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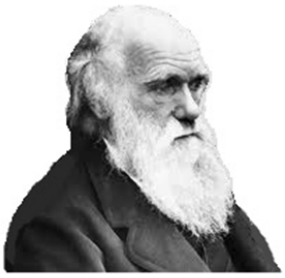

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Urban resilience under pressure: Forced displacement, territorial reconfiguration and the challenges of planning, mobility and infrastructure in Ouahigouya, Burkina Faso

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ABSTRACT

Security crises affecting the Sahel over the past several years have profoundly transformed the urban dynamics of cities hosting displaced populations. In Burkina Faso, the city of Ouahigouya has become one of the principal refuge centres for internally displaced persons (IDPs), resulting in rapid population growth and increasing pressure on urban infrastructure and services. This study analyses the effects of forced displacement on the city's urban resilience. It aims to examine the demographic, spatial and infrastructural transformations induced by the massive influx of IDPs, assess the pressures exerted on urban systems, and propose an integrated tool for evaluating urban stress. The methodological approach combines quantitative and qualitative analyses based on documentary data, surveys conducted among 989 households, stakeholder interviews, and spatial analyses. The data collected were used to develop an Urban Resilience Stress Index (URSI) designed to measure the overall level of pressure exerted on the urban system. The findings indicate that the number of IDPs in Ouahigouya increased from 21,128 in 2020 to 147,134 in March 2023. This exceptional growth has led to the progressive saturation of educational, healthcare and housing infrastructure, increased land-use pressures, rapid

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expansion of peripheral urban areas, and reduced accessibility to certain essential services. The URSI reached a value of 0.86, indicating a very high level of urban stress. The analysis also highlights the systemic nature of the vulnerabilities observed, resulting from the interactions between demographic pressures, infrastructural constraints, land-use dynamics and limited institutional capacities. This research contributes to the growing body of literature on urban resilience in fragile contexts by proposing an analytical framework applicable to secondary cities in the Sahel. It emphasises the need to integrate forced displacement into urban planning policies, strengthen the capacities of local authorities, and promote resilient and adaptive urban development strategies.

***Keywords*:** urban resilience, internally displaced persons (IDPs), crisis-induced urbanization, secondary cities, urban mobility, spatial planning, Urban Resilience Stress Index (URSI), Burkina Faso

1. INTRODUCTION

Urbanisation is one of the most significant demographic and territorial transformations of the twenty-first century. According to UN-Habitat (2020), more than 56% of the world's population now lives in urban areas, and this proportion is expected to reach nearly 68% by 2050. While urbanisation has long been associated with industrialisation, economic growth and rural-to-urban migration, contemporary urbanisation is increasingly influenced by factors related to security crises, climate change and forced population displacement (Cohen, 2006; OECD, 2021).

Sub-Saharan Africa is currently experiencing the highest rates of urban growth in the world. Projections indicate that its urban population is expected to more than double over the coming decades, profoundly transforming territorial systems and development dynamics (OECD, 2021; OECD et al., 2025). This growth is no longer confined to large metropolitan areas; it also affects intermediate and secondary cities, which are playing an increasingly important role in the organisation of national territories (Roberts, 2014; Myers, 2011). In many African contexts, cities are becoming key destinations for populations displaced by armed conflict, insecurity and environmental disasters (Gemenne et al., 2021).

The Sahel region provides a particularly striking illustration of this trend. For several years, security crises, the impacts of climate change and institutional fragilities have contributed to a significant increase in forced population displacement. These internal migratory movements are profoundly altering the demographic and territorial balances of Sahelian countries. Cities, particularly secondary cities, are gradually becoming centres of refuge and demographic concentration, while continuing to face often limited institutional and infrastructural capacities (World Bank, 2023; UNDP, 2025).

In Burkina Faso, the continuous deterioration of the security situation since 2015 has led to significant population displacements from rural areas and localities most exposed to armed violence. According to national statistics, several hundred thousand people have been forced to leave their habitual places of residence in search of areas considered safer. In this context, a number of secondary cities have experienced particularly rapid demographic growth as a result of the massive influx of internally displaced persons (IDPs).

The city of Ouahigouya provides a particularly representative example of this phenomenon. As the capital of the Yaadga Region, it has become one of the principal reception centres for populations fleeing insecurity in northern Burkina Faso. The massive influx of IDPs

has profoundly transformed the city's demographic structure, patterns of urban land occupation, and demand for infrastructure and basic services. The sectors most affected by these changes include housing, education, healthcare, drinking water supply, sanitation, urban mobility and local governance (CONASUR, 2023). These transformations raise the issue of urban resilience, understood as the capacity of an urban system to absorb shocks, adapt to disturbances and maintain its essential functions despite crises (Pelling, 2003; Walker et al., 2004). Over recent years, the concept of urban resilience has gradually emerged as a key analytical framework for understanding how cities respond to growing risks and uncertainties (Davoudi, 2012; Meerow et al., 2016; Sharifi & Yamagata, 2016). Recent research particularly emphasises the multidimensional nature of resilience, which encompasses not only capacities for resistance and recovery but also capacities for adaptation and transformation of urban systems.

Furthermore, several studies have highlighted the particular vulnerability of secondary cities to contemporary crises. Unlike large metropolitan areas, these cities generally possess more limited financial resources, weaker institutional capacities and less developed infrastructure, which reduces their ability to absorb major demographic shocks (Roberts, 2014; Myers, 2011). Nevertheless, they now occupy a strategic position in the management of humanitarian crises and the stabilisation of fragile territories.

Despite the growing interest in urban resilience, forced displacement and African urbanisation, several gaps remain in the scientific literature. Existing research has focused primarily on large metropolitan areas or on the humanitarian dimensions of forced displacement. The long-term consequences of these phenomena for secondary cities remain relatively underexplored. Similarly, few studies have proposed integrated tools for assessing the levels of stress and vulnerability experienced by urban systems in situations of protracted crisis. This study seeks to contribute to addressing these gaps by analysing the effects of forced displacement on the urban resilience of the city of Ouahigouya. More specifically, it aims to: (i) analyse the demographic, spatial and infrastructural transformations induced by the massive influx of internally displaced persons; (ii) assess the pressures exerted on urban services and local institutional capacities; and (iii) propose an Urban Resilience Stress Index (URSI) to evaluate the level of stress experienced by the urban system.

The central hypothesis of this study is that the massive arrival of internally displaced persons generates a multidimensional form of urban stress that simultaneously affects demographic dynamics, infrastructure, land systems, urban mobility and governance capacities. Understanding these interactions is essential for the design of public policies capable of strengthening the resilience of secondary cities confronted with protracted crises. The remainder of this paper is organised as follows. Section 2 presents a review of the literature on urban resilience, secondary cities and forced displacement. Section 3 outlines the methodology adopted for the study. Section 4 presents the main findings. Section 5 discusses these findings in the light of existing scientific literature. Section 6 examines their implications for public policy, while Section 7 concludes the paper and proposes directions for future research.

2. LITERATURE REVIEW

2. 1. Crisis-induced urbanisation

Contemporary urbanisation dynamics in Sub-Saharan Africa can no longer be analysed solely through the traditional lenses of demographic transition and economic migration.

