects on the relationship between the findings and existing theory, outlines the main limitations of the research, and provides directions for future inquiry.

The findings of this thesis broadly align with the intended academic contribution, connecting grounded insights into governance in informal settlements with established theoretical frameworks. Evidence from the non-SPA area supports existing theory on hybrid governance (Meagher, 2012; Colona & Jaffe, 2016) and the effects of structural exclusion from formal development and service provision (Roy, 2005; Watson, 2007). The results further affirm the significant role of community engagement and inclusive participation in enabling equitable service delivery and building resilience (Seeliger & Turok, 2013; Satterthwaithe et al., 2020).

In relation to disaster risk management (DRM), the research reinforces the importance of integrated approaches (Twigg, 2015) and the necessity of sustained community participation to address structural vulnerabilities (UN-Habitat, 2020). An emergent finding beyond the initial theoretical framing was the influence of planning without immediate implementation. Publicly communicated plans increased perceived tenure security and encouraged incremental upgrading by residents and structure owners.

The research faced two main limitations. First, the SPA was too broad a concept and its implementation stage difficult to pinpoint, making it challenging to connect the independent and dependent variables. Future studies should adopt a longitudinal design or focus on a specific sub-program, such as the water token system or the People's Manifesto. Second, the indicators used were broad to allow for emergent findings given the researcher's limited initial knowledge of the context. But, future research should apply more specific assessment tools for processes such as community mapping, inclusive participation in *barazas*, and capacity-building of CBOs and residents.

Overall, the research strengthens the link between empirical evidence from informal settlements and theoretical debates on governance, participation, and DRM. It also highlights the need for more precise and longitudinal approaches to capture the complex, evolving effects of multi-faceted upgrading programs like the SPA.

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Appendix

1. Tables Atlast.ti

1.1: Respondents Distribution:

Equal distribution of age, gender, CBO activity, household size and time in area through purposive sampling.

	Viwandani	Kwa Reuben
Age: Age 20-30	4	5
Age: Age 30-40	1	1
Age: Age 40+	1	0
CBO Active member	1	2
CBO Not member	3	1
CBO Passive member	2	3
Gender female	4	2
Gender male	2	4
Household Size: Household size 1	1	1
Household Size: Household size 2-4	3	2
Household Size: Household size 4-6	2	1
Household Size: Household size 6+	0	2
Time in area: Time in area 10+ years	5	5
Time in area: Time in area 4-10 years	1	1

1.2 Distribution of answers regarding evictions

Distribution of answers regarding SPA induced evictions don't differ significantly: Demolition to prevent fire; Residents that believe housing will have to be demolished in event of a fire. Eviction; Residents who do experience having to leave their house for SPA implementation as eviction. Moving; Residents who experience leaving their house as any moving, neutral to the effects of SPA. Voluntary moving; Residents who highlight the importance of interventions and upgrading and are willing to move for it to take place.

	Kwa Reuben	Viwandani
Demolition to prevent spread	5	5
Eviction	4	2
Moving	3	1
Voluntary moving	2	4

2. Operationalization

2.1 Operational Definitions

Concept	Definition
Special Planning area (informal settlement)	(Explanation) The Mukuru Special Planning Area (SPA) is a large-scale, participatory informal settlement upgrading initiative in Nairobi, established to transform the 689-acre Mukuru slum into a healthy, functional neighborhood. It represents an innovative planning model that brings together residents, government and over 40 partner organizations to co-develop inclusive and integrated development solutions. The SPA serves as both a legal and strategic framework that recognizes the limitations of conventional planning and the importance of community-led approaches in addressing urban informality. (Muungano, 2020)
Informal settlement	Urban informality refers to the diverse and dynamic set of practices, relationships and spaces that exist in complex negotiation with formal regulatory systems of the state. It encompasses livelihoods, housing, land tenure and service provision that are not fully recognized, regulated or protected by official frameworks. Far from being marginal or temporary, informality is a structuring logic of urbanization, actively produced through political and economic processes, including uneven development, state policies and market dynamics. Urban informality is not the absence of formality, but a mode of governance and spatial production that reflects power relations. It is a space where rules are selectively applied, often in ways that maintain control and exclusion, while enabling flexibility and survival for marginalized groups. As such, informality is both a means of livelihood and a terrain of struggle, where urban residents navigate uncertainty, assert claims to space and rights and reshape the city from below. (McFarlane; Banks & Lombard & Mitlin; Roy)
Planning / Upgrading	Urban planning is a strategic and institutional process that shapes the development and organization of cities through land use policy, spatial design and governance. Planning is a fundamentally political and contested field. It operates not only through formal state mechanisms but also through informal and grassroots practices that challenge exclusion and promote alternative urban visions. These dynamics reveal how planning can reinforce inequalities, especially by regulating informality and marginalizing certain voices. At its core, planning is both a tool of control and a space of resistance, where dominant visions of the city are negotiated and reimagined. Upgrading functions as a targeted intervention that formalizes and improves conditions within informal settlements, often without fully integrating them into the broader planning system. (Miraftab; Roy; Allmendinger, Satterthwaite)

