

Mapping urban mobility and territorial accessibility in Kaya, Burkina Faso: Challenges for sustainable transport planning

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Abstract

Urban mobility has become one of the most pressing challenges facing secondary cities in the Sahel, particularly in contexts characterised by rapid demographic growth, forced displacement and limited transport infrastructure. The city of Kaya, located in north-central Burkina Faso, has experienced profound territorial transformations since the onset of the security crisis, resulting in a significant influx of internally displaced persons (IDPs) and increasing pressure on urban services and mobility systems. This study analyses the interactions between demographic dynamics, urban expansion and everyday mobility patterns in Kaya. The research draws on household mobility surveys, traffic counts, field observations and spatial analyses conducted in 2023. The findings reveal a mobility system dominated by walking (52.0%) and two-wheeled transport (46.5%), while collective transport remains almost non-existent. The study also identifies a strong concentration of traffic-generating activities around educational facilities and religious establishments, which together account for more than half of all traffic-generating points in the city. Furthermore, the results demonstrate that 57% of residents consider their primary mode of transport inadequate for their mobility needs. The rapid growth of the displaced population has intensified mobility demand and increased pressure on transport infrastructure, particularly within the most densely populated sectors. The paper argues that the mobility challenges observed in Kaya are closely linked to broader processes of urban restructuring induced by demographic change and forced migration. Strengthening urban mobility planning, improving accessibility and promoting sustainable transport policies therefore emerge as critical priorities for supporting inclusive urban development in rapidly transforming secondary cities of the Sahel.

Keywords: Urban mobility; Accessibility; Internally displaced persons; Urban growth; Transport geography; Kaya; Burkina Faso

1. Introduction

Urban mobility constitutes one of the fundamental dimensions of contemporary urban development. It influences access to employment, education, healthcare, markets and public services while shaping the spatial organisation and economic performance of cities (Hesse and Rodrigue, 2004; UN-Habitat, 2020). As urbanisation accelerates across Sub-Saharan Africa, mobility systems are increasingly confronted with demographic growth, territorial expansion and infrastructure deficits that challenge the sustainability and inclusiveness of urban development (OECD/SWAC, 2020; United Nations, 2022).

These challenges are particularly visible in secondary cities, which often experience rapid urban growth without corresponding investments in transport infrastructure and mobility planning (Tacoli, 2017; World Bank, 2020). In many Sahelian countries, secondary urban centres have become strategic destinations for populations fleeing insecurity and

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armed conflicts. Consequently, these cities face increasing pressure on housing, public services, transport networks and urban governance systems (UN-Habitat, 2020; United Nations, 2022).

Burkina Faso provides a particularly relevant example of these transformations. Since 2015, the country has experienced a major security crisis that has generated large-scale internal displacement and significantly altered demographic and territorial dynamics. Several urban centres have consequently become major reception zones for internally displaced persons (IDPs), creating new challenges for urban planning and service provision. Among these cities, Kaya occupies a strategic position due to its geographical location, administrative functions and role as a humanitarian hub within the Centre-Nord Region (INSD, 2022).

The demographic evolution of Kaya illustrates the magnitude of these changes. According to the Fifth General Population and Housing Census (RGPH 2019), the city had a resident population of 121,970 inhabitants, characterised by a predominantly young age structure, with nearly 81% of residents under 35 years of age. Furthermore, sectors 4 and 6 alone account for more than half of the city's population, highlighting a strong spatial concentration of residents within specific urban areas. Such demographic concentrations often generate significant mobility demand and increase pressure on urban infrastructure and public services (UN-Habitat, 2020).

The security crisis has further intensified these demographic pressures. Official statistics indicate that the number of internally displaced persons residing in Kaya increased from 80,820 individuals in 2020 to 122,570 in March 2023. This massive influx has transformed urban spatial structures, accelerated urban expansion and increased demand for mobility, accessibility and transport services. Similar processes have been observed in other African cities experiencing rapid demographic growth associated with migration and displacement (Tacoli, 2017; OECD/SWAC, 2020). Recent evidence from Ouahigouya demonstrates that forced displacement can substantially accelerate urban expansion, intensify pressure on infrastructure and generate profound territorial reconfigurations affecting urban mobility systems (Ballo & Yaméogo, 2026).

Mobility systems constitute a critical interface through which urban residents access opportunities and essential services. Accessibility to workplaces, schools, health facilities and markets largely depends on the efficiency and availability of transport systems (Hesse and Rodrigue, 2004; Lindholm, 2013). In rapidly growing cities, deficiencies in mobility systems may exacerbate social inequalities, spatial exclusion and economic vulnerability (Pothukuchi and Kaufman, 1999; Morgan, 2009).