Increasingly, they are shaped by crisis-related factors, including armed conflicts, insecurity, environmental disasters and the impacts of climate change. These phenomena generate large-scale forced population displacements, resulting in rapid and often unplanned reconfigurations of urban spaces.

In this context, cities become preferred areas of refuge due to the opportunities they offer in terms of relative security, access to services and economic opportunities, including those within the informal sector.

This evolution has led several scholars and international organisations to describe these processes as "constrained urbanisation" or "crisis-induced urbanisation". The UN-Habitat (2020) report highlights that cities in developing countries are absorbing an increasing share of displaced populations, often without possessing the institutional, financial and technical capacities required to respond effectively to such pressures. Similarly, the World Bank emphasises the growing role of cities in accommodating internally displaced populations, while also drawing attention to the risks of infrastructure overload and the deterioration of urban living conditions (World Bank, 2023).

From an academic perspective, several studies have demonstrated that these forms of accelerated urbanisation tend to exacerbate existing vulnerabilities. According to Pelling (2003), cities exposed to recurrent shocks develop specific forms of vulnerability associated with weak governance systems and inadequate infrastructure. Likewise, Dodman and his colleagues (Brown et al., 2014) argue that informal urban expansion, often associated with the settlement of displaced populations, contributes to increasing socio-spatial inequalities and environmental risks.

These analyses converge in showing that crisis-induced urbanisation constitutes a non-linear process characterised by high levels of uncertainty and a limited capacity of public authorities to anticipate and manage ongoing transformations.

2. 2. Secondary cities as fragile urban spaces

Within this context of crisis-induced urbanisation, secondary cities occupy an increasingly strategic position, despite having long remained marginal within urban research. These cities, which perform intermediary functions between rural areas and major metropolitan centres, play a crucial role in territorial organisation and the structuring of local economies. However, they also possess structural characteristics that make them particularly vulnerable to external shocks.

The work of Roberts (2014) demonstrates that secondary cities generally exhibit significantly lower levels of infrastructure provision and investment than larger urban agglomerations. This situation results in inadequate infrastructure, particularly in the areas of water supply, sanitation, healthcare and transport. Furthermore, institutional capacities are often limited due to shortages of qualified human resources and significant financial constraints, thereby restricting the ability of local authorities to plan and regulate urban development effectively.

The Organisation for Economic Co-operation and Development also highlights that these cities are particularly exposed to economic, environmental and security-related shocks (OECD, 2021). This heightened exposure can be explained by their limited economic diversification, dependence on informal activities and relatively weak integration into national and international networks. Under such circumstances, the massive arrival of displaced populations can rapidly

exceed local absorption capacities, leading to the saturation of public services, increased pressure on land resources and the proliferation of informal housing.

Finally, recent literature emphasises that these structural vulnerabilities may also create opportunities for innovation in urban governance. According to Barthel and his colleagues (Elmqvist et al., 2013), secondary cities can become laboratories for adaptive solutions, provided that institutional coordination mechanisms are strengthened and participatory approaches are promoted. In the absence of appropriate public policies, however, they risk becoming spaces where urban fragilities are concentrated and where the cumulative effects of crises lead to a long-term deterioration in living conditions.

2. 3. Urban resilience frameworks

The concept of urban resilience has gradually emerged as a central analytical framework for understanding the transformation dynamics of cities in the face of shocks and disturbances. Originating in the ecological sciences, it has subsequently been widely adopted in urban studies to analyse the capacity of urban systems to respond to crisis situations. Within this perspective, urban resilience is generally defined as the ability of an urban system to absorb shocks, adapt to change and, where necessary, transform itself in order to maintain its essential functions (Meerow et al., 2016).

Beyond this definition, the literature highlights the multidimensional nature of urban resilience, encompassing physical, social, economic and institutional dimensions. According to Meerow and her colleagues, resilience is not limited to a simple return to pre-crisis conditions following a shock; rather, it involves processes of learning and transformation that can sustainably improve the functioning of urban systems. This dynamic perspective is also emphasised by Davoudi (2012), who regards resilience as a bridging concept linking different approaches to urban planning, particularly in contexts characterised by increasing uncertainty and complexity.

Furthermore, several studies emphasise the importance of institutional and governance capacities in building urban resilience. Beatley highlights the role of public policies, citizen participation and multi-level governance in enhancing cities' ability to anticipate and manage crises. Similarly, the approaches developed by Walker and his colleagues underline that resilience depends on system flexibility, functional diversity and adaptive capacity in the face of multiple disturbances (Walker et al., 2004).

However, despite the conceptual richness of the urban resilience framework, its operational implementation remains limited, particularly in African contexts. Numerous scholars have pointed to the absence of standardised indicators capable of rigorously and comparatively measuring the level of resilience or vulnerability of urban systems. As noted by Sharifi and Yamagata (2016), existing tools are often fragmented, sector-specific or difficult to apply in contexts characterised by limited availability of reliable data and high levels of informality.

In African secondary cities, this challenge is further exacerbated by weak information systems, the rapid pace of urban transformation and the magnitude of crisis-related pressures. In this context, the development of integrated analytical tools capable of simultaneously capturing demographic, infrastructural, spatial and institutional dimensions appears essential. It is within this perspective that the present study is situated, proposing a synthetic Urban Resilience Stress Index (URSI) in order to contribute to the operationalisation of the resilience concept in fragile urban contexts.

3. METHODOLOGY

3. 1. Presentation and justification of the study area

This research is based on a case study focusing on the city of Ouahigouya, located in the Nord Region of Burkina Faso (see Figure 1). This secondary city occupies a strategic position within the national urban system as a major administrative, economic and social centre serving the surrounding territories. It functions as an interface between rural areas and larger urban centres, providing essential services in the fields of public service provision, trade and regional mobility.