Fire Risk Management	Disaster risk management is a comprehensive and dynamic process aimed at identifying, assessing, reducing and responding to risks posed by natural and human-induced hazards. It encompasses not only technical measures, such as early warning systems, land-use planning and emergency response, but also social, political and institutional dimensions that influence vulnerability and resilience. DRM recognizes that disasters are not purely natural events, but the product of intersecting hazards, exposure and social vulnerability, shaped by historical, economic and political processes. Effective management therefore requires an understanding of the root causes of risk, including inequality, governance and the marginalization of certain populations. To do so it should involve collaborative and adaptive strategies that engage stakeholders at multiple levels, promote inclusive decision-making and build long-term capacity for resilience in both formal institutions and local communities. (Wisner; Tierney; Bryson)
Adaptive Governance	Adaptive governance is a flexible and decentralized approach to managing complex systems under conditions of uncertainty and change. It relies on collaboration across multiple actors and institutions, with an emphasis on inclusive participation and collective learning. Decision-making is distributed across levels and sectors, allowing local knowledge and bottom-up initiatives to shape responses alongside formal structures. Key features include institutional flexibility, cross-scale coordination and the presence of bridging actors who connect networks and facilitate cooperation. By enabling systems to adjust and reorganize without losing core functions, adaptive governance supports resilience and fosters more responsive and context-sensitive forms of governance. (Folke, Hahn, Olsson; Birkmann; Djalante)

2.2 Indicators Likert scale Gradation

Variable	Indicator		1	2	3	4	5
1. Stakeholder Coordination	- Clear assignment of responsibility for fire risk mitigation among existing actors.	Likert Scale Rating	No clear assignment of responsibility	Limited or unclear responsibility assignment	Some responsibilities are defined	Most responsibilities are clearly defined	Roles are clearly assigned with no major gaps
	- Effectiveness of coordination between fire-related stakeholders.	Likert Scale Rating	no or very poor coordination is perceived	informal coordination occurs	coordination is ad hoc or driven by crises	regular coordination meetings or forums exist	coordination mechanisms are institutionalized and highly functional
	- Perceived effectiveness of information sharing across institutions	Likert Scale Rating	information is not shared	information sharing is inconsistent or limited to select actors	information is shared but not systematically	information sharing is fairly effective across actors	information flows transparently and effectively
	- Perceived influence of CBOs in inter-institutional decision-making	Likert Scale Rating	CBOs are excluded from formal decision-making	CBO influence is minimal or symbolic	CBOs participate but have limited decision-making power.	CBOs have a recognized role in inter-institutional decisions.	CBOs actively shape and influence decisions at multiple levels
	- Clarity of mandate overlap or duplication among actors	Likert Scale Rating	mandates are unclear or contradict each other	Mandates are unclear	mandate overlap is acknowledged but not resolved	mandate overlaps are managed	mandates are complementary and well-integrated
2. Legal framework	- Perceived compatibility of fire risk actions with formal regulations	Likert Scale Rating	Informal actions seen as illegal or blocked by regulation.	Some tolerance, but mostly obstructed or informal.	Partial alignment; informal efforts tolerated.	Informal actions seen as mostly compatible.	Informal responses fully align with formal standards.
	- Perceived flexibility of planning rules for informal upgrading	Likert Scale Rating	Rules are rigid and unsuitable.	Slight flexibility, rarely applied.	Some adaptation possible.	Rules viewed as adaptable.	Rules are flexible
	- Extent to which SPA legal exemptions are seen to facilitate risk reduction	Likert Scale Rating	SPA exemptions unknown or irrelevant.	Exemptions known but not helpful.	Exemptions acknowledged, limited impact.	Exemptions useful in enabling upgrades.	Exemptions actively support risk reduction.
3. Resource allocation	- Adequacy of funding allocated to fire risk-related interventions	Likert Scale Rating	No or negligible funding; fire risk not prioritized.	Minimal funding; irregular or symbolic support.	Some funding exists, but inconsistent or project-based.	Funding is generally sufficient and regularly allocated.	Fire risk interventions are well-funded and prioritized.
	- Flexibility of budget use across sectors for fire risk actions	Likert Scale Rating	Budgets are fixed; no cross-sector use possible.	Very limited flexibility; difficult to reallocate.	Occasional flexibility, often slow or bureaucratic.	Budgets can be adjusted to support fire safety.	High flexibility; funds can shift where needed.
	- Sufficiency of resources available for implementation at local level	Likert Scale Rating	Local actors lack basic tools, staff, or materials.	Local resources insufficient for sustained action.	Basic resources exist, but often fall short.	Local teams have access to most necessary resources.	Local implementation is fully resourced and sustainable.

