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Socially inclusive infrastructure for disaster risk reduction in urban planning: insights from the SADC region

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Introduction: The accelerating pace of urbanization in the 21st century has intensified the need for inclusive and resilient infrastructure development, particularly in the face of rising socio-economic inequalities and escalating disaster risks. This study explores the integration of social equity dimensions and Disaster Risk Reduction (DRR) principles within urban planning frameworks as a pathway toward sustainable and resilient urban futures.

Methods: A qualitative research design was adopted, drawing on a triangulated methodology that includes document analysis, an extensive literature review, and selected case studies on urban planning practices. These methods were employed to interrogate current urban development paradigms and assess the extent to which equity and resilience are operationalized in planning processes.

Results: Findings indicate that, despite growing theoretical advancements in equitable and risk-sensitive urban development, significant systemic challenges remain. These include limited community participation in planning processes, persistent institutional silos, and resource constraints that hinder transformative action. The analysis further reveals that current urban governance mechanisms often lack the capacity to meaningfully integrate long-term resilience and equity considerations.

Discussion: In response to these challenges, the study recommends a paradigm shift in urban planning towards the adoption of future-oriented and participatory approaches. Key policy recommendations include: (1) embedding equity-focused DRR strategies within urban development policies; (2) fostering multi-stakeholder collaboration to bridge institutional divides; and (3) mainstreaming anticipatory and inclusive planning models in urban governance systems. Such integrative approaches are essential for aligning infrastructure development

with the broader goals of social justice, environmental sustainability, and urban resilience.

KEYWORDS

infrastructure development, social equity, urban planning, planning frameworks, systemic barriers, disaster risk reduction

Introduction and background

In the Global South, there is rapid urbanization driven by rural-urban migration and population growth. More often, such urbanization is spontaneous and unplanned, and where urban planning initiatives have been undertaken, they fail to account for the needs of marginalized communities, leading to inequality in terms of housing, services, and access to opportunities. In particular, the Southern Africa Development Community (SADC) region, Latin America, and parts of Asia face considerable challenges in fostering inclusive cities.

In Latin America, cities like São Paulo in Brazil and Buenos Aires in Argentina have experienced extensive informal (unplanned) settlements, also known as *favelas* or *villas miserias*. Such settlements often lack adequate infrastructure in terms of water, electricity, healthcare, and education facilities, as well as proper security. Urban planning policies in these cities have historically favored elite neighborhoods while neglecting informal settlements. For example, the implementation of the "*Favela Bairro*" program in Rio de Janeiro (1990s) aimed at improving living conditions in slums, but its outcomes were mixed, as it faced resistance from both residents and urban planners, who did not always respect the existing social fabric (Baker and Crouch, 2009).

These challenges in Latin America were compounded by the dominance of neoliberal economic policies, which emphasized market-driven solutions and often marginalized the needs of low-income urban dwellers. The growth of megacities in this context exacerbated inequality, limiting access to urban benefits for the poorest populations (Sabatini, 2001). Recent studies emphasize the persistence of inequalities, as urban growth often exacerbates social segregation rather than integration (Pandey et al., 2025).

In Asia, rapid urbanization and the expansion of megacities like Mumbai (India), Jakarta (Indonesia), and Manila (Philippines) have also led to widespread informal settlements. In these regions, urban planning has often focused on economic growth and infrastructure development at the expense of social inclusion (Mehrotra, 2009; Ravallion, 2007). The urban poor in these cities frequently experience exclusion from the formal housing market and struggle to access clean water, sanitation, and healthcare services. For instance, in Mumbai, the urban poor are often pushed to peripheral areas or confined to overcrowded slums (Deshpande and Sharma, 2023; Chakraborty, et al., 2024). The redevelopment policies in Mumbai, such as the Slum Rehabilitation Authority (SRA) scheme, have been criticized for displacing communities without providing adequate replacement housing or services (Pugh, 2013). These initiatives often lack sufficient attention to social equity, as they prioritize the interests of real estate developers over the needs of vulnerable communities. Recent research by Ananda et al. (2024) underscores the persistent challenges in ensuring housing security in the face of urban growth, emphasizing the neglect of equitable urban policies. Sub-Saharan Africa is experiencing rapid urbanization, with cities like Lagos (Nigeria), Nairobi (Kenya), and Addis Ababa (Ethiopia) growing at unprecedented rates. However, urban planning in many African cities has struggled to address inequality and social inclusion (Brookings Institution, 2023; Turok and McGranahan, 2021; Centre for Strategic and International Studies, 2018).

Rapid population growth and the lack of affordable housing have resulted in the proliferation of informal settlements that are often underserved by basic infrastructure. In the SADC region, the situation is particularly challenging. Cities like Harare (Zimbabwe) and Lusaka (Zambia) have witnessed the expansion of informal settlements due to inadequate urban planning. The challenges of land tenure and the lack of effective policies for inclusive development are key drivers of this issue (Friedmann, 2005; World Bank, 2020; Masimba and Walnycki, 2024). Kenya offers a pertinent example of the tensions between ambitious urban planning and the realities of social equity. Nairobi, the capital city, has experienced significant urban expansion, driven by both population growth and migration from rural areas. However, the city has struggled to balance this expansion with the needs of its lower-income populations, resulting in widespread informal settlements such as Kibera, Mathare, and Korogocho. These areas often lack adequate infrastructure and services, with residents facing challenges in accessing clean water, sanitation, and reliable public services (Wamuhu, 2015).