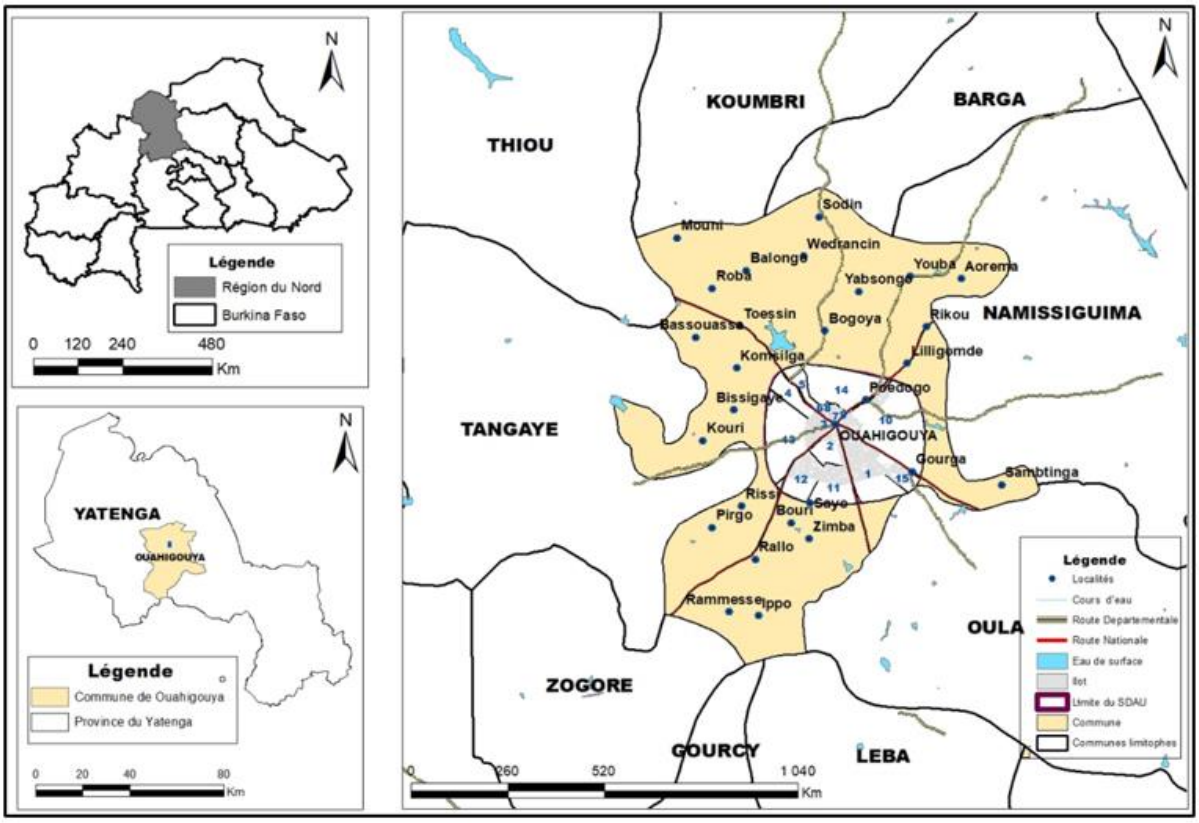

Figure 1. Geographical Location of the Municipality of Ouahigouya, Burkina Faso.

The selection of Ouahigouya as the study area is justified by several converging factors. Firstly, since 2015, the city has experienced exceptional demographic growth resulting from the massive influx of internally displaced persons (IDPs) following the deterioration of the security situation in the country. This dynamic makes it a particularly relevant case for analysing the effects of crisis-induced urbanisation within a Sahelian context. According to available institutional data, secondary cities in Burkina Faso, including Ouahigouya, have absorbed a significant proportion of displaced populations, thereby increasing pressure on already fragile urban systems (World Bank, 2023). Secondly, Ouahigouya exhibits characteristics that are typical of African secondary cities, including relatively limited

infrastructure provision, urban governance constrained by restricted financial and human resources, and a strong dependence on informal dynamics. These characteristics make it an appropriate setting for examining the capacity of intermediate cities to absorb rapid demographic shocks, as highlighted in the work of Roberts (2014) on secondary city systems.

Finally, the selection of this city reflects an analytical objective aimed at addressing the existing knowledge gap concerning urban dynamics in crisis contexts within non-metropolitan cities. As noted by Myers (2011), African secondary cities remain significantly underrepresented in urban studies research despite their growing importance in territorial transformation processes. The study of Ouahigouya therefore provides an original empirical contribution to the understanding of these dynamics while enhancing knowledge of urban resilience challenges in fragile contexts.

3. 2. Research Design

This study adopts a convergent mixed-methods research design, combining quantitative, qualitative and spatial approaches in order to capture the complexity of the urban dynamics under investigation. This approach enables the integration of different types of data and enhances the robustness of the findings, in accordance with methodological recommendations in the social sciences applied to urban studies (Creswell et Plano Clark, 2018).

From a quantitative perspective, a household survey was conducted among a sample of 989 households. The sampling strategy was designed to ensure adequate representation of the different areas of the city, particularly the central neighbourhoods and peripheral zones characterised by a high concentration of internally displaced persons (IDPs). The data collected focused primarily on socio-demographic characteristics, access to basic services and patterns of land occupation.

The qualitative component was based on semi-structured interviews conducted with institutional stakeholders, local officials and community representatives. These interviews provided a deeper understanding of governance mechanisms, adaptation strategies and the constraints faced by local authorities in a context of rapid urban growth.

In addition, a spatial analysis was undertaken to examine territorial dynamics. The use of Geographic Information Systems (GIS) enabled the mapping of urban expansion areas, population distribution patterns and inequalities in access to services, thereby providing a spatially explicit understanding of the phenomena under investigation.

3. 3. Analytical Framework

In order to operationalise the concept of urban resilience, this study proposes a composite indicator referred to as the Urban Resilience Stress Index (URSI). The purpose of this index is to measure the level of pressure exerted on the urban system through a set of complementary dimensions, in line with contemporary approaches to urban resilience (Meerow et al., 2016; Sharifi et Yamagata, 2016).

$$URSI = \frac{D + I + S + F}{4}$$

The index is based on four principal components. Demographic pressure reflects the intensity of population growth and its impact on the city's absorption capacity. Infrastructure

saturation refers to the level of demand placed on urban facilities and services. Service accessibility is used to assess the quality, availability and accessibility of basic services. Finally, land-use and spatial stress reflects patterns of land occupation, particularly the expansion of informal settlements and conflicts over land use.

The selection of this indicator is motivated by the objective of analytical simplification while providing an integrated assessment of the different dimensions of the urban system. It constitutes an operational tool that is particularly well suited to contexts characterised by data constraints, as is often the case in African cities.

3. 4. Data processing and analysis

Quantitative data were processed using STATA software, enabling the production of descriptive analyses and composite indicators. The analyses focused on data distributions, group comparisons and the identification of major trends.

Spatial analysis was conducted using ArcGIS software, facilitating the processing of georeferenced data and the production of thematic maps. This approach made it possible to identify territorial disparities and areas experiencing high levels of pressure.

Qualitative data were analysed through thematic coding, enabling the identification of key analytical themes and the systematic organisation of stakeholders' perspectives. This method contributed to a deeper understanding of the institutional and social dynamics underlying the observed phenomena.

Overall, the methodology was based on a data and methodological triangulation approach aimed at enhancing the validity and reliability of the findings. Such an integrated approach is widely recommended in research addressing complex urban systems and crisis contexts (Creswell et Plano Clark, 2018).

3. 5. Data constraints and methodological approach for estimating internally displaced persons (IDPs) in Ouahigouya

The analysis of internally displaced persons (IDPs) is primarily based on data derived from national and international humanitarian monitoring systems, notably the National Council for Emergency Relief and Rehabilitation (CONASUR), as well as United Nations humanitarian coordination mechanisms, particularly the Office for the Coordination of Humanitarian Affairs (OCHA), and global forced displacement databases such as those maintained by the Internal Displacement Monitoring Centre (IDMC). These sources constitute the principal references for quantifying and monitoring displacement dynamics in Burkina Faso and in areas affected by insecurity.

However, the availability of these data remains characterised by considerable spatial and temporal heterogeneity. National statistics produced by CONASUR are generally more consistent at the aggregated level; however, disaggregated data at the municipal level, particularly for localities such as Ouahigouya, remain partial, discontinuous or subject to variation depending on reporting periods and prevailing security conditions.