4. Flexibility and Sustainability	- Adaptability of fire safety strategies to changing settlement conditions	Likert Scale Rating	Strategies are rigid and not responsive to changes.	Rare or slow adjustments; mostly reactive.	Some adaptation occurs but inconsistently.	Strategies are regularly adapted based on local changes.	Highly adaptive strategies that respond proactively to evolving conditions.
	- Presence of long-term planning mechanisms for fire safety	Likert Scale Rating	No long-term planning; only ad hoc or emergency responses.	Some planning exists but short-term and fragmented.	Mid-term plans exist, but long-term vision is unclear.	Long-term planning is evident and partly institutionalized.	Clear, institutionalized long-term plans guiding fire safety efforts.
	- Perceived strength and continuity of CBOs involved in fire risk	Likert Scale Rating	CBOs are inactive, weak, or fragmented.	CBOs exist but have limited capacity or inconsistent presence.	CBOs are active but reliant on external support.	Strong and relatively stable CBO presence over time.	CBOs are highly active, well-organized, and embedded in long-term risk governance.
5. Barriers for fire risk integration	- Perceived political will to prioritize fire safety	Likert Scale Rating	No political interest; fire safety is ignored.	Minimal attention; seen as low priority.	Some political interest, but inconsistent or symbolic.	Fire safety is on the agenda and occasionally prioritized.	Strong, consistent political commitment to fire safety.
	- Degree to which technical expertise is available for fire safety planning	Likert Scale Rating	No local expertise; total reliance on outsiders.	Limited expertise available; major capacity gaps.	Some technical knowledge exists, but unevenly distributed.	Adequate expertise is available for planning and guidance.	Strong, accessible, and localized technical capacity for fire safety.
	- Extent to which competing priorities hinder fire risk integration	Likert Scale Rating	Fire safety is constantly sidelined by other agendas.	Frequently overlooked due to competing development needs.	Sometimes affected by competing priorities.	Mostly integrated despite competing demands.	Fully integrated; fire safety is balanced with other priorities.
6. Participatory process	- Perceived level of community involvement in fire safety planning	Likert Scale Rating	No community involvement at all.	Involvement is symbolic or limited to a few individuals.	Some community engagement, but irregular or selective.	Broad and active community involvement in planning.	Deep, consistent involvement across all levels of the community.
	- Extent to which residents feel heard in SPA decision-making	Likert Scale Rating	Residents feel completely excluded.	Few voices are acknowledged; limited influence.	Some residents feel heard, but not consistently.	Most residents feel their input matters.	Residents feel they directly shape key decisions.
	- Clarity of communication about fire risks and plans	Likert Scale Rating	No communication or awareness.	Communication is unclear, infrequent, or technical.	Some communication exists but lacks clarity or reach.	Clear and regular communication reaching most residents.	Communication is transparent, accessible, and widely understood.
	- Perceived transparency of decision-making processes	Likert Scale Rating	Decisions are made opaquely, with no public input.	Minimal transparency; decisions seem pre-determined.	Some transparency, but not enough to build trust.	Transparent processes are visible and partially participatory.	High transparency; decisions are open, justified, and inclusive.

	- Inclusion of marginalized groups in participatory spaces	Likert Scale Rating	Marginalized groups are completely excluded.	Some outreach exists but with little effect.	Inclusion is attempted, but uneven and limited.	Marginalized groups are regularly engaged.	Strong, consistent inclusion of marginalized voices in all processes.
	- Resident awareness of roles and rights in planning processes	Likert Scale Rating	No awareness of rights or planning processes.	Very low awareness; only a few individuals are informed.	Moderate awareness; some residents know their roles.	Many residents are aware and engaged.	Widespread understanding of roles, rights, and responsibilities.
7. Spatial interventions	- Presence of adequate separation between buildings	Likert Scale Rating	No separation; structures fully attached.	Average separation <2m; heavily obstructed.	Some gaps (2–4m); partially obstructed.	Average separation ~4–6m; mostly clear.	Average separation >6m; clear and consistent throughout.
	- Accessibility of roads for emergency response	Likert Scale Rating	No road access; only footpaths.	Narrow paths (<1.5m); inaccessible for vehicles.	Some 3m roads; obstructed or discontinuous.	Continuous 4–6m access roads; mostly clear.	Wide, unobstructed emergency roads (>6m); highly accessible.
	- Amount of stone built housing	Likert Scale Rating	Almost all housing is Metal Sheet or makeshift.	Majority Metal Sheet; very few stone structures.	5–10% stone housing	20% stone-built units.	At least half of housing is permanent stone structures.
	- Presence gas tank in house	Likert Scale Rating	Gas tank used indoors in all units.	Most homes store/use gas tanks inside.	Mixed practices; some indoor, some outdoor.	Majority store/use gas tanks safely outside.	Gas tanks rarely present indoors; strong adherence to safety.
	- Safety of electrical wiring and connections	Likert Scale Rating	Exposed, tangled wires; clear fire hazard.	Mostly illegal connections; no insulation.	Mixed; some safe, others makeshift.	Generally safe wiring; few hazards visible.	Wiring is safe, organized, and legally connected.
	- Availability of nearby water points	Likert Scale Rating	No access to water points nearby.	Very limited access; long walking distance.	Some shared taps, but irregular supply.	Reliable water point within 50m.	Multiple water points within close reach and good pressure.
8. Perceived Significance of Fire Risk	- Perceived severity of fire outbreaks	Likert Scale Rating	Fires are perceived as very frequent and highly destructive.	Fires occur often and pose a serious risk.	Fires happen occasionally and are a concern.	Fires are rare and generally under control.	Fires are almost never mentioned as a concern; strong sense of safety.
	- Perceived importance of fire risk compared to other hazards, housing or economic challenges	Likert Scale Rating	Fire is seen as the most urgent daily threat.	Fire is one of the top concerns.	Fire is important, but on par with housing, floods, or jobs.	Fire is a lower concern; other issues are more pressing.	Fire is no longer seen as a major problem; other priorities dominate.