Urban planning in Nairobi has often been dominated by large-scale development projects that prioritize middle-class housing and infrastructure, often neglecting the needs of the poor (Wamuhu, 2015). The rapid growth of informal settlements highlights the failure of urban policies to provide affordable housing and access to basic services for the most vulnerable residents. A prominent example of this is the demolition of informal housing in 2010 under the Nairobi Regeneration Plan, which, despite promising infrastructure improvements, resulted in the displacement of thousands without offering adequate relocation options (Ng'weno, 2018). Kenya's Vision 2030, designed to transform the country into a middle-income economy, has been criticized for prioritizing economic growth over inclusivity. The focus on large infrastructural projects, such as the Nairobi Expressway, has raised concerns about the displacement of low-income communities and the exacerbation of social inequalities (Njuguna and Ouma, 2021). Although these projects are intended to alleviate congestion and stimulate the economy, they frequently fail to incorporate informal settlements or address issues of social equity (Njuguna and Ouma, 2021).

In Zimbabwe, for example, Operation Murambatsvina (2005) forcibly removed hundreds of thousands of informal settlers without providing them with alternative housing or livelihoods, exacerbating poverty and inequality (Makumbe, 2005). A more recent examination of Zimbabwe's urban policies by Bhanye et al.

(2023) highlights the continued struggle for secure land tenure and affordable housing options.

Unpacking 'social inclusivity' and 'socially inclusive infrastructure'

Since "social inclusivity" and "socially inclusive infrastructure" have become catchy terms or concepts in urban planning and DRR forums, there is a need to unpack them so that urban planners, DRR practitioners, and citizens have a common understanding. They are multi-layered constructs whose interplay is determined by power dynamics, cultural norms, and institutional practices. Social inclusivity refers to processes, policies, and practices that enable individuals irrespective of their gender, race, socio-economic status, disability, age, or ethnicity to socially, economically, and politically participate as equal members of society or community and that their participation is underpinned by principles justice, and the respect for diversity. Thus, social inclusivity implies not leaving anyone behind. In the final analysis, social inclusivity entails ensuring that policies and practices do not reinforce exclusion but deliberately encourage the participation of underrepresented and marginalised communities by removing any structural barriers to foster an environment where all diverse voices are heard and valued.

Socially inclusive infrastructure is more than just building physical structures. It entails creating built environments that are accessible, safe, and beneficial for all members of society, be it in public spaces, transportation systems, housing, and other community services. These facilities should be designed to include the needs of the most vulnerable and marginalized groups in the community such as the young and the aged, people living with visual, auditory, physical and speech disabilities, etc. Each of these groups needs specialised infrastructure to access certain services and hence the concept "socially inclusive infrastructure".

In short, while 'social inclusivity' constitutes a broad and normative goal that ensures the participation of each individual member of society in social activities, 'socially inclusive infrastructure' is the physical manifestation of this goal within the urban environment. However, both concepts are characterised by a commitment to equity, the dismantling of barriers, and proactive engagement with diverse communities. Both concepts have a symbiotic relationship since, in an urban environment, social inclusivity often results in the creation of inclusive infrastructure, which in turn facilitates even greater social inclusion.

Urban infrastructure is also often viewed as a catalyst for enhancing societal wellbeing and fostering economic opportunities. However, conventional approaches to infrastructure development frequently prioritize efficiency and economic growth, thus perpetuating possible existing social inequities, further marginalizing vulnerable populations, hence limiting their access to essential services such as transportation, housing, and public spaces (Soja, 2010).

Thus, while the concept of inclusive infrastructure development posits that social equity should be a core tenet of urban planning (Graham and Marvin, 2001), the practical realization of this ideal raises several complex challenges. As identified by UN-Habitat (2020), urban planners frequently encounter difficulties to effectively integrate Disaster Risk Reduction (DRR) with the needs of disadvantaged groups into their planning processes. This disparity suggests that merely advocating for inclusivity does not guarantee that the diverse needs of urban populations will be adequately addressed.

However, although participatory planning techniques are often lauded as methods to bridge the equity gap in urban development, these strategies can be problematic in practice. While the aim is to amplify community voices, the actual implementation of participatory processes can be marred by power imbalances, where more privileged groups dominate discussions (Fainstein, 2010; Sebunya and Gichuki, 2024), and hence the effectiveness of community engagement is undermined, leaving the voices of marginalized groups unheard. Moreover, Talen (2018) had earlier noted that policies that promote affordable housing and accessible public transportation do not automatically translate into equitable outcomes. Structural barriers such as systemic inequities, local political dynamics, and funding limitations can still hinder the successful execution of these initiatives, thus raising questions about the existence of and actual commitment to equity in urban planning.

Problem statement

Urban planning practices in the Southern African Development Community (SADC) region inadequately address social equity, despite growing global recognition of the need for inclusive infrastructure (UN-Habitat, 2022; World Bank, 2021). Marginalized populations, including low-income households, informal settlement dwellers, and historically disadvantaged communities, are systematically excluded from planning processes and often displaced by large-scale infrastructure projects, thus perpetuating spatial inequality and socio-economic segregation (Harvey, 2010; Huchzermeyer, 2011; Turok and Scheba, 2020). Institutional inertia, fragmented governance, limited stakeholder engagement, and resource constraints hinder the integration of equity considerations into urban planning frameworks (Parnell and Robinson, 2012; Todes, 2022). Additionally, there is a lack of actionable, context-sensitive frameworks to incorporate social equity into infrastructure development across the region, exacerbated by climate-related risks, rapid urbanization, and increasing inequality (SADC, 2020c; UNDRR, 2022). This study explored how urban planners and policymakers in the SADC region operationalize social equity in infrastructure development, using literature reviews, document analysis, and expert interviews to identify pathways for embedding equity-focused, inclusive, and participatory approaches into urban planning and governance.