These limitations can be explained by several structural constraints. Firstly, security conditions in northern and north-central Burkina Faso considerably restrict access to certain areas, thereby affecting the direct collection of data on displaced populations. Secondly, statistical systems operating in crisis contexts often function under logistical constraints, with varying capacities for data collection, verification and consolidation. Finally, official

publications frequently prioritise national or regional aggregations at the expense of systematic municipal-level granularity.

Beyond these technical constraints, the specialised literature on humanitarian studies and the geography of crises highlights that the production and dissemination of data on forced displacement are also influenced by issues related to information governance. In fragile contexts, data management may be shaped by institutional considerations, particularly those associated with state sovereignty, the sensitivity of security-related information and the relationships between national authorities and humanitarian actors. Recent studies indicate that such dynamics may restrict the circulation of detailed datasets, especially when they concern strategically important or unstable areas (Crawford et al., 2015; De Haas, 2021).

In this context, a major limitation of the present study concerns the unavailability of recent data for the years 2025 and 2026. This absence can be attributed to several converging factors. Firstly, data relating to internal displacement are generally published with a time lag due to the processes of verification, inter-institutional consolidation and validation undertaken by national authorities and humanitarian organisations.

In response to these constraints, the analysis primarily relies on data available up to the most recent consolidated publications. Consequently, the data for the years 2020, 2021, 2022 and 2023 are derived from official public sources produced by CONASUR. However, for the year 2024, estimation methods were employed to ensure the continuity of the time series. To this end, municipal-level data for Ouahigouya in 2024 were reconstructed using a proportional estimation model based on the relationship between locally observed figures and national totals. This approach is founded on the assumption of a relative stability in the municipality's share of the national total, estimated from the years for which observations were available.

From a methodological perspective, this approach can be expressed as follows: the number of internally displaced persons in Ouahigouya is estimated as a proportion of the national total, with the coefficient derived from observed data and subsequently extrapolated to periods for which no direct observations are available. Although this method involves a degree of simplification, it offers the advantage of ensuring analytical continuity and temporal comparability while relying on recognised institutional data sources.

Ultimately, the construction of IDP data at the municipal level for Ouahigouya in 2024 was undertaken within a context characterised by significant constraints relating to data availability, granularity and timeliness. These constraints stem from a combination of technical, security-related and institutional factors, as well as from the specific characteristics of data governance in humanitarian contexts. Within this framework, the use of a proportional estimation method constitutes a pragmatic methodological solution, making it possible to reconcile analytical rigour, transparency of assumptions and optimal utilisation of the available data. The following method was therefore applied:

$$\text{IDPs}_{(\text{Ouahigouya, t})} = \alpha t \text{ X } \text{IDPs}_{(\text{National, t})}$$

where:

- **IDPs (Ouahigouya, t)** represents the number of internally displaced persons in the municipality of Ouahigouya in year *t*;
- **IDPs (National, t)** represents the total number of internally displaced persons at the national level in year *t*, as reported by CONASUR;

- α_t denotes the relative share (proportional coefficient) of Ouahigouya in the national total in year *t*.

The coefficient α_t is derived from the available observations (notably for the years 2021 and 2022) and subsequently extrapolated to years for which municipal-level data are unavailable, under the assumption of temporal continuity in displacement patterns and their underlying structure.

4. RESULTS

The analysis of the data collected in this study highlights five main findings: (i) demographic shock and urban reconfiguration; (ii) infrastructure saturation and pressure on urban services; (iii) land-use transformations and the spatial expansion of the city; (iv) urban mobility and accessibility to services; and (v) the construction and interpretation of the Urban Resilience Stress Index (URSI).

4. 1. Demographic Shock and Urban Reconfiguration

The findings of this study reveal a major demographic transformation of the city of Ouahigouya resulting from the massive influx of internally displaced persons (IDPs). Whereas the urban growth of this secondary city had historically been driven by the conventional mechanisms of natural population increase and regional economic migration, the security crisis that emerged in Burkina Faso from 2015 onwards profoundly altered this trajectory.

Available data (see Table 1) indicate a dramatic increase in the number of IDPs recorded in the city. The number rose from 21,128 individuals in December 2020 to 93,496 in December 2021, before reaching 143,391 in December 2022 and 147,134 as of 31 March 2023. This trend reflects an exceptional increase in the urban population within only a few years. The period between 2020 and 2021 represents the most abrupt phase of the phenomenon, with an increase exceeding 340%, highlighting an unprecedented demographic shock at the local level. This dynamic continued throughout 2022 before experiencing a relative slowdown in 2023, which appears to reflect the progressive saturation of local absorption capacities rather than an actual decline in forced displacement.

Table 1. Trends in the number of internally displaced persons in Ouahigouya (2020-2023).

Year	IDPs	Growth rate
2020	21 128	—
2021	93 496	+342 %
2022	143 391	+53 %
2023	147 134	+2,6 %
2024	142 000	—
2025	—	—

Source : CONASUR, OCHA, Humanitarian Data Exchange, 2024.

Further analysis of the demographic structure of the displaced population reveals a marked predominance of children. In March 2023, children accounted for approximately 60% of all IDPs recorded in the city. Among them, school-aged children constituted the largest category. This situation places considerable pressure on existing educational, healthcare and social infrastructure. Women also represent a substantial proportion of the displaced population, whereas men constitute the least represented group. This demographic configuration reflects the characteristics of forced displacement in conflict-affected contexts, where the most vulnerable populations primarily seek protection in urban centres perceived as relatively safer.

From a spatial perspective, IDPs are distributed according to two principal settlement patterns. A proportion of displaced persons is accommodated in sites officially recognised by local authorities and humanitarian organisations, while a much larger proportion is dispersed across urban and peri-urban neighbourhoods within host families. This spatial dispersion contributes to a form of diffuse urbanisation that largely escapes conventional planning mechanisms. Peripheral areas appear to be the principal destinations for newly arrived populations owing to the relative availability of land and lower settlement costs.

The massive influx of displaced populations has profoundly altered the demographic balance of the city. Institutional data indicate that IDPs now represent an exceptionally large proportion of Ouahigouya's total population. This situation places the city in an atypical configuration in which urban dynamics are driven more by forced displacement than by conventional mechanisms of urban growth. The phenomenon observed may therefore be characterised as crisis-induced urbanisation, marked by the rapid acceleration of urban growth as a result of an exogenous shock.

4. 2. Infrastructure saturation and pressure on urban services

Rapid population growth has generated multidimensional pressures across urban infrastructure and public services (see Figure 2). The findings of the urban diagnostic reveal a situation of widespread overload affecting the principal sectors of urban development.

In the field of education, the massive influx of displaced children has considerably increased demand for school infrastructure. Existing educational establishments are required to accommodate both pupils from host communities and displaced children, resulting in a significant increase in class sizes. This situation contributes to deteriorating learning conditions, shortages of educational resources and an increased risk of school dropout. Schools located in peripheral areas appear to be particularly affected due to the high concentration of displaced populations within these districts.