3. Findings

3.5 Results Averages Likert scale grading

Variable	Indicator	Viwandani		Kwa Ruben	
		Score	Amt. quotes	Score	Amt. quotes
Stakeholder	Coordination	2,3	13	3,6	20
	Influence CBO's	1,7	4	4,2	7
	Information sharing	2,3	15	3,6	17
	Mandate	2,2	5	3,6	10
	Responsibility	1,7	7	3,4	8
Resources	Adequacy	1,8	6	3	2
	Flexibility	1,2	4	1,8	7
	Local level	2	8	2,6	9
Flexibility & Continuity	Adaptability	1,8	4	3,1	8
	Continuity CBO's	2,4	5	3,9	9
	Long-term planning	1,4	8	4,1	7
Barriers	Competing priorities	2	5	3	3
	Political will	1,8	13	2	1
	Technical expertise	-	-	-	-
Participatory process	Clarity of communication	2,3	4	3,9	8
	Community involvement	2,1	9	3,9	10
	Feeling heard	2,3	8	2,8	10
	Marginalized groups	-	-	-	-
	Perceived transparency	2	3	2	3
	Roles and Rights	2	1	3,9	7
Spatial interventions	Access road	1,9	9	4,1	13
	Building seperation	1,8	19	2,4	11
	Electricity	1,8	13	2,5	13
	Gas tank	1,5	4	2,3	7
	Stone House	1,7	10	2,1	8
	Water points	1,9	10	3,6	15
Perceived severity	Safety	1,4	17	2,4	13
	Compared safety	2	5	3,5	8

Spatial Observations

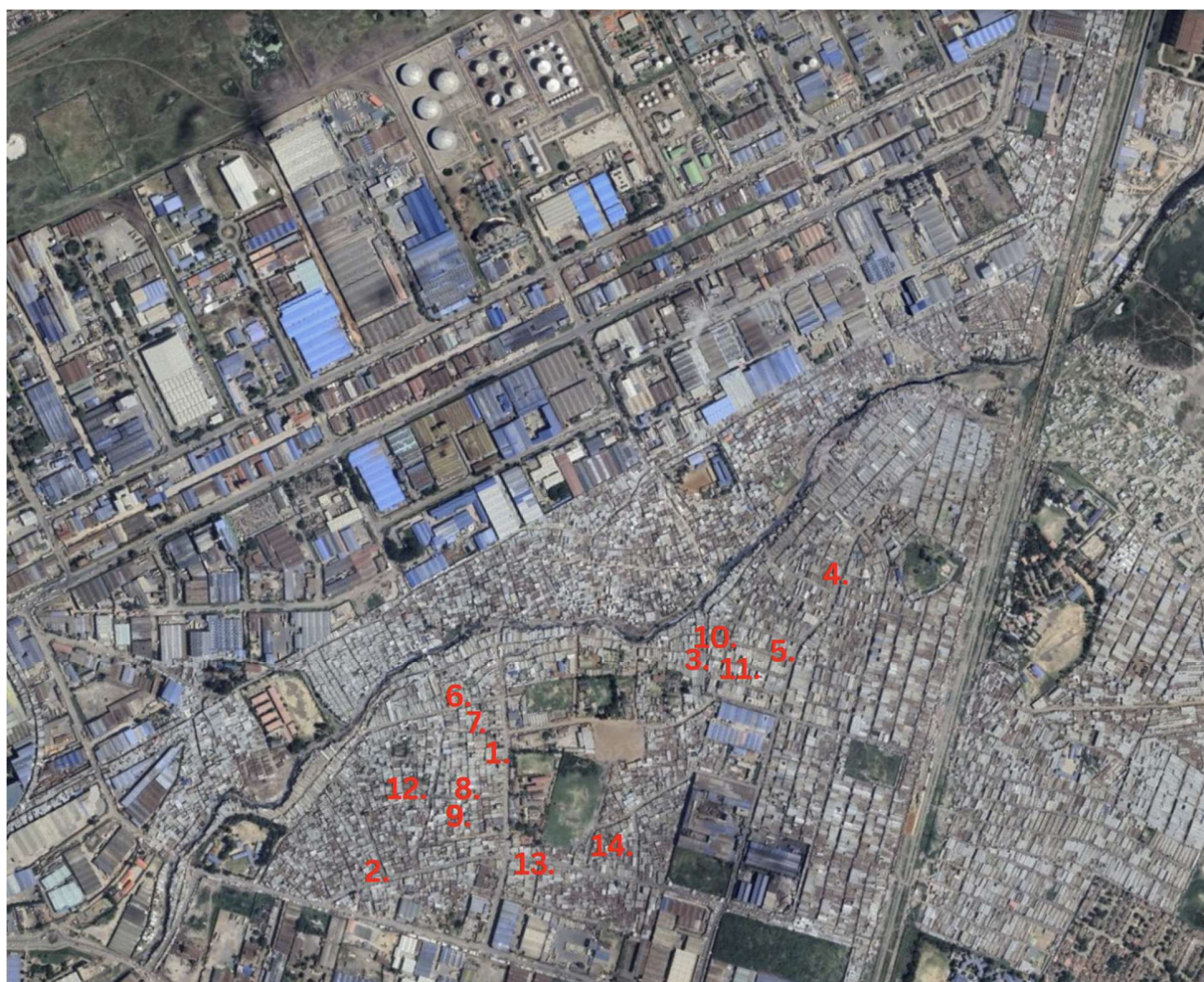
To triangulate qualitative interview findings and enrich contextual understanding of fire safety conditions, spatial observations were conducted in both the SPA-upgraded and non-upgraded areas. These observations followed three complementary approaches:

3.5.1 Systematic Access Road Assessment

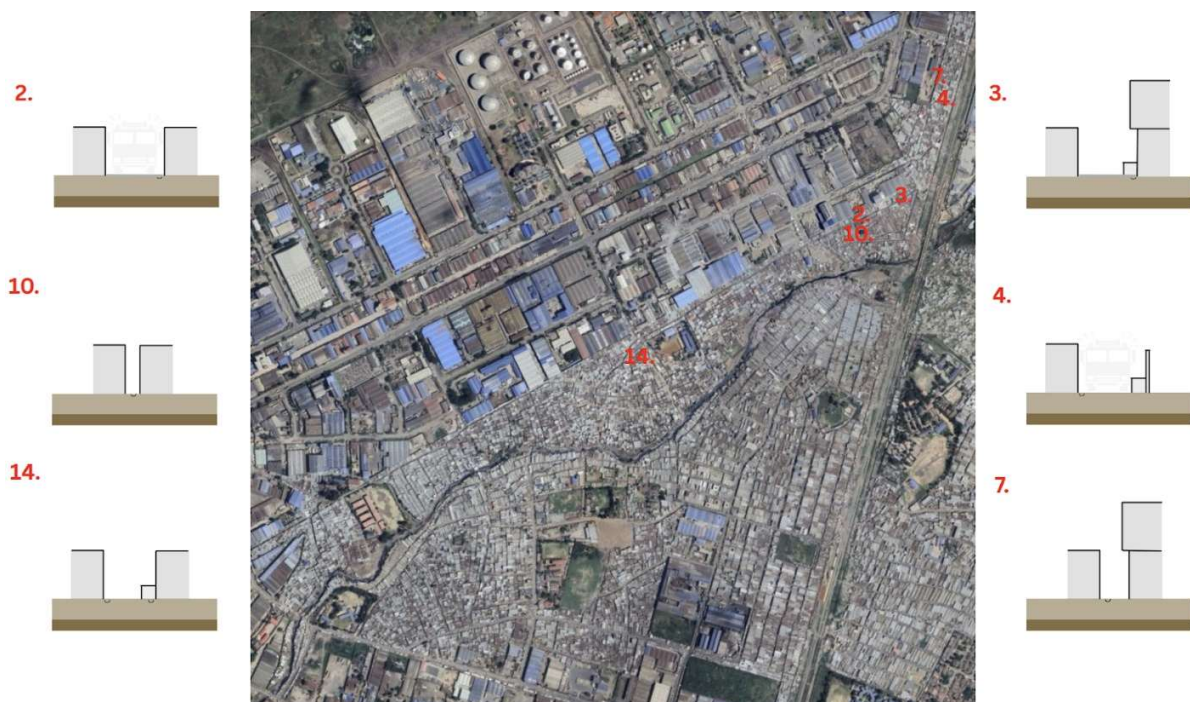
The width and condition of 14 streets and access roads were measured and visually assessed across both areas. Observations focused on clutter, pavement quality and navigability, factors critical for fire truck access and emergency evacuation. These data were then compared to explore whether spatial restructuring under the SPA had tangible effects on accessibility.

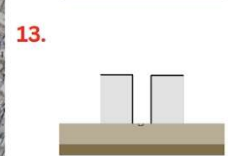
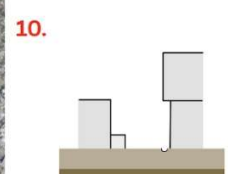
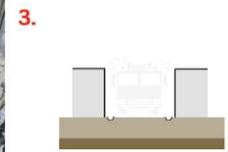
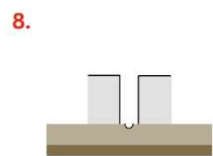
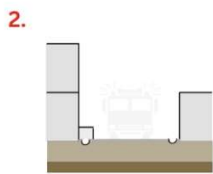
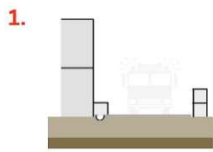


Viwandani						
	Width (m)	Non paved/Paved	Cluttered/Free	Clogged/No drainage/Drainage functioning		
1	21	1	1	1		(Access Road)
2	6.5	1	0	0		(Access Road)
3	4.5	1	0	0		(Access Road)
4	5	0	0	0		(Access Road)
5	0.6	0	0	0		
6	0.3	0	1	0		
7	1.2	0	0	0		
8	0.6	0	0	0		
9	0.6	0	1	0		
10	0.5	0	1	0		
12	1.4	0	0	0		
13	0.8	0	0	0		
14	1.2	0	0	0		



Kwa Reuben						
	Width (m)	Non paved/Pave	Cluttered/Free	Clogged/No drainage/	Drainage functioning	
1	12	1	0	1		(Access Road)
2	12	1	0	1		(Access Road)
3	11	1	0	1		(Access Road)
4	12	1	0	1		(Access Road)
5	8	0	1	1		
6	1.2	0	0	0		
7	4	0	0	0		
8	0.8	0	1	0		
9	0.6	0	1	0		
10	8	1	0	1		
12	1	0	1	0		
13	0.4	0	1	0		
14	0.8	0	0	0		





3.5.2 Household Level Sampling

A purposive sample of eight accessible homes from each area was observed and compared based on fire safety-relevant variables: primary building material, electricity connection, presence of a gas tank, distance to the nearest water point and spatial separation from adjacent structures. Although access limitations constrained the randomness of the sample, the selection aimed to reflect typical residential conditions. Comparative graphs illustrate differences and support or challenge claims raised during resident interviews.