Theoretical framework

This research was grounded in two key classical theories: Justice and the City (Harvey, 1975; Harvey, 2010) and Participatory Planning Theory (Arnstein, 1969). Justice and the City (Harvey, 1975; Harvey, 2010) framework emphasizes spatial justice and critiques the unequal distribution of resources in urban spaces. It advocates for equitable planning practices that address systemic inequalities. Harvey's ideas have evolved alongside contemporary

concerns about social and environmental justice. Modern scholars emphasize the importance of addressing urban inequality through policy reforms and community-driven urban design. Issues such as gentrification, housing affordability, and environmental sustainability are central to debates on spatial justice. For example, Fainstein's (2010) concept of the "just city" builds on Harvey's work by proposing a framework that prioritizes equity, diversity, and democracy in urban planning (Fainstein, 2010). More recent studies have integrated the concept of climate justice into broader discussions of spatial justice, highlighting the intersectionality of environmental, social, and urban inequalities, particularly in rapidly urbanizing regions of the Global South (Sultana, 2022a; Shi et al., 2016). This intersection is especially pronounced in the SADC region, where vulnerable populations are disproportionately exposed to climate-related hazards such as floods, droughts, and heatwaves, while simultaneously lacking access to adequate infrastructure and basic services (Ziervogel et al., 2022; UN-Habitat, 2022). Climate justice frameworks emphasize not only the differential impacts of climate change but also the uneven distribution of adaptation resources and decision-making power in urban governance systems (Islam, 2024). Spatial justice, therefore, cannot be pursued in isolation from environmental justice, as infrastructure investments often reinforce socio-environmental vulnerabilities when they exclude marginalized communities from planning and benefit-sharing processes (Anguelovski et al., 2020). Recognising and addressing these overlapping injustices is essential for creating equitable, climate-resilient cities, and calls for the integration of participatory, future-oriented, and equity-driven approaches in both urban planning and climate adaptation strategies across the SADC region (Pelling et al., 2018; Chu et al., 2019). Future research on spatial justice is expected to explore the role of technology and data-driven urban planning in mitigating inequities. Smart cities, if managed ethically, can be leveraged to promote inclusivity and access to resources. Scholars may also focus on global south perspectives, critiquing how colonial legacies influence urban inequalities (Parnell and Robinson, 2012). The integration of participatory governance mechanisms, rooted in local knowledge, will likely be essential in achieving spatial justice in rapidly urbanizing regions.

In Participatory Planning Theory (Arnstein, 1969), Sherry Arnstein's "ladder of citizen participation" categorizes the levels of public involvement in decision-making, ranging from tokenism to genuine partnership. This theory underpins the importance of integrating diverse voices in urban planning. Contemporary research not only acknowledges the enduring relevance of Arnstein's ladder, but also criticizes its limitations. For instance, scholars argue for a more nuanced understanding of power dynamics in participation, as not all groups hold equal capacity to engage (Bherer et al., 2016). Furthermore, participatory planning is now intertwined with digital engagement tools, enabling broader citizen involvement but also raising concerns about digital exclusion (Evans-Cowley and Hollander, 2020). Participatory planning is increasingly viewed as a means to address equity issues in urban governance, particularly by incorporating diverse voices from underrepresented communities (Sebunya and Gichuki, 2024).

It is anticipated that future participatory planning theories are likely to integrate technological tools, such as artificial intelligence (AI) and big data, to enhance citizen engagement. However, challenges related to data privacy, the digital divide, and the ethical issues associated with AI in urban governance. Emerging approaches will need to prioritize co-creation and intersectionality, acknowledging the interconnectedness of social, cultural, and environmental issues in urban planning (Castán Broto and Neves Alves, 2018). With intersectionality, individuals are seen as holding multiple identities that intersect, resulting in varied experiences of privilege and/or marginalization. Thus, a socially inclusive society addresses these overlapping disadvantages rather than treating any single category in isolation. Additionally, participatory planning in post-pandemic cities is expected to focus on resilience-building and adaptive governance to respond to global crises. These theories provide a lens for examining how infrastructure planning processes can be reshaped to prioritize social equity.

Policy gaps and challenges

In the Global South, the gap between ambitious urban planning initiatives and the reality on the ground is often due to weak governance structures, inadequate data, and a lack of coordination between different levels of government and stakeholders. While urban planning in these regions often focuses on large-scale infrastructure projects, such as highways, public transport systems, and large housing developments, these initiatives frequently overlook the needs of vulnerable populations. This policy gap is evident in the SADC region, where urban planning frameworks frequently fail to address issues of social equity, resulting in entrenched inequality.

A critical policy issue in the SADC region is the failure of urban planning to incorporate disaster risk reduction (DRR) strategies. Urban areas in the region are highly susceptible to climate-related hazards, such as floods, droughts, and cyclones. Furthermore, DRR policies often fail to consider the needs of informal settlements. A good example was the Cyclone Idai disaster in 2019, which revealed how poorly planned urban growth exacerbates vulnerability, particularly for low-income communities in cities like Beira (Mozambique). Vulnerable communities are often located in high-risk areas that the affluent communities have avoided and are characterised by limited access to emergency services or disaster mitigation measures (UNDRR, 2020). The more urban areas expand, the more critical the need for the incorporation of DRR policies, particularly in megacities across the Global South. Recent work by Kapucu et al. (2024) suggests that the lack of adequate risk assessments in urban planning in the Global South significantly undermines resilience, leaving communities more exposed to disasters. This underlines the need for policies that integrate climate adaptation and risk reduction alongside growth and development strategies.