The healthcare sector faces similar challenges. Health centres and hospital facilities must respond to growing demand for medical services without a proportional increase in their service capacity. Interviews conducted with institutional stakeholders reveal increasing pressure on medical consultations, essential medicines and services dedicated to vulnerable populations. Difficulties in accessing healthcare are particularly pronounced among displaced households with limited financial resources.

Water supply and sanitation systems are also affected by this rapid population growth. The increase in the number of users has placed additional demands on existing infrastructure. In several urban and peri-urban areas, current capacities appear insufficient to meet rising demand. This situation has resulted in a gradual deterioration in service quality and an increased risk of public health problems associated with inadequate sanitation facilities.

Overall, the analysis of urban infrastructure demonstrates that the city's initial capacities had been designed to accommodate gradual population growth rather than such a rapid and large-scale increase in demand. Existing infrastructure is now operating at utilisation levels significantly above those envisaged during the planning and design phases, thereby increasing system vulnerability and reducing operational efficiency.

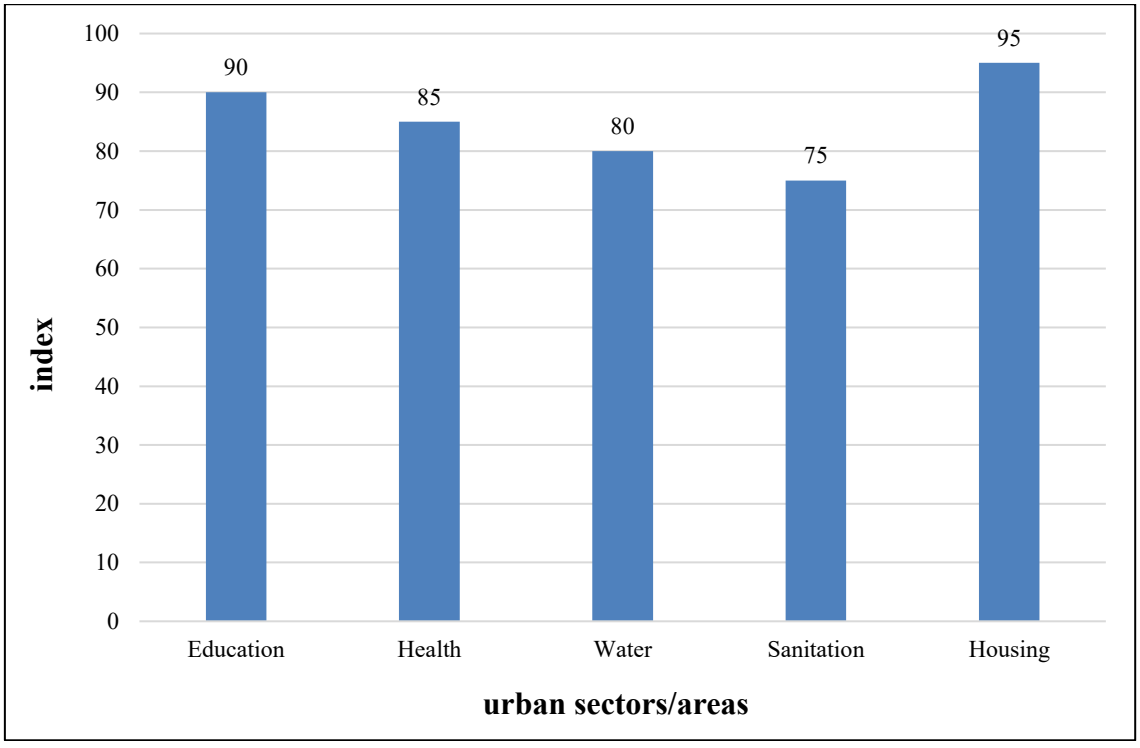

Figure 2. Main impacts of the influx of internally displaced persons on urban infrastructure. Source: Mohamed Ibrahim Ballo & Joseph Yameogo, field data, June 2024.

4. 3. Land-use transformations and the spatial expansion of the city

Table 2. Key changes in land use observed.

Scale	Observations
Housing	Residential densification
Land	Increased demand for land
Urbanisation	Suburban sprawl
Land use	The emergence of informal settlements
Housing	Rising rents

Source: Mohamed Ibrahim Ballo & Joseph Yameogo, field data, June 2024.

One of the most visible consequences of the massive influx of internally displaced persons (IDPs) concerns the land-use and spatial transformations observed in the city of Ouahigouya. The findings of the urban diagnostic (see Table 2) indicate that rapid demographic growth has significantly altered patterns of urban and peri-urban land occupation, generating new pressures on land resources and accelerating processes of informal urbanisation.

The continuous increase in population has generated a growing demand for housing that substantially exceeds the available supply. This situation has encouraged the expansion of informal residential areas in the peripheral sectors of the city, where regulatory constraints are relatively less stringent and access to land remains more affordable. As a result, a significant proportion of displaced households have settled in unplanned or poorly serviced neighbourhoods, which are often characterised by inadequate basic infrastructure, particularly with regard to drinking water supply, sanitation and road networks.

This process has contributed both to the rapid densification of existing neighbourhoods and to the emergence of new peripheral residential areas. Host families have also played a decisive role in this spatial transformation. In response to the massive influx of displaced populations, many households have shared their plots or developed additional housing units in order to accommodate relatives or generate supplementary rental income. This unplanned densification has progressively altered the urban morphology and increased pressure on collective facilities and public services.

Interviews conducted with local stakeholders also reveal growing tensions related to access to land. The gradual scarcity of available land in certain urban areas has contributed to rising land and rental prices, further reducing housing opportunities for the most vulnerable households. Displaced populations, who generally possess limited financial resources, are particularly exposed to these constraints. This situation contributes to reinforcing socio-spatial inequalities that already exist within the city.

Furthermore, the observed urban expansion is occurring in a context where existing planning instruments were developed prior to the security crisis and do not fully account for the scale of the new demographic dynamics. This mismatch between planning instruments and current realities limits the capacity of local authorities to effectively guide urban development. As a result, spatial growth has become largely reactive, driven more by immediate settlement needs than by a structured planning rationale.

Spatial analysis therefore highlights a gradual transition towards a model of urban development characterised by rapid peripheral expansion, increasing fragmentation of urban space and the proliferation of informal housing. These transformations constitute a major challenge for the sustainability of urban development in the medium and long term.

4. 4. Urban mobility and accessibility to services

Rapid urban population growth has also altered patterns of mobility and accessibility to services within the city of Ouahigouya (see Table 3). Daily travel by both host and displaced populations has intensified as a result of demographic growth, generating new pressures on transport infrastructure and circulation networks.

The concentration of displaced populations in peripheral neighbourhoods has increased the distances required to access key urban services. Administrative, healthcare, educational and commercial facilities remain predominantly located in central areas, obliging a substantial proportion of residents to undertake longer and more costly daily journeys. This situation

particularly affects the most vulnerable households, whose limited financial resources constrain their ability to use motorised modes of transport.

Table 3. Observed impacts on urban mobility.