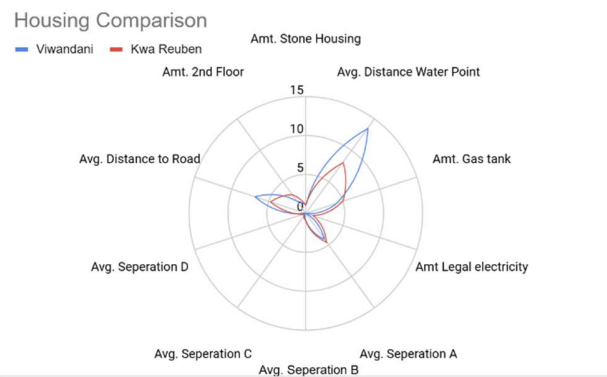


Housing Viwandani											
	Iron sheet/Stone	Distance water p	Gas tank/Electri	Illegal/legal elect	Seperation A	Seperation B	Seperation C	Seperation D	Distance to road	1 Floor / 2nd Floor	
1	0	12	0	0	6	0	0	0	0	0	
2	0	15	1	0	1.5	0	0	0	14	0	
3	0	30	1	0	1	0	0	0	8	0	
4	0	15	1	0	6	0	0.5	0	0	1	
5	0	10	0	0	4	0	0	0	0	0	
6	0	8	0	0	1.2	0.5	0.5	0	6	0	
7	1	8	1	0	12	6	0.5	0.5	12	1	
8	0	10	0	0	1.5	0.5	0	1	15	0	



Kwa Reuben											
	Iron sheet/Stone	Distance water p	Gas tank/Electri	Illegal/legal elect	Seperation A	Seperation B	Seperation C	Seperation D	Distance to road	1 Floor / 2nd Floor	
1	1	6	0	1	12	0	0.6	0	0	1	
2	0	8	0	0	6	0.5	0	0.5	6	0	
3	0	12	1	0	1	0	0.6	0	8	0	
4	0	12	1	0	2	0	0	0	0	0	
5	0	6	1	0	5	0	0	0	8	0	
6	0	3	0	0	1.5	0.5	1	0	6	1	
7	0	6	1	0	7	6	1	0.5	0	1	
8	0	12	1	0	2	0.5	0	1	10	0	

Housing compared	Viwandani	Kwa Reuben
Amt. Stone Housing	1	1
Avg. Distance Water Point	13.5	8.125
Amt. Gas tank	4	5
Amt Legal electricity	0	1
Avg. Seperation A	4.15	4.5625
Avg. Seperation B	0.88	0.9375
Avg. Seperation C	0.19	0.4
Avg. Seperation D	0.19	0.25
Avg. Distance to Road	6.875	4.75
Amt. 2nd Floor	2	3



3.5.3 Inductive Observation

Additional field observations were conducted inductively to identify unanticipated spatial features relevant to fire safety and disaster risk. These included informal water access points, drainage conditions, fire-fighting barriers and waste accumulation. Such observations provided context-specific insights into how physical conditions beyond planned upgrades affect everyday risk and response capacity.

4. Interview guide

Main Question:

Can you tell me a bit about yourself and your household?

Follow-up Prompts:

Age and gender

How many people live in your household?

How long have you lived in this area?

Section A: Perceived Significance of Fire Risk

Main Question:

How do you see the risk of fire in your neighborhood?

Follow-up Prompts:

How serious is it compared to other issues like flooding, crime or eviction?

Do local leaders or institutions take it seriously?

Have there been past fire incidents? How were they handled?

Section B: Community Participation

Main Question:

How involved are you and your neighbors in decisions about safety and upgrading in the area?

Follow-up Prompts:

Participation in meetings or activities about fire safety

Whether community members have a voice in decisions

Clarity of communication on fire risks

Whether concerns are listened to by planners or service providers

Inclusion of all groups in participation

Awareness of your role or rights in local decision-making

Section C: Spatial Risk and Mitigation

Main Question:

Can you describe how the physical layout and conditions in the neighborhood affect fire safety?

Follow-up Prompts:

Width of roads and access for emergency vehicles

Building density and spacing

Common housing materials (e.g., flammable?)

Use of open fires for cooking or waste

Electrical safety

Water access in case of fire

Section D: Institutional Flexibility and Sustainability

Main Question:

How effective and lasting are the changes or improvements made for safety?

Follow-up Prompts:

Do you think improvements will last? Or improvements will come?

Presence and strength of local safety groups or organizations

Ability of institutions to adapt or respond to changing risk

Section E: Barriers and Competing Priorities

Main Question:

What makes it hard to improve fire safety in this neighborhood?