Climate change and urban resilience

Urban planning in the Global South is increasingly being influenced by the growing impact of climate change, which exacerbates vulnerabilities in already marginalized communities. Climate change-related risks, which include rising temperatures, flooding, and drought, pose significant threats to urban populations

in the SADC region and beyond. For example, in Manila, the urban poor are highly vulnerable to flooding and typhoons due to the city's inadequate drainage systems and lack of effective urban planning. In these cities, climate change intersects with social inequality, making poor communities more susceptible to climate-related disasters (Noble, 2017). Similarly, in cities like Lusaka, Zambia, and Harare, Zimbabwe climate change impacts, such as frequent droughts, floods and high temperatures, threaten the availability of portable water, and urban agriculture-based livelihoods thus exacerbating urban poverty (SADC, 2020c). A study by Johnson et al. (2021) emphasizes how climate change disproportionately affects the poorest urban dwellers in Sub-Saharan Africa, further deepening existing socio-economic disparities.

Whereas urban areas are major contributors to climate change and associated disasters, they are also among the most vulnerable to their impacts. As a response, the integration of global climate frameworks into urban planning to achieve sustainable development and resilient cities is crucial. International frameworks which include the Paria Agreement, sustainable development goals and the Sendai Framework for Disaster Risk Reduction, among others, provide strategic tools, targets and direction to assist urban areas to integrate climate related action into their development initiatives. Th Paris Agreement established in 2015 under the United Nations Framework Convention on Climate Change (UNFCCC) outlines strategic objectives to limit and/or eliminate global warming to below 2°C above pre-industrial levels (UNFCCC, 2015). Therefore, countries are required to develop and submit the Nationally Determined Contributions (NDCs), which include various climate change mitigation and adaptation strategies in urban areas which are centered around green infrastructure development, integrated public transport, low-emission building codes, and land use and zoning reforms to reduce climate risks.

Sustainable development goals agenda 2030, goals and 13, pays attention to climate change. Goal 11 aspires to "Make cities and human settlements inclusive, safe, resilient, and sustainable" whereas goal 13 "take urgent action to combat climate change and its impacts" (United Nations, 2015). That is, urban planning is a mechanism for achieving these goals by encouraging and promoting the designing of inclusive, accessible public spaces, the improvement of slum conditions and building of climate-resilient housing, and, planning of energy-efficient infrastructure and sustainable mobility. The Sendai Framework for Disaster Risk Reduction (2015–2030), emphases the reduction of disaster risks through, early warning, preparedness and risk-sensitive planning and promotes the mainstreaming of risk reduction into infrastructure, spatial planning decisions and urban governance (UNDRR, 2015). Urban planning can integrate this framework through the identification and avoidance of high-risk areas such as floodplains and unstable slopes, the enforcement of hazard-resilient building regulations, and assurance that critical infrastructure in urban areas is disaster-ready.

As SADC is also confronted with disasters as a result of climate change, such as prolonged floods and droughts, rising temperatures, and water insecurity, integrating policy in their urban planning for disaster risk reduction is a priority. The majority of urban centers in this region are vulnerable and not resilient because of rapid rural-urban migration, mushrooming of informal settlements, and inadequate infrastructure. To respond to these regional challenges, the SADC has developed frameworks that guide climate action in alignment with the global frameworks, with the hope of building and developing urban areas that are climate resilient, produce low carbon and are inclusive. Firstly, the SADC Regional Infrastructure Development Master Plan (RIDMP)'s emphasis is on the integration of transport, energy, ICT, water infrastructure, and climate-proofing with the aim of promoting green infrastructure and climate-resilient urban transport systems (SADC, 2012). Secondly, the SADC Climate Change Strategy and Action Plan (CCSAP) 2015–2030 developed mainly for climate change mitigation and adaptation, focusses on the region's DRR strategies, better water resources management and sustainable urban development by encouraging its members states integrate climate action into national and urban planning (SADC, 2020b). Thirdly, the Regional Indicative Strategic Development Plan (RISDP) 2020–2030 supports inclusive urban development planning that responds to the socio-economic challenges and vulnerabilities that are aggravated by climate change by guiding SADC's long-term development agenda with an emphasis on infrastructure development, climate resilience, and urban sustainability (SADC, 2020a). Lastly, the SADC Disaster Risk Reduction Strategy and Plan of Action (2021–2030) is aligned with the Sendai Framework for Disaster Risk Reduction and endorses the integration of DRR into urban planning through the adoption of appropriate building codes and land-use policies (SADC, 2021).

Addressing the challenges of urban planning in the face of climate change requires a shift towards more inclusive and sustainable approaches. For example, in Latin America, cities like Medellín, Colombia, have begun to incorporate climate resilience into their urban planning strategies, focusing on social inclusion and the provision of green infrastructure (Anguelovski et al., 2019). Their urban planning has further adopted a "Sustainable Urban Mobility Plan" which is in alignment with the SDGs 11 and 13 aspirations, focusing on the development of cable cars, strengthening of public transit, and ensuring equitable access (UN-Habitat, 2020). In Asia, the "eco-city" movement in cities like Singapore started earlier than in Latin America and emphasizes sustainable urban development with a focus on environmental, economic, and social resilience (Hu et al., 2016). More recently, Lv and Sarker (2024) highlighted the role of integrated urban systems in building resilience to climate change, emphasizing the need for cities in Asia to adopt more adaptive and participatory planning frameworks. In South Africa's local government, the NDC accentuates the densification of urban settlements and integrated transport systems, requiring municipalities to align their spatial development frameworks accordingly (DEA, 2016). Whereas in Japan, post the 2011 earthquake, the country's recovery plans in alignment with Sendai principles focused on revising urban zoning aimed at relocating communities away from hazard-prone coastlines (Maly and Suppasri, 2020).