Aspect	Observed Impact
Daily travel demand	Increase
Distance to basic services	Increase
Accessibility of peripheral neighborhoods	Decrease
Pressure on transportation infrastructure	Increase
Travel time	Increase

Source: Mohamed Ibrahim Ballo & Joseph Yameogo, field data, Jannary 2025.

Field observations reveal a significant dependence on non-motorised modes of transport as well as informal transport solutions. Deficiencies in the road network, combined with the rapid expansion of peripheral neighbourhoods, reduce the overall efficiency of the urban mobility system. In several recently developed areas, the absence or poor quality of access roads constitutes an additional barrier to access to essential services.

Rapid urban growth is also placing increasing pressure on existing road infrastructure. Major roads now accommodate traffic volumes that exceed those originally anticipated during their design phase. This situation contributes to the accelerated deterioration of infrastructure and reduces the overall quality of travel conditions. Accessibility challenges become particularly acute during the rainy season, when certain peripheral areas experience temporary isolation due to poor transport connectivity.

Beyond transport-related issues, accessibility to services constitutes a central dimension of urban resilience. The findings indicate that the geographical remoteness of certain facilities, combined with rapidly increasing demand, reduces the effective accessibility of basic services. This situation creates growing territorial disparities between better-equipped central neighbourhoods and rapidly expanding urban peripheries.

The transformations observed in mobility systems therefore reflect a growing tension between the spatial expansion of the city and the capacity of existing infrastructure to ensure equitable access to urban services. This tension constitutes one of the principal challenges of urban planning in contexts of crisis-induced urbanisation.

4. 5. Construction and interpretation of the urban resilience stress index (URSI)

In order to provide an integrated assessment of the effects of the massive influx of internally displaced persons on the urban system of Ouahigouya, an Urban Resilience Stress Index (URSI) was developed. This indicator is intended to synthesise the different dimensions of vulnerability identified throughout the study and to provide an overall measure of the level of pressure exerted on the city.

The index is based on four complementary components representing the principal mechanisms of vulnerability observed (see Figure 3). The first component relates to demographic pressure and reflects the intensity of the population shock experienced by the city. The second component measures the level of saturation of urban infrastructure. The third component assesses the deterioration in accessibility to, and quality of, urban services. Finally, the fourth component captures land-use and spatial stress resulting from accelerated urban expansion.

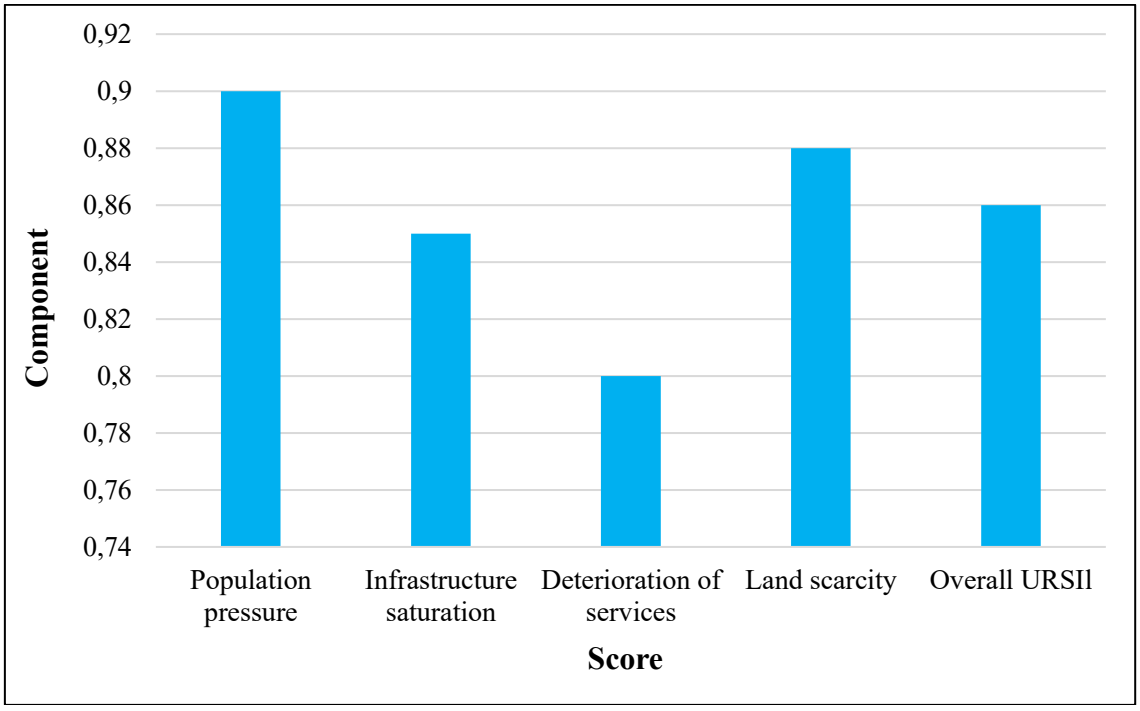

Figure 3. Components of the URSI index.
Source: Mohamed Ibrahim Ballo and Joseph Yameogo, field data, January 2025.

The results obtained indicate high levels across all the components analysed. Demographic pressure achieved a score of 0.90, reflecting the exceptional scale of the influx of displaced populations. Infrastructure saturation reached a score of 0.85, indicating substantial pressure on urban facilities and services. The deterioration of urban services recorded a score of 0.80, while land-use stress attained a value of 0.88.

The aggregation of these different dimensions resulted in an overall URSI value of 0.86. This score places Ouahigouya within the category of very high urban stress. The urban system therefore appears to be confronted with simultaneous pressures affecting demographic, spatial, infrastructural and institutional dimensions.

The principal strength of this indicator lies in its ability to provide a synthetic assessment of complex phenomena that are generally analysed through sector-specific approaches. The findings demonstrate that the challenges faced by the city do not stem from isolated deficiencies but rather from a set of interactions among multiple components of the urban system.

This approach highlights the systemic nature of the vulnerabilities observed and underscores the need for integrated responses that go beyond traditional sector-based interventions.

The URSI therefore constitutes an operational tool capable of supporting urban planning processes and resilience monitoring in fragile contexts. Its application could facilitate comparisons between territories facing similar situations and enable the monitoring of changes in urban stress levels over time.

5. DISCUSSION

The analysis of the findings presented in this study provides several important avenues for scientific discussion.

5. 1. Crisis-induced urbanisation as the primary driver of urban growth

The findings demonstrate that the recent growth of Ouahigouya cannot be explained through the conventional mechanisms of urbanisation typically observed in African cities. Whereas traditional models generally attribute urban expansion to natural population growth, economic migration or processes of modernisation, the case under investigation reveals a form of urbanisation largely driven by a protracted security crisis. The exceptionally rapid increase in the number of internally displaced persons (IDPs) has profoundly altered the demographic and spatial trajectories of the city, transforming it into a major reception centre in northern Burkina Faso.

This situation confirms the analyses advanced by UN-Habitat and the World Bank (2020, 2023), according to which cities in fragile countries are absorbing an increasing share of displaced populations and are gradually becoming the principal spaces of refuge in conflict-affected contexts. The observations made in Ouahigouya indicate that forced displacement can no longer be viewed solely as a humanitarian issue; it has also become a structuring factor in urban development. The city thus emerges as a space where issues of security, territorial development and urban governance intersect and interact simultaneously.