Research conducted in Sub-Saharan Africa consistently highlights the predominance of walking and two-wheeled transport modes in cities where formal public transport systems remain limited or absent (Tschirley et al., 2015; World Bank, 2020). Walking often represents the primary mode of daily mobility among low-income populations, while motorcycles increasingly play a central role in facilitating access to urban opportunities and services (Kin et al., 2017; OECD/SWAC, 2020). At the same time, the absence of efficient collective transport systems frequently constrains accessibility and reinforces territorial inequalities (Tacoli, 2017). Evidence from Burkina Faso further confirms this trend. In Ouagadougou, motorcycles account for approximately 67% of daily urban trips, reflecting the combined influence of affordability, flexibility and deficiencies in collective transport services (Ballo et al., 2025).

The relationship between urban growth, forced displacement and mobility remains relatively underexplored in African urban studies. Existing research has largely focused on metropolitan areas, while secondary cities receiving substantial displaced populations have attracted comparatively limited scholarly attention (UN-Habitat, 2020; World Bank, 2023). Yet these cities provide valuable insights into the interactions between demographic change, territorial restructuring and mobility adaptation.

The case of Kaya therefore offers an important opportunity to investigate how forced displacement and accelerated urbanisation reshape everyday mobility systems. The city has undergone significant territorial transformations resulting from demographic growth, humanitarian pressures and changing patterns of urban occupation. Understanding these dynamics is essential for developing sustainable transport strategies capable of supporting inclusive urban development and territorial resilience (World Bank, 2020; United Nations, 2022).

The main objective of this study is to analyse the interactions between urban growth, forced displacement and mobility systems in Kaya, Burkina Faso. Specifically, the research seeks to:

- Examine the demographic and territorial transformations affecting the city;
- Analyse the characteristics of mobility demand and travel behaviour;
- Identify the dominant transport modes and their spatial implications;

- Assess the adequacy of existing mobility systems in meeting residents' needs;
- Propose strategic recommendations for improving urban accessibility and sustainable mobility.

The study hypothesises that the mobility challenges observed in Kaya are not solely the result of infrastructure deficiencies but are also closely associated with demographic restructuring, spatial concentration of activities and the territorial consequences of forced displacement. Consequently, improving urban mobility requires integrated approaches combining transport planning, territorial governance and sustainable urban development strategies (Hesse and Rodrigue, 2004; Lindholm, 2013; World Bank, 2020).

2. Materials and methods

2.1. Study area

The study was conducted in the city of Kaya, the administrative capital of the Centre-Nord Region of Burkina Faso (Figure 1). Located approximately 100 km northeast of Ouagadougou, Kaya occupies a strategic position within the national urban system and serves as an important commercial, administrative and humanitarian centre for the northern part of the country. The city functions as a major crossroads connecting Ouagadougou to the Sahel Region and several neighbouring provinces, thereby playing a crucial role in regional mobility and territorial integration (INSD, 2022).