Research approach

This study employed a qualitative methodology to explore inclusive infrastructure development. Data was collected through a review of literature, document analysis, and an analysis of researcher insights and experiences. A case study design was also employed to gain more insights from the unique circumstances and environments of different urban areas. This was benchmarked with

data from the Sendai monitor and the International Science Council on horizon scanning. Key planning policies, urban development guidelines, and project reports from global organizations such as UN-Habitat, the World Bank, and municipal planning authorities were reviewed. A Thematic analysis was used to highlight the extent to which social equity considerations are embedded in current frameworks. All this was compared with findings from peer-reviewed articles, books, and conference proceedings on urban planning, social equity, and participatory governance. Notable contributions include works by Susan Fainstein (2010). The use of cases in qualitative research allows for in-depth, context-specific analysis, prioritizing understanding over generalizability (Yin, 2018; Stake, 2020). In this study, a "case" refers to a specific urban planning initiative or project within a defined geographical or socio-political context. Each case offers a comprehensive exploration of the socio-political, economic, and environmental factors shaping urban planning outcomes. Cases provide opportunities to examine stakeholder perceptions and interactions, including those of governments, communities, and private actors (Flyvbjerg, 2011). The diversity of cases enables comparative analysis, uncovering patterns, successes, and shortcomings across various regions and urban planning models (Creswell and Poth, 2018).

Case selection

Six cases were selected for the study grounded in the scientific principles of comparative case study analysis within the framework of qualitative research and Disaster Risk Reduction (DRR). The cases selection considered the following:

- Geographic Diversity and Urbanization Context
- Relevance to Disaster Risk Reduction (DRR)
- Representation of Social Equity and Community Inclusion Issues
- Variation in Urban Planning Approaches
- Policy and Implementation Challenges
- Applicability to Qualitative Research

The six cases were chosen from the SADC region and other municipals of the global south, and included Alexandra Township Upgrading Project (South Africa), Maputo's Climate Resilience Project (Mozambique), Lilongwe's Urban Poor Development Strategy (Malawi), Durban's Urban Climate Adaptation and Resilience (South Africa), Bogotá's TransMilenio Transportation System (Colombia), and the Redevelopment of Dharavi Slum (India), The cases illustrate the complex interplay between ambitious urban planning initiatives and the realities of social equity, community inclusion, and resilience.

These cases represent cities in different geographic and socio-economic contexts, spanning Africa, Asia, and Latin America. They reflect the global scope of challenges and opportunities associated with urbanization, particularly in regions experiencing rapid urban growth and high vulnerability to social and environmental risks.

Each city is characterized by unique significant urbanization pressures, including population growth, informal settlement expansion, and inadequate infrastructure. Three of the six cases are drawn from Sub-Saharan Africa (SADC region), offering insights into DRR and urban planning in one of the world's most vulnerable regions to climate change and urban inequalities. Including cases from Latin America and South Asia ensures the study examines solutions from diverse cultural, political, and environmental contexts, facilitating cross-regional learning. Each case highlights critical aspects of DRR integration in urban planning, making them valuable for examining how cities address disaster risks while promoting inclusivity and resilience. The cases offer diverse perspectives on how DRR principles can align with social equity and inclusivity in urban planning.

Findings

Issues emerging from planning policies and guidelines

A review of key planning policies, urban development guidelines, and project reports from prominent global organizations such as UN-Habitat, the World Bank, and various municipal planning authorities in Southern African Development Community (SADC) countries reveals significant insights into the extent to which social equity is considered within disaster risk reduction (DRR) and sustainable development frameworks. These can be itemized as; lack of comprehensive equity frameworks, disparities in resource allocation, marginalization of vulnerable groups, insufficient integration of local knowledge, and the interplay between climate adaptation and social inequality all pose significant challenges.

Lack of comprehensive equity frameworks

Many SADC countries exhibit a significant gap in the formulation of policies that explicitly address social equity in DRR and sustainable development. According to UN-Habitat (2020), while there are frameworks in place for sustainable urban development, these often lack the necessary specificity to guide equitable practices effectively. The absence of comprehensive equity guidelines can lead to inconsistencies in the implementation of policies, particularly in multi-dimensional contexts where vulnerable groups may be disproportionately affected by disasters.

Disparities in resource allocation

Resource allocation remains a critical issue as highlighted in the analysis of municipal planning reports. Vaguely defined criteria for funding and resource distribution often result in uneven support across communities. As noted by Bhattacharya et al. (2019), inadequate investments in infrastructure for marginalized communities exacerbate their vulnerabilities in the face of disasters. The World Bank (2018) also emphasizes that without targeted interventions, disadvantaged populations remain at greater risk, undermining the principles of equity and fairness practices.

Marginalization of vulnerable groups

The review underscores the systemic marginalization of certain demographic groups, especially women, children, and the elderly, in DRR strategies. The indication is that in most SADC countries, the use of participatory approaches is superficial, and therefore fails to include the voices of marginalized groups (Mastrorillo, 2016). Although UN-Habitat advocates for inclusive practices, the actual engagement of these populations in decision-making processes often remains tokenistic or cosmetic and thus, affecting the relevance and efficacy of DRR policies (UN Habitat, 2020).

Insufficient integration of local knowledge

Another critical issue identified is the insufficient integration of local knowledge and community-based approaches in DRR and sustainable development frameworks. A study by Reid et al. (2017) highlights that although local communities often possess valuable insights into their vulnerabilities and capacities, their ideas and knowledge are frequently overlooked during the planning processes. Thus, this lack of recognition does not only diminish the effectiveness of DRR strategies but also perpetuates existing inequalities.

Climate change adaptation and social inequality

The intersection of climate change adaptation strategies and social equity considerations has emerged as one of the most significant concerns. As outlined by the World Bank (2019), climate change impacts exacerbate existing socio-economic disparities, making it imperative to embed equity into adaptation planning. However, many SADC countries have failed to align their climate change policies with equity objectives, hence prioritizing economic growth over social justice (Mastrorillo, 2016).