The case of Ouahigouya also illustrates the gradual transition from planned urbanisation to reactive urbanisation. Local authorities are confronted with transformations whose pace far exceeds conventional planning capacities. Planning instruments developed prior to the crisis now appear insufficient to regulate urban dynamics characterised by high levels of uncertainty. This situation has led to the emergence of urban growth that is largely driven by the immediate survival and settlement needs of displaced populations.

The findings therefore reinforce the argument that crisis-induced urbanisation constitutes a distinct category of urban transformation requiring analytical approaches that differ from those traditionally employed to study the growth of African cities.

5. 2. Confirmation of the structural vulnerabilities of secondary cities

The findings of this study also confirm several key insights from the literature on secondary cities. Roberts (2014) argues that secondary cities generally possess more limited institutional, financial and technical capacities than large metropolitan areas. The experience of Ouahigouya clearly illustrates this reality. Even prior to the massive arrival of displaced

populations, the city was already facing significant constraints in terms of urban infrastructure, financial resources and territorial governance. The influx of IDPs did not create these vulnerabilities; rather, it amplified them and made them more visible. The deficiencies observed in the sectors of education, healthcare, housing, sanitation and mobility reflect pre-existing fragilities that have been exacerbated by accelerated demographic growth.

This situation highlights the central role of urban absorption capacities. A resilient city is not merely a city capable of responding to a crisis; it is also a city possessing an institutional and infrastructural foundation sufficiently robust to integrate new populations without experiencing a major deterioration in its essential functions. In the case under study, the limitations observed demonstrate that local absorption capacities have been substantially exceeded.

The findings also confirm that secondary cities now occupy a strategic position in the management of contemporary crises. Long regarded as intermediary spaces between rural areas and large metropolitan centres, they are increasingly becoming central actors in the reception and integration of displaced populations. This evolution justifies greater attention from both public policy-makers and the scientific research community.

5. 3. A systemic interpretation of urban vulnerabilities

One of the principal contributions of this research lies in its analysis of the interactions between the different forms of vulnerability observed. The findings demonstrate that the challenges encountered in Ouahigouya cannot be interpreted as a simple accumulation of sector-specific problems. Rather, they are part of a systemic process in which demographic, spatial, economic, institutional and infrastructural dimensions mutually influence one another.

Rapid population growth leads to the saturation of urban infrastructure. This saturation reduces the quality of urban services. The deterioration of services subsequently encourages informal forms of land occupation, which further intensify land-related tensions and complicate urban management. These dynamics, in turn, reinforce the constraints faced by local institutions, thereby creating a cycle of cumulative vulnerability.

This systemic perspective is consistent with Pelling's (2003) analysis of urban vulnerability. According to this author, urban risks arise less from the existence of an isolated shock than from the interaction between multiple factors of fragility. The findings obtained in Ouahigouya perfectly illustrate this logic. The massive displacement of populations acts as a triggering factor that reveals and amplifies vulnerabilities already present within the urban system.

The observations also confirm the findings of Brown and Dodman (2014) regarding the role of informal urbanisation in African contexts. The rapid expansion of peripheral neighbourhoods and unplanned forms of housing constitutes an adaptive response to the crisis, while simultaneously generating new vulnerabilities related to service accessibility, land tenure security and environmental risks.

5. 4. Contributions and limitations of the URSI

The Urban Resilience Stress Index proposed in this study represents an attempt to operationalise the concept of urban resilience within a context characterised by limited data availability. The findings demonstrate that this tool is capable of synthesising multiple

dimensions of vulnerability within a single indicator while preserving a multidimensional understanding of the phenomenon under investigation.

The overall value obtained, equal to 0.86, reveals a particularly high level of urban stress. This result confirms both the qualitative and quantitative observations collected during the fieldwork. It demonstrates that the challenges facing the city simultaneously affect several essential components of the urban system and cannot be addressed through isolated sector-based interventions.

The principal advantage of the URSI lies in its ability to facilitate comparisons between different urban situations and to monitor changes in stress levels over time. In contexts where detailed data are often scarce or incomplete, a composite indicator can constitute a valuable tool for decision-making and investment prioritisation.

The findings also resonate with recent research on urban resilience in fragile territories. Analyses conducted within the framework of the Sahel Regional Resilience Programme led by the United Nations Development Programme indicate that Sahelian cities are increasingly confronted with a combination of security, climatic and demographic risks requiring integrated approaches to urban management. Experiences undertaken in several Sahelian municipalities particularly highlight the importance of anticipation mechanisms, local governance and adaptive planning in strengthening the capacity of territories to absorb shocks and maintain their essential functions.

Similarly, the most recent studies on African urban dynamics highlight the accelerating growth of intermediate and secondary cities, which are absorbing an increasing share of the continent's urban expansion. Projections published in 2025 indicate that Africa's urban population is expected to reach approximately 1.4 billion inhabitants by 2050, further reinforcing the strategic role of secondary cities in territorial development processes. This evolution gives particular relevance to the case of Ouahigouya, whose current transformations foreshadow some of the challenges that many African cities are likely to face over the coming decades.

Nevertheless, several limitations should be acknowledged. The construction of the index is based on a limited number of components and on methodological choices that may influence the results obtained. Furthermore, the uneven availability of data in crisis contexts may affect the accuracy of certain estimates. The URSI should therefore be regarded as an analytical support tool rather than as an exhaustive measure of urban resilience.

These limitations nevertheless open up interesting avenues for future research. Further studies could incorporate additional dimensions such as governance, social cohesion, economic resilience and climate-related vulnerabilities in order to improve both the robustness of the indicator and its transferability to other African urban contexts.

5. 5. Towards a renewal of urban planning approaches in fragile contexts

The findings of this study highlight the need to rethink traditional approaches to urban planning in fragile contexts. Conventional planning models generally rely on assumptions of relatively predictable and gradual growth. However, the dynamics observed in Ouahigouya demonstrate that cities may now be confronted with extremely rapid transformations driven by external factors such as conflict, humanitarian crises and climate change.

In this context, planning approaches must evolve towards more flexible, adaptive and resilient models. The ability to anticipate different growth scenarios, incorporate uncertainty

into decision-making processes and strengthen coordination among institutional stakeholders now appears to be an essential condition for sustainable urban development.

Finally, the experience of Ouahigouya demonstrates that urban resilience cannot be reduced to a question of infrastructure alone. It also depends on the quality of governance, institutional learning capacity, community participation and the ability of urban systems to adapt to rapid change. This broader conception of resilience now constitutes one of the principal challenges facing secondary cities confronted with contemporary crises.

6. POLICY IMPLICATIONS

6. 1. Rethinking urban planning in contexts of protracted crisis

The findings of this research highlight the need for a profound renewal of urban planning approaches in secondary cities confronted with forced population displacement. The case of Ouahigouya demonstrates that traditional planning tools, generally designed on the basis of relatively stable demographic growth assumptions, rapidly become inadequate when cities are exposed to large-scale and unpredictable migratory shocks.