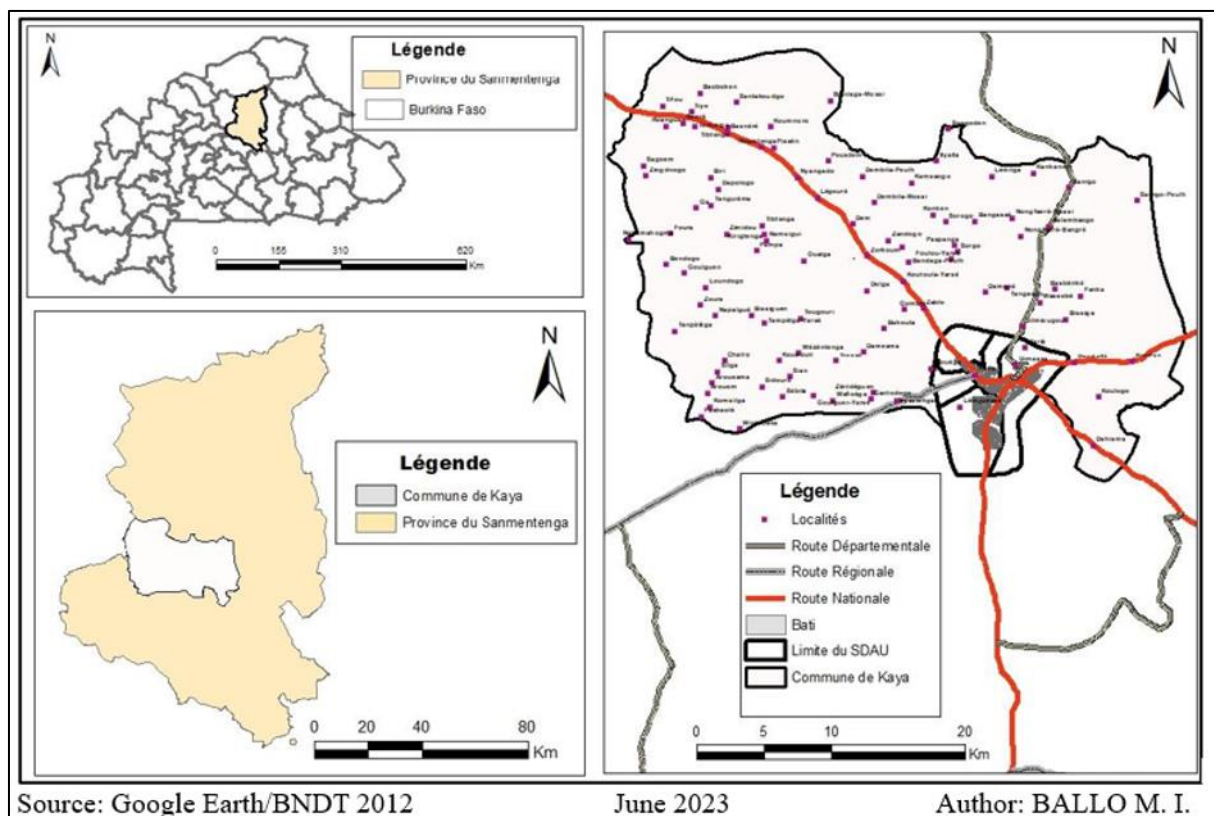


Figure 1 Geographical location and spatial structure of the Municipality of Kaya

Kaya has experienced significant demographic growth over the past two decades. According to the Fifth General Population and Housing Census (RGPH 2019), the city had a resident population of 121,970 inhabitants distributed across seven administrative sectors. The urban structure is characterised by a predominance of young populations, with approximately 81% of residents under the age of 35. Furthermore, sectors 4 and 6 account for a substantial share of the city's population, reflecting strong spatial concentration patterns.

Since the beginning of the security crisis in Burkina Faso, Kaya has become one of the principal destinations for internally displaced persons (IDPs). Official statistics indicate that the displaced population increased from 80,820 individuals in 2020 to 122,570 in March 2023, exceeding the resident population recorded during the 2019 census. This exceptional demographic pressure has generated profound territorial transformations and significantly increased mobility demand throughout the urban area.

From a transport perspective, Kaya exhibits the characteristics commonly associated with secondary cities in Sub-Saharan Africa, including limited road infrastructure, a predominance of informal transport systems and strong dependence on walking and two-wheeled vehicles (Tacoli, 2017; OECD/SWAC, 2020). These characteristics make the city particularly relevant for analysing the relationships between demographic growth, territorial restructuring and urban mobility.

2.2. Research design

This study adopts a mixed-methods approach combining quantitative and qualitative analyses of urban mobility patterns. The methodological framework is based on principles widely applied in transport geography and urban mobility studies, integrating household travel surveys, origin-destination surveys, traffic counts, spatial analysis and field observations (Hesse and Rodrigue, 2004; Lindholm, 2013).

The research draws upon data collected during the Urban Mobility Plan (UMP) study conducted in Kaya in 2023. The dataset includes information on travel behaviour, modal choice, trip purposes, traffic flows, transport infrastructure and accessibility conditions throughout the city. The integration of multiple data sources enhances the reliability of the analysis and allows for a comprehensive understanding of mobility dynamics within the urban area.

2.3. Data collection methods

2.3.1. Household Mobility Survey

A household mobility survey was conducted to collect information on residents' travel behaviour, transport mode preferences and accessibility conditions. The survey gathered data concerning daily trips, travel purposes, travel times, transport costs and perceptions regarding the adequacy of existing mobility systems.

Household travel surveys constitute one of the most widely used methods for analysing urban mobility because they provide detailed information on individual travel behaviour and transport demand (Ortúzar and Willumsen, 2011). Such surveys are particularly valuable in African cities where mobility data remain limited and formal transport monitoring systems are often absent (World Bank, 2020).

2.3.2. Origin-Destination surveys

Origin-destination (OD) surveys were conducted to identify the spatial organisation of travel patterns within the city. These surveys recorded trip origins, destinations, travel purposes and transport modes, thereby enabling the analysis of spatial interactions between different urban sectors.