Reflections and takeaways from case studies

The cases that were analyzed illustrate the tension between ambitious urban planning initiatives and the realities of social equity and community inclusion. These cases include the Bogotá's TransMilenio Transportation System, Colombia, Redevelopment of Dharavi Slum, India, Alexandra Township Upgrading Project, South Africa, Maputo's Climate Resilience Project, Mozambique, Lilongwe's Urban Poor Development Strategy, Malawi and Durban's (eThekwini Municipality) Urban Climate Adaptation and Resilience, South Africa.

Bogotá's TransMilenio Bus Rapid Transit (BRT) system was designed and launched in 2000 to provide an affordable, efficient, and accessible transportation solution to a rapidly growing urban population. The project adopted a public-private partnership (PPP) strategy to share the costs and improve operational efficiency. The system was implemented to address severe traffic congestion, pollution, and poor access to reliable public transit, particularly for low-income residents living in peripheral neighborhoods. It consists of exclusive bus lanes, feeder routes connecting underserved areas, and well-integrated transport hubs. TransMilenio is now widely recognized as a model for urban mobility in cities with resource constraints, which demonstrates how cities can use innovative infrastructure solutions to address transportation inequities while reducing traffic and environmental issues.

However, although it was designed for inclusivity, its fare structure has been criticized as unaffordable, particularly for the poorest residents, limiting accessibility for the very communities it aimed to serve. A significant portion of low-income populations continues to rely on informal transport options, which are unregulated and unsafe. Rapid population growth and insufficient capacity have led to overcrowding during peak hours, diminishing user satisfaction. Feeder routes have not been extended adequately to cover all underserved neighborhoods, leaving some marginalized groups without effective transit access. Initially, planning phases involved little consultation with affected communities, leading to implementation challenges and public dissatisfaction in certain areas.

The project indirectly contributes to Disaster Risk Reduction (DRR) by reducing air pollution and greenhouse gas emissions, which are linked to climate change impacts. However, the system has not fully addressed resilience to natural disasters, such as flooding, which frequently disrupts urban mobility in Bogotá. TransMilenio significantly reduced travel times and improved connectivity between central business districts and outlying areas. Despite its challenges, the system remains a globally recognized example of urban mobility innovation in low- and middle-income countries.

Redevelopment of Dharavi Slum, India

Dharavi, located in Mumbai, India, is one of the largest informal settlements in the world, with an estimated population of between 700,000 and 1,000,000 people within 2.1 square kilometers. Therefore, the Dharavi Redevelopment Project (DRP) was launched in 2004 by the Maharashtra state government to transform Dharavi into a formal urban area with better housing, sanitation, and infrastructure. The project embarked on the development of multi-story apartment complexes to replace informal housing and included provisions for improved water supply, drainage, and waste management systems. The Dharavi case is emblematic of the challenges in balancing urban renewal with the livelihoods and cultural fabric of informal settlements. As a thriving hub of informal businesses, Dharavi contributes an estimated $1 billion annually to Mumbai's economy through small-scale industries like leather goods, pottery, and textiles.

Despite the scale and positive intentions of the project, consultation with residents and business owners during the planning phase was minimal. Proposed designs ignored the economic and social realities of Dharavi's residents, particularly those dependent on informal industries. The redevelopment plans prioritized high-rise apartment complexes that failed to accommodate the needs of many households and businesses, thereby displacing a significant portion of the population. An informal economy, which depended on spatially distributed, ground-level workshops and markets, was not considered in the redevelopment model. The project's focus on commercialization and high-value real estate developments led to concerns that it was more aligned with the interests of developers than the residents.

During the housing allocation phase, the criteria used excluded many long-term residents who lacked formal ownership documentation, perpetuating inequities. It is worth noting that Dharavi faces significant vulnerabilities to flooding and public health crises due to inadequate drainage and sanitation systems. While the DRP included plans for improved infrastructure, delays, and fragmented implementation left these issues largely unaddressed. The redevelopment plan aimed to improve sanitation and drainage systems to reduce vulnerability to seasonal floods and health risks. However, the lack of a holistic risk assessment and poor maintenance of existing infrastructure meant that vulnerabilities to disasters remained high. Thus, despite over two decades of planning, the DRP has seen limited implementation due to resistance from residents, legal battles, and changing political priorities. While some small-scale housing upgrades and sanitation improvements have occurred, the broader redevelopment vision remains unrealized.

Alexandra township upgrading project, South Africa

The Alexandra Renewal Project (ARP) was launched in 2001 as part of South Africa's broader urban renewal program to address poverty, inadequate infrastructure, and social inequalities in one of Johannesburg's most underserved areas. The upgrades aimed to mitigate flood risks in the Jukskei River area, which frequently affects nearby informal settlements. The project included upgrading housing, improving sanitation, and developing transportation infrastructure, and local communities were involved in the planning process. The project highlights the challenges and successes of addressing historical inequities in urban areas while emphasizing participatory governance. Despite some challenges, ARP has demonstrated the importance of including marginalized communities in decision-making to ensure infrastructure investments meet their needs.

Maputo's climate resilience project, Mozambique

Maputo has faced increasing vulnerability to flooding and coastal erosion due to climate change. The Climate Resilience Project has focused on improving stormwater drainage, upgrading informal settlements, and implementing mangrove restoration along the coastline. The project incorporates nature-based solutions such as mangrove restoration to reduce disaster risks and protect vulnerable coastal areas. Community participation has been central, with residents involved in co-developing climate-resilient housing designs and adaptation measures. This project has demonstrated how integrating DRR principles into urban planning can address the dual challenges of social equity and climate resilience, particularly in informal settlements.