Follow-up Prompts:

Main barriers (e.g., space, money, land rights, politics)

Other issues that get more attention than fire risk

Are residents or institutions overwhelmed by other needs?

Section F: Stakeholders and Coordination

Main Question:

Who do you think is responsible for reducing fire risk here and how do they work with others?

Follow-up Prompts:

Local leaders, government, NGOs or other actors

How are they coordinated with the government or each other?

Is there a clear process or confusion about roles?

Are responsibilities clearly communicated to the community?

Section G: Disaster Response and Perceptions

Main Question:

If a fire were to happen here, how do you think the response would go?

Follow-up Prompts:

Who responds first — neighbors, fire services, others?

How coordinated is the response?

Have you experienced or heard of past fire responses?

Was the response quick and effective?

Are there any preparedness or response plans in place?

Main Question:

If there was one thing you could change to make the area safer from fire, what would it be?

Are there any things you can tell about your living environment in regards to safety that we haven't talked about?

5. Privacy Checklist

CHECKLIST PRIVACY RELATED ASPECTS IN RESEARCH

INSTRUCTION

This checklist must be completed for every research carried out by researchers (staff and students) from the Department of Public Administration and Sociology (DPAS). This checklist must be completed before starting to collect data or approach participants. Students can get help from their supervising teacher when completing this checklist.

This checklist is a mandatory part of the thesis and must be uploaded to Canvas before data processing is started. Consult the Frequently Asked Questions (FAQ) when completing the checklist. This can be consulted on Canvas. The FAQ contains guidelines that guarantee privacy.

If you have any doubts about specific aspects of your research, discuss this with your EUR thesis supervisor in order to together find a solution.

PART I: GENERAL INFORMATION

Title of the project: Planning for Fire Risk Reduction in Informal Settlements: A case study in Special Planning Area Mukuru, Nairobi

Name and email address of student: Boris Staalenhoef, 627165bs@eur.nl / boris.staalenhoef@gmail.com

Name and e-mail address of thesis supervisor: Paul Rabé, rabe@ihs.nl

Start date and duration: January until submission (June 29th)

Is the research being conducted within DPAS? **YES** - NO

If NOT: at or for which institution or organization will the study be conducted?
(for example, an internship organization)

PART II: TYPE OF RESEARCH STUDY

Indicate what type of research your study involves by circling the correct answers:

1. Are natural persons involved in the research? • If YES, go to Part II

• If NO, go to PART IV

2. Is personal data processed as part of the research? Personal data relates to identified or identifiable natural persons. This includes both direct and indirect data. Interpret indirect personal data in the broadest sense of the word.

1

Indirect personal data can be any data that can be indirectly traced to a person.

If YES, justify below for what purpose the personal data is processed YES – NO YES – NO

In order to answer the research question (Currently: How does the Special Planning Area framework enable or limit the integration of fire risk reduction strategies in Mukuru?) it is necessary to differentiate the location of residents between respondents from the SPA area and outside of it. The extent to which this information will be detailed will be up to the respondent, but it is relevant for triangulation to explore the areas and spatial environment that respondents have been in. To make sure respondents are aware of their right to withhold information on their location or the option to answer questions fully anonymously these options are discussed in the consent form before the interview.

3. Are special personal data processed as part of the research? Special personal data: • Race or ethnic origin;

• Political views;

• Religious or philosophical beliefs;

- Trade union membership;
- Genetic data;
- Biometric data for the unique identification of a person, for example fingerprints or facial images;
- Information about mental or physical health; and/or
- Information regarding a person's sexual behavior or sexual orientation. If YES, justify the purpose of the processing for each personal data

YES – NO

2

4. Are minors (<16 years old) involved in the study, or other vulnerable groups who cannot give consent? For vulnerable groups, the residents of a women's refuge, refugees, and people with intellectual disabilities should be considered.

If YES, justify your answer below YES – NO

3

5. Will you pseudonymize any collected (special) personal data? With pseudonymization, identifying data is separated from non-identifying data and replaced by artificial identifiers.

Consider, for example, replacing the name and address data of each respondent with a unique respondent number. As a result, it is not visible to outsiders who the person to which these personal data belong is. Only the person who can make the link between the respondent number and the name and address details is able to link the personal data. Sufficient measures must be taken to make it impossible for unauthorized persons to link these files.

If YES, explain how you pseudonymize the personal data

YES – NO

Respondents' names will not be mentioned in the research, but replaced with unique respondent numbers that correspond with the areas of residence of respondents.

PART II – PERMISSION

Use the following table to assess whether a consent form should be prepared.

Type of data set	Informed consent form?
Collection of data set with personal data	Yes, a consent form must be prepared for all respondents.
Collection of data set with special personal data	Yes, a consent form must be prepared for all respondents. Important! Explicit consent is required for the processing of special personal data.