Origin-destination analysis is a fundamental tool in transport geography because it provides insights into urban functional relationships, accessibility patterns and territorial connectivity (Rodrigue, 2020). The method facilitates the identification of major mobility corridors and strategic nodes within urban transport systems.

2.3.3. Traffic counts

Traffic counts were undertaken at major intersections and transport corridors across the city. These observations aimed to quantify traffic volumes, identify peak periods and evaluate the performance of key transport routes.

Traffic counting remains one of the most effective methods for assessing road utilisation and transport demand (Meyer and Miller, 2013). The collected data provide valuable information concerning traffic intensity, modal composition and spatial distribution of vehicular flows.

The results indicate that certain corridors experience traffic volumes reaching approximately 7,441 passenger car equivalent units (PCU) per day, reflecting substantial pressure on specific sections of the urban road network.

2.3.4. Field observations

Direct field observations were carried out throughout the study area to assess road conditions, pedestrian infrastructure, traffic management practices and accessibility constraints. Particular attention was paid to areas experiencing high mobility demand and significant concentrations of displaced populations.

Field observations are widely recognised as a valuable complement to quantitative surveys because they provide contextual information regarding user behaviour, infrastructure quality and operational constraints (Lindholm, 2013).

2.4. Data analysis

The collected data were analysed using descriptive statistical methods and spatial analysis techniques. The analysis focused on:

- Demographic and territorial characteristics;
- Modal distribution of trips;
- Travel behaviour patterns;
- Spatial concentration of mobility-generating activities;
- Accessibility conditions;
- Perceptions of transport adequacy.

Modal shares were calculated to determine the relative importance of different transport modes. Traffic-generating activities were mapped to identify major attraction points and mobility corridors. Furthermore, accessibility indicators were used to evaluate the capacity of existing transport systems to meet residents' mobility needs.

The analysis also examined the implications of demographic growth and forced displacement for urban mobility systems, drawing on conceptual frameworks developed in transport geography and urban studies (Hesse and Rodrigue, 2004; Tacoli, 2017).

2.5. Limitations of the study

Although the dataset provides extensive information on urban mobility patterns, certain limitations should be acknowledged. First, the analysis relies primarily on data collected during a specific period in 2023 and may not fully capture seasonal variations in mobility behaviour. Second, the rapidly evolving security context may influence mobility dynamics beyond the period covered by the surveys. Third, some informal mobility practices may remain underrepresented due to the inherent difficulties associated with measuring informal transport activities.

Nevertheless, the combination of household surveys, origin-destination surveys, traffic counts and field observations provides a robust empirical basis for analysing mobility systems in Kaya and contributes valuable evidence to the growing literature on urban mobility in rapidly transforming African cities.

3. Results

3.1. Demographic growth and territorial reconfiguration

One of the most significant findings of the study concerns the demographic transformation experienced by Kaya during the last decade. The city has evolved from a medium-sized regional centre into one of the principal reception areas for internally displaced populations in Burkina Faso. This demographic expansion has profoundly altered the spatial organisation of the city and generated new mobility demands.

The resident population recorded during the 2019 census reached 121,970 inhabitants (Table 1). However, by March 2023, the number of internally displaced persons alone was estimated at 122,570 individuals (Figure 2). These figures illustrate the exceptional demographic pressure affecting the city and highlight the importance of displacement dynamics in shaping contemporary urban development.

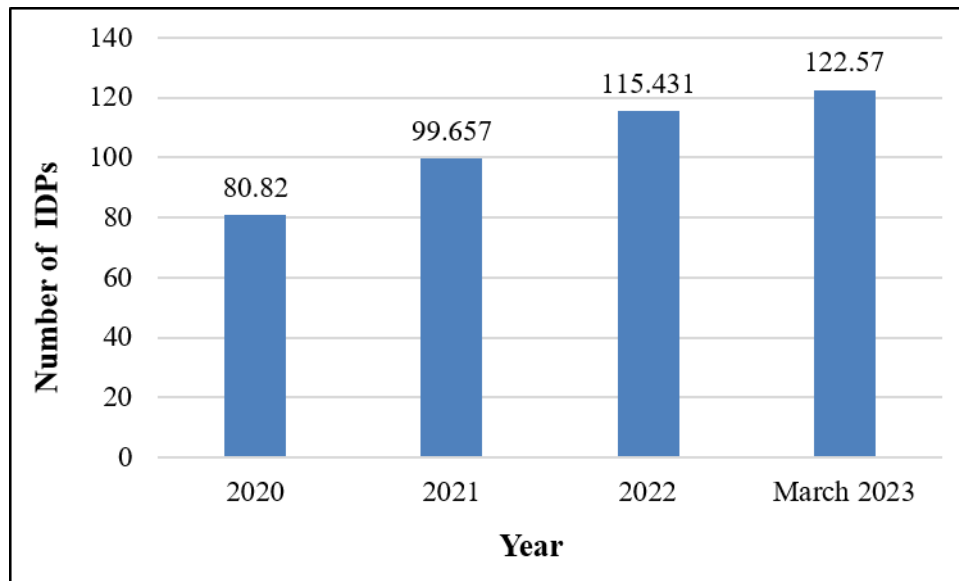
Table 1 Selected demographic and spatial indicators of the municipality of Kaya