Lilongwe's urban poor development strategy, Malawi

In Lilongwe, Malawi's capital, infrastructure development initiatives under the Urban Poor Development Strategy aimed to improve housing, water supply, and sanitation services in informal settlements. Efforts included improving drainage systems and reducing flood risks in low-income, high-risk areas prone to seasonal flooding. The strategy incorporated community-driven approaches, where local residents participated in identifying priority projects and co-managing resources. The initiative demonstrates how inclusive approaches to urban planning can improve access to infrastructure for marginalized populations while addressing systemic inequalities.

Durban's (eThekwini municipality) urban climate adaptation and resilience, South Africa

Durban's Municipal Climate Protection Programme (MCPP) integrates DRR into urban planning by addressing vulnerabilities in informal settlements, developing green infrastructure, and implementing climate adaptation measures. The MCPP has a strong focus on flood risk management, with initiatives such as wetland restoration and resilient drainage systems. The program has worked closely with local communities to design climate-resilient housing and promote urban agriculture for food security. Durban's initiatives offer a strong example of how cities in the SADC region can combine equity, climate adaptation, and resilience-building in urban planning. Table 1 below provides a summary of the above case studies.

While projects like Bogotá's TransMilenio and Maputo's Climate Resilience Project included community input, participation was often limited in scope. The Dharavi Slum Redevelopment, on the other hand, faced significant opposition because residents felt excluded from key decision-making processes, leading to distrust and delays (Rigon, 2022). Similarly, in Alexandra, South Africa, the Alexandra Renewal Project (ARP) involved community consultations but did not fully address long-standing grievances regarding land tenure and service delivery. It also emerged that issues of affordability and accessibility are of paramount importance. TransMilenio's pricing structure, while affordable for some, has remained prohibitive for Bogotá's poorest citizens. This highlights a critical equity issue that, while infrastructure is made available, it may not be truly accessible to the most vulnerable populations (Cervero, 2013). Resource Constraint is another emerging theme. Projects like Lilongwe's Urban Poor Development Strategy have demonstrated the potential of community-driven approaches but limited financial and technical resources restrict scalability and long-term sustainability (Satterthwaite, 2020). Similarly, in Maputo, scaling mangrove restoration and maintaining stormwater systems require additional funding and technical capacity.

The aspect of Resilience Gaps is demonstrated by both the Maputo and Alexandra projects. While DRR principles were integrated into projects in Maputo and Alexandra, implementation gaps remain. For instance, informal settlements in Maputo continue to face flood risks due to challenges in maintaining and expanding infrastructure in high-risk areas. In Alexandra, flood mitigation efforts in the Jukskei River area improved conditions but failed to address broader systemic issues like land-use planning.

In Dharavi, redevelopment plans risked displacing informal workers and small business owners without adequate compensation or alternative arrangements (Rigon, 2022). In other words, the redevelopment was a threat to other people's livelihoods, and hence, there was little or no buy-in. Similarly, informal settlement residents in Alexandra still experience inequities in service delivery, perpetuating historical injustices. Infrastructure improvements often disproportionately benefit higher-income groups or better-organized communities. For instance, in Bogotá, wealthier neighbourhoods benefit more from improved transit efficiency, while low-income users still face affordability barriers (Cervero,

TABLE 1 Case studies summary.

Case study	Geographic context	Objective	DRR integration	Outcome	Source
Bogotá's TransMilenio, Colombia	Latin America	Create an affordable, efficient, and accessible public transportation system to reduce urban congestion and improve mobility.	Reduces emissions and contributes to climate change mitigation indirectly.	Reduced travel times and improved access for low-income communities, but concerns remain about affordability for the poorest citizens.	Cervero (2013), Fainstein (2010).
Dharavi Slum Redevelopment, India	South Asia	Transform one of Asia's largest informal settlements into a formalized urban area with better housing, sanitation, and infrastructure.	Flood risk reduction and sanitation improvements were proposed but unfulfilled.	Limited progress due to opposition from residents over inadequate stakeholder participation and loss of livelihoods in redevelopment plans.	Rigon (2022), Satterthwaite (2020).
Alexandra Township, South Africa	Sub-Saharan Africa	Address poverty, inadequate infrastructure, and social inequalities through housing upgrades, sanitation improvements, and transportation infrastructure.	Mitigates flood risks in the Jukskei River area.	Improved basic services and flood risk mitigation, but progress has been slow, and some community concerns about inclusivity remain.	UN-Habitat (2020), Housing Development Agency (2016).
Maputo's Climate Resilience Project, Mozambique	Sub-Saharan Africa	Mitigate flood and erosion risks through stormwater drainage, mangrove restoration, and upgraded informal settlements.	Incorporates mangrove restoration, stormwater drainage.	Reduced flood risks and improved housing conditions, though scalability and sustained funding remain challenges.	Satterthwaite (2020), UNDRR (2015).
Lilongwe's Urban Poor Development Strategy, Malawi	Sub-Saharan Africa	Improve housing, water supply, and sanitation in informal settlements through participatory governance and community-driven approaches.	Participatory approaches mitigate disaster risks in informal settlements.	Enhanced community engagement and improved basic services, but limited financial resources hinder a large-scale impact.	Satterthwaite (2020).
Durban's Climate Adaptation, South Africa	Sub-Saharan Africa	Focus on green infrastructure for flood and heat risk reduction.	Unequal climate adaptation benefits for marginalized groups.	Green infrastructure and climate-resilient urban planning.	Coordination between stakeholders, sustainability.

The major takeaways from the case studies are the gaps and social equity issues that emerged.

2013). In the final analysis, projects across all the cases analysed face challenges in addressing underlying inequalities related to land ownership, historical neglect, and systemic exclusion. Alexandra faces the historical legacy of apartheid-era segregation, which continues to shape the township's development trajectory, limiting the full realization of equitable urban renewal.