Collection of data set with personal data of vulnerable groups	Yes, a consent form must be prepared for all respondents. Important! If minors are involved in a study, the following rules apply: • Under 16 years of age: permission from respondent (if possible) and parent/guardian • Older than 16 years and younger than 18 years: permission from respondent.
--	--

Research with field observations without manipulations for which participants do not have to be identified	No, no consent form is required.
Data files in which no personal data is processed	No, no consent form is required.
Reuse of existing data set with the permission for reuse in future research in the same research area	No, there is no consent form in the following cases: 1. With initial research, the respondents gave permission for the data set to be reused for future research in the same field. 2. The owner of the initial research has publicly informed that the dataset is being reused for future research in the same field.
Reuse of existing data set without the permission for reuse in future research in the same research area	Yes, a consent form must be prepared for all respondents. Important! Do you not have the contact details? Then ensure that the data owner informs the public about the reuse of the dataset for future research. For example, by means of a Privacy Statement.

* Add your information and consent form in Appendix I (if applicable). 4

PART IV: DATA COLLECTION

7. From whom/what do you collect your data?

Note: indicate this per individual data source (interviews, questionnaire research, observations, etc.)

Interviews: with residents of Mukuru Viwandani and Mukuru Kwa Reuben Special Planning Area. Selection of residents is done so there is a representation with regards to gender and age. Men and women between 18 and 70.

8. How will you collect your data?

Note: indicate this per individual data source (interviews, questionnaire research, observations, etc.)

Through in-depth semi-structured interviews. These will be conducted in person, in or close to the location of residence of respondents.

9. What is the (expected) sample size?

2 x 5 - 8

10. What is the size of the population from which you draw a sample?

Estimates of the amount of residents in both areas vary greatly. Based on the 2021 government census Mukuru Viwandani holds 44,881 residents and Mukuru Kwa Reuben holds 130,401 residents. The total research population would thus be approximately 200.000 residents.

PART V – DATA STORAGE AND COPIES

11. Where do you store the data obtained in the short term ?

Note: Indicate this per individual data source, for example for test data on paper and for digital data files.

The recordings and transcripts of the interviews will be stored on OneDrive.

12. How long will you keep the data?

Note: Indicate this per individual data source, for example for test data on paper and for digital data files.

For a maximum of 10 years.

13. Who is responsible for the direct daily management, storage and backup of the data related to your research ?

Myself (Boris Staalenhoef).

14. Who has access to your research and underlying data set and with whom is it shared? Please note - ensure that only authorized persons have access to your research and underlying data set. For example, access to certain documents that are stored on your computer.

Myself (Boris Staalenhoef) and possibly my supervisor (Paul Rabé).

15. How (often) will you make backup copies of your research data for short-term security?

As often as possible, through the automatic backup of OneDrive.

PART VI: SIGNATURE

Please note that it is your responsibility to follow the privacy guidelines whilst conducting your research. Erasmus University Rotterdam recommends that you use the FAQs to ensure that the data is authentic, of high quality and processed correctly. This also means that you inform participants about the research and that you guarantee its confidentiality when storing and using personal data.

Deviating from the proposed advice from Erasmus University Rotterdam, as included in the FAQs, falls under your responsibility.

I hereby declare that the study will be conducted in accordance with the privacy guidelines of the Department of Public Administration and Sociology of the Erasmus University Rotterdam. I have answered all questions truthfully.

Name student: Boris Staalenhoef

Name EUR supervisor: Dr Paul Rabé

Signature:

Date: Date: 03/06/2025.

6. Research Consent Form (English)

Study Title: Planning for Fire Risk Reduction in Informal Settlements

Researcher: Boris Staalenhoef, Erasmus University Rotterdam, IHS

Date: 02 May, 2025

Why this research?

This study looks at the challenges and opportunities of slum upgrading and spatial interventions for mitigation of fire risk. The focus is on the role of adaptive governance in creating resilience.

Why are you being asked to join?

You are invited because your experiences as a community member of Mukuru can help us understand what works, what doesn't and what is missing in fire risk reduction.

What will you be asked to do?

If you agree, we will do a one-time interview. This will take about 20-40 minutes and may be recorded with your permission. You can skip any question or stop the interview at any time. Your participation is voluntary and you will not face any consequences if you choose not to take part or if you stop later.

Risks or Discomforts

There are no known risks from joining this study. Some questions may be personal. If you feel uncomfortable, you can skip any question or stop the interview.

What do you get?

You contribute to a better understanding of the area you live in. A reimbursement is provided to compensate you for your time.

Your privacy

Your answers will be kept private. We will not use your name in anything we publish. We will store your answers safely and use them only for this research and possibly future academic

studies. The data will be kept for 7 years and then deleted. Only the researcher and university staff may view the original data.

Can you change your mind?

Yes. You can withdraw at any time, even after the interview. If the data has not yet been published, we will delete it. If it has been fully anonymized, it may no longer be possible to remove it.

Do you want the results?

You can ask to receive a summary of the results once the study is finished.

Questions or concerns?

If you have questions, contact: Name: Boris Staalenhoef

Email: boris.staalenhoef@gmail.com Phone: +316 13539998

If you have privacy concerns, you can also contact Erasmus University's Data Protection fg@eur.nl.

Consent Form

By signing below, I confirm that:

I understand the purpose of the study and what is being asked.

I know participation is voluntary and I can stop at any time.

I agree to the interview being audio recorded.

I understand that my identity will remain confidential in any report or article. I agree that my answers may be used for future research or education, anonymously. I want to receive a summary of the research findings.

I agree to be contacted again for future research.

Name of participant:

Signature:

Date: 12-05-25