Indicator	Value
Total population	121,970
Population under 35 years (%)	81.0
Number of urban sectors	7
Share of population in Sectors 4 and 6 (%)	>50
Population density trend	Increasing

Source: INSD (2022)

The concentration of populations within sectors 4 and 6 has further reinforced spatial inequalities in mobility demand. These sectors accommodate a large proportion of the resident population and constitute important origins and destinations for daily travel activities.

The rapid increase in population has consequently generated substantial pressure on transport infrastructure, public services and urban accessibility conditions. Similar dynamics have been observed in other rapidly urbanising cities experiencing demographic shocks associated with migration and displacement (Tacoli, 2017; OECD/SWAC, 2020).



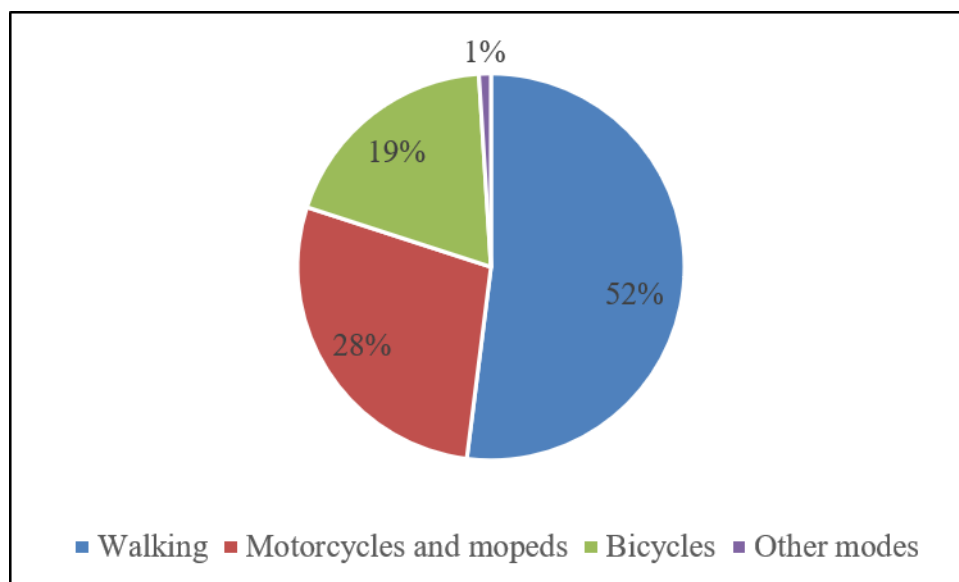
Source: CONASUR, 2023

Figure 2 Evolution of the number of Internally Displaced Persons (IDPs) in Kaya

3.2. Modal split and travel behaviour

The analysis of modal distribution reveals a mobility system largely dominated by non-motorised and individual transport modes. The findings indicate that walking constitutes the principal mode of transport in Kaya, accounting for approximately 52% of all daily trips. Two-wheeled motorised vehicles represent 28% of trips, while bicycles account for 19% (Figure 3). Conversely, collective transport services remain extremely limited and contribute only marginally to daily mobility patterns.

These results are consistent with observations made in many secondary African cities where limited public transport provision compels residents to rely heavily on walking and informal transport solutions (Tacoli, 2017; OECD/SWAC, 2020). The predominance of walking reflects both the compact urban structure of Kaya and the economic constraints affecting a large proportion of households.



Source: Mohamed Ibrahim BALLO, field data, September 2025

Figure 3 Modal split of daily urban trips in Kaya

The strong dependence on walking highlights the central role of pedestrian mobility in the functioning of the city. However, this situation also reflects the limited availability of alternative transport options. In many neighbourhoods, residents are required to travel considerable distances on foot to access schools, markets, healthcare facilities and administrative services.