These examples highlight the intersection of social equity, inclusive urban planning, and DRR in diverse African contexts. They provide valuable insights into how participatory governance and community-driven approaches can improve infrastructure planning. They also point out the role of nature-based solutions and climate adaptation in reducing disaster risks. There are several practical challenges and lessons learned from implementing socially equitable infrastructure projects in rapidly urbanizing cities.

Conclusion

The integration of disaster risk reduction (DRR), vulnerability theory, spatial justice, and participatory planning theory offers a comprehensive framework to address the multifaceted challenges faced by urban planning in the Global South. As cities in regions like Bogotá, Dharavi, Alexandra, Maputo, Lilongwe, and Durban navigate rapid urbanization, climate change, and socio-economic inequalities, it is crucial that urban planning strategies are inclusive, adaptive, and resilient. The theories discussed provide vital insights into the dynamics of social equity, environmental resilience, and spatial justice, highlighting the necessity of addressing both physical and social vulnerabilities to achieve more just and sustainable urban environments.

Urban planning that disregards these principles risks perpetuating existing inequalities and exacerbating the vulnerabilities of marginalized communities. As David Harvey's critique of spatial justice underscores, any development that excludes marginalized groups from decision-making processes not only fails to address their needs but also worsens the risks they face. Similarly, resilience theory and sociotechnical systems theory remind us that sustainable solutions must incorporate both the technical aspects of infrastructure and the lived realities of vulnerable populations. The case studies analysed reveal that while progress is being made in some areas, there is a pressing need for more inclusive and equitable urban planning practices that integrate both climate resilience and social equity.

Recommendations

I. Urban planning processes in the SADC region must prioritize the active involvement of marginalized communities throughout all stages of decision-making. This includes recognizing informal settlements and ensuring that their residents have a meaningful voice in urban development. Employing participatory planning techniques can empower communities and yield more sustainable, socially just, and contextually appropriate solutions (Arnstein, 1969; Broto et al., 2015).

II. Cities should adopt integrated approaches that address both environmental and social vulnerabilities, incorporating climate resilience and vulnerability reduction into urban planning frameworks. This approach should not only enhance physical infrastructure but also build the social resilience of vulnerable populations by providing them with resources, education, and adaptive capacity (Fainstein, 2010; Hung et al., 2024). Climate adaptation strategies, including flood management, water conservation, and disaster preparedness, are essential, particularly for low-income communities in flood-prone areas.

III. Urban planners must ensure the equitable distribution of urban development benefits, focusing on access to transportation, housing, and basic services. Infrastructure projects should reduce spatial inequalities by providing affordable and accessible services, ensuring that low-income communities are not excluded from development initiatives (Harvey, 1975; Hidalgo, 2018).

IV. Urban resilience projects must integrate local knowledge and experiences to ensure that interventions are contextually relevant and effective. By leveraging local expertise, planners can better identify vulnerabilities and design solutions that are tailored to the specific needs of communities, as demonstrated in Maputo's climate resilience efforts (Sultana, 2022b; Maputo City Council, 2020).

V. To achieve long-term sustainable development, urban planning must adopt multidisciplinary approaches that combine environmental sustainability, social equity, and economic resilience. Collaboration between governments, civil society organizations, and the private sector is crucial to creating strategies that address both immediate and future community needs, as exemplified by flood management and affordable housing projects in Lilongwe (Adams and Boateng, 2018).

VI. Transparent and accountable governance structures are vital to ensure that urban planning processes are equitable and responsive to marginalized communities. Governments and developers must be held accountable through regular community consultations and established feedback mechanisms to ensure that socially inclusive and environmentally sustainable projects are effectively implemented.

VII. Integrating socially inclusive infrastructure into urban planning requires a holistic, community-centered approach. In the SADC region, urban planners must ensure that infrastructure not only mitigates disaster impacts but also meets the needs of vulnerable populations, emphasizing community-driven planning, empowerment through information, and inclusive design.

VIII. Urban planning should promote the integration of nature-based solutions such as green infrastructure, wetland restoration, and the creation of recreational spaces that also serve as flood mitigation features. These measures can simultaneously reduce hazard risks and improve environmental quality, as seen in Harare's community-led wetland rehabilitation projects (Pasquini et al., 2024).

IX. Policy integration and institutional collaboration are key to effective disaster risk reduction (DRR) in urban planning. Thus, to adopt robust policies that mandate inclusive design practices, such as those outlined in the SADC Disaster Management Strategy (2017), and collaborate across sectors, urban planners can ensure that DRR measures are effectively integrated into urban development strategies. Cross-sectoral initiatives, as seen in Durban, enhance public infrastructure and community preparedness (City of Durban Disaster Management, 2018). Integrating socially inclusive infrastructure into urban planning for disaster risk reduction (DRR) in the SADC region is not solely a technical undertaking but a transformative process aimed at fostering resilience and equity. Achieving this requires the active engagement of local stakeholders, the design of adaptive and accessible infrastructure, institutional collaboration, and a commitment to iterative learning. Future research should prioritise the development of operational, context-specific frameworks that embed climate justice into spatial and urban planning. This includes exploring the role of indigenous knowledge systems, local governance mechanisms, and traditional spatial practices in shaping equitable and climate-resilient urban infrastructure.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Ethics statement

Ethical approval was not required for the study involving humans in accordance with the local legislation and institutional

requirements. Written informed consent to participate in this study was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and the institutional requirements.

Author contributions

WL: Methodology, Writing – review and editing, Conceptualization, Data curation, Formal Analysis, Supervision, Writing – original draft. GM: Writing – original draft, Writing – review and editing. JK: Writing – original draft, Writing – review and editing. CB: Writing – original draft, Writing – review and editing. CM: Writing – review and editing. TR: Writing – review and editing, Writing – original draft. OK: Writing – review and editing, Writing – original draft.

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