In this context, urban policies must evolve towards models that place greater emphasis on anticipation and the management of uncertainty. Territorial planning documents should incorporate prospective scenarios that explicitly consider security risks, population movements and humanitarian crises likely to have long-term effects on urban dynamics. Such an approach would enable local authorities to better anticipate future needs in terms of infrastructure, public facilities and land for urban development.

Urban planning can no longer be conceived as a static exercise based solely on conventional demographic projections. It must become an adaptive process capable of incorporating the rapid changes that increasingly characterise cities located in the fragile regions of the Sahel.

6. 2. Strengthening the institutional capacities of local authorities

The study reveals that urban resilience largely depends on the ability of local institutions to manage rapid territorial transformations. In Ouahigouya, the challenges observed extend far beyond infrastructure-related issues and highlight the institutional limitations faced by local authorities.

Strengthening the administrative, technical and financial capacities of municipalities therefore emerges as a strategic priority. Local authorities must be provided with qualified human resources, territorial monitoring tools and coordination mechanisms necessary to respond effectively to the new demands of urban governance. This notably involves the development of efficient urban information systems capable of monitoring population dynamics, land occupation patterns and public service needs in real time.

Furthermore, coordination among the different levels of governance must be improved. Interventions by the central government, local authorities, technical and financial partners, and humanitarian organisations often remain fragmented. Greater articulation among these actors would enhance policy coherence and optimise the use of available resources.

The establishment of permanent institutional mechanisms for urban crisis management could also contribute to improving the response capacity of cities confronted with sudden population influxes.

6. 3. Investing in resilient urban infrastructure

The findings indicate that infrastructure saturation constitutes one of the principal manifestations of urban stress in Ouahigouya. Public policies should therefore give particular attention to strengthening public facilities and basic infrastructure.

Future investments should prioritise infrastructure capable of meeting not only current needs but also future demographic developments. This approach requires moving beyond reactive investment strategies that intervene only once infrastructure has already become saturated. Instead, investment planning should be based on anticipatory mechanisms capable of incorporating growth scenarios associated with forced displacement.

Particular attention should be devoted to the sectors of education, healthcare, drinking water supply and sanitation. These sectors appear to be the most severely affected by rapid population growth. Strengthening them constitutes an essential condition for preserving the quality of life of both host and displaced populations while reducing the risk of social tensions.

Urban mobility infrastructure also deserves specific attention. Improving accessibility to peripheral neighbourhoods and strengthening connections between residential areas and major service centres would contribute to reducing the territorial inequalities observed in access to urban facilities and services.

6. 4. Integrating internally displaced persons into urban development policies

One of the major lessons emerging from this study is the need to consider internally displaced persons not merely as beneficiaries of humanitarian assistance but also as full participants in urban development processes.

In many contexts, public interventions remain heavily influenced by emergency-response approaches that prioritise short-term humanitarian assistance. However, the findings observed in Ouahigouya demonstrate that forced displacement is often a long-term phenomenon producing structural effects on urban organisation. This reality requires a stronger articulation between humanitarian policies and territorial development strategies.

The integration of IDPs into urban development strategies should particularly address access to housing, basic services, employment and vocational training. Economic inclusion mechanisms appear especially important, as they contribute to reducing the vulnerability of displaced households while strengthening their participation in the local economy.

Such an approach would also help reduce the risks of spatial and social marginalisation that frequently accompany situations of protracted displacement.

6. 5. Developing urban governance based on resilience principles

The findings of this research demonstrate that urban resilience should be regarded as a cross-cutting objective of public policy. From this perspective, urban development strategies should explicitly incorporate the capacity of cities to absorb shocks, adapt to change and maintain their essential functions during periods of crisis.

The development of urban resilience monitoring indicators represents a particularly promising avenue. The URSI proposed in this study illustrates the feasibility of developing simple tools capable of measuring changes in urban stress levels and guiding public decision-making. The regular use of such indicators could contribute to improving investment targeting and strengthening early warning mechanisms. Furthermore, the participation of local communities should be reinforced within urban planning and management processes.

Host and displaced populations often possess detailed knowledge of territorial realities and can contribute to the identification of solutions adapted to local constraints. More participatory forms of governance would therefore enhance both the ownership and effectiveness of public policies.

Finally, urban resilience should be understood as a continuous process of collective learning. The crises affecting Sahelian cities are likely to multiply under the combined effects of conflict, climate change and demographic pressures. In this context, urban institutions must strengthen their capacity to learn from experience, innovate and adapt their modes of intervention.

6. 6. Lessons for secondary cities in the Sahel

Beyond the specific case of Ouahigouya, this research highlights challenges that are increasingly relevant to secondary cities across West Africa and the wider Sahel region. These cities now occupy a strategic position in the management of forced displacement and the stabilisation of territories affected by crises.

The lessons derived from this study suggest that investment in secondary cities can generate significant benefits in terms of territorial resilience. By strengthening their reception capacities, infrastructure and institutions, it becomes possible to reduce the negative impacts of crises on populations while promoting more balanced urban development at the national level.

Public policies would therefore benefit from fully recognising the structuring role of secondary cities within the development and resilience strategies of Sahelian states. Such an orientation would contribute to better preparing territories for the urban and humanitarian challenges that increasingly characterise the region.

7. CONCLUSIONS

This research sought to analyse the effects of crisis-induced urbanisation on the urban systems of African secondary cities through the case of Ouahigouya, Burkina Faso. The findings demonstrate that the massive influx of internally displaced persons (IDPs) has profoundly altered the city's development trajectory by generating a major demographic shock, increasing pressure on urban infrastructure and services, and intensifying land-related tensions and mobility challenges. These transformations have encouraged the rapid expansion of peripheral urban areas and exposed the limitations of traditional planning mechanisms in responding to crisis-induced growth dynamics.

The study highlights the systemic nature of the vulnerabilities observed. The challenges identified in the fields of housing, education, healthcare, water supply, sanitation and mobility result from complex interactions between demographic pressures, infrastructural constraints, territorial dynamics and limited institutional capacities. The Urban Resilience Stress Index (URSI) proposed in this research constitutes an original methodological contribution that enables a synthetic assessment of the levels of stress affecting urban systems. The value obtained for Ouahigouya (0.86) indicates a very high level of urban pressure and confirms the need to develop integrated approaches to territorial management in fragile contexts.

The findings also contribute to ongoing scientific debates on crisis-induced urbanisation, urban resilience and the strategic role of secondary cities within Sahelian territories. They demonstrate that these cities now lie at the heart of forced displacement dynamics and constitute

essential spaces for the reception, integration and stabilisation of populations affected by crises. From an operational perspective, the study highlights the importance of strengthening the capacities of local authorities, investing in resilient infrastructure and integrating displaced populations into urban development strategies.

Despite certain limitations related to data availability in an unstable security environment, this research opens up promising avenues for the comparative analysis of urban resilience in other African cities facing similar challenges. In a context characterised by the increasing frequency of security, climatic and socio-economic crises, understanding the mechanisms that underpin resilience appears more essential than ever for promoting sustainable and inclusive urban development in the secondary cities of the Sahel.

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