Motorcycles have emerged as the second most important mode of transport. Their growing popularity can be explained by their relative affordability, operational flexibility and capacity to navigate congested urban environments. Similar trends have been documented in several West African cities where motorcycles increasingly compensate for the absence of efficient public transport systems (Kin et al., 2017; World Bank, 2020).

The results further indicate that transport mode selection is strongly influenced by income levels, trip purposes and residential location. Households located in peripheral areas tend to rely more heavily on motorcycles and bicycles due to longer travel distances and weaker accessibility conditions.

3.3. Mobility satisfaction and accessibility constraints

An important dimension of urban mobility concerns the extent to which available transport modes meet the needs of residents. The survey findings reveal substantial dissatisfaction with existing mobility conditions.

Approximately 57% of respondents reported that their primary means of transport does not adequately satisfy their daily mobility requirements (Table 2). This finding reflects significant accessibility constraints affecting both resident and displaced populations.

Table 2 Residents' perception of transport adequacy in Kaya

Perception	Percentage (%)
Adequate	43
Inadequate	57
Total	100

Source: Mohamed Ibrahim BALLO, field data, June 2025

Several factors explain this dissatisfaction. First, many residents face financial constraints that limit access to motorised transport. Second, road infrastructure remains insufficient in several expanding neighbourhoods. Third, the absence of structured collective transport services restricts mobility options, particularly for vulnerable groups such as women, elderly people and internally displaced persons.

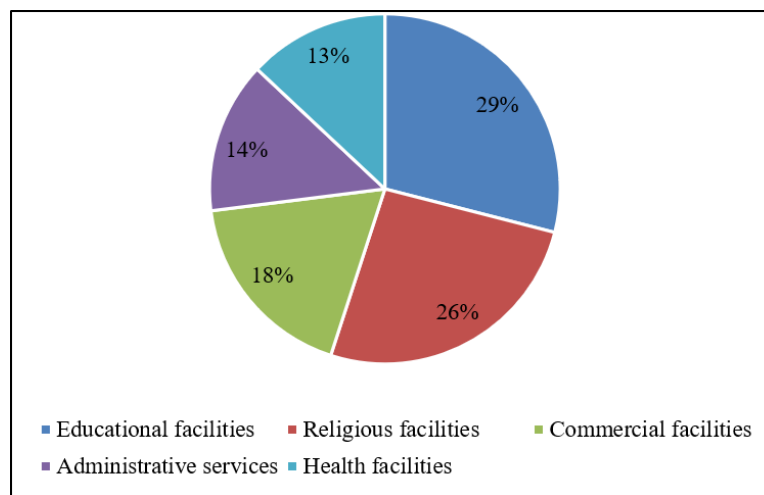
Accessibility challenges are particularly pronounced in newly urbanised areas where rapid population growth has not been matched by proportional investments in transport infrastructure. Such disparities contribute to unequal access to employment opportunities, education and healthcare services.

These findings support previous studies suggesting that transport accessibility constitutes a key determinant of urban inclusion and social equity (Pothukuchi and Kaufman, 1999; Morgan, 2009).

3.4. Spatial distribution of mobility-generating activities

Urban mobility patterns are strongly influenced by the spatial distribution of activities that attract daily movements. The survey identified a total of 267 major trip-generating and trip-attracting facilities across the city.

Educational institutions represent the largest category, accounting for 29% of all identified activity generators. Religious establishments constitute the second largest category with 26%. Together, these two categories account for more than half of all major activity centres within the city (Figure 4).



Source: Mohamed Ibrahim BALLO, field data, September 2025

Figure 4 Main mobility-generating activities in Kaya

The dominance of educational and religious facilities demonstrates the importance of social and institutional functions in shaping daily mobility patterns. School-related travel generates substantial morning and afternoon flows, while religious activities contribute to periodic concentrations of traffic throughout the week.

The spatial concentration of these activities also contributes to the emergence of specific mobility corridors linking residential neighbourhoods with major urban functions.

From a transport geography perspective, these activity centres constitute strategic nodes within the urban mobility system, structuring movement patterns and influencing accessibility conditions throughout the city (Rodrigue, 2020).

3.5. Traffic flows and temporal mobility patterns

Traffic counts reveal substantial temporal variations in mobility demand. Peak traffic periods are concentrated during the morning hours, particularly between 07:00 and 08:00.

This pattern reflects the synchronisation of daily activities, particularly school attendance, employment-related travel and commercial activities. Similar temporal distributions have been observed in numerous African cities characterised by strong dependence on educational and informal economic activities (World Bank, 2020).

The analysis further indicates significant disparities in traffic intensity across the urban road network. Some strategic corridors experience traffic volumes reaching approximately 7,441 passenger car equivalent units (PCU) per day (Table 3).

Table 3 Key traffic characteristics in Kaya

Indicator	Value
Peak period	07:00–08:00
Maximum observed traffic volume	7,441 PCU/day
Main traffic generators	Schools, religious facilities
Dominant transport modes	Walking, motorcycles, bicycles

Source: Mohamed Ibrahim BALLO, field data, June 2025

The concentration of traffic on a limited number of corridors increases the risk of congestion and reduces network efficiency. Moreover, the rapid demographic growth experienced by the city suggests that traffic volumes are likely to continue increasing in the coming years.

The spatial organisation of traffic flows therefore highlights the need for proactive transport planning capable of accommodating future mobility demand while preserving accessibility and urban functionality.

4. Discussion

4.1. Urban growth and mobility transformation

The findings demonstrate that urban mobility in Kaya is closely linked to broader processes of demographic growth and territorial restructuring. The rapid increase in population, combined with the arrival of large numbers of internally displaced persons, has significantly altered travel demand and accessibility patterns.

Unlike many conventional urban growth processes driven primarily by economic expansion, Kaya's recent transformation has been strongly influenced by humanitarian and security-related factors. This particular context generates distinctive mobility challenges that extend beyond traditional transport planning concerns.

The coexistence of resident and displaced populations has intensified competition for urban resources and increased pressure on transport infrastructure. Similar dynamics have been documented in cities affected by conflict-induced displacement in other parts of Africa and the Middle East (UN-Habitat, 2020).

4.2. Mobility inequalities and accessibility challenges

The results reveal significant inequalities in access to mobility within the city of Kaya. Although walking remains the dominant mode of transport, its predominance should not necessarily be interpreted as evidence of sustainable mobility. Rather, it often reflects economic constraints and the limited availability of alternative transport options. Similar findings have been reported in several African cities where walking constitutes a necessity rather than a deliberate mobility choice (Tacoli, 2017; World Bank, 2020).

The survey results indicate that 57% of respondents consider their principal means of transport inadequate for meeting their daily mobility needs. This high level of dissatisfaction suggests the existence of substantial accessibility deficits that affect residents' ability to participate fully in urban life.

Accessibility inequalities are particularly pronounced among vulnerable groups. Internally displaced persons often settle in peripheral areas characterised by limited infrastructure and weaker access to employment opportunities, educational institutions and healthcare services. These conditions increase travel distances and reinforce dependency on walking and low-cost transport modes.

The spatial concentration of population growth within specific sectors has also intensified pressure on existing infrastructure. As residential areas continue to expand, mobility demand increasingly exceeds the capacity of available transport facilities. Similar patterns have been observed in rapidly urbanising secondary cities throughout West Africa (OECD/SWAC, 2020).

From a geographical perspective, these findings highlight the close relationship between mobility and social inclusion. Access to efficient transport systems directly influences access to opportunities and contributes to the reduction of

territorial inequalities (Pothukuchi and Kaufman, 1999; Morgan, 2009). Consequently, improving urban mobility should be considered not only as a transport issue but also as a broader development and social equity objective.

4.3. Implications for urban transport planning

The study highlights several implications for urban transport planning in rapidly growing secondary cities. First, the predominance of walking indicates the necessity of prioritising pedestrian infrastructure within urban development strategies. Sidewalks, pedestrian crossings and safe walking corridors remain largely insufficient despite the central role of walking in daily mobility.

Second, the increasing importance of motorcycles demonstrates the need for transport policies adapted to local mobility realities. Rather than focusing exclusively on conventional public transport models, planners should recognise the contribution of motorcycles to urban accessibility while simultaneously addressing safety concerns and environmental impacts (Kin et al., 2017).

Third, the concentration of activity generators around educational and religious facilities suggests the importance of integrating land-use planning with transport planning. The development of mobility corridors connecting residential neighbourhoods with major activity centres could significantly improve accessibility and reduce travel constraints.

The observed traffic concentrations on a limited number of corridors also point to the need for targeted infrastructure investments. Strategic interventions on heavily used routes could enhance network performance and support future urban growth.

Furthermore, the findings underline the importance of adopting integrated mobility planning approaches capable of addressing the combined effects of demographic growth, displacement and territorial expansion. Traditional transport planning methods often underestimate the impacts of humanitarian crises on urban systems. In contexts such as Kaya, mobility planning must therefore be closely linked to urban resilience and territorial governance strategies (UN-Habitat, 2020; World Bank, 2023).

4.4. Towards sustainable urban mobility in secondary sahelian cities

The experience of Kaya provides valuable lessons for other secondary cities facing similar demographic and territorial pressures. The results demonstrate that urban mobility systems can become critical bottlenecks when urban growth occurs more rapidly than infrastructure development.

Promoting sustainable mobility in such contexts requires a multidimensional approach. First, investments in pedestrian infrastructure should be prioritised given the dominant role of walking in daily travel patterns. Second, non-motorised transport policies should be integrated into broader urban development strategies. Third, the development of affordable collective transport services could significantly improve accessibility for low-income populations.

Urban mobility planning should also incorporate spatial considerations. The distribution of schools, healthcare facilities, markets and administrative services strongly influences travel demand and accessibility conditions. Improved coordination between land-use planning and transport planning could therefore reduce travel distances and enhance urban efficiency.

Finally, strengthening institutional capacities remains essential for supporting evidence-based transport planning. The collection and analysis of mobility data should become a regular component of urban governance in order to monitor changing travel patterns and anticipate future needs.

5. Conclusion

This study examined the relationships between urban growth, forced displacement and mobility systems in the city of Kaya, Burkina Faso. Drawing on household mobility surveys, traffic counts, origin-destination analyses and spatial observations, the research provides new insights into the mobility challenges facing rapidly transforming secondary cities in the Sahel.

The findings reveal that urban mobility in Kaya is dominated by walking, which accounts for approximately 52% of daily trips, followed by motorcycles (27.7%) and bicycles (18.8%). Collective transport remains almost non-existent, highlighting the limited diversity of available mobility options.

The study further demonstrates that demographic growth and forced displacement have significantly reshaped the urban landscape. By 2023, the number of internally displaced persons residing in Kaya exceeded 122,000 individuals, generating unprecedented pressure on urban infrastructure and mobility systems.

The identification of 267 major mobility-generating activities, dominated by educational and religious facilities, illustrates the importance of institutional functions in structuring daily travel patterns. The concentration of traffic flows during morning peak periods and the high traffic volumes observed on strategic corridors further confirm the growing complexity of urban mobility dynamics.

Perhaps most importantly, the finding that 57% of residents consider their principal transport mode inadequate highlights the existence of significant accessibility challenges affecting both resident and displaced populations. These challenges extend beyond transport infrastructure and reflect broader processes of territorial transformation, demographic restructuring and urban adaptation.

The study concludes that sustainable mobility planning must become a central component of urban development strategies in rapidly growing secondary cities. Investments in pedestrian infrastructure, improved accessibility, integrated land-use planning and strengthened institutional capacities are essential for enhancing mobility, reducing territorial inequalities and promoting inclusive urban development.

Beyond the case of Kaya, the findings contribute to ongoing debates in urban geography and transport geography concerning the interactions between demographic change, spatial organisation and mobility systems in cities of the Global South. As urbanisation and displacement continue to reshape African urban landscapes, understanding these dynamics will become increasingly important for designing resilient and sustainable urban futures.

Compliance with ethical standards

Acknowledgments

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Disclosure of conflict of interest

The author declares that he has no known competing financial, professional or personal interests that could have influenced the research, analysis, interpretation of results or publication of this article.

Statement of ethical approval

This study was conducted in accordance with internationally accepted ethical principles governing social science and urban mobility research. All research activities respected the principles of voluntary participation, confidentiality, anonymity and informed consent. No experimental procedures involving human subjects were undertaken. Particular attention was paid to the ethical management of information collected from vulnerable populations, including internally displaced persons residing in the study area.

Statement of informed consent

Informed consent was obtained from all participants prior to their involvement in household surveys, origin-destination surveys and interviews. Participants were informed about the objectives of the study, the voluntary nature of their participation and the confidential treatment of the information provided. No personal identifying information is disclosed in this article, and all data were analysed and reported in aggregated form.

Author contributions

Mohamed Ibrahim BALLO solely conceived and designed the study, developed the methodological framework, conducted the field surveys and observations, collected and analysed the data, interpreted the findings, prepared the figures and tables, and wrote, reviewed and approved the final manuscript.

Data availability statement

The datasets generated and analysed during the current study are not publicly available due to confidentiality considerations related to survey respondents and mobility data. However, anonymised data supporting the findings of this research are available from the author upon reasonable request and subject to applicable ethical and institutional requirements.

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